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European Commission


Final Report

June 2010

Entec UK Limited

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Executive Summary

Study Objectives and the Purpose of this Report

This study “Managing scarce water resources – implementing the pricing policies of the Water Framework Directive” had the overall objective of providing advice on water pricing policy in the context of the implementation of the Water Framework Directive (WFD) and emerging policy areas such as water scarcity and droughts and climate change adaptation. The purpose of the study was to inform the development of the Commission’s work on the assessment of Member States’ River Basin Management Plans (RBMPs) and to undertake an initial assessment of the potential need for further work on water pricing beyond the implementation of Article 9 (see below) of the WFD.

The work undertaken has been carried out through a series of tasks. A critical review of the literature was carried out to assess the latest thinking and work done so far on water pricing in relation to Article 9. A review of the requirements of Article 9 was undertaken. In addition, a review of a number of draft RBMPs was undertaken as final versions of plans were not available at the time of this review. As this review considered a selection of draft plans, its purpose was not to assess the quality of compliance, rather to provide an overview of how a cross-section of Member States were planning to meet Article 9 requirements. On the basis of this review, a set of recommendations for improving implementation were made. In light of the overview of planned implementation of Article 9, the wider policy implications of Article 9 were also considered in this project, in particular, the role of water pricing in delivering objectives of other policies as well as the need for further research, capacity building and networking.

What is the Water Framework Directive?


The Directive establishes a framework for the protection of all water bodies (including inland surface waters, transitional waters, coastal waters and groundwater) which:

- Prevents further deterioration of, protects and enhances the status of water resources;
- Promotes sustainable water use based on long-term protection of water resources;
• Aims at enhancing protection and improvement of the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of “priority substances” and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;

• Ensures the progressive reduction of pollution of groundwater and prevents its further pollution;

• Contributes to mitigating the effects of floods and droughts.

What are the Requirements of Article 9?

The text of the WFD along with a number of supporting Common Implementation Strategy (CIS) documents (including guidance and information sheets) constitute the key documents that define the objectives, scope and specific requirements of the WFD in relation to cost-recovery and incentive water pricing, the central pillars of Article 9. Various Articles and Annexes of the WFD stipulate provisions related to cost-recovery of water services and incentive water pricing.

In broad terms, Article 9 states that Member states:

i. **Shall take account of the principle of the recovery of the costs** of water services including environmental and resource costs having regard to the economic analysis conducted according to Annex III, and in accordance with the polluter pays principle;

ii. Shall ensure that water pricing policies provide adequate incentives for water users to use water efficiently and contribute to the achievement of meeting the environmental objectives of the WFD;

iii. Shall ensure an adequate contribution of the different water users, disaggregated into at least industry, households and agriculture to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle;

iv. May take account of social, environment and economic issues of the recovery as well as geographic and climate conditions;

v. **Shall report** (in the River Basin Management Plans) on how they plan to implement i to iii above;

vi. **Shall not be in breach** of the WFD if they decide in accordance with established practices not to apply the provisions of paragraph 1, second sentence, and for that purpose the relevant provisions of paragraph 2 of Article 9 for a given water use activity where this does not compromise the purposes and the achievement of the WFD objectives.
Article 9 also states that none of the requirements contained within it should prevent the funding of preventative or remedial measures required to achieve the objectives of the WFD.

The requirements of Article 9 as described above appear fairly clear when taken at face value, however, as evident from the work undertaken by this and indeed a number of other studies as well as the evidence provided with the draft RBMPs, these requirements are at times ambiguous, flexible and open to a range of interpretations.

What Has Been Written about Article 9 and Where are the Gaps?

A wide range of literature sources have been reviewed as part of this study, including WFD Common Implementation Strategy (CIS) guidance, “academic” literature (such as journals) and policy documents. Overall, the literature calls for more guidance on the interpretation of Article 9 and related methodological issues. There is a wide recognition in all the literature that the flexibility provided by Article 9 leaves considerable room for different approaches to implementation by Member States.

Overall, while an extensive body of research provides theoretical background to the issues set out in Article 9 as well as empirical evidence on particular relevant aspects of it, for example, incentive properties of water pricing, little empirical evidence is yet available on the implications of implementing Article 9 (for instance, charging for environmental and resource costs), indeed most of the ongoing discussion on water pricing is of an ad-hoc nature.

The gaps in knowledge are largely related to the lack of coverage of particular issues in the literature and/or the lack of consensus on those issues that are discussed. The major gaps identified in the literature are as follows:

- The aims of the WFD are discussed extensively in the literature but debates are ongoing as to whether different aims are compatible or whether there is a hierarchy among them. There is also no agreement on a consistent approach to water pricing that would achieve all the WFD objectives;

- “Water services” and “water uses” are discussed extensively, but debates are ongoing as to whether abstraction for irrigation, impoundments for hydropower, navigation and flood protection should be considered “water services”;

- Environmental and resource costs are discussed extensively, but debates are ongoing regarding their definition, the methodology for estimating these costs and the degree to which these costs are “internalised” (internal costs are the costs borne by those who use the resource compared to external costs which are the costs borne by someone other than the individual or groups who use a resource) as well as on operational difficulties regarding their assessment and valuation;

- In relation to statements within the article such as “shall take account of the principle of recovery of costs” there is very little understanding of what “taking into account” actually means and what actually constitutes a minimum required rate of cost recovery in Member States;

- Provision of “adequate” incentives for users of water is not discussed in the literature, in particular criteria to make judgements whether an incentive provided is adequate or not and what incentives for
the efficient use of water resources can (or should) be considered ‘adequate’ are not discussed. However the academic literature discusses extensively water pricing system design and price elasticity of demand (i.e. the degree to which changes in price affect demand) which are key when considering incentive properties of water pricing on the use of water resources. Water pricing design and price elasticity of demand are two factors that ultimately define the effectiveness, i.e. incentive properties of a policy instrument. In particular, if price elasticity of demand is “inelastic” (i.e. if the price rises then demand falls but only slightly), water pricing may have no or very little impact on water use reduction.

- The requirement to ensure “adequate contribution” of the different water uses… to the recovery of the costs of water services is not covered in the literature. In particular there is no discussion on what constitutes an “adequate contribution”;

- Article 9 states that “Nothing in this Article shall prevent the funding of particular preventive or remedial measures in order to achieve the objectives of this Directive”. This issue is not discussed;

- While traditional approaches to water pricing and cost recovery are discussed in some literature sources, the issue of “established practices” in the context of Article 9 is not discussed;

- Links to other environmental and wider policies that involves use of economic instruments are not discussed extensively and/or explicitly apart from interactions with the Common Agricultural Policy (CAP).

What are the Key Issues?

Based on the literature review and a review of the requirements of Article 9, the study identified a number of key issues relating to Article 9. These were identified on the basis of a number of criteria such as whether a particular issue made a major contribution to meeting the WFD objectives, whether the issue was not covered within the literature, or if it was, whether there was general consensus of views. The key issues that were identified largely reflect the outcomes of the literature review and are as follows:

- **Aims of article 9**: discussed extensively in the policy literature, but debates are ongoing on whether i) the aims are compatible; ii) there is a hierarchy among them; iii) a particular water pricing design exists that achieves them all;

- **Water services/ water uses**: discussed extensively in the policy literature, but debates are ongoing on whether abstraction for irrigation, impoundments for hydropower, navigation and flood protection are water services;

- **Incentive pricing**: Provision of “adequate” incentives for users of water: this issue was not explicitly covered in the literature. Particular issues include, i) criteria to make judgements whether the incentive provided is adequate and ii) what incentives for the efficient use of water resources can (or should) be considered ‘adequate’ and iii) whether the requirement relates to water users or water services;
• **Cost recovery:** Ensuring “adequate contribution” of the different water uses... to the recovery of the costs of water services. Particular issues include i) costs to be covered; ii) sectors to be included and iii) what constitutes an “adequate contribution”

• **Environmental and resource costs** discussed extensively in both policy and academic literature, but debates are ongoing on i) the definition of environmental and resource costs; ii) the methodology for estimating the costs and whether these have been internalised; iii) operational difficulties and implications for pricing, e.g. is it possible to introduce such pricing?

• **Flexibility:** Having regard to “the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected” and the existence of established practices for existing water-use activities. Particular issues include: i) what “have regard to” means in practice, ii) what the specific effects and conditions are, iii) what the magnitude of the effects should be and iv) which specific requirements the flexibility applies to.

In light of the above issues identified in this study, it is to be expected that Member States will use a variety of interpretations, approaches, methods and arguments when implementing Article 9. Given this, it is therefore critical that thorough reporting is provided by Member States to demonstrate how they will implement Article 9 provisions, particularly in relation to the key requirements relating to cost recovery and incentive pricing and the justification of how the flexibility in Article 9 has been applied e.g. by showing that they do not compromise the purposes and the achievement of the objectives of the WFD. Furthermore, the WFD does not imply the use of a particular approach for instance to assessing financial, environmental and resource costs. Similarly, assumptions made about the lifetime of investments, discount rates and costing methods have a direct impact on the assessment of financial cost recovery rate. Therefore, the transparency vis-à-vis the methods used and assumptions must be considered a necessary condition for compliance with the Article 9. Without this thorough reporting, it will be difficult to undertake a comparative assessment of the implementation of Article 9.

**What are Member States Doing to Meet the Requirements of Article 9?**

In order to provide some information regarding how Member States are proposing to meet Article 9 requirements, a review of a selection of draft RBMPs was undertaken. The purpose of this exercise was not to undertake a compliance assessment, rather it was to provide an overview of how a number of Member States were planning to meet Article 9 requirements based on information reported in draft RBMPs. The assessment undertaken was based on a broad cross-section of the plans that were available up to May 2009. It was important to gain an appreciation of the situation in Southern Member States which are experiencing water scarcity problems. However, at the time of this assessment, Southern Member States had yet to publish their draft RBMPs, and it was therefore necessary to review the published reports on Significant Water Management Issues (SWMI) and on Article 5 (in particular the sections on economic analysis of water use).

All draft RBMPs reviewed contained a section on economic analysis and cost recovery and addressed the issues of cost recovery, polluter pays principle, incentive water pricing and contribution of water uses to the costs of water
services. However the extent and depth of the analysis of these issues included in the draft RBMPs varied significantly across Member States; in particular while some draft RBMPs addressed Article 9 in a few paragraphs, others dedicated whole reports to the issue.

The review of the draft RBMPs indicated that there is a wide variety in the application of Article 9 across all Member States. The table below provides some examples of this variety.

**Observed Variation in the Focus and the Depth of the Analysis in the Reviewed Draft RBMPs**

<table>
<thead>
<tr>
<th>Issues</th>
<th>Scope of the Variation</th>
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<tbody>
<tr>
<td>Aims of the Article 9</td>
<td>No significant variation was found as the majority of the Member States (apart from a very small number) did not discuss the aims of the Article 9 at all.</td>
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<td>The Member States who did discuss the aims of the Article 9 considered that these vary between identification of the costs of providing water services, establishing the causation of those costs by different water users and ensuring the contribution of these water users to the costs and contribution to achieving good ecological status.</td>
</tr>
<tr>
<td>Water services and water uses</td>
<td>There is a consensus that public water supply and wastewater are considered water services.</td>
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<td>The scope of the variation therefore includes public water supply and sewerage services on one hand (as some Member States consider only these to be water services) and (absolute or conditional i.e. relating to specific sectors and/or level of impact) inclusion of individual provision of water supply and wastewater collection and treatment, i.e. self-services as well as of hydropower production. In addition a few other Member States consider irrigation, navigation, capture and storage of surface water (e.g. reservoirs), water transport, drainage, fish farming and forestry as water services.</td>
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<td>Overall, when activities other than public water supply and wastewater collection and treatment are defined as water services (e.g. hydropower production and self-services), the impact of those other activities on water status seem to constitute the key justifying reason.</td>
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<td>Much fewer Member States explicitly discuss water uses, with the majority of the Member States referring to the results of impacts and pressures analysis when discussing (significant) water uses.</td>
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<td>Overall, agricultural and industrial water uses (both in relation to water abstraction and pollution) are typically defined as water uses. The energy sector, in particular in relation to hydro and thermal power production, shipping and navigation, flood protection, aquaculture, mining, commercial sector as well as water related tourism are also frequently discussed and considered in the context of water uses in many Member States.</td>
</tr>
<tr>
<td>Adequate Incentives</td>
<td>Significant variation was observed in relation to the incentive properties of water charging systems between the draft RBMPs reviewed. In particular, while some Member States did not discuss incentive properties of water charging systems at all in their draft RBMPs, other Member States did include (explicit or implicit) discussion in the plans, which in some instances was based on the assessment of incentive properties. In particular, the discussion evolved around the impact of water price on water use (and wastewater discharge volumes and toxicity), and the polluter pays principle (i.e. who is being subjected to water charging).</td>
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<td>A more homogeneous situation was observed with regard to the assessment of whether existing water charging systems offer “adequate” incentives. In particular, the majority of the Member States did not present any justification or defence in the draft plans, while those few who did, did not do so explicitly.</td>
</tr>
<tr>
<td>Social, environmental and economic implications of cost recovery and</td>
<td>Quite a homogeneous situation was observed in the reviewed draft plans with regard to the flexibility offered by the Article 9(1) and 9(4) provisions (in relation to established practices, social, economic and environmental considerations). In particular, the vast majority of the Member States did not discuss or refer to these provisions at all. However, a range of issues which potentially could be used for such purposes were occasionally mentioned (e.g. affordability issues), and a very small number of Member States did refer to social, economic and environmental considerations that may be called upon.</td>
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| established practices                                                 | None of the draft RBMPs reviewed reported on exemptions from the cost-recovery principle using the Article 9.4 provisions on ‘established practice’.

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<table>
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<tr>
<th>Issues</th>
<th>Scope of the Variation</th>
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<tr>
<td>Environmental and</td>
<td>Significant variation was observed with regard to interpretation of environmental and resource costs in the draft RBMPs reviewed. In some cases there were explicit and detailed discussions and definitions of environmental and resource costs, while in others there was no discussion or provision of interpretation at all. In some instances, while no formal definition was given, interpretation of environmental and resource costs pursued by a Member State could be inferred.</td>
</tr>
<tr>
<td>resource costs</td>
<td>In the instances when interpretation was provided, the interpretations varied. In most cases environmental costs were related to the residual damage to aquatic environment, i.e. occurring when the status of water bodies is less than good, while resource costs were typically considered in the context of water use above natural recharge rates. The interpretation of resource costs ranged from assessing the damage caused by over-abstraction, to viewing resource costs in the context of opportunity costs resulting from misallocation of resources over time and between different users.</td>
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<td>Overall, Member States defined environmental costs are as the cost of damages imposed by water use on the environment and ecosystems as well as on other users of the environment. However key differences were found in relation to wider (non-aquatic) impacts and linkages to the failure to achieve good water status.</td>
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<td></td>
<td>There was significant variation between Member States with regard to the discussion on internalisation of environmental and resource costs. While some Member States did not include any discussion in the draft plans, others discussed them in great detail. However even then a discussion on the extent to which the costs are internalised was not always present. It was found that Member States pursued one or both of water pollution or abstraction charges, and mitigation measures. In addition, in some Member States schemes exist to compensate for the damages caused to aquatic environment.</td>
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<td>The situation with regard to the methods and techniques used for assessing environmental and resource costs was quite diverse in the reviewed draft plans. Some plans did not include any discussion, some stated only briefly that there was no need to use specific techniques since the costs were considered to be fully internalised, while others provided a detailed description of the methods employed (e.g. models, primary valuation studies or the use of unit values). Where attempts to assess environmental and resource costs were made, this was done either by estimating the costs of mitigation and abatement measures, or by assessing the revenues from pollution and abstraction charges. The contingent valuation method was used by one of the Member State reviewed.</td>
</tr>
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<td></td>
<td>The extent of consideration of the Polluter Pays Principle (PPP) was also variable. Overall, there was a consensus that PPP should be interpreted in the context of the pressure caused by different users and activities. There was also an acknowledgment that those who are causing the damage need to cover mitigation costs.</td>
</tr>
<tr>
<td>Adequate Contribution</td>
<td>Some Member States did not discuss the issue, while in other cases it was discussed only implicitly. In the instances when it was discussed, it largely focussed on the impacts of diffuse pollution caused by agricultural activities on raw water quality. However the discussion ranged between a high level qualitative description and an in-depth quantitative analysis.</td>
</tr>
<tr>
<td>Cost Recovery</td>
<td>There was consistency between Member States with regard to the sectors considered and scale of assessment of cost recovery, with the majority of the Member States considering households, industry and agriculture. In addition a few Member States also referred to other sectors, such as hydropower production, forestry and aquaculture, tourism and water needs for nature.</td>
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<td></td>
<td>Most of the Member States reported on cost recovery at the national, regional or individual water provider’s scale. Assessing cost recovery at the scale of RBD was found to be challenging throughout the EU and very few Member States presented cost recovery assessment at the RBD scale. It was achieved either by aggregating the data by individual water providers, or by disaggregating the data based on pro-rata allocation. Practically all Member States considered financial, environmental and resource costs in published draft plans qualitatively or quantitatively (with environmental and resource costs in most cases considered in a qualitative manner).</td>
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<td>Almost all Member States reported on the estimated cost recovery rates in their draft plans in a significant level of detail, along with details on the approach to assessing cost recovery and sources of information. In most cases the reported levels related to financial cost recovery or overall cost recovery when environmental and resource costs are judged to be internalised.</td>
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<td></td>
<td>Most of the Member States reported extensively on the existing subsidies and cross-subsidies in the draft plans addressing cross-subsidies between different user groups and subsidies for infrastructure.</td>
</tr>
</tbody>
</table>
A range of areas where clarification is required were identified. These are summarised in the table below. It should be noted that not every comment applies to each Member State, but rather it highlights the variation in both the level of assessment and approach to implementation within the reviewed draft RBMPs.

**Summary of General Areas of Clarification with Regard to the Assessment of Article 9 within the Draft RBMPs.**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Areas for Clarification</th>
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<tbody>
<tr>
<td>Aims of the Article 9</td>
<td>Improved understanding of the Aims of Article 9 required across Member States, as a very small number of the Member States discussed the aims of the Article 9.</td>
</tr>
<tr>
<td>Water services and water uses</td>
<td>Clear definition of water services and water uses as not all Member States provided an explicit definition of water services and water uses in the draft RBMPs reviewed.</td>
</tr>
<tr>
<td></td>
<td>Justification behind the identification of water services, with regard to the non-public provision of water supply and waste water treatment, hydropower, flood protection and others.</td>
</tr>
<tr>
<td>Adequate Incentives</td>
<td>Detailed discussion and assessment of incentive properties of existing water pricing systems is required as only small number of Member States included the assessment in the draft plans.</td>
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<td>Furthermore, justification of existing charging systems in terms of the “adequacy” is needed based on a clear interpretation of “adequate incentives”</td>
</tr>
<tr>
<td>Social, environmental and economic implications of cost recovery</td>
<td>Clear and explicit discussion is needed in RBMPs where this provision is applied by Member States.</td>
</tr>
<tr>
<td>Established practices</td>
<td>Article 9.4 provisions relating to established practices should be covered in each RBMP where they are applied. This should include an explanation how these purpose and achievement of the objectives of the Directive are not compromised.</td>
</tr>
<tr>
<td>Less than full implementation</td>
<td>Member States are required to report the reasons for not fully applying the requirements relating to adequate incentives and adequate contribution to cost recovery. This needs to be reported clearly and with sufficient justification.</td>
</tr>
<tr>
<td>Environmental and resource costs</td>
<td>Clear and explicit addressing of the definition and assessment of environmental and resource costs</td>
</tr>
<tr>
<td></td>
<td>Detailed discussion as to the internalisation of environmental and resource costs and the methods employed for the assessment</td>
</tr>
<tr>
<td>Adequate Contribution</td>
<td>A qualitative, if not quantitative discussion, of the issue of adequate contribution of water uses to the costs of water services and how this has been implemented.</td>
</tr>
</tbody>
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Can Meeting Article 9 Requirements Contribute to Achieving the Objectives of Other Policies?

The principles of cost recovery and incentive water pricing included within Article 9 of the WFD have significant potential to aid in the delivery of objectives within other policies. In particular it can aid mitigation of the impacts and occurrences of water scarcity and drought events across Europe through reducing water demand and potentially promoting alternative water supply sources. It can also play a role within climate change adaptation as the benefits of Article 9 for alleviating water scarcity and droughts, and in preventing and mitigating floods, will also support climate change adaptation. However, other policies may provide incentives to water users which might result in behaviours that would compromise the objectives of the WFD and those of Article 9. In addition, the approach taken to implementing Article 9 by Member States, particularly in relation to the definition of water services and uses, will influence the contribution to other policy objectives. Full utilisation of potential synergies between different policy areas and mitigation of likely conflicts will facilitate efficient policy making in which a sound scientific knowledge base and sufficient capacity in terms of skills and competence are critical.

It has not been possible to look at every single policy at a Member State level; hence a high level screening of those policies at an EU level considered most relevant to the WFD has been undertaken. The following policy areas have been identified where water pricing may provide an interaction in relation to delivery of policy outcomes:

- Water scarcity and droughts;
- Flood mitigation;
- Climate change adaptation;
- Other policy areas such as energy policy, common agricultural policy, transport policy, cohesion and regional development policy and sustainable development.

At a strategic level, water pricing in general and, in particular, the requirements of Article 9, will contribute to the objectives of water scarcity and drought mitigation policy. Taking account of the fact that the water saving potential in the EU including Southern Member states is higher than the projected water demand1, there is therefore

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significant scope for Article 9 to contribute to alleviating water scarcity across Europe through reducing water demand (thereby avoiding the costs of development of additional supply) and potentially promoting alternative water supply sources. In the context of Article 9, by defining agricultural (irrigation), industrial and household water use (both public and self-services) as ‘water services’, designing and implementing water pricing schemes that ensure recovery of financial, environmental and resource costs are pre-requisites for ensuring that water pricing contributes to alleviating water scarcity and drought phenomena. Also the removal of inefficient subsidies and incentives that cause further pressure on water resources is of critical importance for alleviating water scarcity.

The ability of water pricing to ensure rational water use will ultimately define its role in alleviating water scarcity. The effectiveness of water pricing as a tool to alleviate water scarcity and drought related problems will depend on incentive properties of water pricing systems in place, which in turn depends not only on price elasticity of demand (how responsive, or “elastic”, demand would be to a change in price) but on a number of other factors as well such as design of the pricing scheme. Therefore, implementing water pricing alone is not likely to fully tackle the problem of water scarcity and droughts and it needs to be coupled with other measures.

In the case of the Floods Directive, the contribution of water pricing in general and specifically the requirements of Article 9 to the objective of the Directive are less direct. Water pricing policies can have a positive albeit indirect impact on reducing flood risk through the improved water efficiency measures within households that will lead to a reduction in the per capita wastewater load on sewerage infrastructure and therefore reduced likelihood of sewer flooding. In terms of meeting WFD objectives, assessing and valuing in particular the environmental costs related to flood risk management water service would be difficult. The effectiveness of applying water pricing in this area in relation to the achievement of the WFD objectives will depend, amongst other things, on the impact that flood defence systems have on water quality and the role that pricing plays in determining the level of provision of flood protection.

The strategic objectives of climate change adaptation in the context of the security of water supply and mitigation of adverse events such as droughts and floods are in line with the objectives of Article 9 to promote efficient and sustainable water use. Thus in the context of the implementation of the Article 9, climate change adaptation largely relates to mitigation and prevention of water scarcity, droughts and floods. The impact of incentive water pricing in relation to alleviating water scarcity and droughts as well as in preventing and mitigating floods will also be therefore also support climate change adaptation. In particular, improvements to water demand management and water savings achieved through water pricing will therefore contribute to the objectives of climate change adaptation.

Similarly, water pricing in general and Article 9 requirements in particular would contribute to the objectives of the EU Sustainable Development policy. On one hand full implementation of the WFD and Article 9, in particular ensuring rational water use through the use of incentives, would contribute to the objectives of the conservation of
natural resources and climate change adaptation. On the other hand the objectives of the sustainable transport policy area will have an impact on navigation as a water use.

Future Research Needs and Capacity Building

Future Research Needs

Based on the review of literature and a selection of draft RBMPs, the main knowledge gaps in terms of research in the context of the Article 9 identified in this study include:

- The operational aspects of definition, measurement and internalization of environmental and resource costs;
- The operational aspects in relation to the Polluter Pays Principle, such as establishing a causal relationship between the actions of polluter and the damage costs;
- Lack of clarification of some key aspects of the Article 9. Further analysis and case law may be helpful;
- While there is no lack of research on instruments for environmental policy with respect to Article 9 there are some remaining research questions, such as how different policy instruments and charging mechanisms perform with respect to the Article 9 criteria (cost recovery and adequate incentives) in order to assess potential conflicts and trade-offs between the ‘cost recovery’ and the ‘adequate incentives’ criteria;
- At least as important as the choice of instrument type are its specific design features. Subtle differences in design can sometimes be decisive for an instrument’s cost-effectiveness. Further research is needed on, for instance, specific instruments to address the impact of climate change adaptation, water scarcity/droughts and floods which could include ‘Payment for Ecosystem Services’-like schemes for public services (such as water storage and conservation) or innovative insurance schemes and their possible role in meeting Article 9 requirements;
- Good models are essential for the ex ante assessment of impacts in complicated systems such as water use. Improvements in integrated hydro-economic models which are still in their infancy will assist in the implementation of article 9;
- The monitoring and ex post evaluation of instruments also deserves high priority including empirical analysis of instrument effectiveness, efficiency and side effects (including the impact on technological development).
Capacity Building and Networking

Following the review of a number of draft RBMPs, it is clear the Article 9 is implemented in many ways. It is however difficult to point to many specific areas where a lack of skills or data could be the main reason for Member States choosing simple or a low level of ambition for implementing Article 9. The only area where skills and competence capacities might have been an issue is with regard to the limited coverage of environmental and resource costs in applied cost recovery schemes. However, lack of data, particularly in terms of the underlying natural sciences data (e.g. relating to size of environmental damage) may also have contributed to this.

As pricing of services is an activity that all commercial service providers have to address in some way, all Member States should have a relatively large pool of experts that could support the introduction of the cost recovery aspects of Article 9. The need for more specialised fields of expertise could be an issue but through developing guidance or drawing on existing international guidance, increased information exchange and worked examples, skill deficiencies could potentially be overcome.

There are certain elements of the assessment of environmental and resource costs where the knowledge is immature. Lack of skills related to valuation of environmental and resource costs and/or lack of expertise to judge how other policy measures could be used to internalise these costs could constitute a constraint to the implementation of this aspect of Article 9. More simple models that take, for example, resource costs into account would not require skill and competencies that are unavailable and in those cases other barriers, in particular, lack of data availability may have constrained how ambitious the plans have been in their references to environmental and resource costs.

Overall, the necessary skills appear likely to have been available to deliver the main requirements of Article 9 and therefore, the observed level of planned implementation of Article 9 requirements identified in the draft plans is not considered to have been significantly influenced by gaps in the necessary skills and competencies available.
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Appendix B References (Literature Review)
1. Background and Introduction

1.1 Study Objectives and this Purpose of this Report

This study “Managing scarce water resources – implementing the pricing policies of the Water Framework Directive” had the overall objective of providing advice on water pricing policy in the context of the implementation of the Water Framework Directive (WFD) and emerging policy areas such as water scarcity and climate change adaptation. The purpose of the study was to inform the development of the Commission’s work on the assessment of Member States’ River Basin Management Plans (RBMPs) and to undertake an initial assessment of the potential need for further work on water pricing beyond the implementation of Article 9 of the WFD.

The work undertaken has been carried out through a series of tasks. A critical review of the literature was carried out to assess the latest thinking and work done so far on water pricing in relation to Article 9. A review of the requirements of Article 9 was undertaken. In addition, a review of a number of draft RBMPs was undertaken. As this review considered a selection of draft plans, its purpose was not to assess the quality of compliance, rather to provide an overview of how some Member States were planning to meet Article 9 requirements. On the basis of this review, a set of recommendations for improving implementation were made. In light of the overview of planned implementation of Article 9, the wider policy implications of Article 9 were also considered in this project, in particular, the role of water pricing in delivering objectives of other policies, existence of any conflicting incentives arising from different policies as well as the need for further research, capacity building and networking.

Following an introduction to the Water Framework Directive, Article 9 and its requirements, this report sets out the results of the study, including the steps required to strengthen the implementation of Article 9 and possible future work on water pricing policy.

1.2 What is the Water Framework Directive?


The Directive establishes a framework for the protection of all water bodies (including inland surface waters, transitional waters, coastal waters and groundwater) which:

- Prevents further deterioration of, protects and enhances the status of water resources;
- Promotes sustainable water use based on long-term protection of water resources;
• Aims at enhancing protection and improvement of the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of “priority substances” and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;

• Ensures the progressive reduction of pollution of groundwater and prevents its further pollution;

• Contributes to mitigating the effects of floods and droughts.

Overall, the Directive aims to achieve good water status for all waters by 2015.

The Water Framework Directive clearly integrates economics into water management and water policy decision-making. To achieve its environmental objectives and promote integrated river basin management, the Directive calls for the application of economic principles (for example the polluter-pays principle), economic approaches and tools (such as cost-effectiveness analysis) and economic instruments (such as water pricing).
2. What Does Full Implementation of Article 9 Mean?

2.1 What are Article 9 Requirements?

Article 9 of the WFD is described in Box 1 below, along with other text from the directive that is relevant to water pricing. The text of the WFD, along with a number of supporting Common Implementation Strategy (CIS) documents and subsequent information sheets, constitute the key documents that define the objectives, scope and specific requirements of the WFD in relation to cost-recovery and incentive water pricing, which are the central pillars of Article 9. Various Articles and Annexes of the WFD stipulate provisions related to cost-recovery of water services and incentive water pricing (see box below, which should be used as a reference guide to the key Article 9 and other WFD provisions mentioned in this report).

<table>
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<tr>
<th>Box 1: Key Requirements of the WFD on Cost-Recovery and Water Pricing</th>
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<tr>
<td><strong>Article 9: Recovery of costs for water services</strong></td>
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<tr>
<td>1. Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.</td>
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<tr>
<td>2. Member States shall report in the river basin management plans on the planned steps towards implementing paragraph 1 which will contribute to achieving the environmental objectives of this Directive and on the contribution made by the various water uses to the recovery of the costs of water services.</td>
</tr>
<tr>
<td>3. Nothing in this Article shall prevent the funding of particular preventive or remedial measures in order to achieve the objectives of this Directive.</td>
</tr>
<tr>
<td>4. Member States shall not be in breach of this Directive if they decide in accordance with established practices not to apply the provisions of paragraph 1, second sentence, and for that purpose the relevant provisions of paragraph 2, for a given water-use activity, where this does not compromise the purposes and the achievement of the objectives of this Directive. Member States shall report the reasons for not fully applying paragraph 1, second sentence, in the river basin management plans.</td>
</tr>
</tbody>
</table>

**Article 11: Programme of measures:**

...3. "Basic measures" are the minimum requirements to be complied with and shall consist of: ... (b) measures deemed appropriate for the purposes of Article 9;...
The economic analysis shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to:
(a) make the relevant calculations necessary for taking into account under Article 9 the principle of recovery of the costs of water services, taking account of long term forecasts of supply and demand for water in the river basin district and, where necessary:
-estimates of the volume, prices and costs associated with water services, and…

ANNEX VI: LISTS OF MEASURES TO BE INCLUDED WITHIN THE PROGRAMMES OF MEASURES…PART B

The following is a non-exclusive list of supplementary measures which Member States within each river basin district may choose to adopt as part of the programme of measures required under Article 11(4):…

(iii) economic or fiscal instruments…

ANNEX VII: RIVER BASIN MANAGEMENT PLANS

...7.2. a report on the practical steps and measures taken to apply the principle of recovery of the costs of water use in accordance with Article 9;…


The requirements of Article 9 as described in broad terms above appear fairly straightforward, however, as evident from the work undertaken by this study, and indeed a number of other studies, as well as the evidence provided with the draft RBMPs, these requirements are at times ambiguous, flexible and open to a range of interpretation.

2.2 What are the Main Challenges to Full Implementation and Compliance with Article 9?

As set out previously, following the adoption of the WFD, Member States were faced with a number of significant and diverse challenges imposed by the requirements on cost recovery and incentive pricing. These included methodological, political, institutional and legal challenges as well as the practical challenges of implementation.

Having regard to the debates ongoing in academic and policy dimensions, there are still a lot of challenges present. Key challenges include:

- Definition of “water services” and “water uses”, i.e. identifying activities subject to the principle of cost-recovery;
- Methods of assessing the current levels of cost-recovery and incentive properties of existing water pricing systems;
- Assessment and internalisation of environmental and resource costs;
Creating the environment for business

- Designing incentive water pricing;
- Availability, quality and scale of information.

In order to aid coherent implementation of the economic elements of the WFD, a guidance document referred to as the ‘WATECO’ guidance was developed under the WFD Common Implementation Strategy (CIS), in addition to a number of information sheets including ones on reporting on cost-recovery and on environmental and resource costs. These documents, together with the text of the WFD, provided an important foundation for the work on the Article 9 in the Member States.

Following the submission of the Article 5 reports, and according to the assessment of the first stage in the implementation of the WFD, most of the Member States did not identify water services clearly. Furthermore, half of the Member States have not supplied information on cost recovery at all, but those who did failed to include environmental and resource costs in the analysis.

### 2.3 What Has Been Written About Article 9?

This section and Section 2.4 sets out the results of the literature review carried out as part of this study. A wide range of literature sources were reviewed, including WFD Common Implementation Strategy (CIS) guidance, academic (e.g. journal articles) and policy documents.

In general the academic literature offers a comprehensive discussion on water pricing theory and in particular on the incentive properties of water pricing, although not necessarily in the context of the Article 9. Nonetheless the evidence provided in the academic literature can offer a valuable insight into implementing Article 9 requirements. Non-academic literature, in particular the text of the WFD and CIS guidance documents, define the objectives, scope and specific requirements in relation to cost-recovery and incentive pricing and aim to provide guidance on these areas. Such documents have, however, been criticised in the academic literature for a lack of clarity in wording, and for the lack of clearly defining methodological approaches. Conversely, a number of fundamental Article 9 related issues, such as the definition of “water services” and “water uses” in the context of the article and the interpretation of what “adequate contribution” actually means, are not typically addressed in academic literature.

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Overall, the literature calls for more guidance on the interpretation of Article 9 and related methodological issues. There is a wide recognition in all the literature that the flexibility provided by the Article 9 leaves considerable room for different approaches to implementation to be adopted.

Academic and policy literature address different provisions of the Article 9 to varying degrees. While consensus is present in the literature on some of the elements of the article (for instance public water supply and sewerage being a “water service”), other issues are extensively debated, e.g. definition of resource costs.

Overall, while an extensive body of research provides theoretical background to the issues set out in the Article 9 and empirical evidence on particular relevant aspects of the Article 9 (for example incentive properties of water pricing) little empirical evidence is yet available on the implications of implementing Article 9 (for instance charging for environmental and resource costs). Most of the ongoing discussion on water pricing is still of an ad-hoc nature. Water pricing system design and price elasticity of demand (i.e. the degree to which changes in price affect demand) is key when considering incentive properties of water pricing on the use of water resources, as it defines the effectiveness of a policy instrument. In particular, the academic literature suggests that if price elasticity of demand is “inelastic” (i.e. if the price rises then demand falls but only slightly), water pricing may have no or very little impact on water use reduction. While income-related impacts of water pricing are studied extensively, broader economic impacts of water pricing are rarely addressed at a government level. Overall, contradictory evidence was found on incentive water pricing, and further research is needed.

2.3.1 Scoping the Requirements of Article 9

Very few academic sources provide a detailed discussion on the legal aspects of the Article 9 and most of the literature quotes and refers to the requirements of Article 9 without discussing possible interpretations of the provisions, challenging or critically assessing them.

A number of concerns (including significant flexibility and unresolved methodological and practical problems) are identified and calls for more guidance seem to be shared across academic and policy literature.

In particular, the key points that are raised regarding the requirements of article 9 include the flexibility and scope for implementation provided to Member States in relation for instance to the rate of cost recovery (which should be ‘taken into account’ as a ‘principle’), the nature and the scope of application of the obligation vis-à-vis water pricing under the WFD, conditional exemptions for not realizing particular provisions due to economic, social and environmental considerations, the definition of environmental and resource costs as well as reference to the definitions included in Article 2.38 and 2.39.

There is an overall consensus in the literature that costs of water services include financial, resource and environmental costs, all of which have to be recovered.
2.3.2 Water Services and Water Uses

Recognition of the importance of defining “water services” (and “water uses”) in the context of the Article 9 is present in the literature (mostly in the national policy documents, as academic sources do not discuss the issue extensively) highlighting the added complication in the transboundary context. However, it is symptomatic that references are commonly made to the Articles 2.38, 2.39 and WATECO guidance.

There seems to be a general perception in the reviewed academic and policy sources that public water supply and sewerage collection and treatment are water services and thus are subject to the Article 9 requirements. However, no consensus is present on whether self-services (water supply and sewerage), abstraction and distribution for irrigation purposes, impoundments for hydropower, flood protection and navigation are included.

The literature review showed that in practice, the distinction between water use and water services is not always clear-cut and is surrounded by many political obstacles related to the discrepancy between current and potential future pricing of water use and services.

2.3.3 Financial Costs

Financial costs are also extensively discussed in the literature. In general, a consensus is present over the need to cover financial costs of water services, however a number of key questions are still outstanding:

- Methodological and practical challenges related to the choice of methods and lack of information, including different scales of the reporting systems in place, accounting for subsidies and cross-subsidies, environmental taxes and multi-purpose services. While the WFD does not imply the use of a particular approach for calculating financial cost recovery, the literature demonstrates how different approaches to treating capital expenditures result in different cost recovery levels. Similarly, assumptions made about the lifetime of investments, discount rates, costing methods have direct impact on assessment of financial cost recovery rate;

- Justification of the financial cost recovery levels below 100% in accordance to Article 9(1) or 9(4);

- Treatment of past financial costs of major infrastructural investment, i.e. questions are posed whether these costs should be covered as it might be socially or legally unacceptable;

- Conflicts and synergies between cost-recovery and incentive functions of water pricing systems.

2.3.4 Environmental and Resource Costs

The issue of environmental and resource costs is one of the most contentious in the literature reviewed. The most debates occur in three domains:
• Definition of environmental and resource costs in the context of Article 9 as the WFD does not provide any definition. No universal definition could be found in the literature; a number of alternative definitions are present in the CIS documents and academic literature. Particularly, the issue of whether the opportunity costs should be included is debated;

• Methodological challenges related to estimating environmental and resource costs as there is no consensus in the literature on a recommended approach. Some literature sources suggest that investments to comply with the set environmental standards represent internalised environmental costs and the remaining emissions can be seen as socially optimal for which the sectors should not be charged additionally;

• Making recovery of environmental and resource costs operational. There is a common perception in the literature that environmental and resource costs are rarely considered in current water tariffs and internalising these costs will prove most difficult (particularly, in the case of self-services). Furthermore, it has been questioned whether resource cost can be consistently assessed and charged for particularly at a local level.

2.3.5 Subsidies

Academic and policy literature suggests that subsidies reduce users’ contribution to the cost of water services, negate polluter pays principle and can mute the impact of price incentives for rational water use.

Overall, there is a consensus that subsidies can have a substantial impact on prices and charges and that water services benefited substantially from the direct and in-direct subsidies, as well as cross-subsidies. It is, however, highlighted that water sector has always been dependent on significant government funding and removal of subsidies would be a sensitive political issue.

2.3.6 Adequate Contribution

Article 9 in the WFD also specifies that water users provide an ‘adequate’ contribution to the level of cost recovery, however what exactly constitutes an adequate contribution is not defined. The contribution of water users to the costs of water services therefore will be determined by the way the “adequate contribution” is interpreted and applied in practice across the Member States. There are, however, diverging opinions with regard to the level of user contribution to the recovery of costs of water services; while some argue for the expansion of the contribution, others highlight the social implications.

There is, however a general agreement that impact of diffuse pollution on raw drinking water quality represents such a case (in particular agricultural pollution), but ensuring the contribution may be hampered by the difficulties in linking additional costs for water services to the actual polluters and by the affordability, social equity and political acceptability considerations.
2.3.7 Incentive Water Pricing

Multiple objectives of water pricing under Article 9 are widely recognized in policy and academic literature; these include enacting cost-recovery, provision of incentives, implementation of polluter pays principle and contribution to the WFD environmental objectives. However, the concept of “adequate incentive” requires further specification as well as further clarification is needed on whether Article 9 requirements on incentive pricing refer to water services and/or water uses.

The literature acknowledges the potential for water pricing to provide incentives for rational water use thus reducing water consumption and pollution. However, while the importance of water pricing system design for the incentive properties is widely highlighted in the literature, a variety of opinions is found with regard to alternative designs of an incentive water pricing system. While some authors question the feasibility of designing water pricing system that meets all the objectives (as some objectives will be incompatible with some charging methods), other argue that properly designed water tariffs serve multiple objectives, including economic efficiency, resource conservation, equity, fairness, and fiscal sustainability objectives of water pricing.

While the WFD does not define a particular approach to incentive water pricing, policy and academic literature suggests that water pricing requires a volumetric element in order to provide an incentive to reduce consumption. However, it is highlighted that little is currently known on the effectiveness of water pricing for achieving the environmental objectives of the WFD.

2.3.8 Other Provisions of Article 9

Article 9 of the WFD includes a number of additional provisions that apart from the CIS guidance documents are not explicitly covered in the literature, in particular those related to the clauses that allow, in the implementation of the provisions of the article 9, to have regard to the social, environmental and economic effects of the recovery and established practices. While academic literature reviewed provided numerous examples and evidence on social, economic and environmental effects of water pricing and cost recovery, which may be used by the Member States as the arguments, the provision in article 9(4) relating to “established practices” has not been covered.

2.3.9 Implications of Article 9 for the Different Sectors

Two approaches to categorisation of sectors (or types of water use) appear in the literature and are either sector specific or service specific. In particular, water activities are discussed in the literature according to the sectors using it and covering households, industry, agriculture, hydropower production etc., or by water services, typically entailing water supply and sewerage services.

Concerns over anticipated impacts of introducing the cost-recovery principle on suppliers of water services are discussed extensively in the literature. Consensus is present in the literature vis-à-vis the fact that water supply and
wastewater services are very capital-intensive activities characterised by high fixed costs and relatively low
variable costs. Subsequently, water tariff design should reflect this particularity in order to avoid jeopardizing
financial sustainability of water services. For instance, evidence is provided on instances when large decreases in
water use are associated with low supplier’s revenues (due to large reduction in water use at higher prices).

On the other hand, introduction of cost-recovery principle gives rise to concerns over the anticipated impact on
different sectors in particular in the context of affordability and equity. Academic literature express a number of
concerns related to ensuring cost-recovery; in particular the following concerns are highlighted: i) affordability of
households to pay for the provision of drinking water; ii) reduction in farmers’ incomes and potential withdrawal
farmers from the irrigation sector; iii) implications for hydropower producers among others.

Externalities and the contribution of different uses to the cost of water services is discussed extensively in the
literature, but not necessarily in the context of the Article 9 of the WFD. Diffuse pollution caused by agriculture is
widely discussed in the context of contribution of water uses to the cost of water services, as this type of pollution
commonly increases the costs of water treatment. There is a consensus in the academic literature vis-à-vis the fact
that ideally the price of agricultural production should include the economic value of off-farm water quality effects,
however estimating these costs in practice may be challenging due to diffuse nature of pollution.

Academic literature suggests that incentives provided by water pricing are different for different uses; thus different
incentives may be required in different settings, locations and for different uses. Evidence is provided in the
literature on the impact of water pricing on changing agricultural practices and water use. However, in situations
when it is not possible to establish who has caused pollution indirect methods of control are feasible, such as
taxation, legal restriction uses.

### 2.3.10 Implications for Policy Instruments

A variety of (economic) policy instruments, including water pricing, taxation (e.g. for pollution or pumping), water
markets (e.g. tradable water rights, permits) and subsidies is discussed in academic and policy literature. It is
suggested that the choice of the appropriate instrument under the WFD is likely to be based on considerations of
economic efficiency and social acceptance as well as on the resource under consideration. However, it is
highlighted that numerous practical challenges remain for defining, measuring and implementing pricing to
promote cost recovery.

There is a general perception in the academic and policy literature that design of water pricing and user demand
characteristics are critical to its incentive properties. Comprehensive discussion can be found in the literature on
total, average and marginal water pricing, however not in the context of Article 9. While some academic literature
argues efficient water pricing is normally equivalent to pricing at marginal social cost, other authors argue for the
use of average price. However, the use of marginal costs is not a common way to calculate the price of water for a
number of reasons, including political, social and financial concerns. Alternative water pricing designs are studied
extensively in academic literature, in particular two-tiered pricing. However, in order to implement volumetric
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Water pricing for abstraction or consumption, water use has to be determined either through metering or an alternative technique; this may represent a challenge, particularly in agriculture but also in households.

Water markets are discussed in academic literature in the context of their role in leading to the efficient allocation of water resources. It is highlighted that overall, while water markets may in principle contribute to the efficiency of allocation of water amongst users, they are not very common as water allocation mechanisms, particularly in agriculture; in fact water markets are almost absent in the EU with exception of Spain and Italy. Consensus is present in the academic literature vis-à-vis the role and limitations of water markets; in particular, the benefit of employing water market depends crucially on the level of transaction costs. Contradictory empirical evidence is found in the literature. Some suggest that the benefits of water markets can be substantial while others conclude that given transaction costs at realistic levels, the level of economic gains from introduction of a market in are likely to be at best modest. Finally, the lack of an adequate legal framework, appropriate institutional setting and potential adverse impacts may also constrain development of water markets.

The role of subsidies to encourage favourable water user behaviour or incentives provided by other policies, such as CAP, is also discussed in the literature. It has been argued that subsidies can be as or more efficient in promoting rational water use as water pricing.

Both academic and policy literature recognises that the economic sustainability of water services depends on the recovery of costs through tariffs charged to users; subsequently, the tariff structures of water services should reflect their cost structures. So far the literature suggests that volumetric-based pricing is key to introducing incentives relating to water use. It is argued, however, that reduction in water use can have dramatic consequences on the water service as the revenues drop. The literature also highlights, that marginal cost pricing would lead to deficits for suppliers. Two-part tariffs consisting of fixed and variable part may offer solution, as it is efficient, equitable (in the sense that the user pays), and achieve financial viability because the fixed component ensures that sufficient revenue is recovered. Two-tiered tariffs also can potentially be designed to ensure cost recovery and address equity concerns.

Recovery of resource costs is discussed extensively in academic literature; it is, however, highlighted that prior to the adoption of the WFD these have been more or less forgotten by the research community partly because the demand for such a research was almost non-existent. While the literature recognises that omission of resource cost from the price is unlikely to result in socially optimal water use, consistent calculation of resource costs is extremely difficult. It is argued by some that estimated values are too crude and inexact to be basis for decisions on prices. Alternatively, the literature highlights abstraction charges introduced in attempt to internalize resource costs can be considered in areas with local aquifers at risk of over-exploitation.

While some debate is ongoing in academic and policy literature on interpretation of “polluter pays principle” and “environmental costs”, consensus is present on the importance of an adequate framework for the assessment and valuation of these costs, which is a prerequisite for their incorporation into water pricing processes. In particular, it is highlighted that the choice of valuation techniques and the assumptions made will impact the assessment of environmental costs and consequently the water tariff.
According to the literature reviewed, environmental costs may be internalised through a number of mechanisms, for instance pollution tax (charge). The key is to set the charge at the level that covers environmental costs. Different approaches are likely to be required for point source and diffuse pollution as targeting diffuse pollution may be challenging. Thus, alternative approaches are suggested in the literature, such as altering input or management practices via e.g. an input tax.

Academic and policy literature sources argue that efficient pricing policies are almost absent in most countries and in such cases there is no incentive for rational water use. Consensus is present in the literature vis-à-vis theoretical foundations of incentive properties of water pricing, i.e. water users would respond to the introduction of (or an increase in) water prices by reducing their consumption and the role of water pricing system design and user demand characteristics. In particular, while the literature suggests that volumetric tariffs provide incentives, in practice, the impact of volumetric tariffs on demand might be negligible when the total bill represents a small portion of a user’s production costs or income or when water user has no alternative (due to technical, social or economic constraints). Price elasticity of demand is thus crucial to whether or not pricing policies are likely to have an impact on the actual water demand. However, the literature acknowledges that ultimately, it is important to assess how changes in water demand will affect water status, i.e. WFD environmental objectives, which is one of the least covered topics in the literature.

The impacts of water pricing in agriculture and water industry are studied extensively in the literature. There are however contradicting evidence on the implications and incentive properties of water pricing in agricultural sector.

2.3.11 Possible Arguments in Member States’ Article 9 Implementation

Academic literature provides a variety of arguments that Member States are likely to use to underpin their interpretation of different aspects of the Article 9 implementation. It is not common, however, that the academic literature reviewed explicitly discuss arguments that Member States may use in the context of the Article 9 implementation.

A wide range of further more implicit arguments have been found in the reviewed literature which are potentially relevant to particular aspects of Article 9. In general terms, economic, social and environmental aspects are highlighted.

A number of arguments appear in the literature with regard to design and implementation of incentive water pricing system. In particular these concern the potential effectiveness of water pricing (in comparison to other tools to ensure rational water use). The lines of arguments usually relate to higher efficiency of other policies or measures to ensure rational water use. For instance, it is argued that other policies, such as CAP may have more substantial effect on farmer’s water use-related decisions than water pricing.

Also, the effectiveness of water pricing to abate pollution or promote rational water use has been questioned in some instances. Evidence provided in the academic literature suggests that for a number of reasons, such as
inelastic price elasticity, water pricing may be inefficient in promoting rational water use, or result in inequitable water use reduction by different income groups.

Overall, other measures and approaches will be needed when water pricing does not provide sufficient incentive, when transaction costs outweigh potential benefits or when water savings achieved through cost recovery by 2010 will not be sufficient to meet water demands.

The academic literature also highlights the need to account for institutional, physical and cultural considerations when developing water pricing system. In particular, different institutional contexts may imply a different interpretation and practical implementation of the principles concerned, and therefore lead to different results.

While the cost-recovery principle has a long tradition in some countries, it may not be the case in others; in some Member States it is more politically acceptable to have stringent emission limits than to charge for water use and extraction.

Water markets or tradable permits for water use or pollution are a good example of an approach that is not yet generally accepted; institutional arrangements are critical to making water resource trading practical.

Physical context is equally important as for instance water metering is related to a number of practical and operational issues such as meter location, installation and meter reading possibilities etc.

Concerns about particular groups or particular sectors are raised in the literature in relation to water pricing in general as well as in the context of Article 9. In particular key concerns are related to potential effects on the poorer groups in society and social goals of water supply, i.e. none should be denied essential water use. Also impacts on (irrigated) agriculture, which has great social importance and is the main source of employment in some rural areas, are discussed in detail.

It is suggested that adverse social and economic impacts may have to be counter-balanced by subsidies. Furthermore, justifications may include claims of historic allocation of water resource and vital industries, food and energy security. In recognition that alternative pricing policy designs will have different distributional effects, these need to be studied. It is suggested that pricing policies targeted on equity often are achieved by subsidising subsistence water needs, or adopting various pricing mechanisms to account for varying income levels.

2.4 What are the Gaps in the Literature?

The gaps are largely related to the lack of coverage of particular issues in the literature and/or the lack of consensus on those issues that are discussed. The major gaps identified in the literature are as follows:

- The aims of the WFD are discussed extensively in the literature but debates are ongoing as to whether different aims are compatible or whether there is a hierarchy among them. There is also no agreement on a consistent approach to water pricing that would achieve all the WFD objectives;
“Water services” and “water uses” are discussed extensively, but debates are ongoing as to whether abstraction for irrigation, impoundments for hydropower, navigation and flood protection should be considered “water services”;

Environmental and resource costs are discussed extensively, but debates are ongoing regarding their definition, the methodology for estimating these costs and the degree to which these costs are “internalised”, as well as on operational difficulties regarding their implementation;

In relation to the statement “shall take account of the principle of recovery of costs” there is very little understanding of what “taking into account” actually means and what actually constitutes a minimum required rate of cost recovery in Member States;

Provision of “adequate” incentives for users of water is not discussed in the literature. In particular criteria to make judgements as to whether an incentive is adequate or not, and what incentives for the efficient use of water resources can (or should) be considered ‘adequate’ are not discussed;

The requirement to ensure “adequate contribution” of the different water uses to the recovery of the costs of water services is not covered in the literature. In particular there is no discussion on what constitutes an “adequate contribution”;

Clause 9.3 states that “Nothing in this Article shall prevent the funding of particular preventive or remedial measures in order to achieve the objectives of this Directive”. This is not discussed in the literature;

While traditional approaches are discussed in some literature sources, the issue of “established practices” is not discussed in relation to 9(4);

Links to other environmental and wider policies that involve the use of economic instruments are not discussed extensively and/or explicitly apart from interactions with the Common Agricultural Policy.

### 2.5 What are the Key Issues?

Following on from the gaps identified above, the review of the requirements of Article 9 resulted in a list of key issues in relation to the Article 9. A number of key issues have been identified from the list based on the assessment of the significance of the issue in terms of whether is makes a major contribution to the WFD objectives. The key issues identified included:

- **Aims of article 9**: discussed extensively in the policy literature, but debates are ongoing on whether i) the aims are compatible; ii) there is a hierarchy among them; iii) a particular water pricing design exists that achieves them all;

- **Water services/water uses**: discussed extensively in the policy literature, but debates are ongoing on whether self-services, abstraction for irrigation, impoundments for hydropower, navigation and flood protection are water services;
Creating the environment for business

- **Incentive pricing**: Provision of “adequate” incentives for users of water: this issue was not explicitly covered in the literature. Particular issues include, in particular: i) criteria to make judgements whether the incentive provided is adequate and ii) what incentives for the efficient use of water resources can (or should) be considered ‘adequate’ and iii) whether the requirement relates to water users or water services;

- **Cost recovery**: Ensuring “adequate contribution” of the different water uses… to the recovery of the costs of water services. Particular issues include i) costs to be covered and rate of recovery; ii) sectors to be included iii) what constitutes an “adequate contribution” and iv) the polluter pays principle.

- **Environmental and resource costs** discussed extensively in both policy and academic literature, but debates are ongoing on i) definition of environmental and resource costs; ii) methodology for estimating the costs and whether these have been internalised; iii) operational difficulties and implications for pricing, e.g. is it possible to introduce such pricing?

- **Flexibility**: Having regard to “the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected” and the existence of established practices for existing water-use activities. Particular issues include: i) what “have regard to” means in practice, ii) what the specific effects and conditions are, iii) what the magnitude of the effects should be and iv) which specific requirements the flexibility applies to.

The following section discusses some relevant issues to be considered in relation to each of these key issues. This discussion below does not represent a definitive or comprehensive interpretation of these issues. Its purpose is to highlight some relevant considerations and characterise the questions raised by Article 9 in relation to the issues listed above.

### 2.5.1 Aims of the Article 9

The main aim of Article 9 is to support the achievement of the WFD objectives. This is evidenced by the fact that the achievement of the WFD objectives is referred to in Article 9(1), 9(2), 9(3) and 9(4). This is to be achieved through the elements that can be considered as the sub-aims of the article:

- Cost recovery including environmental and resource costs;
- Application of the polluter pays principle;
- Providing incentives for rational water use.

Overall, it could be argued that incentive pricing is the element that directly contributes to the achievement of the WFD objectives, through providing incentives to efficient water use. However, the application of cost recovery and the polluter pays principle will contribute to meeting the WFD objectives by ensuring that those who cause the costs (including environmental costs) associated with water consumption and use contribute to them.
In broad terms it can be assumed that if the pricing strategy is linked to the quantities of the resource used or pollution levels (incentive pricing) then the other two principles secure a fair distribution of costs among water users (the polluters pays principle) and between economic sectors by reducing or eliminating subsidisation of the water services (cost-recovery principle).

Clearly, the pricing design needed to achieve the WFD objectives will also depend on the Member State’s interpretation and operationalisation of these objectives. Moreover, the water pricing will have to take into account other Member State specific circumstances, in particular the package of other policy instruments that are used to (or may contribute to) the achievement of the WFD objectives.

The three sub-aims are compatible in principle as it is possible to design a pricing structure that provides incentives, recovers costs and is based on the actual use/contribution from each water service user.

Cost Recovery

The principle of cost recovery is typically applied in order to secure sufficient financing of an activity or to reduce the need for subsidisation. From that perspective, cost recovery is a question of economic (or financial) sustainability and equity. In many cases, when the quantity of the service is measured, incentive is also provided along with the cost-recovery as changing consumption is reflected in the payment. For water services this is not always the case as there are many instances when water supply and wastewater services are being paid for using a norm principle (i.e. assumed average consumption). When the consumer pays based on a norm and his/her actual consumption does not affect the payment, then there is no incentive to optimise the use of water. It is important to stress that the cost recovery and incentive pricing are two different concepts. Often when referred to cost-recovery for a service it is implicitly assumed that cost-recovery also creates incentive for the rational use of the service. However, cost recovery will not in itself support the achievement of the WFD objectives. It should be noted, however, that these aims are compatible which is important in relation to the effect of the Article. In the case of volumetric water pricing (e.g. water consumption is metered) full cost recovery will imply a larger incentive.

Incentive Pricing

As noted above, it is possible to ensure full cost-recovery in a way that does not provide any incentive and therefore no impact on, for example, water conservation; it is also possible to have incentives in place without achieving full cost-recovery. Incentives require that the price is related to a parameter which one wants to impact. Volumetric water tariffs based on measured consumption are therefore necessary for introducing an incentive to conserve water. Therefore it is a precondition for any incentive pricing scheme that the water consumption is being metered or measured in one way or another.
Polluter Pays Principle

The concept of the polluter pays principle is based on the idea that payment is in relation to the extent of pollution caused. Whilst water pricing that ensures cost-recovery could be independent of the actual amount of water used or the load of pollution discharged, the polluter pays principle implies that payment should be linked to the actual use or pollution discharged or that there is a contribution from all users in relation to the consumption or pollution. The application of the polluter pay principle in practice is subject to debate.

2.5.2 Water Services/Water Uses

There is consensus in the literature that the sectors (‘water services’) as defined by Article 2(38) of the WFD are most likely to be relevant for the purposes of Article 9. Different opinions are expressed with regard to the following sectors and activities (i.e. there is no consensus on whether these are covered under the Article 9):

- Do “water services” include self-services (private abstractions or direct discharges by households, industries and agriculture (irrigation))? From a practical perspective the issues relating to self-services are slightly different. The financial costs are generally covered. Therefore, the issue relates to coverage of resource and environmental costs;

- Should activities that include storage/impoundment only be considered as a “water service”? It is therefore an issue whether storage, for example, for hydropower production purposes should be considered a water service. Where the financial costs of such storage are covered, the issue when considering inclusion of storage and impoundment under “water services” is about the resource and environmental costs;

- Are water uses such as diffuse pollution; hydropower; navigation; flood protection relevant to the article 9 requirements?. The way water uses are defined by 2(39) suggests that the latter sectors will only be relevant to the article 9 requirements when they have a significant impact on the status of water body. Given that water services that need to be covered by the economic analysis are those that have the significant impacts, the scope of Article 9 could include these additional uses. Including these under the requirements of Article 9 means in practice that suitable mechanisms have to be found that make the users pay and that provide them with incentives for efficient use.

2.5.3 Incentive Pricing

The condition for a pricing scheme to provide an incentive is simply that there is relationship between the payment and the amount of water used or the amount of pollution discharged. This requirement of volumetric tariffs has been discussed in the literature as it is a clear condition for an incentive to be present. Refer to section 2.5.1 for further discussion of incentive pricing.

There is no common operational definition of the term "adequate" and therefore significant room for interpretation is created. It can be argued that ‘adequate’ (i.e. effective) incentives for efficient use of water resources require at
volumetric charging. In other words, schemes that do not charge according to the amount of water used (or the amount of pollution discharged) are unlikely to create adequate incentives. Incentive water pricing policies could range from water pricing with no variable element, to pricing schemes in which the whole tariff is linked to the volume consumed. There is also a link with the principle of cost recovery particularly including environment and resources costs; if they are included in volumetric pricing schemes, the incentive is increased, thus the maximum incentive impact is achieved when the tariff is volumetric and all costs are included. The specific design of water tariff scheme and its incentive effect will depend, to some extent on water service in question and the sector which is subject to the water pricing policy.

"Adequate” could be considered in relation to the overall objectives of the WFD. The incentive would then be considered sufficient to ensure that objectives are met given the contribution from other measures included in the Programme of Measures (PoM). This brings Article 9 in as a key instrument for efficient resource use.

If adequate is understood as meaning ‘sufficient incentive for efficient water use’ then the interpretation is strongly linked to how "efficient water use" is defined. There are a number of ways this could be done including making a link with over-abstraction in the case where abstraction exceeds the natural recharge rate or where there is an impact on the WFD objectives (e.g. reduced and insufficient flow).

The effect of a given water pricing scheme will depend on the price elasticities (how responsive demand is to a change in price) which are comprehensively discussed in the literature. Recovery of the financial costs of the service might not be sufficient to eliminate the overabstraction. It is then an issue of how to determine the associated resource and environmental costs. If all resource costs are included then there should not be an issue in terms of overabstraction.

2.5.4 Cost Recovery

The literature has covered the issue of cost-recovery extensively and overall, there is a shared perception that financial, resource and environmental costs need to be covered. There is no consensus, however, on how to estimate the resource and environmental costs and how these can be made operational (see next section for discussion of this issue).

While there is a general consensus that financial costs should be recovered, there are challenges in estimating financial costs in a unified manner (for example how historical capital expenditures and subsidies should be treated in the calculations). In addition, there are a number of issues which are still unresolved in relation to financial costs includes the existent of different approaches to treating capital expenditures which result in different cost recovery levels, the availability of information a varying geographical scales, and the accounting for subsidies and cross-subsidies.

The issue of the cost recovery rate, i.e. the percentage of the costs that are recovered for the aim to be fulfilled has not been discussed extensively in the literature. It is not clear whether Article 9 implies that the rate should be
100%. Given that in other sectors cost-recovery usually means full cost-recovery this could be considered as the starting point while other elements of the article introduce the provisions for allowing the rate to be less than 100%.

There are no existing benchmarks or standards that can be used to define a minimum level of cost-recovery.

Guidance on the interpretation of the terms ‘adequate’ contribution is currently lacking. One possible implication is that there is less scope for cross-subsidisation between the three sectors distinguished in the article (industry, households and agriculture) than between users within each of these sectors. In other words, collectively each of these sectors will have to cover (most of) the costs of its own use of water services, but there is some room for discretion in allocating the cost incidence between sub-sectors, regions or even individual firms, farms and households. This flexibility is, of course, restricted by other legislation and policy principles, such as competition law.

The reference to the polluter pays principle is the only additional guidance and it suggests that “adequate” could mean that the contribution should be proportional to the resource use or the pollution discharged.

2.5.5 Environmental and Resource Costs

How to estimate and include the environmental and resource costs are key issues and these have been discussed extensively in the literature. In terms of cost recovery, for the environmental and resource costs, the issue is whether they can actually be estimated and included and not so much about the rate of coverage. Much has been written on the question how environmental and resource (E&R) costs can be defined and measured/estimated, including a CIS information note. Nevertheless, the issue remains to a large extent unresolved. We will deal with it here from an operational perspective: how can a Member State apply the requirement in article 9.1 that these costs should be recovered (as part of the total costs of water services)? In their first implementation reports on the WFD, most Member States having supplied information on cost recovery have not taken into account environmental and resource costs (European Commission, 2007).

A strict interpretation of the E&R cost recovery requirement would imply that Member States have to assess the environmental impact of every single water service within their territory and attach a monetary value to it. Obviously, this is would be extremely challenging to undertake: the data and models that would be needed for such an exercise are not currently available. In addition, this would be a hugely resource intensive exercise and depending on the water service (and the size of its accompanying) environment and resource costs may not result in significant progress in terms of the delivery of WFD objectives.

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The need is therefore to operationalise this requirement in an effective way. In principle, it is possible to produce estimates by applying standardized monetary values to specific physical impacts. However, as noted in the literature, the results of using valuation methods in the domain of water are subject to much uncertainty. In addition, the temporal and spatial variation associated with water mean that the use of standard values is problematic particularly in the context of fixing price levels for specific water uses and services. At present, there are no standard ‘shadow prices’ for the E&R costs involved in the abstraction of 1 m$^3$ of groundwater (although some regional estimates do exist) or in the discharge of 1 gram of COD from a wastewater treatment plant. Nevertheless, a considerable amount of research is going on to arrive at estimates for at least some elements of the environmental and resource costs.

Given the controversial nature of economic valuation, as well as the practical difficulties of applying them, a more pragmatic approach could be applied, e.g. based on avoided costs or the cost of measures to attain the good ecological status required by the WFD. One option thus is to use the (current) costs of mitigating measures as a proxy for the environmental costs; i.e. this approach implies that the E&R costs are recovered (internalized) by means of the planning processes and policies used to bring these measures about. Mitigating measures are those measures that are taken to prevent environmental damage. Obviously, if the provider of the water service is charged for these costs and passes them on to the users of the water service, the environmental costs are internalised and should not be added to the costs of providing the service. A disadvantage of this approach is that it does not take into account the additional measures that would be needed to achieve the WFD objectives. If it is expected that these costs will increase over time, the future cost estimates could be used and added to the current costs.

2.5.6 Flexibility of the Article 9

Article 9(1), 3rd paragraph, allows for flexibility in relation to the requirements of Article 9(1) by providing for Member States to ‘have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected. As the WFD does not specify the social, environmental and economic concerns or the geographic and climatic conditions that Member State may have ‘regard to’, there is room for (political) discretion here. The WFD does not contain any criteria to determine the extent and limits of this scope. Nor are there standard benchmarks relating to affordability of water services. These differ by Member State. Nevertheless, the following considerations may be relevant for Member States when applying the provision:

- Generally, exemptions from the ‘cost recovery’ requirement are unlikely to be acceptable if they are merely intended to protect specific sectors or individual firms. Such measures may easily come into conflict with the general prohibition of state aid and/or with the ‘polluter pays principle’. The flexibility should therefore not be used by Member States to charge firms’ or sectors’ use of water services well below (full) cost recovery level, even if applying the cost recovery requirement might threaten the viability of a whole sector (e.g. irrigated agriculture) in a particular region;

- For households, the scope of the flexibility clause may be wider, because exempting them from the (full) cost recovery principle (for social reasons) does not affect competition. However, the basic
requirements of adequate incentives and adequate contribution imply that households will have to be charged for their water use to some extent at least. In practice, this might for instance mean that there is some room for discretion in the way different groups of households are charged;

- An important economic effect of incentive pricing and cost recovery may be related to the ‘transaction costs’ involved. Making people and firms pay for their use of water services may involve substantial costs of metering, monitoring, invoicing etc. Especially in the case of small users, these costs can easily become disproportional. In such situations, it may be legitimate to apply other parameters than actual use when recovering the costs of water services. For example, households may be charged for their water consumption at a fixed rate (or using proxies such as family size or floor area of the dwelling) and farmers may be charged on a per hectare basis for irrigation water. Such charging systems may still ensure adequate cost recovery, but they reduce the incentives to use water efficiently. Therefore, if a Member State applies these proxies, it should also make sure that other effective instruments are in place to promote efficient water use.

Given the scope for discretion, there is a clear need for detailed reporting of the way in which this flexibility has been applied by Member States.

Additional flexibility is offered by Article 9(4). This paragraph has not been discussed to any significant extent in the literature. The key issue is how to define an ‘established practice’ for a given water-use activity and the definition of a ‘water-use activity’. Furthermore, Article 9(4) requires that Member States should show that the purposes and the achievement of the WFD’s objectives are not being compromised. One way this could be done in practice is by introducing additional, effective measures that compensate for the higher water demand resulting from the subsidization.
3. What are Member States Doing to Meet the Requirements of Article 9?

3.1 What is Article 9 Delivering Practically?

In order to provide some information regarding how Member States are proposing to meet Article 9 requirements, a review of a selection of draft RBMPs was undertaken. The purpose of this exercise was not to undertake a compliance checking approach, nor to provide a comprehensive assessment of planned Article 9 implementation. The purpose was to provide an overview of the variation in how some Member States were planning to meet Article 9 requirements, as interpreted from information reported in draft RBMPs. The assessment undertaken was based on a broad cross-section of the draft plans that were available up to May 2009 and included selected draft RBMPs from sixteen Member States. These included: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Poland, Spain, Sweden, The Netherlands and the UK. Gaining an appreciation of the situation in Southern Member States, which are experiencing water scarcity problems, was critical to the execution of this task. However, at that point in time southern Member States have not yet published draft RBMPs, instead published Article 5 reports by Cyprus and Spain, in particular the Economic Analysis of water uses as well as Significant Water Management Issues (SWMI) reports were reviewed. The focus of the review was on the following themes:

- The understanding of the aims of the Article 9;
- The definition of water services and water uses;
- The interpretation of 'adequate' incentives;
- How the flexibility in article 9 was applied and justified (e.g. social, environmental and economic implications of the cost recovery, the existence of established practices);
- The definition and assessment methods of environmental and resource costs;
- The interpretation of 'adequate' contribution;
- The calculation of cost recovery;
- The pricing instruments applied.
All of the reviewed draft RBMPs contained a section on economic analysis and cost recovery. However the extent, depth and the focus of the analysis varied significantly across Member States, draft RBMPs and themes (see the table below). In particular while some draft RBMPs addressed Article 9 in a few paragraphs, others dedicated whole reports to the issue which were reviewed as well.

Table 3.1  Observed Variation in the Focus and the Depth of the Analysis in the Reviewed Draft RBMPs

<table>
<thead>
<tr>
<th>Issues</th>
<th>Scope of the Variation</th>
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<tbody>
<tr>
<td>Aims of the Article 9</td>
<td>No significant variation was found as the majority of the Member States (apart from a very small number) did not discuss the aims of the Article 9 at all. The Member States who did discuss the aims of the Article 9 considered that these vary between identification of the costs of providing water services, establishing the causation of those costs by different water users and ensuring the contribution of these water users to the costs and contribution to achieving good ecological status.</td>
</tr>
<tr>
<td>Water services and water uses</td>
<td>There is a consensus that public water supply and wastewater are considered water services. The scope of the variation therefore includes public water supply and sewerage services on one hand (as some Member States consider only these to be water services) and (absolute or conditional i.e. relating to specific sectors and/or level of impact) inclusion of individual provision of water supply and wastewater collection and treatment, i.e. self-services as well as of hydropower production. In addition a few other Member States consider irrigation, navigation, capture and storage of surface water (e.g. reservoirs), water transport, drainage, fish farming and forestry as water services. Overall, when activities other than public water supply and wastewater collection and treatment are defined as water services (e.g. hydropower production and self-services), the impact of those other activities on water status seem to constitute the key justifying reason. Much fewer Member States explicitly discuss water uses, with the majority of the Member States referring to the results of impacts and pressures analysis when discussing (significant) water uses. Overall, agricultural and industrial water uses (both in relation to water abstraction and pollution) are typically defined as water uses. Energy sector, in particular in relation to hydro and thermal power production, shipping and navigation, flood protection, aquaculture, mining, commercial sector as well as water related tourism are also frequently discussed and considered in the context of water uses in many Member States.</td>
</tr>
<tr>
<td>Adequate Incentives</td>
<td>Significant variation was observed in relation to the incentive properties of water charging systems between the draft RBMPs reviewed. In particular, while some Member States did not discuss incentive properties of water charging systems at all in their draft RBMPs, other Member States did include (explicit or implicit) discussion in the plans, which in some instances was based on the assessment of incentive properties. In particular, the discussion evolved around the impact of water price on water use (and wastewater discharge volumes and toxicity), and the polluter pays principle (i.e. who is being subjected to water charging). A more homogeneous situation was observed with regard to the assessment of whether existing water charging systems offer “adequate” incentives. In particular, the majority of the Member States did not present any justification or defence in the draft plans, while those few who did, did not do so explicitly.</td>
</tr>
<tr>
<td>Social, environmental and economic implications of cost recovery and established practices</td>
<td>Quite a homogenous situation was observed in the reviewed draft plans with regard to the flexibility offered by the Article 9(1) and 9(4) provisions (in relation to established practices, social, economic and environmental considerations). In particular, the vast majority of the Member States did not discuss or refer to these provisions at all. However, a range of issues which potentially could be used for such purposes were occasionally mentioned (e.g. affordability issues), and a very small number of Member States did refer to social, economic and environmental considerations that may be called upon. None of the draft RBMPs reviewed reported on exemptions from the cost-recovery principle using the Article 9.4 provisions on ‘established practice’.</td>
</tr>
</tbody>
</table>
**Issues** | **Scope of the Variation**
---|---
Environmental and resource costs | Significant variation was observed with regard to interpretation of environmental and resource costs in the draft RBMPs reviewed. In some cases there were explicit and detailed discussions and definitions of environmental and resource costs, while in others there was no discussion or provision of interpretation at all. In some instances, while no formal definition was given, interpretation of environmental and resource costs pursued by a Member State could be inferred.

In the instances when interpretation was provided, the interpretations varied. In most cases environmental costs were related to the residual damage to aquatic environment, i.e. occurring when the status of water bodies is less than good, while resource costs were typically considered in the context of water use above natural recharge rates. The interpretation of resource costs ranged from assessing the damage caused by over-abstraction, to viewing resource costs in the context of opportunity costs resulting from misallocation of resources over time and between different users.

Overall, Member States defined environmental costs are as the cost of damages imposed by water use on the environment and ecosystems as well as on other users of the environment. However key differences were found in relation to wider (non-aquatic) impacts and linkages to the failure to achieve good water status.

There was significant variation between Member States with regard to the discussion on internalisation of environmental and resource costs. While some Member States did not include any discussion in the draft plans, others discussed them in great detail. However even then a discussion on the extent to which the costs are internalised was not always present. It was found that Member States pursued one or both of water pollution or abstraction charges, and mitigation measures. In addition, in some Member States schemes exist to compensate for the damaged caused to aquatic environment.

The situation with regard to the methods and techniques used for assessing environmental and resource costs was quite diverse in the reviewed draft plans. Some plans did not include any discussion, some stated only briefly that there was no need to use specific techniques since the costs were considered to be fully internalised, while others provided a detailed description of the methods employed (e.g. models, primary valuation studies or the use of unit values). Where attempts to assess environmental and resource costs were made, this was done either by estimating the costs of mitigation and abatement measures, or by assessing the revenues from pollution and abstraction charges. The contingent valuation method was used by one of the Member State reviewed.

The extent of consideration of the Polluter Pays Principle (PPP) was also variable. Overall, there was a consensus that PPP should be interpreted in the context of the pressure caused by different users and activities. There was also an acknowledgment that those who are causing the damage need to cover mitigation costs.

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Adequate Contribution | Some Member States did not discuss the issue, while in other cases it was discussed only implicitly. In the instances when it was discussed, it largely focussed on the impacts of diffuse pollution caused by agricultural activities on raw water quality. However the discussion ranged between a high level qualitative description and an in-depth quantitative analysis.

Cost Recovery | There was consistency between Member States with regard to the sectors considered and scale of assessment of cost recovery, with the majority of the Member States considering households, industry and agriculture. In addition a few Member States also referred to other sectors, such as hydropower production, forestry and aquaculture, tourism and water needs for nature.

Most of the Member States reported on cost recovery at the national, regional or individual water provider’s scale. Assessing cost recovery at the scale of RBD was found to be challenging throughout the EU and very few Member States presented cost recovery assessment at the RBD scale. It was achieved either by aggregating the data by individual water providers, or by disaggregating the data based on pro-rata allocation. Practically all Member States considered financial, environmental and resource costs in published draft plans qualitatively or quantitatively (with environmental and resource costs in most cases considered in a qualitative manner).

Almost all Member States reported on the estimated cost recovery rates in their draft plans in a significant level of detail, along with details on the approach to assessing cost recovery and sources of information. In most cases the reported levels related to financial cost recovery or overall cost recovery when environmental and resource costs are judged to be internalised.

Most of the Member States reported extensively on the existing subsidies and cross-subsidies in the draft plans addressing cross-subsidies between different user groups and subsidies for infrastructure.
Issues | Scope of the Variation
---|---
Pricing Instruments | The majority of Member States considered some type of economic and fiscal instruments in the draft plans, while a small number of Member States did not present any discussion on financial instruments in the programs of measures. While a range of economic instruments (existing and proposed) were discussed, very few Member States assessed and discussed the effectiveness of those economic instruments. Most of the Member States did not consider or propose new economic instruments.

The vast majority of Member States reported on the planned steps towards implementing Article 9 in the draft plans. However the level of detail and the focus of the steps planned varied significantly from an intention to perform further analysis up to detailed account of the steps planned.

### 3.1.1 Aims of the Article 9

Discussion of the aims of Article 9 was present in a small number of the reviewed draft plans. Where such discussion was present, the focus was on the links between cost recovery and the polluter pays principle whilst also stressing the role of Article 9 in supporting the achievement of the WFD objectives which was described as contribution and support to decision making to achieve Good Ecological Status.

### 3.1.2 Water Services and Water Uses

Some of the reviewed draft RBMPs noted that there was an absence of clear guidance on what specific activities should be classified as water services for Article 9 implementation. The majority of the Member States reported on water services and water uses and, public water supply and wastewater collection and treatment were considered as “water services”. There was a large difference of approaches with regard to whether other activities constitute water services, with activities as diverse as hydropower, irrigation, navigation and non-public water supply/wastewater treatment defined as water services within different Member States. In addition, there was not a common view on whether individual provision of water supply and wastewater collection and treatment i.e. self-services, were water services. Diverse interpretations were observed across Member States varying from the complete exclusion of self-services from the definition of water services up to selective or conditional inclusion (i.e. sector specific or in relation to the level of impact on water status). Whilst very few Member States presented explicit justification behind their definition of “water services”, it appeared a general rule that when activities other than public water supply and wastewater collection and treatment were defined as water services, the impact of these activities on water status seemed to constitute the key justifying reason.

Much fewer Member States explicitly discuss water uses. The discussion with regard to water uses tended to be focused more towards the outcomes of the pressures and impacts analysis, rather than an explicit discussion of detailed water uses. Typically a discussion of agricultural and industrial water uses, both in relation to water abstraction and pollution, was presented. The energy sector, shipping and navigation, flood protection, aquaculture, mining, the commercial sector as well as water related tourism were also frequently discussed and considered in the context of water uses in many Member States.
3.1.3 Adequate Incentives

There was a large variation in the depth of discussions surrounding this area. Some Member States did not address it at all, while others covered it either explicitly or implicitly.

The evaluation of the effectiveness of current water charging systems also varied significantly. While some Member States reported that their existing regulatory instruments and water pricing provide significant incentives to water users to use water resources efficiently, others stated that they have no incentives towards efficiency and savings of water currently in place. Volumetric water pricing and environmental taxes on abstraction or emissions were the most commonly highlighted incentives. Although some evidence on the effectiveness of volumetric water pricing on reducing water use was presented by a selection of Member States, the implications of measures on water use was not consistently assessed overall.

Justification of existing charging systems tended to be implicit and was limited across the draft RBMPs, as was the provision of definitions by Member States covering their interpretation of ensuring “adequate incentives”.

3.1.4 Social, Environmental and Economic Implications of the Costs Recovery and ‘Established Practices’

The vast majority of the reviewed draft RBMPs did not explicitly refer to the Article 9 provisions relating to established practices (Art.9(4)) or social, economic and environmental considerations (Art.9(1)). No explicit attempts were found in the reviewed plans to justify the current levels of cost recovery based on the social, economic and environmental considerations. However, draft RBMPs did discuss issues relating to the social and economic implications of water pricing and cost recovery for agriculture and on household affordability to pay for water services. In particular, presence of discounts and cross-subsidies was justified based on considerations of social equity. Furthermore, some Member States argued that the costs associated with historic pressures cannot be passed on to consumers.

None of the reviewed draft RBMPs reported on exemptions from the cost-recovery principle using the Article 9.4 provisions on ‘established practice’.

3.1.5 Environmental and Resource Costs

Interpretation of Environmental and Resource Costs

Not all Member States discussed interpretation of environmental and resource costs in the published draft RBMPs. In some instances, while no formal definition was given, interpretation of the environmental and resource costs pursued by a Member State could generally be inferred from the plans.
While no consensus is present with regard to interpretation of environmental and resource costs in the reviewed Member States draft RBMPs in most cases environmental costs are related to the residual damage to aquatic environment, i.e. occurring when the status of water bodies is less than good, while resource costs are typically considered in the context of water use above natural recharge rates.

In some cases, no resource costs were associated with water use where water demand represented a small proportion of annually renewable water and the presence of no aquifers currently in bad quantitative status.

Some Member States viewed resource costs in the context of opportunity costs that occur when there is an alternative way (ways) to use the good, i.e. resource costs are associated with the costs of foregone economic benefits from the best alternative use of water. These costs arise from a misallocation of resources (in quantity and / or quality) over time and between different users, occurring when there is competition for water, and alternative water uses that generate economic or environmental value greater than the present or intended use for the future. Thus, water scarcity is an important element in the context of resource costs and can be related either to the imbalances in groundwater and surface water input/output or qualitative impacts, e.g. contamination, on water that lead to localised limitations on use e.g. fishing industry and bathing.

Overall, Member States define environmental costs as the cost of damages imposed by water use on the environment and ecosystems as well as on other users of the environment, i.e. the environmental cost is therefore related to the externalities generated by the current resource use. However key differences exist in relation to i) whether the impacts are limited to aquatic ecosystems only and ii) whether environmental costs are interpreted in relation to the failure to achieve good water status (i.e. environmental costs occur only when risk assessment shows failure).

**Internalisation of Environmental and Resource Costs**

While a fair proportion of Member States did not offer any discussion on internalisation of environmental and resource costs in the reviewed draft RBMPs, some provided a detailed description. Overall, two broad approaches to internalising these costs (or a mixture of both) were identified. The costs are typically internalised either through water pollution or abstraction charges or through mitigation measures, for example expenditures to ensure good status are viewed as a vehicle to internalise environmental and resource costs.

Other measures included in draft RBMPs which were considered to contribute to the internalisation of environmental and resource costs were:

- Schemes aiming to compensate for the damage caused to the aquatic environment;
- Legislation to prevent over-abstraction;
- Legislation to enforce the implementation of the statutory requirements with respect to wastewater discharges.
It is worth noting that while some Member States described the mechanisms for internalising environmental and resource costs in detail, discussion on the extent to which the costs are actually internalised was not always present. Discussion with regard to pollution and abstraction charges indicated that in spite of the fact that these instruments are typically designed and aim to cover environmental and/or resource costs, the level of the actual rates is not always considered sufficient to achieve internalisation. There was also a general presumption that if water bodies achieve good status then environmental and resource costs are internalised.

Methods and Techniques for Assessment of Environmental and Resource Costs

A number of Member States did not discuss assessment methods and techniques, while others stated that as environmental and resource costs are considered to be fully internalised in water services charges there is no need to develop specific techniques and methods to assess these separately. Furthermore, Member States in general highlighted that due to methodological and/or data availability challenges, estimation of environmental and resource costs was not feasible in a consistent manner. One Member State (Poland) applied the Contingent Valuation method (a survey-based economic technique for the valuation of non-market resources, such as environmental preservation or the impact of contamination) to assess the environmental costs which were calculated based on the average WTP for improving the quality of water.

Where attempts to assess environmental and resource costs were made, this was done either through the estimation of costs of mitigation and abatement measures, or by assessing the revenues from pollution and abstraction charges, or through a combination of the two. Resource cost estimation varied in scale from using unit values to dynamic hydro-economic models, which took into account water availability in space and time and economic demands for alternative uses, and compared existing water allocation to the situation when allocation of resources is optimised. Such an approach allowed the estimation of resource i.e. opportunity costs at the RBD scale, and improved efficiency in water resource allocation. A unit cost approach pursued by some Member States, on the other hand, was based on determining the quantitative deficit of water resources in a RBD, water body or country and assigning a specific unit value of benefits lost as a result of the water deficit.

Polluter Pays Principle

Some of the reviewed draft RBMPs included an explicit discussion of the Polluter Pays Principle. While the length and depth of the discussion varied significantly from a few sentences to a separate section, there appeared to be a consensus that the principle should be interpreted in the context of the type of pressures caused by different users, and that the ones who are causing the damage need to cover associated mitigation costs. The challenge of applying this principle to inherited damage was highlighted by some Member States, as often the responsible party or the source of the damage cannot be identified.
3.1.6 Adequate Contribution

A number of the draft plans did not discuss the issue of the adequate contribution of water uses to the costs of water services. Some Member States limited the discussion to references to the national legislation that promotes the principles of the Article 9 and noted ‘adequate contribution’ as a concept.

However, a number of Member States did discuss the issue, although the detail of the discussion varied across the plans that were reviewed. They typically focused on the impacts of diffuse pollution caused by agricultural activities, such as extensive fertiliser use, and the impacts of (private) wastewater discharges on raw water quality.

In the vast majority of plans that were reviewed, there was no explicit reporting of how the requirement relating to “adequate contribution” would be met.

3.1.7 Cost Recovery

The review of the published draft RBMPs in the context of assessing cost recovery for water services across Member States was focused on the following questions:

- What sectors are discussed in the context of cost recovery assessment?
- What is the scale of the assessment?
- What costs are covered?
- What are the reported levels of cost recovery of water services?
- Is cost recovery assessment transparent? What are the sources and reliability of data?
- Are water charging systems described and analysed in terms of their contribution to cost recovery?
- Are subsidies and cross-subsidies present and what is justification presented?

Sectors Considered and Scale of Assessment

Most of the Member States focused their analysis of cost recovery on households, industry and agriculture, to meet the minimum requirements of Article 9 for disaggregation of the analysis. A few Member States also referred to other sectors, such as hydropower production, forestry and aquaculture, tourism and water needs for nature.

Most of the Member States reported on cost recovery at the national, regional or individual water provider’s scale. Assessing cost recovery at the scale of the River Basin District (RBD) was reported as being challenging. The very few Member States that presented cost recovery assessment at the RBD scale were only able to do so either because the RBD coincided with water services provision areas or by aggregating the data from individual water...
Creating the environment for business

providers. The latter was only considered to be feasible when water service areas are relatively small and can be reliably aggregated. For instance, caution was expressed by a Member State when using aggregation or disaggregation rules (e.g. pro-rata allocation) to attribute water service area to the RBD level, as it could result in an error because there is no obvious relationship between the water service area and the RBD.

Costs Considered in the Assessment

Article 9 requires that financial, environmental and resource costs are considered. While very few published draft RBMPs discussed the interpretation of environmental and resource costs, practically all Member States considered financial, environmental and resource costs qualitatively or quantitatively in their published draft RBMPs and there was recognition that all types of costs need to be recovered.

The quantitative assessment tended to focus on the financial costs, whereas environmental and resource costs tended to be considered in a more qualitative manner. The following issues were amongst those highlighted in the financial cost assessments:

- The implications of applying alternative accounting systems for capital costs;
- Approaches to treating annual depreciation;
- The treatment of financial costs of multifunctional infrastructure.

Finally, the majority of the Member States emphasized that more knowledge may be needed regarding environmental and resource costs before financial instruments can be applied (or adapted) to internalise them.

 Reported Levels of Cost Recovery, Transparency and Data Reliability

Almost all Member States reported on the estimated cost recovery rates in a significant level of detail. In most cases the reported levels of cost recovery related to financial cost recovery or overall cost recovery where environmental and resource costs are judged to be internalised.

Most of the draft plans included a detailed account of their sources of information and offer explanations on the methods and approaches used to assess cost recovery, though there was substantial variability in the reporting on methods and data, which varied from no discussion at all to a very detailed report on the approach taken.

Existing Water Charging Systems

Significant variety was observed across different Member States both in terms of institutional and legislative systems and mechanisms and levels of water charges. Member States provided a thorough and detailed description of their existing water charging systems and some provided commentary on their systems’ effectiveness with
regard to providing incentives to rational water use. Overall, a number of Member States have water charging systems that incorporate a volumetric element, thus creating the basis for incentive water pricing.

Subsidies and Cross Subsidies

Most of the Member States reported extensively on the existing subsidies and cross-subsidies in their published draft RBMPs.

Overall, subsidies of some kind seem to be present in all Member States. However, not all Member States explicitly justified their existence and extent. Affordability, equity concerns and the extent of established practices were the areas most often referred to.

In new Member States EU funded subsidies for water supply and wastewater collection and treatment infrastructure were reported as being of particular importance, though public support for general water infrastructure is also highly pronounced in older Member States as highlighted by several of them. Treatment of historic subsidies in the context of cost recovery was also discussed.

3.1.8 Pricing Instruments

Economic Instruments Considered

Most of the Member States considered some type of economic instruments in their published draft RBMPs. Member States extensively considered financial support, for instance financial support mechanisms to farmers to comply with good practice. There was also discussion of a wider range of economic instruments, including environmental taxes (e.g. on pesticides or emissions), water pricing, compensatory payments for the damage caused, emissions trading, requirements for specific technologies or for certain levels of emissions (marketing), transfer of water rights and many others. In particular, while some Member States did not consider or propose new economic instruments in their Programmes of Measures, others did include economic tools and instruments (including financial incentives) in the programmes.

Although there are obviously many economic instruments in use, very few Member States presented a discussion of their actual effectiveness. Overall Member States extensively considered administrative and legal instruments, with most of the Member States not considering or proposing any new instruments.

Planned Steps Towards Implementing Cost Recovery Principle

Almost all Member States reported on the planned steps towards implementing the cost recovery principle. However the level of detail and the focus of these steps varied significantly from an intention to perform further
analysis to a detailed account of the steps planned. Overall, Member States discussed further studies and analysis in relation to various aspects of Article 9, introduction of new administrative and legal instruments, promotion of water saving technologies, amendments to the existing water pricing policies, and measures to improve transparency and fill in information gaps.

3.2 What are the Areas in Need of Further Clarification?

The review of a selection of the draft RBMPs indicated that there is wide variety in the approach to the implementation of Article 9, and the reporting of it, across Member States (as shown in the summary table below, which draws on the discussion above). It should be noted that not every comment is to be applied to each Member State, but rather it highlights the variation in both the level of assessment and approach to implementation within the reviewed draft RBMPs.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Areas for Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aims of the Article 9</td>
<td>Improved understanding of the Aims of Article 9 is required across Member States, as very few Member States discussed the aims of the Article 9. Those who did interpreted the aims as ensuring the application of the Polluter Pays Principle and contributing to achieving good ecological status</td>
</tr>
<tr>
<td>Water services and water uses</td>
<td>Clear definition of water services and water uses as not all Member States provided an explicit definition of water services and water uses in the draft RBMPs reviewed</td>
</tr>
<tr>
<td></td>
<td>Justification behind the identification of water services, with regard to the non-public provisions of water supply and waste water treatment, hydropower, flood protection and others.</td>
</tr>
<tr>
<td>Adequate Incentives</td>
<td>Detailed discussion and assessment of incentive properties of existing water pricing systems is required as only small number of Member States included the assessment in the draft plans.</td>
</tr>
<tr>
<td></td>
<td>Furthermore, justification of existing charging systems in terms of the “adequacy” is needed based on a clear interpretation of “adequate incentives”</td>
</tr>
<tr>
<td>Social, environmental and economic implications of cost recovery and established practices</td>
<td>Clear and explicit discussion is needed in RBMPs where this provision is applied by Member States.</td>
</tr>
<tr>
<td></td>
<td>Article 9.4 provisions relating to established practices should be covered in each RBMP where they are applied. This should include an explanation how these purpose and achievement of the objectives of the Directive are not compromised.</td>
</tr>
<tr>
<td></td>
<td>Member States are required to report the reasons for not fully applying the requirements relating to adequate incentives and adequate contribution to cost recovery. This needs to be reported clearly and with sufficient justification.</td>
</tr>
<tr>
<td>Environmental and resource costs</td>
<td>Clear and explicit addressing of the definition and assessment of environmental and resource costs</td>
</tr>
<tr>
<td></td>
<td>Detailed discussion as to the internalisation of environmental and resource costs and the methods employed for the assessment</td>
</tr>
<tr>
<td>Adequate Contribution</td>
<td>A qualitative, if not quantitative discussion, of the issue of adequate contribution, including how ‘adequate contribution’ has been interpreted, of water uses to the costs of water services.</td>
</tr>
</tbody>
</table>
### Criteria vs. Areas for Clarification

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Areas for Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Recovery</td>
<td>Cost Recovery is generally well reported though not necessarily well calculated as there are areas where the assessment could be clarified and made more transparent. In addition RBD scale estimations of cost recovery should be encouraged where possible. Accurate account and justification of subsidies and cross-subsidies.</td>
</tr>
<tr>
<td>Pricing Instruments</td>
<td>More understanding of the effectiveness of particular instruments is required</td>
</tr>
</tbody>
</table>
4. How Can Article 9 Implementation Contribute to the Objectives of Other Policies?

4.1 Background

The principle of cost recovery and incentive water pricing included within Article 9 of the WFD has significant potential to aid in the delivery of objectives within other policies. In particular it can aid mitigation of the impacts and occurrences of water scarcity and drought events across Europe (through reducing water demand and potentially promoting alternative water supply sources) as well as play a role within climate change adaptation, since the impact of incentive water pricing in relation to alleviating water scarcity and droughts as well as in preventing and mitigating floods will also be translated in supporting climate change adaptation. Given the scope for variation in the approach to the implementation of the Article 9, it is not possible to undertake a definitive assessment of its contribution to other policy areas. For example, the approach taken by Member States in defining water uses and services, and therefore the sectors to which Article 9 requirements apply will play a significant role in determining its contribution to other policy areas. It follows that full implementation of Article 9 (e.g. broad definition of water services, full cost recovery, strict definition of the polluter pays principle etc) has potential to maximise the contribution of Article 9 to the meeting of other policy areas objectives.

However, other policies may provide incentives to water users which might result in behaviours that would compromise the objectives of the WFD and those of Article 9. Full utilisation of potential synergies between different policy areas and mitigation of likely conflicts will facilitate efficient policy making in which a sound scientific knowledge base and sufficient capacity in terms of skills and competences are critical.

Clearly it is not possible to look at every single policy at a Member State level, hence a high level analysis of those policies considered most related to the WFD has been undertaken. The following policy areas have been identified where water pricing may provide an interaction in relation to delivery of policy outcomes:

- Water scarcity and droughts;
- Flood mitigation;
- Climate change adaptation;
- Sustainable development.
4.2 Water Scarcity and Droughts

4.2.1 The Problem

Water scarcity and drought is now emerging as a major challenge with climate change expected to make matters worse due to rising temperatures and changes in precipitation in spite of significant EU mitigation efforts. While “drought” is a natural phenomenon and relates to a temporary decrease in water availability due for instance to rainfall deficiency, “water scarcity” refers to long-term water imbalances, combining low water availability with a level of water demand exceeding the supply capacity of the natural system.

Droughts have dramatically increased in number and intensity in the EU over the past thirty years while water scarcity, i.e. the long-term imbalance resulting from water demand exceeding available water resources is no longer uncommon and limited to the Southern Member States. Overall an increasing number of EU Member States including Northern Europe and in particular the United Kingdom (the South East and the Thames river basin districts), Belgium, Netherlands, Denmark and Slovakia have been affected by the occurrence of seasonal or longer term droughts and water scarcity situations in recent years. Other Member States with less severe conditions are nevertheless now concerned about declining water table levels in some of their groundwater resources. However, the situation is not homogenous even within individual Member States, and water availability can vary greatly from one region to another. For instance, water availability in northern Spain is significantly better than in the south due to abundant rainfall.

Currently about 10% of the total EU area and about 16.5% of the total population is affected by water scarcity and if temperatures rose by 2 to 3°C climate change could bring increased water scarcity. In total, the proportion of European river basin areas in the severe water stress category is likely to increase from 19% today to 34-36% by the 2070s. The long-term changes in annual renewable water resources will be more pronounced in certain regions: in particular the South-Eastern countries might be the area with the greatest increase in pressure on their water resources.

Overall, inappropriate land-use planning and water allocation between economic sectors contribute significantly to imbalances between water needs and existing water resources along with the wastage of large amounts of water across Europe. Historically, a majority of Member States tended to give precedence to developing new water

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supplies in order to secure public water supply and satisfy new economic needs for water in the short term as opposed to improving water demand management.

4.2.2 Water Scarcity and Droughts: What is EU Policy Response?

In recognition of water scarcity becoming an increasingly frequent phenomenon in the European Union the Commission carried out an in-depth assessment of water scarcity and droughts and presented an initial set of policy options to increase water efficiency and water savings in its Communication in 2007. The Communication presents an initial set of policy options at European, national and regional levels to address and mitigate the challenge posed by water scarcity and drought within the Union. In term of actions on the ground, these options can be viewed as involving:

- The identification of the most appropriate and cost-effective measures in order to efficiently address water scarcity and drought issues;
- Consideration of possible priorities or a “water hierarchy” to guide policy-making in the light of water availability at the river basin level.

The policy is based on a combination of measures (in particular demand management and economic instruments, including efficient water pricing) and allows for new water supply under certain conditions such as the principles of the water hierarchy. In particular, the policy stipulates that water saving must become the priority, and all possibilities to improve water efficiency must be explored in line with water hierarchy. Additional water supply infrastructure should be considered when other options have been exhausted, including effective water pricing policy and cost-effective alternatives.

The policy measures themselves, proposed to alleviate water scarcity and droughts, cover the following areas:

- **Water pricing**: additional efforts are needed from Member States to adapt their water pricing policies to the issue of water scarcity making sure they provide incentives for water savings;
- **Allocating water and water-related funding more efficiently**: measures include, in particular, improving land-use planning in order to adapt economic activities to the level of water available locally, improving financing of water efficiency measures within the framework of existing sectoral policies and developing financial incentives for the promotion of water efficient devices and practices;
- **Drought management**: development of drought management plans in order to efficiently prevent and mitigate drought impacts, development of an observatory and an early warning system on droughts,

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and further optimising the use of the EU Solidarity Fund and European Mechanism for Civil Protection to deliver assistance to Member States that have been affected by severe droughts: but only if these are not a result of inefficient water management;

- **Assessment of water supply infrastructure**: water supply options will also need to be considered when all water demand management including effective water pricing policy and cost-effective alternatives and prevention measures have been optimized, but have still not redressed the balance between supply and demand. These include storage of water, water transfers or use of alternative sources (e.g. desalination, wastewater re-use, groundwater recharge and rainwater harvesting);

- **Water efficient technologies and practices**: measures include developing specific standards for water-using devices, including farm equipment, setting requirements on the water performance of buildings as well as steps to reduce leakages in water networks;

- **Development of water-saving culture in Europe**: measures include an active awareness-raising policy with information, education and training, marketing of ever more efficient devices or "water-friendly" products;

- **Improvement of knowledge and data collection**: measures include, in particular water scarcity and drought information system maintenance throughout Europe and research and technological development opportunities.

The policy recognises that the WFD provides all the tools needed to achieve truly sustainable water management. It is stressed however, that implementing these tools (in particular water pricing and cost recovery) in the most effective way remains a challenge.

The Commission will be reviewing and further developing the strategy for water scarcity and droughts in 2012.

### 4.2.3 What is the Role of Water Pricing?

Article 9 of the WFD includes measures to reduce risks of water scarcity and mitigate the impacts of droughts, for example, the quantitative status for groundwater or the efficient use of water resources through water pricing policies, as these are expected to contribute to sustainable management of scarce resources.

The spatial and temporal distribution of water resources across Europe is one of the main drivers of water scarcity and droughts. A comprehensive analysis and an agreement on the driving forces behind water scarcity as well as evidence of unsustainable water consumption by some sectors or in some EU regions is found in the literature. In particular, water scarcity problems are largely associated with irrigated agriculture and to a lesser extent with tourism and residential developments (including second-home residences). Therefore impacts of water pricing on water use by agriculture, public water supply, industry and tourism are of most relevance. The ability of water pricing to ensure rational water use will ultimately define its role in alleviating water scarcity; however effectiveness of water pricing as an instrument in promoting efficient water use depends on a number of factors including the design of the pricing scheme and price elasticity of demand.
The role of water pricing as part of water demand management can be significant and thereby contribute to water scarcity alleviation and drought mitigation. For example, water pricing has potential to alleviate water shortages by having an impact on the water demand of different uses which leads to reduced pressure on water resources. An adequate and well explained (transparent) scheme of water pricing could contribute to creation of incentives for reducing human pressures and impacts on water bodies by reducing water consumption. It is suggested that introducing the “user pays” principle at EU level would put an end to losses or waste, ensuring that water remains available for essential uses across Europe and thus would encourage “efficient water use” in particular with regard to significant water saving potential. However, some of the evidence on the impacts of water pricing on water use implies that in some instances water pricing may have no or very limited effect on water abstraction. For instance, in agriculture, the impact of water pricing on water demand depends on variety of factors, such as water pricing design, crop types, soil and climate and if price is inelastic it will not contribute significantly to reduced water consumption.

Agriculture

The agricultural sector, especially in Southern European countries where scarcity problems are the greatest is by far the largest consumer of water. Efficient water pricing policies can, theoretically (and to some extent in practice), have a demonstrable impact on water demand from the agricultural sector leading to reduced pressure on water resources; however the present inadequacy of water pricing policies is significant for the agricultural sector. Some studies suggest that the impact of water pricing policies on water demand depends on variety of factors, such as elasticity of demand (see above) and crop type etc.

If agricultural irrigation is considered a ‘water service’ and therefore required to be considered under the provisions of Article 9, the impact of the cost recovery and the incentive properties of the water pricing system requirements will play a substantial role in determining whether the optimal consumption level is achieved (or not) within that sector. For instance, it is generally agreed that fixed area fees in irrigation do not promote water savings. In order to ensure that fees provide an incentive to conserve water, agricultural water pricing structures will need be volumetric (i.e. based on consumption) and possibly include a variable element whereby cost rises with volume used. However, in general, water is a relatively insignificant cost item in agriculture, usually accounting for no more than a few percent of total cost; therefore, substantial price increases may be needed to provide incentives that really steer farming decisions towards a more efficient use of water resources. The relationship between water pricing and illegal water abstraction would also need to be taken into account.
Households, Industry and Tourism

It is estimated that there is a huge potential for water saving across the EU as at least 20% of water is currently wasted due to inefficiency. Households can save between 18% and 47% while the domestic, i.e. commercial and institutional sector can save 33% of water. There is also a significant water saving potential in the industrial sector as 43% of the current use can be saved. Significant water savings can be made in the tourism sector (between 30% and 50% for the different sub-sectors).

Although the literature suggests that whilst economic incentives (e.g. via volumetric pricing) are usually more efficient in reducing use than product labelling or advice, seasonal usage restrictions and volumetric water allocations are also tools that can be very effective reducing water consumption and therefore alleviating water scarcity. For instance in some Member States, seasonal usage bans have been introduced during scarcity periods. Therefore water pricing is not the only measure that is needed to achieve the policy.

In most water-intensive industries, cost recovery is likely to meet relatively few barriers in principle, as their water use is usually measured and volumetric charging is in place. Given the prevalence of volumetric charging for industrial water users, the key impact of the implementation of Article 9 is likely to be the cost recovery requirement relating to environment and resource costs. In the context of article 9, if water supply provided by a third party is not included in a cost recovery scheme the consumed volume will be higher than the optimal consumption, and therefore will not contribute to water scarcity alleviation. If water supply is included, whether the optimal consumption level is achieved or not will be determined by the incentive properties of the tariff. In the case of self-services, financial costs are always covered therefore, inclusion of environment and resource costs is critical to provide an incentive to save water.

4.2.4 The Contribution of Article 9 to the Achievement of the Objectives of Water Scarcity and Droughts policy

The objectives of Water scarcity and droughts policy and Article 9 are aligned at multiple levels; firstly the Communication on water scarcity and droughts highlights that “progressing towards full implementation of the WFD is a priority in order to address mismanagement of water resources” and includes a specific reference to Article 9. The policy on water scarcity and droughts sets out the water hierarchy, with water demand management


10 as above

11 as above
aiming to move towards a water-efficient and water-saving economy being an absolute priority. In particular, the policy stipulates that water saving must become the priority, and all possibilities to improve water efficiency must be explored in line with water hierarchy. Additional water supply infrastructure should be considered when other options have been exhausted, including effective water pricing policy and cost-effective alternatives.

Although water savings will not on their own resolve water scarcity and drought problems across the EU, defining agricultural (irrigation), industrial and households water use (both public and self-services) as ‘water services’ for the purposes of implementing Article 9 as well as designing and implementing incentive water pricing schemes which ensure recovery of financial, environmental and resource costs are pre-requisites for water pricing to contribute to alleviating water scarcity and drought phenomena. It is however concluded that implementing water pricing alone will not fully tackle the problem. Thus water pricing needs to be coupled with other measures which the proposed policy options include. The effectiveness of water pricing as a tool to alleviate water scarcity and drought related problems will depend on incentive properties of water pricing system in place, which in turns depends on factors such as the design of the pricing system and the price elasticity of demand.

In practice very few published draft RBMPs reviewed as part of this study discuss the incentive properties of the current water pricing systems in place, and therefore the extent to which implementation of Article 9 contributes to water demand management and alleviation of water scarcity is not readily quantifiable.

4.3 Flood Mitigation

4.3.1 The Problem

Between 1998 and 2004, Europe suffered over 100 major damaging floods, including the catastrophic floods along the Danube and Elbe rivers in the summer of 2002. Severe floods in 2005 further reinforced the need for concerted action. Since 1998 floods in Europe have caused some 700 deaths, the displacement of about half a million people and at least €25 billion in insured economic losses\(^\text{12}\). Catastrophic floods thus endanger lives and cause human tragedy as well as significant economic losses.

Floods are natural phenomena but through the right measures Member States can reduce their likelihood and limit their impacts. In addition to economic and social damage, floods can have severe environmental consequences, for example when installations holding large quantities of toxic chemicals are inundated or wetland areas destroyed.

4.3.2 Flood Mitigation: What is EU Policy Response?

In recognition of the need to address the assessment and management of flood risks across the European Union the EU Floods Directive was adopted in 2007. The Directive is the cornerstone of the EU flood prevention and mitigation policy and aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive requires Member States to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015.

The operational objectives include preliminary flood risk assessment, production of hazard maps and flood risk maps and development of Flood Risk Management Plans.

The implementation of the EU Floods Directive is closely coordinated with implementation of the WFD; notably flood risk management plans and river basin management plans are being coordinated and Member States can choose to include the flood risk management plans in the RBMPs.

4.3.3 What is the Role of Water Pricing?

Having identified the synergistic nature of the Floods Directive and the WFD, the question turns to the role of water pricing in flood risk management. Water pricing policies that provide incentives for users to use water resources efficiently can have a positive impact on reducing flood risk albeit through more indirect routes. Improved water efficiency measures within households will lead to a reduction in the per capita wastewater load on sewerage infrastructure. Reduced flows to sewer will consequently reduce the likelihood of sewer systems becoming overloaded during periods of heavy rainfall and reduce the likelihood of sewer flooding and/or the need for storm tanks or combined sewer overflows to discharge into water courses. Thus there are potential flood risk and water quality benefits that may be manifested through the provisions of Article 9.

Another area of potential overlap between Article 9 and flood mitigation is the principle of cost recovery for water services. If flood protection is defined as a water service for the purposes of the implementation of Article 9, it becomes subject to the relevant requirements including cost recovery including the environmental and resource costs related to flood protection. Valuing morphological impacts for these purposes will be very difficult. The effectiveness of water pricing in terms of meeting WFD objectives would depend on the impact of the flood defence measures on the water quality and the role pricing plays in determining the level of provision of flood protection. For example, the appropriate level of flood protection is in some cases generally determined through a different process than pricing – this is often a local political issue.

According to the reviewed draft RBMPs none of the Member States included flood defence infrastructure under the definition of water services and only four Member States (Belgium, Germany, Hungary and Latvia) defined flood protection as water use.
4.3.4 The Contribution of Article 9 to the Achievement of the Objectives of Flood Mitigation Policy

Whilst the objectives of the WFD overall and the Floods Directive are aligned in several areas as discussed above, the direct contribution of the implementation of Article 9 to the achievement of policy objectives within the Floods Directive are less clear cut. As discussed above, certain approaches relating to the implementation of Article 9 could be viewed as delivering potential benefits for flood risk management but the evidence for direct, significant contribution of water pricing to meeting the objectives of the Flood Directive is limited.

4.4 Climate Change Adaptation

4.4.1 The Problem

Climate change will cause significant changes in the quality and availability of water resources; limited water availability already poses a problem in many parts of Europe and the situation is likely to deteriorate further due to climate change. The adverse climatic conditions may be expected to occur more frequently in the future due to global warming, and as water scarcity is expected to rise there will be the increasing need for an efficient water allocation system.

Climate change is a key driver, which is expected to affect the spatial and temporal distribution of air temperature and precipitation in Europe. The variability is expected to increase, leading to a higher probability of extreme events such as droughts or floods.

According to the Intergovernmental Panel on Climate Change, climate change at the global scale will bring water scarcity to between 1.1 and 3.2 billion people, as temperatures rise by 2 to 3°C.13

4.4.2 Climate Change Adaptation: What is EU Policy Response?

The objective of the EU’s Adaptation Framework14 is to improve the EU’s resilience to deal with the impact of climate change.


The framework adopts a phased approach. Phase 1 (2009-2012) will lay the groundwork for preparing a comprehensive EU adaptation strategy to be implemented during phase 2, commencing in 2013.

Phase 1 will focus on four pillars of action: 1) building a solid knowledge base on the impact and consequences of climate change for the EU, 2) integrating adaptation into EU key policy areas; 3) employing a combination of policy instruments (market-based instruments, guidelines, public-private partnerships) to ensure effective delivery of adaptation and 4) stepping up international cooperation on adaptation. Overall Phase 1 includes various actions aimed to integrate adaptation into key EU policy areas and further employ a combination of policy instruments including market-based instruments to ensure effective delivery of adaptation amongst other objectives.

4.4.3 What is the Role of Water Pricing?

Climate change adaptation is of particular relevance in the context of increased flooding and water scarcity and drought, which could also enhance the risk of failure of meeting the objectives of the WFD.

In the context of the WFD and Article 9, climate change adaptation is related to mitigation and prevention of water scarcity, droughts and floods. The discussion above on the role of water pricing in relation to alleviating water scarcity and droughts as well as in preventing and mitigating floods therefore applies here.

In addition, developing guidance on effective water pricing was highlighted as a possible soft short-term measure in the Impact Assessment that accompanied the White Paper on climate adaptation.

4.5 Sustainable Development

4.5.1 The Problem

Current developments are in many respects not sustainable as limits on the carrying capacity of the planet are being exceeded and social and economic capital is under pressure. A number of key challenges such as climate change and clean energy, conservation and management of natural resources, global poverty, sustainable consumption and production need addressing. The aim of the EU Sustainable Development strategy is to contribute to further change to avoid irreparable damage and to create a future of prosperity, equity and well-being.
4.5.2 Sustainable Development: What is EU Policy Response?

Sustainable development is set out in Article 3(3) (TEU) of the new Treaty\(^\text{15}\) as an overarching and long-term goal of the EU. The EU Sustainable Development Strategy (SDS) constitutes a long-term vision and an overarching policy framework providing guidance for all EU policies and strategies with a time frame of up to 2050. It aims to ensure a real influence on EU policies, including other cross-cutting EU strategies, to ensure coherence between short and long-term objectives and between different sectors.

The Renewed EU Sustainable Development Strategy (RSDS) adopted in 2006 covers seven areas of action including:

- Climate change and clean energy;
- Sustainable transport;
- Sustainable consumption and production;
- Conservation and management of natural resources;
- Public health;
- Social inclusion, demography and migration;
- Global poverty.

New challenges and future focus areas of the EU SDS could focus on intensifying efforts for the protection of biodiversity, air, water and other natural resources among other policy areas.

4.5.3 What is the Role of Water Pricing?

Sustainable development strategy constitutes a long-term vision and an overarching policy framework that covers a wide range of EU policies.

While the aims of the Article 9 directly contribute to conservation and management of natural resources through the aim to ensure rational and sustainable use of water resources, it also indirectly contributes to climate change adaptation and public health policies. In particular water security is one of the emerging aspects and challenges for the future under the climate change adaptation.

In the context of incentive water pricing promoted under the Article 9 the objectives of the RSDS under the area of conservation and management of natural resources include “to improve management and avoid overexploitation of natural resources, recognising the value of ecosystem services”; "to improve management and avoid overexploitation of renewable natural resources such as water" and "to avoid the generation of waste and enhance efficient use of natural resources by promoting re-use" and are of the most relevance. Furthermore, alleviating water scarcity and preventing and mitigating droughts will directly contribute to meeting the objectives on climate change adaptation.

In the context of the Article 9 the objectives are in line with the RSDS in that they contribute to more sustainable water management practices and contribute to addressing the wastage of water. The Article 9 requirements vis-à-vis cost recovery and the possible removal of subsidies would also contribute to the RSDS objectives in relation to progressive phase out of environmentally harmful subsidies which can be found in some sectors.
5. Where To Now?

5.1 Steps Required to Strengthen the Implementation of Article 9

5.1.1 Assessing the Needs for Further Research on Water Pricing

It has not been possible in this study to provide an assessment of the implementation of Article 9 by Member States as this study was undertaken prior to finalisation of RBMPs. Therefore the assessment of the steps needed to strengthen implementation is based on the review of available literature, an assessment of the key issues in relation to Article 9 and the review of a number of draft RBMPs that has been undertaken in this study.

Research priorities and recommendations have been made based on the gaps in knowledge and information that were identified throughout this project. Importantly, there are a number of conceptual and methodological gaps that need to be addressed in order to strengthen the implementation of Article 9. These gaps mainly relate to:

- Defining and measuring costs;
- The polluter pays principle;
- The interpretation of Article 9;
- Policy instruments.

5.1.2 Defining and Measuring Costs

The key gaps concerning the costs that should be recovered under Article 9 include:

- **The definition of environmental and resource (E&R) costs** and the linkage between these two categories. While it is acknowledged that they cannot simply be added (as this would lead to double counting), guidance is lacking on their precise relationship and how to calculate them without the risk of double counting;

- **The measurement of E&R costs.** Substantial research efforts have already been devoted to make progress in this area. The main challenge now is to see how the insights from this research can be applied in practice. This will require water policy makers and water managers at all levels to be prepared to apply the methods and tools that have been developed, and to share their experiences;

- **The issue of “internalisation” of E&R costs.** Where actions are taken that damage the water environment or restrict its use by others this creates an “external cost”. If such costs are taken into
account when making decisions by water policy makers and water managers then these costs are said to be “internalised”. In particular, research needs to address the question to what extent E&R costs can be considered to be internalized (and recovered) if policies and regulations are in place to address the damage done as in the case of policies and regulations put in place to contribute to the achievement of good status under the WFD;

- **Broadening the scope of investigation in E&R costs**, to include relatively un-explored areas such as climate change adaptation, water scarcity and droughts, and floods. This type of research will have to address relatively new questions, for instance how to deal with the social costs (the costs to society as a whole) that arise when people start or continue to live and work in areas with increasing risks of floods and droughts due to climate change;

- **Common methods for cost accounting**. Once there is more clarity and unanimity on definitions and measurement, the development of common principles for cost accounting (both for financial and E&R costs) will be useful to enable a harmonized approach to compliance checking with the cost recovery principle.

### 5.1.3 The Polluter Pays Principle

The polluter pays principle (PPP) is a key element of Article 9, as the cost recovery should take place in accordance ‘in particular’ with this principle, and the adequate contribution of the different water uses should be ensured ‘taking account’ of the principle. However, there are a number of unresolved issues in how this principle works on the ground:

- The identification of the ‘polluter’ and the ‘victim’. This is not always self-evident, and depends, among others, on the initial situation and on prevailing property/ownership and institutional arrangements;

- The possibility to establish a (direct) causal relationship between the actions of the ‘polluter’ and the damage suffered by the ‘victim’. This requires a detailed insight in the mechanisms involved that ‘translate’ a specific action (e.g. the release of an amount of pollutant X into a certain water body) into specific damage (e.g. the reduction or depletion of a specific fish population). This coincides to a large extent with the insights needed to calculate environmental and resource costs, but there are additional challenges involved regarding for instance the contribution of each polluter to the total damage. This is particularly the case for diffuse pollution.

These complications involved in the application of the PPP are not confined to the WFD (or to Article 9 for that matter); they are relevant for all areas of environmental policy. Nevertheless, specific research on its application in water policy will be needed to obtain insight in the particular challenges that this policy area involves.
5.1.4 Common Understanding of Article 9

It has been noted repeatedly that Article 9 contains a number of concepts that leave much scope for interpretation, in addition to containing an element of flexibility. Therefore there seems to be a need for some clarification of different elements. Legal analysis and case law may be helpful to achieve this. Areas for clarification include definitions of ‘water services’ and ‘water uses’, the meaning of terms such as ‘adequate’, ‘taking account of’ and ‘having regard to’ and the question of what the minimum level of cost recovery is necessary to comply with Article 9.

5.1.5 The Choice of Policy Instruments

There is no lack of research on instruments for environmental policy in general. In particular, the question under what conditions economic (or market based) instruments can actually lead to more cost-effective solutions than direct regulation has been dealt with extensively in the literature. With respect to Article 9, the main remaining research questions include the following:

- How do different policy instruments and charging mechanisms perform with respect to the Article 9 criteria (such as cost recovery and adequate incentives) as well as with respect to other criteria (such as effectiveness, efficiency, side effects, acceptance, administrative costs)? Research on these issues needs to address the question of how to deal with potential conflicts and trade-offs between the ‘cost recovery’ and the ‘adequate incentives’ criterion;

- What can be learnt from existing experiences with mechanisms and instruments? It seems worthwhile here to consider especially the opportunities for ‘cross-fertilisation’ (e.g. transferring trading and payment mechanisms from other policy areas to water policy) and to look at instruments applied outside Europe.

5.1.6 Designing and Testing Innovative Economic Instruments

At least as important as the choice of instrument type are its specific design features. Subtle differences in design can sometimes be decisive for an instrument’s cost-effectiveness. Research addressing the following issues seems to deserve priority:

- New or modified cost-effective economic policy instruments to encourage sustainable water use with the objective to reach good ecological status. This research should be closely linked with ongoing and planned research on various types of ‘payments for ecosystem services’ (PES) schemes and on other instruments outside the area of water policy (e.g. CAP – cross compliance);

- Specific instruments to address the impact of climate change adaptation, water scarcity/droughts and floods. Such instruments could include ‘PES’-like schemes for public services (such as water storage and conservation), but also innovative insurance schemes that may provide incentives to reduce the risk and impact of floods and other disasters;
• Transaction cost accounting systems to support the evaluation of the cost-effectiveness of economic instruments. This research is essential to ensure that the theoretical advantages of economic instruments are actually realized. If badly designed, economic instruments may entail high transaction costs which could undo their efficiency advantages. Again, this is a type of research that is relevant for all environmental areas, but will have specific aspects when applied in the area of water policy.

In order to make this research as policy relevant as possible, the engagement of policy makers, water authorities and other stakeholders is essential. Ideally, newly designed instruments should be tested in pilot schemes at representative sites across Europe.

5.1.7 Assessing and Monitoring the Impact of Economic Instruments

Sound methods are essential for the assessment of potential impacts of new policies in complicated systems such as water use. Until recently, hydrologists, ecologists and economists each had their own way of modelling. Integrated hydro-economic models are still in their infancy. Improvements in these models will be needed to address, among others, the wider economic impacts of introducing market based instruments for sustainable water use across different water users. This has also relevance for the soundness of the arguments that Member States might use to defend their interpretation of ‘adequate contribution’ to cost recovery.

The case for economic instruments in water policy will become more credible if they can be shown to deliver on their promises in actual practice. The monitoring and post performance of such instruments therefore deserves high priority. This would include:

• Built-in provisions for monitoring and evaluation (including timetables and budgets) in all newly introduced water policy measures and instruments;

• The exchange of experiences between water authorities in the application of different types of (economic) instruments;

• Experimental and observational analysis of instrument effectiveness, efficiency and side effects (including the impact on technological development).

All this may lead to better insights in typical ‘success and failure factors’. In this respect, the broad scope for implementation of Article 9 can actually be seen as an asset, as it allows for the development of a variety of instruments that can be put to the test in practice. An evolutionary process might thus develop, eventually showing which instrument performs best in specific conditions.

5.2 Capacity Building and Networking

A key question with regard to capacity is whether there are gaps between the available capacity within EU Member States and the capacity necessary for a perhaps more comprehensive implementation of Article 9. Within this
context “capacity” refers to the institutional capacity at the relevant authorities as well as the capacity within organisations and industries involved in implementation of Article 9. This capacity depends upon the availability of relevant knowledge, skills and competences to deal with Article 9 implementation. It should also be noted that implementation of Article 9 not only depends on the relevant capacity/skills/expertise being available but will also require the relevant data (scientific, ecological and financial) to be available.

Assessing capacity in terms of skills and competences is difficult however. Firstly, it is necessary to define the skills and competences that are required for implementation of Article 9 and, secondly, it is necessary to assess whether these skills are available or whether a skills gap exists. Whilst it relatively straightforward to identify the types of skills and competencies required for implementation of the Article, it is much more complex to assess whether there are gaps in the skills available.

Most of the relevant skills will be available at the national level in most or all Member States, though there might be only relatively few experts in, for example, research organisations that possess the adequate skills. At a regional and local level, the availability of relevant skills might be more of an issue. Whether a limited number of a given types of expert in itself has been a constraint of the implementation of Article 9 to date is again difficult to assess. Faced with a potential lack of skills, one option for Member States could be, for example, to use its existing skill base to develop detailed operational guidance on implementation and thereby mitigate gaps in the available resource base.

The judgement and assessment of capacity in this project has been informed by the previous tasks undertaken and inferred from what has been reported within the draft RBMPs reviewed.

5.2.1 What are the Skills Required to Implement Article 9?

The core requirements of Article 9 can be broadly expressed in terms of the need for skills and expertise to cover: (i) cost recovery for water services including resource and environmental costs, (ii) adequate incentives to use water efficiently and (iii) adequate contribution by sectors. It also requires the need to take account of the polluter pays principle. In order to effectively implement the requirements of Article 9, skills and competences in the following areas are judged to be relevant:

- Estimation of financial costs;
- Development of pricing schemes for water service providers;
- Estimation of resource costs;
- Estimation of environmental costs;
- Affordability assessments.
In addition to these specific skills more general policy understanding, management of organisations and technical and environmental understanding is required. These skills are either less specific or they are core elements of the operation and management of the relevant delivery organisations. As core operational elements, they are therefore assumed to be available or that they can be provided by trained and experienced staff with various educational backgrounds. It is therefore considered unlikely that they would constitute any skills gap. The assessment therefore focused on the more specific skills listed above.

5.2.2 What were our Findings?

Following the review of the draft RBMPs, it is clear the Article 9 is implemented in many ways across Member States. It is however, difficult to identify many specific areas where a lack of skills or data could be the main reason for Member States choosing a particular approach to implementing Article 9. The only area where skills and competence capacities might have been an issue in with regard to the limited coverage of environmental and resource costs in applied cost recovery schemes. However, lack of the relevant data e.g. physical/scientific data regarding the environment impacts of specific water services or economic valuations of these impacts may have been more of a constraint.

As pricing of services is an activity that all commercial service providers have to address in some way, all Member States should have a relatively large pool of experts that could support the full introduction of cost recovery. The need for more specialised fields of expertise could be an issue but through developing guidance or drawing on existing international guidance and worked examples, skill deficiencies could potentially be overcome.

There are certain elements of valuation of environmental and resource costs where the knowledge is immature. Lack of skills related to valuation of environmental and resource costs could constitute a constraint on the ability to take full account of resource and environmental costs. More simple models to take, for example, resource costs into account would not require skill and competencies that are unavailable; however there would be a trade-off with the accuracy of the outputs of the simple models. Other barriers may have constrained how ambitious the plans have been in their references to environmental and resource costs.

Overall, the necessary skills appear likely to have been available to deliver the main requirements of Article 9 and therefore, the observed lack of implementation of the Article 9 requirements observed in the plans is not considered to have been a significantly influenced by gaps in the necessary skills and competencies available.
6. Conclusions and Recommendations

6.1 Summary

This study was carried out in order to provide advice on water pricing policy in the context of the implementation of the Water Framework Directive and emerging policy areas such as water scarcity and climate change adaptation. The purpose of the study was to inform the development of the European Commission’s work on the assessment of Member States’ RBMPs and to undertake an initial assessment of the potential need for further work on water pricing beyond the implementation of Article 9 of the WFD by examining the role of water pricing in contribution to the achievement of objectives in other policy areas.

Article 9 relates to the pricing of water in the context of the Water Framework Directive. It includes the principles of cost recovery, the ‘polluter pays’ principle, and incentive pricing. The requirements of Article 9 appear fairly clear-cut when taken at face value; however as this study and a number of others have shown, these requirements are at times not clearly defined, flexible and open to a range of approaches to implementation.

6.2 Conclusions

6.2.1 Gaps in the Understanding and Key Issues in Relation to the Article 9

A wide range of gaps and areas of contention, as well as aspects of the Article 9 crucial to the achievement of the WFD objectives, were identified through a review of academic and policy literature and a detailed assessment of the requirements of Article 9. While there is a consensus in the literature on some of the elements of the article, other issues are extensively debated. A number of fundamental Article 9-related issues, such as the definition of “water services” and “water uses”, and the interpretation of what “adequate contribution” and “adequate incentives” actually means, are not typically addressed in academic literature.

In particular, the key issues identified included:

- **The aims of Article 9.** The main aim of Article 9 is to support the achievement of the WFD objectives which are mentioned repeatedly throughout the article. This is achieved via the various sub-elements of the article, including cost recovery, application of the polluter pays principle, and providing incentives for rational water use. The review showed that there is no agreement on a consistent approach to water pricing that would achieve all the WFD objectives. However the aims are nonetheless considered compatible, as it is deemed possible to design a pricing structure that provides incentives, recovers all costs and is based on the actual use/contribution from each water service user;
• **Definition of water services.** Although the definitions of “water services” and “water uses” are discussed extensively, there is a lack of agreement about whether, for example, abstraction for irrigation, impoundments for hydropower, navigation and flood protection should be considered “water services”;

• **Provision of “adequate” incentives and ensuring “adequate” contributions of water uses to the costs of water services.** There is a lack of guidance and criteria for interpretation of the term ‘adequate’, both in the context of the requirement to provide “adequate” incentives for users of water, and ensuring “adequate contribution” of the different water uses to the recovery of the costs of water services. It has been argued that “adequate” incentives for efficient use of water resources require a volumetric element in the pricing structures, as the schemes that do not charge according to the amount of water used are unlikely to create any incentives at all;

• **Assessment of cost recovery and environmental and resource costs.** While environmental and resource costs are discussed extensively, debates are ongoing regarding their definition, the methodology for estimating the costs, and the degree to which the costs are “internalised”, as well as on operational difficulties regarding their implementation. The WFD does not set out a particular approach for assessing financial, environmental and resource costs. Transparency vis-à-vis the methods used and assumptions in those methods is therefore a necessary condition for compliance with Article 9;

• **Flexibility offered by Article 9 (in particular, reference to “established practices” and social, environmental and economic effects of the recovery, as well as the effect of geographic and climatic conditions).** As the WFD does not specify the social, environmental and economic effects or geographic and climatic condition that Member States may have ‘regard to’, there is much room for (political) discretion here. Additional flexibility is offered by Article 9(4) which refers to the “established” practices. A variety of interpretations, approaches, methods and arguments, could be used for instance to when justifying application of the Article 9(1) and 9(4) provisions. A thorough reporting is therefore critical to Member States’ ability to justify these exemptions, e.g. by showing that they do not compromise the purposes and the achievement of the objectives of the WFD.

### 6.2.2 Progress made by the Member States

The review of a selection of Member States’ draft RBMPs provided an overview of the plans relating to Article 9, highlighted areas of commonality, key issues and the gaps as well providing an assessment of how Member States have applied the flexibility in Article 9. A number of areas for further clarification regarding the implementation of Article 9 were identified.

All of the draft RBMPs reviewed contained some information on economic analysis and cost recovery, and addressed the issues of cost recovery, polluter pays principle and contribution of water uses to the costs of water services. However the extent and depth of the associated analyses varied significantly between Member States. The majority of the Member States did not discuss a range of Article 9 related issues in the draft plans, including: the aims of the Article 9; flexibility offered by the Article 9(1) and 9(4) provisions, and “adequacy” of incentives provided by existing water charging systems.
The review of the draft RBMPs showed that Member States had taken a variety of approaches to implementing Article 9. It also demonstrated that the reporting of Article 9 varies significantly. This demonstrated the need for thorough and clear reporting by Member States regarding the implementation of Article 9.

6.2.3 Alignment with Other Policies

Implementation of Article 9 of the WFD on one hand has the potential to contribute to the objectives of other policies but this largely depends on the approach taken to implementation by Member States. In particular, the definition of water services and uses for the purpose of Article 9 will determine what sectors it applies to and therefore the contribution article 9 makes toward achieving the objectives of other policy areas such as water scarcity and droughts. This will also be affected by the level of cost recovery, the definition of the requirements relating to incentive water pricing and cost recovery. In addition, the role that Article 9 and water pricing plays in general depends on the incentives those policies provide to water services and water uses. In particular, incentive water pricing that results in more sustainable use of water resources and achievement of environmental objectives will contribute to the objectives of water scarcity and drought mitigation, climate change adaptation, sustainable development and flood mitigation policies.

6.2.4 Future Research Needs

A range of research priorities were identified and recommendations made based on the gaps in knowledge and information (including reviewed draft RBMPs) that were identified throughout this project. First of all, there are a number of conceptual and methodological gaps that need to be addressed in order to strengthen the implementation of Article 9. These gaps mainly relate to the requirements of Article 9 regarding adequate incentives and adequate contribution defining and measuring environmental and resource costs and including application of the polluter pays principle. While economic theory can provide answers on how to calculate robustly cost recovery levels and how to assess the incentive properties of existing water pricing systems (although existence of data is a pre-requisite), some of the issues set out in Article 9 are external to the economic domain. For example, it cannot provide answers on what “adequate” is or what the acceptable level of cost recovery is in each particular case and thus requires input from other disciplines.

Secondly, choosing and designing an incentive water pricing system requires further attention and research effort. Particular research needs include the assessment of incentive properties of existing water pricing systems, and a comparative assessment of alternative water pricing systems in relation to the multiple aims of the Article 9.

Furthermore, good models are essential for the \textit{ex ante} assessment of impacts in complicated systems such as water use. Improvements in integrated hydro-economic models that are currently still in their infancy will be needed, along with the monitoring and \textit{ex post} evaluation of instruments in terms of their effectiveness, efficiency and side effects.
6.2.5 Capacity Building and Networking

Implementation of Article 9 requires a set of specific skills and competences within the relevant Member State authorities and other organisations and industries involved, as well as requiring the relevant scientific, ecological and financial data to be available. In particular, in order to effectively implement the requirements of Article 9, skills and competences are required in the areas of estimation of financial, environmental and resource costs, affordability assessments, and development of water pricing schemes. It is expected that most of the relevant skills should be available at the national level in most or all Member States but at a regional level this may not be the case, even though there might be only relatively few experts.

The review of the draft RBMPs showed that Member States are implementing the Article 9 in many different ways. However, apart from the assessment of environmental and resource costs, where skills and competence capacities might have been an issue (however the lack of underlying scientific/ecological information relating to the environmental impacts may have been a greater constraint), the reasons for Member States choosing various a particular approach (e.g. simple or unambitious) for implementing Article 9 appear generally to be unrelated to skills availability. Overall, the necessary skills appear likely to have been available to deliver the main requirements of Article 9 and therefore, the lack of implementation of the Article 9 requirements observed in the plans is not considered to have been significantly influenced by gaps in the necessary skills and competencies available.

In the areas where lack of skills do constitute a constraint, for instance in relation to the valuation of environmental and resource costs, a range of measures could be taken, including among others drawing on existing international guidance and worked examples, developing guidance and using simpler models.
Appendix A
List of the Draft River Basin Management Plans and Background Reports Reviewed


Austria: Economic analysis of water uses in Austria (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (2005). EU Wasserrahmenrichtlinie 2000/60/EG. Österreichischer Bericht der IST – Bestandsaufnahme. Ökonomische Analyse der Wassernutzung)


Creating the environment for business


Ireland: Draft River Basin Management Plans for the Neagh Bann, North Western, South Eastern, Shannon, South Western, Western, Eastern River Basin Districts


Appendix A

June 2010

Sweden: Draft River Basin Management Plans and Programmes of Measures for Bottenhavet, Bottenviken, Norra Ostersjon, Sodra Ostersjon, Vasterhavet RBDs (issued by Water Authorities)

The Netherlands: Draft River Basin Management Plans and Programmes of Measures for Ems, Meuse, Rhine delta and Scheldt RBDs (issued by Ministry of Transport, Public Works and Water Management)

Appendix B
References (Literature Review)


COUNCIL RECOMMENDATION of 3 March 1975 regarding cost allocation and action by public authorities on environmental matters (75/436/Euratom, ECSC, EEC)


Koteen, Alexander, Loomis (2002). Evaluating the benefits and costs of changes in water quality. US Department of Agriculture

Appendix B


