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Warsaw Agricultural University

WFD and Agriculture Linkages at the EU Level

Final Paper about Incentive water pricing and cost recovery in the WFD

Elements for linking EU Agricultural and Water Policies

22/05/2006

Final Version

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The Water Directors endorsed the report during their meeting in Salzburg on 1-2 June 2006.

Foreword

As a result of a process of more than five years of discussions and negotiations between a wide range of experts, stakeholders and policy makers, the Water Framework Directive (or the Directive 2000/60/EC) of the European Parliament and of the Council established a framework for European Community action in the field of water policy. The Directive, which entered into force on the 22nd of December 2000, sets a framework for the protection of all waters with the aim of reaching a "good status" of all community waters by 2015.

The latest reform of the EU Common Agricultural Policy (CAP) in 2003 increased the opportunities for the implementation of the Water Framework Directive (WFD). A working document prepared by the Environment Directorate General of the European Commission highlighted a number of opportunities where the CAP can help achieve the WFD objectives (European Commission, DG Environment, 2003). However, achieving these objectives remains a challenge. Acknowledging this, the Water Directors, who are the representatives of the EU Member States administrations with overall responsibility on water policy, agreed in June 2004 to take action in the context of a Common Implementation Strategy (CIS)[1]. To this aim they established an EU Strategic Steering Group (SSG) to address the issues of interrelations between CAP and WFD. The timeframe for the SSG work is short, given the tight WFD timetable (developing draft River Basin Management Plans by 2008, achieving the ecological status objectives by 2015) and the timing of CAP developments, notably the new European Rural Development Regulation which is to cover the period from 2007 to 2013.

The Strategic Steering Group (SSG) on WFD and Agriculture is led by the UK and the Environment Directorate-General of the European Commission with technical support from the Directorate-General for Agriculture and Rural Development. The aim of the group's work, which met for the first time in April 2005, is to identify the issues relating to agriculture which affect a Member State's ability to meet WFD objectives. The group will also put forward suggestions on how to best manage the risk of not meeting these objectives, taking into account the opportunities of the reformed CAP. There is also a role for the group to consider the potential impacts of achieving the WFD objectives upon agriculture, and the effects this would have on policy development and decisions.

As one of its first steps, the focus of the SSG is on preparing a report to support the aims of the WFD which deal with the opportunities available under water pricing. Ecologic and Warsaw Agricultural University (WAU) have been commissioned to prepare this report in the context of the 6th Framework Programme of Research project "WFD meets CAP – Opportunities for the future"[2]. This report on incentive water pricing and cost recovery in the WFD uses information from:

- the output of the SSG on WFD and Agriculture activities and discussions that have taken place since April 2005;

[1] The main aim of this strategy is to allow a coherent and harmonious implementation of the WFD. The focus is on methodological questions related to a common understanding of the technical and scientific implications of the WFD.

[2] EC Contract no.: SSP-CT-2005-006618 CAP&WFD.

- the replies to the Commission questionnaire on WFD and Programs of Measures that was sent to relevant actors in the EU Member States; and
- the Defra activities on the preparation and arrangement of the UK conference on Water Framework Directive and Agriculture, held on September 20-21, 2005 in London, and the conference outcome.
- the activities on the preparation and arrangement of the Austrian technical conference on CAP & WFD – opportunities for the future, held on March 02-03, 2006 in Vienna, and the conference outcome.

Furthermore, the report builds on the input and feedback from a wide range of experts and stakeholders that have been involved through meetings or electronic communication media.

Ecologic and Warsaw Agricultural University would like to thank all experts of DG Environment, DG Agriculture and Rural Development, Defra and all national experts for supporting us and providing background for this document.

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Policy summary

Background

1. The effects of **agriculture on the environment** are significant and complex, with both positive and negative impacts occurring at local, regional, national and global levels. The recent changes in two crucial policy areas in relation to agriculture – the **Common Agricultural Policy (CAP) reform** and **the new Water Framework Directive (WFD)** – present opportunities to combine the efforts of the two policies in order to improve the environment. Following the latest CAP reform, agreed in June 2003, the CAP can play an important role in water protection. Similarly, with the new approach of the WFD, future water policy will affect agricultural practice more strongly than before.

2. Therefore, the implementation of the legal requirements in both policy areas should be reviewed in order to identify possibilities for better co-operation and to combine implementation efforts. **One of these possibilities is water pricing**.

Water pricing in the context of WFD implementation

3. Several provisions in the WFD relate to water pricing. Water pricing should be considered as a **potentially cost-effective measure** (according to Article 11 WFD) for the implementation of WFD-objectives. More specific provisions can also be found in Article 9 WFD which introduces the concepts of **incentive pricing**, **cost recovery of water services** and the **polluter-pays-principle**.

4. All water uses (including agriculture) need to **contribute adequately towards achieving the WFD environmental objectives** through the Programme of Measures (Article 11 WFD). At the same time, **further clarification is needed** on the question of which types of interaction with the water environment (water uses/water services) the requirements of article 9 WFD relate to (see chapter 3.1, Box 2 for more details).

5. The **polluter-pays principle** (PPP) – as a general principle of European environmental policy – is one of the central organising principles of the WFD. In some **areas, current agricultural practices are not (fully) consistent** with the PPP (e.g. agri-environmental payments). In addition, some possibly cost-effective measures for the implementation of the WFD might **be in conflict** with the PPP. This can be acceptable in the short/medium term as a transition solution in order to reach the WFD objectives at least cost. **Water pricing could be one way of improving** this situation.

6. While CAP payment mechanisms in most cases are more relevant than water pricing in terms of the **incentives they set for water use**, water pricing incentives can represent a way to address pressures on water. Nevertheless, even under the current CAP, **water pricing should be considered** as a potential tool for implementing the WFD-objectives in specific cases.

Cap payments and their links to environmental standards

7. The CAP is one of the main EU policies and has a significant impact on the economy across the whole rural territory of the EU as well as on environmental quality. Hence the current **CAP can help with the implementation of the WFD** due to obligations such as cross-compliance rules and rural development policy.

8. In order to develop a proper water pricing system to fulfil WFD obligations, there is a clear need to understand **how the current system of agricultural subsidies affects the way in which farmers use water**, and how they relate to the incentives transmitted through the water pricing system. In this context, it is necessary to distinguish between the different types of payments under the CAP according to their links to Environmental Quality standards and the different incentives for farmers to reach these standards.

9. Some of these payments may **work against the incentives of a water pricing system** by setting an incentive to use more water. In order to establish a common implementation strategy for the CAP and the WFD, an **integration strategy** must respect the fundamental principles and objectives of both policy areas, such as the Polluter Pays Principle for the WFD and the principle of secure food production under the CAP.

10. When considering the **effects of "decoupling" (payments regardless to production) on water protection**, it can be stated that factors such as prices for fertiliser, water or seeds will have a more prominent impact on production decisions at a farm level than they have up until now. This could result in **lower or higher environmental impacts**, depending on the local conditions, the incentives from the market and the type of business itself (e.g. small-large scale farmers, organic farming). In the case of partial decoupling, there is still a distortion on production decisions, keeping an incentive for water-consuming crops even if it is lower than under the "old" CAP.

Linking CAP and WFD implementation: opportunities for the future

11. Both the CAP and the WFD create **different incentives for farmers**. The CAP sets incentives on production (even if they are less than before the 2003 reform) and the WFD sets incentives for the sustainable use of water. It is crucial to better understand these incentives as they are to some extent be contradictory.

12. **CAP payments will influence the existing systems of water pricing**. So the financial costs of water services can be partly covered by Rural Development payments (or others) used for financing water service investments. In order to develop water prices and to estimate the contribution of the water users to cost recovery, it is important to estimate the contribution of such payments to the costs of water services separately.

13. The WFD implementation will have **social and economic effects on the agricultural sector**. Both policies have mechanisms in place either to avoid social and economic hardship, or to compensate for it. There is a clear need to agree which mechanism should be applied in which instances. Further, there is a need to develop a **common understanding of the WFD term "disproportional costs" and the CAP term "reasonable standard of living".**

14. Due to the limited resources provided under the Rural Development Regulation it can be expected that the provided funds to compensate for social hardships will not be sufficient. Therefore, it is clear that there is a **need to find additional sources of funding**, while strengthening the incentive function of CAP payments toward more sustainable water use and to implement the PPP. One possible **option is the use of revenues generated by water-related green taxes and charges to specifically support adaptation measures in the agricultural sector.**

Conclusions

15. Both agricultural and water policy have their **own separate and legitimate objectives**; integration implies the active pursuit of complementarities and synergies between them. This requires clarity about the respective roles of the two policies and the ways in which they can support each other
16. Water pricing is one **possible link between the two**, but it has to kept in mind that it is not the sole instrument that can solve water resources problems in Europe. However, pricing should be given **due consideration** so that it can be used to promote a more efficient and less polluting use of scarce water resources.

1 Introduction

Agriculture is a significant user of water resources in Europe, accounting for around 30 % of total water use. In southern Europe (where it is a fundamental input) irrigation accounts for over 60 % of water use in most countries; in northern Member States it ranges from zero to over 30 %[3].

The effects of **agriculture on the environment** are significant and complex, with both positive and negative impacts occurring at local, regional, national and global levels. Positive environmental impacts include: providing a 'carbon sink'; supporting and maintaining diverse and attractive landscapes with historic features and providing a complex range of habitats and food sources for farmland wildlife.

Major negative impacts include: greenhouse gas emissions (carbon dioxide, methane and nitrous oxide); soil erosion; water pollution; and adverse effects on biodiversity. Estimates of the economic value of these impacts are necessarily broad-brush and imprecise and studies carried out to assess them have used varying, sometimes incompatible methodologies[4].

Regarding water quality, EU Member States reported that, nutrient inputs from agriculture in all categories of surface water are the second most significant pressure[5]. At least 30-40% of rivers and lakes show eutrophication symptoms or bring high nitrogen fluxes to coastal waters and seas. The agricultural origin of these N fluxes, accounts for 50 to 80% of total N inputs to EU waters, depending on the Member State, watershed and annual variations. For groundwater, even if the available data is incomplete and lacking in coherence, more than 20% are facing excessive nitrates concentrations, with a continuous increasing trend in the most intensive areas of livestock breeding and fertiliser consumption[6].

Regarding water quantity, a total of 20 countries (50 % of Europe's population), lying mainly in central and northern Europe, can be considered as non-stressed,. Nine countries[7] can be considered as having low water stress (32 % of Europe's population). Finally, there are four countries (Cyprus, Malta, Italy and Spain), which are considered to be water stressed (18 % of population in the study region). Water stressed countries can face problems with groundwater over-abstractions and consequent water table depletion and salt-water intrusion in coastal aquifers. While western countries are the largest users of water for energy production (57 %), southern countries use the largest percentages of abstracted water for agriculture (50 %- 75 %) primarily for irrigation[8].

The recent changes in two crucial policy areas in relation to agriculture – the **Common Agricultural Policy (CAP) reform** and **the new Water Framework Directive (WFD)** [9] – present opportunities to combine the efforts of the two policies in order to improve the environment. The latest CAP reform, agreed in June 2003, changed the CAP significantly. It reforms the nature of EU support and combines measures to address environmental issues in more efficient ways. As a result, the CAP can play an important role in water protection.

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[3] http://europa.eu.int/comm/agriculture/envir/index_en.htm#water and Massarutto (2002).

[4] See for example Pretty et al. (2000) for an assessment of the external costs of agriculture in the UK.

[5] WRc, Water Research Centre (2005a).

[6] See http://europa.eu.int/comm/environment/water/water-nitrates/report.html.

[7] These include Romania, Belgium and Denmark and southern countries (Greece, Turkey and Portugal).

[8] EEA (2003).

[9] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy Official Journal L 327, 22/12/2000 P. 0001 – 0073.

Similarly, with the new approach of the WFD shifting from a patchwork regulation to a holistic river basin management approach, future water policy will affect agricultural practice more strongly than before. The main target of the WFD is to achieve ”good status” for all surface, ground and coastal waters in the Community by 2015. Therefore, water resources should be managed across national boundaries, choosing a co-ordinated approach within river catchment areas.

As a consistent legal framework, the WFD sets out to fill an important gap in European water policy. The implementation of the Directive will probably have extensive effects on agriculture because intensive farming in certain areas is one of the main sources of diffuse water pollution.

Despite the decoupling of CAP payments from production in the latest round of reforms, the CAP subsidies system may have a strong influence on the types of farming that are economically attractive to farmers (organic farming, intensive cropping, integrated sustainable farming (Integrated Crop Management (ICM)) (see chapter 4).

Against this background, the implementation of the legal requirements in both policy areas should be reviewed in order to identify possibilities for better co-operation and to combine implementation efforts. One of these possibilities is water pricing, as one of the potential measures for WFD - implementation according to article 11 and as specified further by article 9 of the WFD.

This **paper examines** those elements of the WFD that may have an effect on water pricing – i.e. the selection of cost-effective sets of measures for WFD-implementation, the polluter-pays principle, cost-recovery and incentive pricing - and relates them to the payment mechanism of the CAP. In so doing, it should be noted that the water pricing provisions of the WFD do not exclusively or primarily apply to agricultural water uses. However, as the focus of this paper is to assess the linkages between CAP and WFD, the relevant elements of the WFD will mainly be described in terms of their relevance for and impacts on agriculture. Based on the definitions of water uses and services used in the Directive, further clarification is needed for assessing which requirement of the Directive (e.g. Article 9) relates to which type of interaction with the water environment (e.g. water uses/water services). Though water pricing should be crafted in a way that contributes to the recovery of costs and provides incentives for efficient water use, adverse economic and social impacts stemming from such policy changes must also be taken into account. The paper summarises the relevant components of the WFD and CAP policy frameworks and identifies crucial linkages, synergies and gaps in the joint policy framework that emerges .

The aim of this paper is to point out various possibilities for co-operation in the implementation of the WFD and the CAP in order to exploit possible synergies. A special focus is the possibility of better linking the financial aspects of WFD implementation and CAP reform.

2 Water pricing in the WFD and its effects on agriculture

Water pricing[10] and rights to water access, have been an issue in water management for centuries, especially in those areas where water is scarce. Consequently, a variety of locally adapted approaches and solutions have been developed in Europe, which reflect the local scarcity and pollution conditions as well as the legal, administrative and socio-economic backgrounds of the particular place (water rights, water management structure, market structure for water supply companies, etc.)

Like all network-based sectors, water management is characterised by high fixed costs for the installation and maintenance of the water supply infrastructure, and relatively low variable costs for each unit of water that is consumed; these specific properties need to be reflected in the water pricing system. It should be noted here that due to the specific characteristics of water, the distribution costs are relatively higher than they are for other network services, thus reducing the comparability to gas and electricity for example. In addition, water pricing also needs to reflect the fact that water is not simply an economic resource like oil or steel, but has significant environmental, social and cultural functions. For this reason, the issue of cost recovery and water pricing is by nature a political issue, and cannot be determined by market forces alone. This is also the reason why many regard water supply is a service of general interest.

Although the “polluter pays principle”, which should be an underlying element of European environmental policies, is applicable to some of these problems; the 2000 Commission communication on ”Pricing policies for enhancing the sustainability of water resources” is the first European official document explicitly dealing with these issues in detail. These considerations are reflected in the new European legislative framework for water management, as established by the Water Framework Directive (WFD)[11]. It offers the opportunity to establish a systematic approach to the main issues in water management, introduces new instruments and aims to integrate those instruments that are the focus of this paper: water pricing, integration of the polluter pays principle, cost recovery and incentives through pricing.

~~2.3~~2.1 General Overview WFD

The Water Framework Directive establishes an integrated approach to water management based on river basins. The Directive requires the establishment of a "River Basin Management Plan" (RBMP) by 2009 that must be updated every six years. This first RBMP must give a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the time scale required by the WFD (in general by 2015).

The RBMP should be based on an analysis of the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, an estimation of the effects of existing legislation and the remaining "gap" between this and meeting WFD environmental

[10] On the definition of water price, we follow the 2000 EU communication on water pricing policies: ”The term water price is used here in its very general sense and defined as the marginal or overall monetary amount paid by users for all the water services they receive (e.g., water distribution, wastewater treatment), including the environment. Thus, it encompasses elements linked to the quantity of water extracted from the environment and to the pollution emitted to the environment” (EU Commission (2000), p. 8). At the same time, most of the examples used in this report refer to water abstractions for irrigation in agriculture.

[11] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

objectives. The plan must be developed through a public participation process. A central element of these RBMPs is the set of measures designed to fill the gap left by existing legislation[12].

An important component of the WFD is the consideration of various economic aspects and their integration into the overall implementation process. This integration encompasses a number of perspectives such as different administrative entities, policy aims, different sectors but also scientific disciplines and backgrounds. This explicit and transparent consideration of economic aspects should support a transparent exchange of ideas based on objective information on the various options for WFD implementation. This is especially important in cases where there are clear financial consequences which could influence not only the environmental but also economic and social effects of the WFD.

As a first step of WFD implementation and to provide an overview of the existing situation, Member States had to report environmental problems (sources, pressures and impacts) and also give a first compilation of available economic data relevant to the implementation of the Directive's targets as well as suggesting future actions needed to close any informational and methodological gaps.

While no detailed assessment of these Article 5 reports has been made so far (the reports were due in 2005), a first overview suggests that while considerable information exists that is of value for approaching the economic aspects of the WFD, current information gaps (e.g., water demand elasticities, environmental and resource costs related to water services, etc.) need to be closed in order to have a sufficient information basis.

In addition, a number of questions still need to be addressed in order to assess means of reaching the Directive's targets. Two important aspects that will be considered in this document are:

- How will the targets of the WFD be interpreted and pursued in practice, especially in the case of water pricing issues?
- What linkages could be established to other European but also national policies in fields of relevance (e.g., agricultural policy)?

In order to better understand the challenges and possibilities of the tasks ahead, some main aspects of the WFD will be presented below, focussing on those most relevant to agriculture.

2.2 WFD provisions with an impact on water pricing

Several provisions in the Water Framework Directive relate to water pricing. Water pricing should be considered as a potentially cost-effective measure (according to Article 11) for the implementation of WFD-objectives. More specific provisions can also be found in Article 9 WFD. This article introduces the concepts of incentive pricing, cost recovery and the polluter-pays-principle. The three concepts are closely related, but are not equivalent, with each concept imposing specific requirements on the pricing system. Thus, for example, a pricing system based on flat tariffs can fully recover its costs, but would still fail to provide incentives for efficient water use (see Massarutto 2005 for a more detailed discussion). Alternatively, a pricing system may achieve cost recovery, but violate the polluter-pays-principle by recovering a large share of the cost from a group of water users that did not contribute to the water problem at hand. One of the key challenges for a successful implementation of the

[12] For further and more detailed information see europa.eu.int/comm/environment/water/water-framework/index_en.html.

WFD will be to devise a pricing system that satisfies all three requirements to an adequate degree.

The interdependence between incentive pricing, cost recovery and the polluter-pays-principle is depicted in the diagram below. In a nutshell, the relation can be described as follows:

Figure 1: Economic elements of the WFD

- **Cost recovery** is about the amount of money that is being paid for water services, i.e. it addresses the question **how much is paid for water**;
- The **polluter-pays-principle** looks at the adequacy of contributions from the different water uses towards the total cost, based on their role in causing these costs[13], i.e. it addresses the question **who pays for water**;
- **Incentive pricing** deals with the way water users pay for their use, and whether the right price signals are transmitted, i.e. it addresses the question **how is water being paid for, and how the water price effects the behaviour of water users**.

In the following report, the different concepts and their role in the Water Framework Directive will be explained in more detail.

2.2.1 Programmes of measures (Art.11 WFD)

Under Article 11 of the WFD, EU Member States will need to develop a Program of Measures (POM) for each River Basin District (RBD) taking into consideration the results of characterisation of the particular river basin. A POM may include actions such as:

- measures to manage specific pressures arising from: forestry, agriculture, industry, etc;
- control regimes or environmental permitting systems;
- water demand management measures;
- economic instruments such as incentives, taxes on fertilisers, etc;
- river restoration strategies, etc.

[13] This implies that the polluter-pays-principle applies not only to costs related to pollution, but also to costs caused by all other water uses (e.g. water consumption etc.) and to the question of who covers these costs.

Any measure or policy instrument that is targeted at changing water prices (both for water supply / abstraction and for water pollution) would need to be included in the programme of measures. In addition, the programme of measures (besides being feasible) needs to be cost-effective, meaning that it should provide the lowest-cost means of reaching the given environmental objectives.

Since diffuse pollution from agriculture is one of the main obstacles to achieving good ecological status in many European water bodies, the programmes of measures established under Article 11 of the WFD will clearly affect the agricultural sector in various ways (e.g., production restrictions or limits on the use of fertilisers)[14].

Of special interest in this paper are those ”double-edged” instruments[15] that can have a positive impact both for incentive pricing and the implementation of the polluter-pays-principle and at the same time are part of a cost-effective set of measures for the implementation of the Art. 11 requirements.

Water pricing, charges, and taxes can therefore be considered as possible cost-effective means to reach the objectives of the WFD. In order to fulfil the requirement of a cost-effective implementation of the WFD, it is necessary to look beyond traditional water management measures such as constructing new waste water treatment plants: if the programme of measures is dominated by small-scale, technical measures while the underlying socio-economic problems are not addressed, the results may not be cost-effective.

2.2.2 Incentive pricing (Art. 9 WFD)

The introduction of water pricing as a central policy is one of the main innovations of the WFD and is designed to address problems of water quality and quantity as demand and stresses on water use increase in Europe.

Article 9 of the WFD, requires Member States to introduce incentive pricing by 2010. Member States are to ensure by 2010 that “water pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of the Directive” (COM, 2000, p. 12).

In the River Basin Management Plans, Member States should report on the planned steps towards implementing incentive based water pricing policies and the recovery of the costs of water services.

According to Article 9, Member States may, in introducing water pricing and cost recovery, have regard to social, environmental and economic effects and the geographic and climatic conditions of the region or regions affected, thereby allowing some flexibility. At the same time, a transparent and in-depth analysis of options for incentive pricing and cost recovery as well as their effects is needed. Based on this, the selection of the best – socially and economically acceptable – pricing options can take place. Here, it is important to develop

[14] For more detailed information see summary of the Commissions questionnaire addressed to the Water Directors and the Pilot River Basins on. The development of WFD - Programmes of Measures under the light of agriculture.

[15] The WFD distinguishes between instruments and measures: measures are locally relevant (often engineering solutions, e.g. building a wastewater treatment plant etc.), instruments are decided upon at a higher scale (River Basin, national) and aim for the most part to change behaviour in order to reach the WFD objectives (e.g. charges etc.); this distinction is used in the German handbook for the selection of cost-effective sets of measures (Interwies et al., 2004) as well as in the Dutch handbook on cost-effectiveness analysis under the WFD (van der Veeren 2005).

criteria for assessing the impacts of different pricing policy options in order to decide on the appropriateness of the options selected.

In general, charging for water services and uses can provide incentives to users to reduce their consumption (including the reduction of pollution) of water resources. In general, as prices for a certain product or service increase, overall demand falls. The responsiveness of water demand to price changes is measured through the price elasticity of demand. This elasticity may take on very different forms for different water uses and price levels[16].

In agriculture, the extent to which a farmer's demand for water responds to changes in prices depends on that farmer's demand elasticity. The concept of demand elasticity is central to understanding the environmental, economic, and social effects of water-pricing policies, and to striking an acceptable balance among these competing policy aims. Research shows that elasticities diverge strongly, depending on the region and crops considered and the water infrastructure in place[17]. Elasticities also tend to be much lower in the short run, where farmers have less possibilities of reducing their water consumption by investing in water-saving irrigation technologies or switching to alternative crops (Section 3.2.2 provides further detail on the practical importance of elasticities.).

2.2.3 Cost-recovery (Art. 9 WFD)

An additional important new element of the WFD, is the explicit consideration of the cost recovery principle. The principle extends not only to the financial costs for the provision of a water service (in order to ensure that water service are financed sustainably now and in the future, including the creation, operation, maintenance and replacement of water infrastructure), but it also covers the costs of negative environmental effects associated with the water service (environmental costs) and forgone opportunities of alternative water uses (resource costs) which must all be taken into account. [18]

More specifically, Member States shall by 2010: "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" (Article 9 WFD).

Member States should also ensure by 2010: "an adequate contribution of the different water uses, 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 of the WFD and taking account of the polluter pays principle."

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[16] In general, an elasticity measures how much one variable changes in response to the change of another variable. Thus, the price elasticity of a good measures how demand responds to price changes. For normal goods, price elasticities are negative: if prices go up, demand is reduced. The water demand elasticity – or, more correctly, the price elasticity of water demand – measures by how much consumers reduce (increase) their water consumption if the price increases (falls). A high absolute value of the demand elasticity indicates a high responsiveness of consumers to price changes. A low demand elasticity means that consumption will not change much if the price changes. At the extreme, inelastic demand means that consumers will always demand the same quantity of water, no matter what the price is. Elasticities can be further broken down into short- and long-run elasticities: in the short term, consumers may have few options to reduce their demand, therefore elasticity will be lower than in the long run.

[17] See Varela-Ortega et al. (1998), RPA (2000) as well as Mejía et al. (2004) on the differential effects of water price changes on water demand under different circumstances.

[18] Please see also chapter 3.1 for further details.

Therefore, the Member States will be required to ensure that the price charged to water users/the users of water services - such as for the abstraction and distribution of fresh water and the collection and treatment of waste water - is related to the true costs of this activity.

However, it is important to note the wording of the Directive, which states that the "principle of cost recovery" should be taken into account, rather than demanding that all costs be recovered. In the same way, the Directive does not call for full cost recovery. In combination with the restriction that Member States "may have regard to the social, environmental and economic effects of the recovery", it is to be expected that cost recovery will be addressed in a pragmatic way by most Member States. Therefore, full cost recovery of water services is not likely.

2.2.4 The polluter-pays-principle

As a general principle of European environmental policy, the polluter-pays-principle is concerned not only with costs related to pollution (as the wording may imply) and the question of who pays for them, but also with costs caused by all other water uses (e.g. water abstraction etc.) and the question of who covers these costs. So, a broad definition of the "polluter-pays-principle" is to be assumed.

In the Water Framework Directive, the polluter-pays-principle is closely related to the principle of cost recovery. The principle is mentioned on four occasions in the Directive – twice in the preamble, where it is invoked as a general principle of European environmental policy, and twice in Article 9 WFD, stipulating that cost recovery of water services and the adequate contributions thereto should be in accordance with the polluter-pays-principle. These two concepts--cost recovery and the polluter pays principle--are the core elements which relate the cost of water services to the price that users of those water services pay. The concept of cost recovery, establishes the overall *amount* that users are charged for water services, while the polluter pays principle establishes how these payments should be *allocated* among water users.

Whereas these principles of cost recovery and polluter pays have a long tradition in some EU Member States, this is currently not the case in others. In addition, the agricultural sector is of special importance here, not only due to the high levels of pollution caused by some agricultural water uses, but also to the high percentage of water use attributed to agriculture in some EU Member States.

2.3 Key Messages

- Though the core ideas of article 11 and article 9 WFD are fairly straightforward, their effective implementation requires precise definitions of terms and an understanding of how the underlying core concepts can be interpreted in practice (see chapter 3).
- While there is agreement that incentive pricing is a potential cost-effective measure (article 11) to reach WFD objectives and therefore needs to be considered, further clarification is needed on which types of interaction with the water environment (water uses/water services) the requirements of article 9 of the Directive relate to (see chapter 3.1).
- The polluter-pays principle - as a general principle of European environmental policy - is one of the central organising principles of the WFD. The polluter-pays-principle is concerned not only with costs related to pollution and the question of who pays for them, but also with costs caused by all other water uses (e.g. water abstraction etc.) and the question of who covers these costs. At the same time, some possibly cost-effective measures for the implementation of the WFD might be in conflict with the PPP. This can be acceptable in the short/medium term as a transition solution in order to reach the WFD objectives at least cost.
- In some areas current agricultural practices are not (fully) consistent with the polluter pays principle. Water pricing could be one way of improving this situation.
- Water pricing as a economic policy instrument is an important part of WFD implementation, but does have implications which reach over a much broader field than just environmental policies; therefore, the social and economic aspects of WFD implementation always need to be kept in mind.
- While adequate contributions of water uses to the cost recovery of water services are important for ensuring the sustainability of both the water infrastructure and the environment, the issue of whether water users or users of water services need to contribute to these costs needs to be clarified (see chapter 3.1). At the same time, it also is crucial to consider the incentive effects of water pricing on water users in order to support efficient water use (including pollution).
- Article 5 reports of the WFD offer a variety of information of importance to Article 9 issues, but considerable information gaps exist.

3 How to move towards sustainable water pricing policies in the context of WFD implementation?

Water pricing is a potentially effective and powerful steering mechanism for influencing the behaviour of water users. However, water is not a regular economic good[19]. Since there are no substitutes for or alternatives to the use of water[20] and since water is a necessary basis for many economic activities – including agriculture – with large social importance, care must be taken in policy decisions that affect the costs of water use.

Consequently water pricing and cost issues have been considered for a long time. The WFD offers the opportunity to revisit the issue in order to establish possibilities for improved water management decision making. It needs to be pointed out that the practicability and efficiency of a water pricing system often depends on external factors. For example, the effects of water pricing on farmers' decisions may be negligible in comparison to the effects of the CAP reform on farmer's decisions. These aspects therefore need to be considered and will be touched upon in this paper.

In addition, many EU-Member States have relied to a great extent on "command-and-control" systems in order to reach water-related environmental objectives. While it is feasible to integrate incentive elements into such systems (e.g. through using water pricing) in order to combine "carrots and sticks", the potential practical linkages and consequences need to be considered carefully in order to reach the environmental aims at the lowest costs.

In the context of WFD implementation, the water pricing system is bound by a number of requirements, including the following:

- The pricing system should support the implementation of programmes of measures established under Article 11 WFD, in adherence with the general cost-effectiveness requirement for the programmes of measures. In fact, the programmes of measures may include non-structural policy instruments that directly affect the pricing system, such as taxes, charges or tradable permits;
- In accordance with Article 9 WFD, the water pricing system must ensure that the principle of cost recovery of water services is taken into account, including the environmental and resource costs associated with water services. In practice, this means that cross-subsidisation of water services should be reduced or eliminated;
- In accordance with Article 9 WFD, the water pricing system must be in accordance with the polluter-pays-principle and must provide adequate incentives for an efficient use of water resources;
- The unique national, regional and local circumstances related to water use (environmental, but also economic and societal) need to be taken into account in setting water-pricing policies and price levels;
- The pricing system needs to consider the social and economic effects of possible solutions in order to ensure the sustainability and acceptability of the overall approach. Therefore, undue social and economic hardships may be avoided. If a reform of water pricing meant that entire sectors and industries would be priced out of the market, the costs of such approaches would in most cases be considered to be

[19] The first sentence of the WFD preamble states that "water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such."

[20] It needs to be noted here that alternative technologies consuming less water for the same water use do exist.

disproportionate.[21] In such instances, the potential for temporary exemptions or targeted support measures needs to be evaluated in order to ease such adverse effects.

Based on these considerations, this chapter firstly highlights some crucial WFD terms that need to be specified further for practical implementation purposes. Secondly, some considerations for the use of water pricing in WFD implementation are presented, including some illustrations from Member States of their efforts on these issues. Finally, options for approaching incentive pricing in the WFD implementation context are discussed, while current developments in the context of WFD implementation are sketched out.

3.1 Introducing the key concepts of WFD water pricing

The main importance of water pricing in the WFD lays in its potential role as part of the cost-effective sets of measures for WFD-implementation.

Additionally, the provisions of Article 9 WFD, on cost recovery and water pricing, are phrased in rather general terms and need further clarification and specification to facilitate their practical use. The main questions resulting from the WFD text are:

- What are **water uses**, what are **water services**?
- Does the **content of article 9 apply partly to water uses or only to water services** and the consumers of water services?
- Which **cost categories** should be considered for cost recovery, and how can they be measured?
- What is an **"adequate contribution"** of water uses to the cost recovery of water services?
- How should water pricing policies provide **adequate incentives** for efficient water use?

Some of these issues have been discussed extensively, others not at all. From the previous work on these issues, some responses can be given.

In the context of the "Common Implementation Strategy" (CIS) of the WFD[22], a number of working and drafting groups have produced (legally, non-binding) guidance documents of relevance to the Article 9 provisions. Based on the guidance document by the "Water Economics" (WATECO) working group, the Drafting Groups Eco 1 (especially the cost recovery information sheet) and DG Eco 2 (information sheet on environmental and resource costs) have introduced valuable additions and clarifications.

[21] The WFD implementation measures might lead to a more efficient structure of economic activity in the long-term, so significant costs/changes in the short term might be considered proportionate. Even if this is the case though, the political acceptability and practical implementation of such measures might be very difficult.

[22] See http://www.eu.int/comm/environment/water/water-framework/index_en.html.

Box 1: Definition of water services and water uses[23]

Water services are defined in Article 2 of the WFD as: "all services which provide, for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; (b) waste water collection and treatment facilities which subsequently discharge into surface water." According to the DG Eco 1 information sheet (2004a, p. 3): "Water services are seen as intermediaries between the natural environment and actual water use." As the WFD does not provide a categorical specification of what should be included as a water service, the Member States have room to interpret this definition.

In practice, the key point is to link the water services included in the assessment with the findings of the pressures and impacts study. In other words, water services should be included in the assessment if the pressures and impacts study of Article 5 WFD identifies them as having a significant impact on the status of water bodies.

The Directive does not specify whether the services which should be included are public or private and if they include self-supply services. However the WATECO guidance document (p. 4, Annex II.III, cited in the DG Eco 1 information sheet on cost recovery, p. 3) states that: "To achieve maximum transparency, to ensure equitable and effective treatment vis-à-vis the internalisation of environmental and resource costs, and to preserve competition between economic sectors, water services should, where necessary, include both services provided by third parties and self-services."

Water uses are defined in Article 2 of the WFD as: "water services together with any other activity identified under Article 5 and Annex II having a significant impact on the status of water."

Therefore, agricultural irrigation is a water use, while irrigation water provided by third parties is a water service. In the case of self-abstraction, these must be assessed in a case-by-case manner to determine whether they have significant impacts on the status of water bodies and should therefore qualify as water services.

It should be noted that the distinction between water services and water uses is of relevance for the application of the water pricing provisions in Article 9 WFD:

Box 2: Does article 9 of the WFD deal only with water services?

There is general agreement on the issue that all water uses (including agriculture) need to contribute adequately towards achieving the article 4 environmental objectives through the programme of measures (article 11).

At the same time, There is a need to clarify which types of interaction with the water environment (water uses/water services) the requirements of article 9 relate to:

1. The first interpretation of the directive text, sees water services in the centre of the cost recovery requirements of article 9, while **water uses should adequately contribute to the cost recovery of water services.** This interpretation of the cost recovery content of art. 9 has been used so far e.g. in the guidance document of the WATECO working group and the information sheet on cost recovery. Additionally, incentive pricing and the polluter-pays-principle would apply to both water uses and water services under this interpretation.

[23] This box is based on: CIS ECO1-Information sheet on the assessment of the Recovery of costs for Water services (CIS Working Group 2b, 2004a).

2. The second interpretation is that the **definition of water uses in article 2 (39) is not of relevance to the Art. 9 content**. Article 2 (39) states that "this concept [of water use] applies for the purposes of Article 1 and of the economic analysis carried out according to Article 5 and Annex III, point (b).". No mention is made of article 9. Therefore, whenever the term "water uses" is mentioned in article 9, it is interpreted as "water service uses" (assuming a narrow interpretation of water service, as "consumers of water and sewerage industry services").

Three main implications result out of the second interpretation in the context of agricultural water use. Since diffuse pollution/self-abstractions are (in most EU Member States) not seen as water services and article 9 is here not applied to water uses,

- the **costs imposed on water service**s through e.g. diffuse pollution (such as additional treatment costs for drinking water) or other water uses **do not have to be accounted for** in the overall estimation of water service costs in the context of article 9 implementation;
- **no appropriate contribution** must be made by agricultural water uses (e.g. diffuse pollution/self abstractions) **towards the recovery of water service costs** based on article 9;
- **incentive water pricing does not have to be introduced for water uses** e.g. for diffuse pollution/self abstractions etc. based on article 9.

3.1.1 The different cost categories of relevance for incentive pricing and cost recovery

When considering the incentive function of water prices and the extent to which the polluter pays principle should apply, it is important to clarify which elements constitute the overall water price in agriculture. According to the WFD, an adequate contribution to the costs of water service provision has to be ensured taking into account the cost recovery principle. Taken together, three cost categories - financial, environmental and resource - constitute the economic costs of water.[24]

Financial costs. Of the three cost types, financial costs are the most straightforward to define and measure (except where internalised external costs are included). According to the WATECO and CIS DG ECO 2 documents, financial costs are all the investment, maintenance, operating, and capital costs associated with providing water services. These costs are, for the most part detailed in financial budgets and are therefore also the most easily quantifiable cost type. The financial costs for water provision services, for example, can differ considerably according to what kind of water use is intended (e.g. drinking water costs and agricultural water costs can vary considerably due their different quality standards). It is crucial here that subsidies (both direct and cross subsidies from other users) need to be considered separately from other cost elements under the financial costs. Subsidies have a substantial impact on prices and charges: through direct investments, preferential interest rates or accelerated depreciation, the apparent cost of water services is reduced, allowing for a cheaper provision of these services. However, from a wider economic perspective, these apparent cost reductions are merely a transfer. Therefore a clear indication of their incidence and allocation is needed for the cost recovery assessment.[25] This cost category including a

[24] In most cases it is quite difficult to estimate these numbers exactly but the indication of orders of magnitude could be a possible approach.

[25] For the assessment of cost recovery, accounting for subsidies remains a challenge. Existing data sets often do not allow for a comprehensive analysis of subsidies at the scale of river basin districts, or even at the national level. Therefore, information is required on the level of different subsidies (such as granted benefits, direct

good understanding of the related subsidies is therefore very important for a better understanding of the incentive function of a water pricing policy (see also section 5.1).

Environmental costs: The WATECO Guidance Document (based on the EU communication on water pricing policies; the CIS DG Eco 2 document has kept this definition) defines environmental costs as "the costs of damage that water uses impose on the environment and ecosystems and those who use the environment" (WATECO, 2003, p. 70). Unlike financial costs, environmental costs are frequently related to non-priced environmental services (e.g., the amenity value of clean rivers) and are therefore more difficult to quantify. To estimate the monetary value of environmental costs requires sophisticated economic techniques.[26] The resulting values can only provide likely scales of cost that may have a wide range of uncertainty. This makes internalisation of environmental cost according to article 9 quite difficult.

However, internalisation of environmental costs can also take place by imposing emissions standards on sectors (many Member States have imposed emission standards), assuming that these emission standards were chosen at that particular level because at that level marginal social costs equal marginal social benefits, including environmental and resource costs and benefits. In this situation, the costs that have to be made to meet the requirements (e.g. emission abatement costs by agriculture) can be seen as internalization of environmental damage caused by the (reduced) emissions. The remaining emissions are seen as socially accepted emissions, for which the sectors should not be charged additionally. If it is decided that the internalized environmental costs are insufficient, this means that the emission standards should be adjusted. This is however a political decision. (to achieve WFD objectives, some existing emission standards might have to be tightened, thus suggesting that at present environmental damage caused by the respective substances is not internalized in full, however this does not necessarily prove that the environmental damage estimates in the past were wrong, but might also reflect changes in social preferences).

Resource costs: the most recent definition agreed at the European level is found in the CIS DG Eco 2 document, pp.2: "Resource costs are defined ... as the opportunity costs of using water as a scarce resource in a particular way (e.g. through abstraction or wastewater discharge) in time and space". They equal the difference between the economic value [...] of present or future water use [...] and the economic value [...] of the best alternative water use (now or in the future). Resource costs only arise if alternative water use generates a higher economic value than present or foreseen future water use."

The concept of resource cost is very important for irrigation, which is a major water use in water-scarce regions. Resource costs arise in those cases where higher income / added value associated with alternative water uses is foregone because water abstraction has already been allocated to irrigation.

Here, an important issue is whether all alternative uses of water and the income forgone are to be considered (e.g., water currently used for irrigation could be used for activities associated with tourism) or if one looks only at alternative uses within the agricultural sector (e.g.,

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investments from other levels of government, lower interest rates for investments, accelerated depreciation, etc.). In addition to subsidy payments made to water service providers, cross-subsidies between different user groups also need to be addressed (Pielen et al. 2005, p. 12).

[26] Depending on what the objective is, the estimation of environmental costs can take place with different levels of detail and academic rigour. A full-fledged calculation of environmental costs will normally require an original valuation study, using revealed- or stated-preference techniques. If a broad-brush estimate is sufficient, benefit transfer or damage avoidance cost offer less elaborate alternatives; however, the results are likely to be less robust, expressing the probable environmental costs through ranges rather than providing a definite number.

irrigation for other crops, or using other irrigation practices). This decision depends on whether there is another explicit, overarching policy objective (e.g., agriculture has to be maintained in a specific case in order to ensure food security, etc.) thus restricting the potential to shift water consumption to other water uses. Also, when comparing the potential added value of alternative water uses, it is difficult to decide which alternative uses should be considered and to what extent, in order to construct realistic alternative scenarios. For example, irrigation for luxury golf-courses may provide a very high added value, but since not agricultural area could be transformed into a golf course, the extent to which a change in water use is feasible needs to be accessed carefully.

3.1.2 Interpreting the ”adequate contribution” of water uses to the cost recovery of water services

In the context of measure selection for WFD implementation according to article 11 and when looking at the agricultural sector, the issue of cost recovery is potentially important for activities (water uses) related to irrigation or diffuse pollution for example. Therefore, the agricultural sector must also be brought into the picture where the costs of certain water services (e.g., drinking water provision) are influenced by agricultural water uses (e.g., diffuse pollution). If this is the case, the water user (farmers) should make an ”adequate contribution” to the cost recovery of water services (drinking water suppliers). Of course, need for an adequate contribution from a water use is only valid in case where article 9 is interpreted in a way that water uses are included into the article´s content.[27] This discussion is largely about the extent to which the polluter-pays-principle can be applied to agriculture, in order to reimburse water suppliers' costs for treatment and purification. So far, the question of what constitutes an **adequate contribution** has not been addressed in detail at the European level.

The way the “adequate contribution of a water user contributing to the costs of water services” will be interpreted and applied will in practice determine the relative contribution to the water service (e.g. drinking water provision) costs of:

- the users of a water service (e.g. drinking water consumer) and
- the water users contributing to the costs of water services (e.g. agricultural use).

3.1.2.1 Providing adequate incentives for efficient water use water pricing policies

Another area that needs further work is whether a water-pricing policy provides **adequate incentives** to encourage a sustainable use of water resources. So far, the CIS DG Eco1 document on cost recovery states (p. 18) that an assessment of the incentive properties of the current pricing regime is needed and could be based upon existing results of surveys on pricing (e.g., studies on alternative charging mechanisms) carried out nationally, at river basin district level or for specific water services or user groups.[28] As an general rule, as long as significant water related environmental problems exist, one should examine different instruments to tackle pollution, of which water pricing could be one. While other external factors might be the main reasons for these problems, it might be possible to adjust the water pricing policy in such a way that it provides better incentives for sustainable water use.

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[27] See chapter 3.1 Box 2 for the discussion on the two possible interpretations of article 9 application.

[28] See, for example, Varela-Ortega et al. (1998) or Mejía et al. (2004) on the effects of price changes on agricultural water uses. Both authors argue that the impact of price changes on water demand is highly site-specific, depending on tariff schemes, crop types planted, soil and climate, as well as institutional structures of the water supply system.

To summarise, some work has been carried out in order to clarify and operationalise the main WFD concepts and terms related to water pricing and cost recovery. However, additional work is needed in order to support the practical implementation of these concepts. This can only partly be addressed at the European level as local circumstances differ significantly within the EU, thus requiring a certain flexibility in the interpretation of terms and definitions. At the same time, the flexibility and openness of the key WFD concepts has caused some methodological difficulties[29] that need to be tackled to have consistent and comparable results. This comparability is especially important in transboundary contexts in order to allow a balanced assessment of cost recovery but also a base for potential measures selection in transboundary river basins[30].

While the assessment of environmental and resource costs presents a methodological and empirical challenge, it is also important not to underestimate the relevance of recovering financial costs. In the case of agricultural irrigation, for example, the recovery of infrastructure costs – including maintenance and replacement costs – would already have a significant impact in many instances, especially if significant subsidies for irrigation equipment were also accounted for.

Even if some of the methodological and practical issues related to cost recovery and incentive pricing are not resolved, Member States are currently working towards a better understanding of the current water pricing policies and have initiated discussions and activities to redesign and complement their current pricing policies in a way that supports WFD implementation. These activities by themselves will provide insights leading to clarifications of definitions and practical implementation options.

3.2 Main challenges for water pricing in the WFD

The importance of water pricing and the possibilities of establishing a revised pricing scheme in support of the WFD objectives, varies significantly not only across EU Member States, but also from region to region. In order to understand the complex interactions of environmental problems, incentives, payments and behavioural changes of users in order to estimate the current and future efficiency of a water pricing system, the following questions must be addressed:

- What are the financial, environmental and resource costs of a particular water service and to what extent are these covered?
- If an environmental problem exists (risk of not reaching the WFD-objectives in specific water bodies), what changes can be expected from a change in the pricing regime (on water use behaviour, income changes of the water users involved, impacts on the aquatic environment etc.)?
- What is the importance of external elements/other policies on the behaviour of actors, (e.g., agricultural subsidies in the context of CAP)?

[29] For example, Heinz (2005a and 2005b) argues that the three cost categories mentioned above are defined in official WFD documents in ways that could lead to overlaps, double counting, and divergent measurement methodologies being used by the Member States. As a consequence, no differentiation between environmental and resource costs is currently being made in some Member States. A significant amount of further work still needs to be done to increase the rigour and accuracy of cost estimates.

[30] The upcoming policy-oriented research project under the sixth framework programme of the EU called AQUAMONEY will explicitly work on practicable and comparable way for estimating environmental and resource costs in Europe.

It is crucial, therefore, to have sufficient information to estimate the value of water as an economic factor in a specific situation.

It should be pointed out here that the institutional framework needs to cover the possibility of restricting access to water. In those EU Member States where there is no legal basis to restrict land owners from abstracting water as they wish, it is not possible to introduce pricing systems in support of WFD implementation in the short to middle term.

3.2.1 Improving the information base on agricultural water pricing

Before looking in more detail at the different elements constituting the value of water and potential price-induced changes in behaviour, certain basic information is required to provide a basis for analysis (see also EU Commission 2000, p. 13 and 14). The main pieces of information that are necessary are the quantity of water that is actually consumed (metered), the current tariff structure and level of cost recovery, and the value generated by water uses (measured as marginal productivity of water). These concepts are briefly explained in the following:

Information on crops and areas cultivated and water actually consumed

For water abstraction, sufficient information regarding the quantity of water abstracted (both overall quantity and the quantity used specifically for agricultural use) is required. Concerning agriculture in Europe, there is very limited metering of individual consumption. So, the installation of metering devices and the use of satellite imagery needs to be supported in order to achieve a better knowledge of particular uses and to enable the introduction of volumetric pricing structures.[31] Without such knowledge, the prospect of detailed and targeted tariff structures is limited considerably, which makes a demand management approach to water pricing difficult. In addition, a high percentage of unofficial, illegal water abstractions will place an significant impediment in the way of a well-functioning pricing system.

In addition, in order to relate water abstractions to their use, it is necessary to know what crops are cultivated in the specific area of interest.

It needs to be pointed out that the costs of the collection of such additional information, may be considerable (e.g. for metering), thus influencing in how far it is worthwhile to consider changes of water pricing schemes from case to case.

3.2.1.1 Information on pricing and tariff structures and the current level of cost recovery

Since prices for agricultural water uses are often set at a local scale, a compilation of these structures for a specific case is needed in order to gain an understanding of the current situation.

[31] see also EU Commission (2000), p. 13.

Box 3: Current cost recovery levels for irrigated agriculture in Europe

Summing up the situation in Europe, most irrigation charges are area based which supports a low water use efficiency rate. While farmers using irrigation water through their own wells (self-supply) pay the full financial costs of their water supply, they are never charged for the environmental and resource costs resulting from their (over-) abstractions (EU Commission 2000, p. 11).

At the same time, the assessment of the current level of cost recovery in the context of WFD implementation (Article 5 reports) has not been thorough enough in most Member States and river basins and has generally been restricted to the financial costs of water services (due to the methodological restrictions in assessing the environmental costs in particular and to a lesser extent the resource costs, see section 3.1).

A common view regarding financial cost recovery levels is that with the current agricultural water pricing system, even the financial costs are only partially covered[32]. In particular it does not provide sufficient financing for the investment costs[33], but only for limited operation and maintenance costs.

On the other hand, some recent evidence shows that in Spain, the financial costs of water services (including investment costs) are largely covered, although the actual level of cost recovery hinges on a number of assumptions regarding depreciation schedules and subsidies.[34] Generally speaking, the cost recovery level is considered to be higher in Northern than in Southern Europe.

Overall, the WFD Article 5 reports have compiled a large amount of available information and at the same time identified the major information gaps that need to be closed within the next 2-3 years in order to move towards WFD implementation.

3.2.1.2 Information on added value of agricultural water uses

Besides the costs of water services[35] as set out in the WFD, the added value by the use of the water in agriculture must be considered in order to understand how water pricing affects (or could affect) the use of water in agriculture.

Therefore, it is necessary to obtain information on the financial added value of agricultural activities, i.e. the productivity of water use in agriculture. Information about the financial

[32] "Overall, the full recovery of financial costs is only partly achieved. This is particularly valid for sewerage services and for the agricultural sector, especially in Southern European countries where this sector is by far the largest and least efficient consumer of water and where scarcity problems are greatest. Agriculture pays much lower prices than other sectors, as a result of both direct subsidies and cross-subsidies with financial transfers from the household and industrial sectors to agriculture." EU Commission (2000), p. 10. Similarly, based on OECD(2001, "Environmental Indicators for agriculture"), Floor Brouwer states that (OECD 2002, Brouwer): "In many OECD countries public bodies manage large irrigation works, especially those involving surface-water reservoirs, and the price of water supplied to farmers rarely reflects total costs of delivery, much less external costs."

[33] See: http://europa.eu.int/comm/environment/agriculture/pdf/irrigation_xs.pdf.

[34] See Spanish WFD Art 5 report : http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/implementation_documents_1/wfd_reports/member_states/spain&vm=detailed&sb=Title; A crucial assumption here is using mostly historical cost accounting, so any large capital (infrastructure) investments older than 30-35 years are already amortised; Garrido (2005) considers this period to be too short for this kind of infrastructure. See also Pielen et al. (2005) on the issue of subsidies and cost recovery.

[35] See chapter 3.1.

added value is ideally specified per cubic metre of water used for a particular crop, or per hectare of that crop. In order to use this information to evaluate existing or potential incentives of water pricing, the added value should further be broken down, indicating which part of the added value can be attributed to financial transfers (CAP payments, structural and cohesion payments, etc.). This distinction is crucial in order to assess the influence of payments on water-related decisions made by farmers.

In addition to the direct financial added value, it is also possible to estimate any positive environmental effects related to this agricultural activity, as well as social and societal added value (e.g., employment generated, support of rural development, etc.). Here, the difficulties for estimating these values, especially the environmental effects, are again significant.

3.2.1.3 Relating water prices to the costs of water services

In the context of selecting cost-effective sets of measures for WFD-implementation, the estimation of the costs of both water services and water uses (see section 3.1) is of use for estimating cost recovery levels and for considering the need for measures to internalise external costs, but also is relevant for assessing whether the current pricing regime provides adequate incentives for an efficient water use. If part of the costs is not reflected in the water price, this means that prices do not transmit the right incentives to water consumers. For example, if the environmental costs linked to the provision of water are not represented in the agricultural water price, water consumption will be higher than the sustainable level of water consumption[36].

So, if the current incentive structure is not considered to be adequate, implementing measures for changing these incentives (e.g. changing the water pricing structure) might be part of cost-effective sets of measures (after being compared with other possible measures for achieving the WFD-objectives).

3.2.2 Lower water consumption through higher prices? The issue of elasticities

The crucial question related to the potential for increasing incentives for a more sustainable water use is **whether higher water prices actually lead to a reduction in water consumption**. In economic terms, this is measured as an elasticity: by how much does consumption change in response to a change in price? The higher this elasticity is, the more responsive consumers will be to price changes. The extremes are inelastic demand – where the same quantity is demanded irrespective of the price – and completely elastic demand, where even a small price change will completely change the demand. Closely related to the issue of elasticities, especially for the consideration of the feasibility of such options, is the issue of the income-related effects such higher water prices would have in the agricultural sector.

In general, water pricing policies has a **demonstrable impact on the water demand** of different uses, especially for the agricultural sector. As a direct result of pricing of water use and pollution, the pressure on water resources is generally reduced. However, the actual effect of a given change in water prices (e.g. a 10% increase) is hard to predict, as it will depend on a number of factors:

- **Time frame** of the analysis: price elasticities for irrigation water tend to be low in the short-run, as farmers have little alternatives to reduce water consumption once the

[36] For an overview on the main issues related to the estimation of the different cost categories, see EU Commission (2000), p. 14 and 15.

crops are planted and growing; therefore changes in crop selection or irrigation technology need time to be implemented. Over a longer time frame, farmers have the option to change their consumption behaviour, e.g. through investment in water-saving technology; therefore long-run elasticities are higher (RPA 2000)[37].

- **Price level**: the price elasticity of water demand is not constant, but changes with different price levels. As Massarutto (2005) argues, elasticity tends to be highest for medium price levels, and lower at the extremes. For very low prices, the effect of a price change on consumption is negligible, as consumption is determined by technical necessities rather than by prices. For high price levels, elasticity is lower as a certain minimum water consumption is indispensable. At some very high cut-off price level, agricultural activities will no longer be economically viable, hence consumption drops to zero.
- **Crop type**: the added value of agricultural water use is highly crop-specific and can shift markedly in response to product market conditions (RPA 2000). Within margins, farmers have the opportunity to shift to other, less water-intensive crops or crop varities, however this does not hold for all farmers everywhere[38].
- **Farm type**: the response of farmers will depend on several farm characteristics, including the farm size, the ownership structure, the management (e.g. full-time vs. part-time farming), the business model of the farm (i.e. market-oriented or quality-oriented farming, with the latter category including niche markets like organic farming or geographic indications), and the capital- / labour-intensity of production.
- **Existing infrastructure**: the potential for water savings in response to price changes is largely determined by the technical endowment, i.e. the water supply infrastructure in place. As Varela-Ortega et al. (1998) demonstrate for the case of different Spanish water districts, elasticities tend to be higher in water districts with older infrastructures in place, which have ample margin to improve their technical conditions and save water, while modern water districts are already endowed with up-to-date technologies and have less potential for further savings.

Several studies have researched the response of agricultural water users to price changes, both from a theoretical and from an empirical perspective[39]. However, information on the impact of pricing on the physical environment remains limited (EU Commission 2000).

As a consequence of the above considerations, the increase in water price that would be needed to have an effect on water consumption will often be extremely high: As the Water Scarcity Drafting Group (2005, p. 82) notes, “especially in the case of irrigation water, the effectiveness of price increase is affected by the difference between the value per unit of water to the user (the shadow price of water) and the much lower price charged per unit of

[37] The issue of inelastic short-term demand is also dealt with in OECD (2001), p.20.

[38] There is even a possibility that under certain circumstances, a higher water price may lead to increased demand if there is a move towards producing higher value crops. Through the higher price of water, farming of lower value crops may not generate any positive income. Therefore, the alternative of higher value crops becomes a potentially feasible option, while (sometimes significant) investments are needed for this shift. This means that raising the water price does not necessarily reduce absolute water consumption, but only reduces consumption per unit of value obtained (i.e. increases water productivity). Of course, the potential added value of a higher value crop strongly depends from the CAP payments related to this crop.

[39] See e.g. Massarutto 2002, 2005; Varela-Ortega 1998; RPA 2000 for an overview of studies. For a compilation of studies – mostly from Spain – addressing the elasticity of demand, see Garrido and Calatrava (2005), summarised in Garrido (2005).

water. In many countries, that difference is so big that for any price increase to be effective, it has to be so high, that political considerations may arise that will prohibit it from happening."

The fact that water demand will often be fairly inelastic, especially in the short run, leads to the danger of overshooting: If price incentives are used as the only measure, the price required to achieve a given a water conservation standard could actually exceed the true cost (including environmental and resource costs) of the related water use.

Just as price elasticities of water demand can vary from case to case, the impact of a water price change on farmers' income also varies greatly depending on the specific circumstances:

- in some cases, the higher water price would lead to a lower water consumption as farmers implement simple water saving measures, without any significant income effects. In this way, price changes lead to changes of farmers' irrigation behaviour but do not affect the crops produced or the income generated). In such win-win-situations, the introduction of pricing is beneficial to everyone and this situation should be promoted as far as possible[40];
- in other instances, the increase in water price might reduce agricultural income. While the "significant range of prices for irrigation water [that can presently be found in Europe] shows that farming communities are likely to adapt to a certain level of price increase" (EU Commission 2000, p. 12), this flexibility can only go so far. If the price increase exceeds a certain threshold, the income effect might be greater as farmers give up irrigation.

Thus, having detailed information on price elasticities is crucial in order to better comprehend decision-making at the farm level. This must be understood in order to access the potential effects of water pricing changes, both from an economic/social and environmental point of view.

Considering that the EU (as demonstrated by the CAP) also values the social and economic effects on farmers and rural communities, a dramatic jump in input costs for farmers is likely to be socially undesirable especially if it has little impact on water abstraction rates[41].

3.2.3 The importance of other policies for achieving the WFD objectives

In order to understand and find ways to approach the WFD objectives, it is crucial to realise that water pricing neither starts on a blank page nor does it represent the sole relevant policy.

Water users already face a number of incentives, both market-related and non-market ones. Such incentives need not be directly related to the water price. Other powerful incentives are given by the value of marketed products for which water is used as an input (including the prices of agricultural produce). As seen in the discussion above on the added value thorough agricultural production, these prices strongly influence how much added value can be created by putting water to a certain use.

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[40] See for example EEB (2000): "Apparently it is thus possible for farmers to react to the introduction of a comprehensive pricing scheme with a reduction in water demand without even changing their crop patterns or production method let alone giving up their business. Just by increasing efficiency and avoiding leakage they can keep their water bills from going up." Some authors see a potential of approx. 35-40 % reduction to water consumption in such cases Causape et al. (2004), and Luquet et al. (2005), cited in Garrido (2005), p. 8.

[41] In addition, some authors doubt the effectiveness of FCR pricing policy. The reason is that in some countries of the Mediterranean regions, land-planning and rural development is inextricably linked to the irrigation sector, so the transition to full-cost recovery prices will not be easy in many of these regions (Berbel et al. 2005, p. 29).

Many of these incentives are provided through the market, but they can also be altered through policy interventions (e.g., through support mechanisms for certain crops). Where they exist, such policy interventions may be justified with policy objectives that are entirely unrelated to the objectives of water management, such as the EU target to supply 5.75 percent of transport fuels from biofuels by 2010. A water-pricing mechanism that aims at efficient water use needs to take these ”exogenous” interventions into account[42].

This is especially important for payments related to the CAP[43], since the overall CAP objectives are not necessarily in line with the WFD objectives. It needs to be noted here that the present practice of water use in agriculture has been supported by European and national agricultural policies in the past. Therefore, in case of conflicting objectives, a political decision is necessary as to how the conflicting targets can be reconciled, keeping in mind that the environmental objectives of the WFD are mandatory and can only be lowered through the exemptions of Article 4.

To this end, the great advantage of the WFD set-up is the transparency required for such decisions, thus enabling an objective and open public exchange on these crucial issues.

Due to the great importance of CAP related payments for the incentive structure in agriculture, chapter 4 of this paper will explicitly deal with CAP payments in order to combine these issues in chapter 5.

CAP support mechanisms are much more influential for the efficiency of the pricing system due to their strong incentive function, which affects agricultural decision making more than any water pricing instrument. Therefore, critical questions arise regarding 1) whether it is more useful for reaching WFD objectives to change existing support mechanisms in other sectors rather than introduce new instruments in the water sector, and 2) whether the WFD objectives can even be reached in the first place unless the framework conditions in other sectors are adapted. However, even if an integrated strategy where existing support mechanisms in other policies were also changed, might be more cost-effective overall, it is clear that such a strategy is difficult and time-consuming to pursue, compared to a strategy that focuses primarily on water policy.

Therefore, agreement exists that while CAP support mechanisms in most cases are more relevant than water pricing in terms of the incentives they set for water use, water pricing incentives can represent a way to address pressures on water. So, water pricing as a potential means for implementing the WFD-objectives can be considered in specific cases also under the current status of the CAP.

3.3 Approaches to incentive pricing in the WFD

Based on the considerations sketched out above, EU Member States and the river-basin authorities have to consider potential methods for approaching incentive pricing and cost recovery by 2010.

Here, it is important to mention that in the short- to medium term, the available options are limited by the legal regulations in place (such as the current allocation of water rights, etc.). In the longer term, however, changes to the legislative framework should also be considered

[42] As the European Commission (2000, p. 20) states: “Co-ordination and synergy between water pricing and other policy domains of the European Union are key elements for economic and environmental effectiveness. Several policy areas are clearly relevant in this regard.”; these include, besides the CAP, horizontal policies like Structural and Cohesion policies and the European research policies.

[43] For an analysis of different effects of CAP on irrigation policies in EU Member States, see Massarutto (2000).

as an option (bearing in mind that considerable differences exist in the legal status of such regulations--and, in few Member States, may even have the status of a constitutional right).

In some Eu Member States, irrigated agriculture and the related abstractions are a minor issue for reaching the WFD-objectives. In such cases, water pricing for abstractions will have a lower priority in the considerations for WFD-measure selection.

3.3.1 Revising agricultural water tariff schemes

In order to approach the (theoretical) optimal water use, some main elements to be considered in a revision of a current and a move towards a more incentive-based water pricing system are:[44]

- Water pricing policies should **consider both surface water and groundwater**;
- It is crucial to have a **well-defined objective** for the water tariff scheme revision;
- Water scarcity or bad flow patterns are a precondition for a pricing scheme to have incentive effects, therefore **"maximum allowable quotas"** for the overall water use need to be set, based on the sustainability of the water resources;
- In addition, **specific limits for water consumption** need to be defined **per crop and per area cultivated** for the different regions, in order to enable the evaluation of the tariff structure needed for supporting a sustainable use of water;[45]
- The tariff should primarily be **related to the actual water consumption** rather than to the irrigated area.[46] Pricing structures should include a variable element (i.e. volumetric rate, pollution rate) to ensure they create an incentive for water conservation and reduction of pollution. This, once again, underlines the crucial importance of metering actual water consumption in order to provide correct incentives.
- The **administrative costs of new pricing policies** need to be assessed (e.g. transaction costs but also the costs for the information required to set an incentive price) as well as the **costs for introducing/changing tariff structures** (e.g. metering) in order to determine if its worthwhile changing the pricing regime. The predicted gains in efficiency need to out-weigh the costs of establishing and managing the new system, which might not be the case in all areas and for all environmental water related problems;
- A **transparent and fair pricing system** should be installed in order to raise its acceptability; at the same time, "[…..] improving the fairness or efficiency of a tariff often makes it more complex and more difficult to understand" (Water Scarcity Drafting Group, 2005).

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[44] This compilation is based on: EU Commission (2000), p.16 and 17.

[45] As an example, "an effective way to start introducing water pricing to the [agricultural irrigation] sector might be to calculate, at the appropriate geographical scale, a water quota per hectare and per crop grown based on the best practice in water use. Farmers using more than the determined quota would be penalised by sharply increased water prices." (EU Commission (2000), p. 21). It needs to be considered carefully here that water consumption for a certain crop can be very different from year to year and from region to region.

[46] The main types of tariff structures (excluding the initial connection charge) are: flat-rate tariff; uniform volumetric tariff; two-part or binomial tariff [...] and block tariffs. [...] Tariffs may be designed with several aims, which may in some cases be in conflict: efficiency, raising revenue to cover the costs of supply in a fair and equitable way, reducing environmental costs (abstraction and pollution), understandable for customers and applicable for administration purposes. (Water Scarcity Drafting Group, 2005, p. 81).

- **Phasing the introduction of new water pricing** schemes is needed both for reasons of affordability of the affected water users and political acceptability.
- The establishment of a new water pricing policy needs to be based on a **broad stakeholder consultation** involving all users concerned, which would contribute to the definition of water pricing policies, increase the chances of successful implementation, while making these policies socially and politically acceptable.
- Finally, while **social concerns** should not be the main objective of water pricing policies, in situation of unsustainable water use, they need to taken into account while designing new pricing policies. Therefore, an ex-ante assessment of the social welfare effects is needed (see also section 5.2) in order to identify suitable flanking measures to prevent or limit social hardships. This could be followed up by an ex-post assessment and corresponding correction measures.

Box 4: Volumetric Management of agricultural water: combining tools in the Charente river system, France

The department of Charente, is marked by the economic importance of its agricultural activity (both cereal and feed crops). Irrigation is particularly well-developed in this sub-basin, a third of the utilised agricultural area is irrigated. The hydrological system of the Charente is characterised by strong outflows in winter and by periods of severe low water during the summer. This has caused chronic imbalances between availability of the resource and uses during low flow periods.

Several solutions are available to managers of the resource: (i) impose rules for a **decrease in withdrawals** up to the observed deficit, (ii) create **new resources** or (iii) implement **deficit management tools**. As a result of negotiations, all the actors involved, including representatives of the agricultural profession, decided to combine the 3 solutions (Hardelin, 2003). Consequently, in the year 2000, the Mas-Chaban dam, was created to support the low water levels of the river and two management tools were implemented: a pricing system for agricultural water and a **Volumetric Management (VM) mechanism**. Various follow-up measures of an advisory, training, and informative nature were also implemented to increase the effectiveness of the previously mentioned tools. In cases of water stress, the intensity of which is measured by the river flow downstream, the volumes allocated to agriculture can be reduced up to a complete ban on pumping if needed.

The 1992 French water act, rendered the **metering of water** progressively obligatory and made it easier to establish fees. In the area, a **two-part pricing system** of the river water and it's accompanying ground water was established with a fixed rate and a variable rate. The price-scale established, however does not motivate water economy but is calculated to ensure a budget for the dam management. VM therefore is necessary to manage water scarcity. VM is a system where the balance between supply and demand is determined based on the knowledge of the volumes withdrawn from a foreseeable resource. The following principles apply in the area: (i) each farmer is allotted a reference volume according to historic use and needs, (ii) a calendar for the distribution of this water quota during periods of low water is instituted, (iii) rules for restrictions based on the state of the resource are developed so that if flow falls farmers must reduce use and (iv) a system for monitoring the irrigators' practices is set up. The farmer generally does not incur any sanctions when he uses more than the recommended volume per period. When total usage over the irrigation period exceeds the reference volume, the price per cubic meter of water is multiplied by 10 and the excess in consumption can be deducted from his reference volume for the following year. As well as

the charges and VM, advisory services were established and financial aid for increased efficiency equipment.

The creation of extra resources in the Charente river basin favoured the respect of minimum low flow constraints without harming farmers and actual consumption is lower than the total authorised volume. The main question concerns the effectiveness of the VM instrument itself. Only 4 years after its implementation, it has required profound adaptations: replacement of the advised volumes by authorised ones, modifications of the rules applied for the alert levels and increasing the reality of the sanctions in cases where they would not be respected.

The real usefulness of this management style is in having built the foundations of the first management system based on the dialogue. But it remains some profound dissension among water actors (Granjou, Garin et al., 2004). Some voices coming from the environmental NGOs and also from farmers opposed to the dominant agriculture syndicates, denounce not only the high inertia in the decision taking for alerts during low flow periods, but also challenge the development of the irrigated corn itself, which economic profitability is an illusion since it is largely sustained by the CAP. Many non-irrigants believe the VM does not limit sufficiently the development of the irrigation in Charente and regret that irrigation alternatives are never envisaged nor discussed.

[Example provided by: the French Ministry of Environment[47]]

3.3.2 Using environmental charges and taxes in agricultural water pricing

According to the Commission communication on water pricing policies, the use of economic instruments (e.g., charges, taxes, tradable permits, etc.) gained increasing importance in the 1990's in support of environmental policy and was fully legitimised in the United Nations' Rio Declaration on the Environment and Development in 1992[48]. The central environmental role to be played by economic instruments is also recognised at the European level. The WFD explicitly mentions economic instruments as a potential "supplementary measure" for the implementation of the WFD (Annex VI Part B WFD, as well as Article 38 of the preamble).

Therefore, besides changing the water tariff structure directly, another option is to introduce economic instruments[49] like environmental charges and taxes for supporting both incentive pricing and an increase in cost recovery through the internalisation on environmental and resource costs.

[47] Example based on: Lobier, S, Aubrey, N., Christin, F. Giry, E., Garin, P., Malatere, P-O. (2005).

[48] The Convention on Biological Diversity (CBD) was signed by the Community and all the Member States at the United Nations Conference on Environment and Development in Rio de Janeiro from 3 to 14 June 1992.

[49] A variety of economic instruments can be used in water management (see DEFRA 2002 pp. 83-85, pp. 91- 92 and Annexes I and II) as well as Strosser/Speck (2005) for an theoretical overview and a summary of instruments in use in Europe; at the same time, for the aim of integrating the external effects of water use, charges and taxes seem to be the most appropriate and wide-spread instrument (DEFRA 2002).

Box 5: Financing of measures by agriculture to prevent nutrient leaching in Sweden

In Sweden there is a **tax on nitrogen** in commercial fertiliser of 1,80 SEK per kilogram of nitrogen (0,20 Euro). This amounts to approximately 25-30 million Euro per year (303 MSEK 2004). Since 2005 these funds are to some extent been used for financing measures in the Swedish rural development program. The program includes measures aiming to decrease nitrogen and phosphorus leaching from arable land. The money is paid by all farmers who use commercial nitrogen fertiliser but only farmers in some designated counties are allowed to apply for payment for countermeasures to nutrient leaching. The four countermeasures funded are catchrops, bufferzones, restoration of wetlands and spring ploughing. Each of these measures have a specific payment per hectare. A recent study carried out by the Swedish University of Agricultural Sciences, showed a considerable decrease in nitrogen leaching due to some of these measures. Effects on phosphorus leaching have not been evaluated. Some of these funds are also used to finance research on sustainable agriculture and some for a campaign involving individual on-farm advice on how to decrease nutrient and pesticide leaching. The combination of individual advice and payment for measures enhance each other.

In Sweden, there is also a **tax on pesticides**. In 2004 the tax was 30 SEK per kg active ingredient in the pesticide (3,2 Euro). This amounts to approximately 5 million Euro per year (48 MSEK 2004). To a great extent these funds are repaid to the agricultural sector and used to finance research and development activities to strengthen the competitive ability of Swedish agriculture including areas such as nutrient management, crop protection and the environmental aspects of the production.

[Example provided by: The Swedish Ministry of Agriculture, the Swedish Ministry of Environment, the Swedish Board of Agriculture and the Federation of Swedish Farmers]

The main aim of such economic instruments in the context of WFD-implementation is to correct the water price so that it reflects the ”true costs” associated with the use of water, thus giving the right incentives for efficient water use. To a large extent, this internalisation of external effects refers to the environmental and resource costs linked to a water use in a specific situation that are not depicted in the water price so far. This can best be achieved if there is information on the ”true cost” of water consumption. Ideally, this cost is expressed in monetary units per physical unit (e.g. cost in Euro per cubic metre of water abstracted or per square metre of wetland affected by a certain measure). This would allow some form of judgement on whether water prices provide an adequate incentive for consumers to use water resources efficiently. Here, it will be crucial to relate this incentive function to a specific objective within the context of WFD-implementation. If water prices are too low, and therefore do not provide the right incentives, economic instruments (e.g., charges) can be initiated in order to correct the incentives.

In addition to their incentive function and as seen in the example above, economic instruments can produce **revenue that can be used in different ways** (contribution to the general budget, earmarked for water-related activities/ measures for WFD implementation, compensation for economic/ social hardships incurred for the agricultural sector through WFD implementation, funds for increasing the national contributions to rural developments programs under CAP).

In summing up, the use of economic instruments can be closely related to the WFD implementation: as a potential cost-effective way of reaching the environmental objectives of the WFD, and at the same time supporting the aims of Article 9.

3.4 Key Messages

- There is general agreement on the issue that all water uses (including agriculture) need to contribute adequately towards achieving the article 4 environmental objectives through the programme of measures (article 11). At the same time, **further clarification is needed** on the question of which types of interaction with the water environment (water uses/water services) the requirements of article 9 relate to (see Box 2 for more details).
- Water pricing can be a **potential instrument** for reaching the objectives of the WFD in specific cases. The main terms and concepts (cost categories, adequate contribution to cost recovery, adequate incentives) have yet to be **specified further** in order to support practical implementation. This can only partly be addressed at the European level as local circumstances differ significantly within the EU, thus requiring a certain flexibility in the interpretation of terms and definitions.
- Even if some of the methodological and practical issues related to cost recovery and incentive pricing are not resolved, Member States are currently working towards a better understanding of the current water pricing policies and have initiated discussions and activities to redesign and complement their current pricing policies in a way that supports WFD implementation. These activities by themselves will **provide insights leading to clarifications of definitions and practical implementation options**.
- Many EU-Member States have relied to a great extent on "**command-and-control" systems** in order to reach water-related environmental objectives. While it is feasible to integrate incentive elements into such systems (e.g. through using water pricing) in order to combine "carrots and sticks", the potential practical linkages and consequences need to be considered carefully in order to reach the environmental aims at the lowest costs.
- While considering the **Polluter Pays Principle**, in some cases the financial costs of a water service (e.g., costs incurred by diffuse pollution to drinking water suppliers) are not covered by the polluters themselves. Efforts to reduce diffuse agricultural pollution are financed through payments /cross subsidies (e.g., for cooperative agreements or through CAP payments for agri-environmental measures). In that sense, the decision is taken that the contribution of a water user to these costs will not lead to full cost recovery, but to an "adequate" one. While such measures can be cost-effective for WFD implementation and create incentives of a more sustainable water use, **they are not fully in line with the polluter-pays principle**. Therefore, there is a need to consider how to deal with such payments in the long-term.
- While the main elements for setting up an incentive water pricing system can be established through water management (e.g. relating tariffs to actual consumption, transparency etc.), the **effects other policies (e.g. agriculture) have on decision making** is so large that they cannot be ignored when working on changes for water pricing policies.
- As one of the main policies of relevance in the agricultural sector, **the CAP has a large influence on the incentive and cost recovery aspects of water pricing**. Therefore, some of the main issues (CAP payments covering parts of the financial costs of water services, incentive CAP payments reducing the environmental costs related to a water use, payments increasing the potential added value of producing a certain crop and thus potentially increasing the resource costs of a water use) have to be discussed in the context of water pricing. Agreement exists that while **CAP support mechanisms in most cases are more relevant than water pricing in terms of the incentives** they set for water use, water pricing incentives can represent a way to address pressures on water**. So,**

water pricing as a potential means for implementing the WFD-objectives can be considered in specific cases also under the current status of the CAP.

- Charges and taxes can play an important role in reaching an adequate cost recovery level (through internalising (part of) the environmental and resource costs). In addition to their incentive function, they can produce **revenue that can be used in different ways** (contribution to the general budget, earmarked for water-related activities/ measures for WFD implementation, compensation for economic/ social hardships incurred for the agricultural sector through WFD implementation, funds for increasing the national contributions to rural developments programs under CAP).

4 The current Common Agricultural Policy and its payments

As stated in section 3.2.3, feasible water pricing policies need to take into account the other relevant EU-policies and sectors (e.g. industry, households, agriculture) that might enhance or hinder policy outcomes. The Common Agricultural Policy (CAP) is especially important in this context due to the large effects of agriculture on water affairs. This chapter will have a closer look at the different payments to farmers within the current CAP and their incentive function as related to environmental standards[50].

Since the introduction of the CAP, the common market organisations (CMOs) have gradually replaced national market organisations in those sectors where this was deemed necessary. This organisation of markets guaranteed producers a price higher than the price on the world market for their products. Import levies were introduced which protected producers against imports of cheaper competing products from outside the EU. When internal prices fell below a particular threshold, the market organisations had various instruments with which to intervene in the market and thus re-establish equilibrium. Further, the CAP offered subsidies and guaranteed prices to farmers, providing incentives for them to produce.

It is widely agreed that market interventions and price-support measures have for example encouraged greater agrochemical use than would otherwise have been the case.[51] They may also have promoted farming on marginally productive land[52]. Further, the "historical" payment system resulted in overproduction of certain products and planting of products without taking into account local environmental conditions leading to environmental damage.

4.1 Payments under the current CAP to farmers

As the different types of current EU CAP payments to farmers influence agricultural production in different ways, there is a clear need to understand the basic principles and funding mechanisms behind the CAP in order to design appropriate pricing systems. Further, there is a need to recognise the function these payments have, especially as such payments can support or run counter to the objectives of a water-pricing system. In general the current CAP is based on two areas (so-called 'Pillars') of agricultural expenditure[53]:

- **Market and income support (Pillar 1):** Under Pillar 1, market and income support measures are covered. They cover direct payments to farmers and continuing market-related subsidies under the common market organisations such as buying of products into public storage, surplus disposal schemes and export subsidies. The two main payment schemes under this pillar are single farm payments (SPS) and direct payments for certain products.

  The single payment is an annual income payment to farmers, aiming to ensure greater income stability. Farmers are free to decide what they want to produce in response to demand without losing their entitlement to support.

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[50] The CAP covers several other payments related to its market organisation. For further information see http://europa.eu.int/comm/agriculture/.

[51] It needs to be noted here that the statistical definitions/basis concerning the use of agrochemicals can differ significantly from country to country in the EU.

[52] Brouwer: OECD (2002).

[53] More information can be found at Herbke et al (2005): WFD and Agriculture – Analysis of the Pressures and Impacts - Broaden the Problem's Scope, and the Commissions website on agriculture http://europa.eu.int/comm/agriculture/.

For some products, Member States may maintain product-specific direct aids alongside the SPS where this is justified in order to avoid production abandonment or severe market disturbance as a result of moving to the SPS[54].

Farmers may receive such payments only when they heed the requirements of the Cross Compliance scheme. If a farmer fails to comply with those rules through negligence, direct payments may be reduced by between 5% and 15%. In the event of deliberate non-compliance, payments will be reduced by at least 20% and the producer may be completely excluded from receiving aid.[55]

The CAP reform also introduced the reduction in direct payments to farms to finance the new rural development policy("**modulation**").This mechanism allows the shift of a small portion of "pillar one payments" to additional funding of environmental services ("pillar 2 payments").

- **Rural development (Pillar 2):** Pillar 2 aims at encouraging environmental services, providing assistance to difficult farming areas and promoting food quality, higher standards and animal welfare. The payments for rural development should accompany and complement the market and income support policies of the common agricultural policy[56] The main objectives of the Rural Development funds are to strengthen European rural areas in various ways and to ensure the sustainable use of natural resources in such areas.[57] These objectives are reflected in the upcoming Rural Development Regulation[58] and its related funding mechanism which is built along four axis and sets out several rural development measures to improve the environment.[59] Due to the broad scale of measures provided, Member States have the opportunity to target these measures specifically to their needs and to cover a broad range of topics[60]. The new system of compulsory modulation (i.e., switching of funds from production to rural development) is used to finance the introduction of the new rural development measures.

4.2 Structuring current CAP payments to farmers in accordance to their link to environmental quality standards

In order to develop an efficient water pricing system as well as other economic instruments under the WFD, the link of the CAP payments to environmental quality standards should be recognised. Such payments might support or hamper the effectiveness of a water-pricing system but might also provide options to mitigate the effects resulting from the implementation of such a system. Figure 2 shows the relationship of the two CAP Pillars to environmental quality standards.

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[54] Specific support schemes have nevertheless been introduced for durum wheat, protein crops, rice, nuts, energy crops, starch potatoes, milk products, seeds, arable crops, sheepmeat and goatmeat, beef and veal, grain legumes, cotton, tobacco, hops, as well as for farmers maintaining olive groves.

[55] For detailed aspects of the Cross Compliance regime and its relation to water, see Müssner, et al. (2006).

[56] See Preamble of the Rural Development Regulation.

[57] Presidency Conclusions, European Council, Göteborg 2001.

[58] Council of the European Union (2005): Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

[59] Detailed information on the measures relevant for water protection can be found at Dworak et al. (2005).

[60] For further details on possible links between the Rural Development Payments and the WFD as well as there conflicting timetables, please see Dworak, et al (2005).

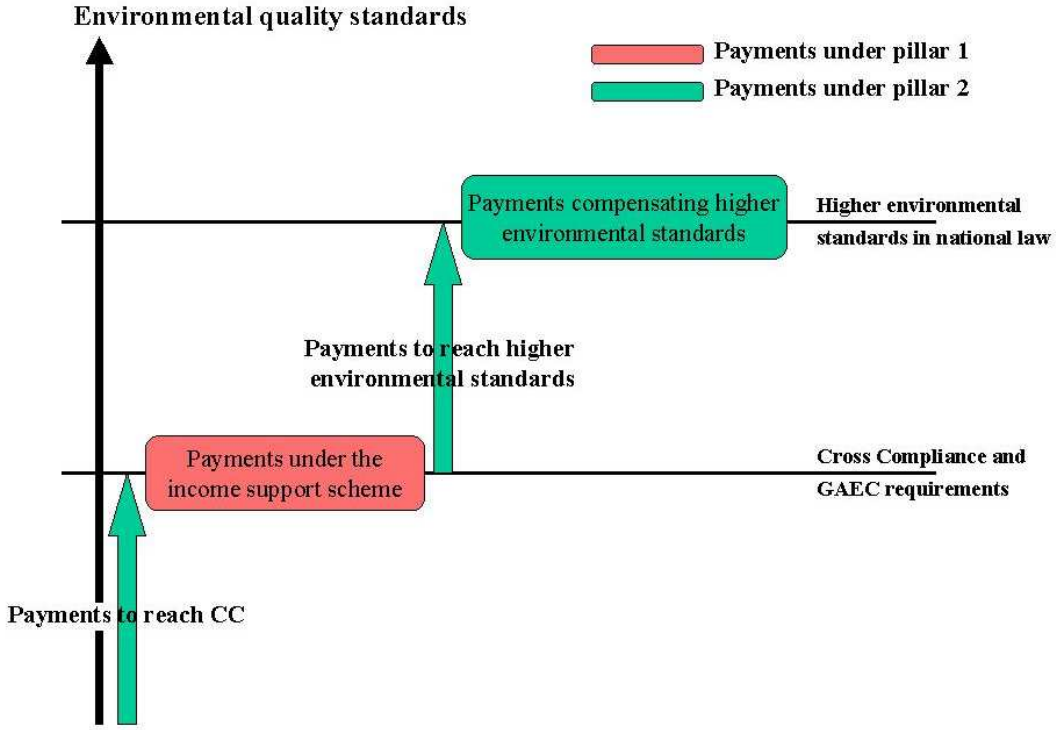

Figure 2: Current CAP payments and their link to environmental quality standards

It has to be noted that the limits between the different categories are not always very clear-cut. Several payments could be used in one or another way, depending on the national implementation. Nevertheless as shown in Figure 2 four functions regarding the environment can be attributed to the CAP payments[61]:

A: **Payments to support the farmers in reaching the Cross Compliance standards** (e.g. Use of advisory services (RDR Art. 24)). These payments cover a small part of pillar-2 payments and can be divided into two subcategories (i) support of organisation and education issues (e.g. Art 24 RDR Advisory Services) and (ii) support for investments under very specific conditions (e.g. setting up of young farmers). In general, the broad set of payments under both pillars should be linked to compliance with basic standards for the environment, food safety, animal health and welfare and good agricultural and environmental conditions. The incentive impact of these measures has to be seen as rather low, due to the fact that payments under the income support scheme (B) are more relevant for farmers (see below):

B: **Payments under the income support scheme**: Payments of this type represent the main funds under the CAP regime. In general they can be related to:

[61] In addition to these four categories, a fifth group of payments not related at all to environmental standards exists (e.g. payments on animal welfare Art 40 RDR)

(i) income support ("decoupled payments") These payments are fixed income transfers that do not depend on the farmers' production choices, output levels, or market conditions[62] (for more details see section 4.3).

(ii) support schemes for specific products ("coupled payments") in order to avoid abandonment of production. Coupled payments means that there is a direct link between the determination of the program benefit, the farmers' production and market conditions (such as prices). Coupled payments affect per-unit net returns associated with specific production choices and increase farmers' profit from growing specific goods[63].

Both types of payments are linked to Cross Compliance but the incentives they cause differ. While the payments independent from production give no incentive for production[64], coupled payments may set an incentive to produce high volumes not taking environmental concerns into consideration (e.g. high water consumption for the production of rice)[65].

C: **Payments supporting higher standards as set out under Cross Compliance**: The payments are covered under the second Pillar and aim to improve the environment and the countryside. Support is given to farmers along the two main lines set out under A: (i) support of organisation and education issues and (ii) support for investments (e.g., Art. 30 RDR Infrastructure related to the development and adaptation of agriculture and forestry). These payments can set an incentive to farmers to establish higher Environmental Quality Standards (even beyond national legislation) than set out under Cross Compliance. The incentive mechanisms, however, differs from the WFD mechanism: CAP incentive payments establish a bonus system whereby environmentally benign practices are rewarded, WFD water pricing provides a system that discourages environmentally harmful practices.

D: **Payments compensating higher environmental standards**: If a farmer applies higher Environmental Quality Standards than set out under the Cross Compliance regime he can receive payments to compensate his social and/or economic hardship (e.g., payments related to the implementation of the WFD (RDR Art 38)). Such payments have been set up in order to reflect the need both for a good environmental quality and to keep farmers in business. This is a particularly important issue, not only in terms of food production but also to maintain the EU landscape (e.g. erosion reduction in mountain areas to prevent flooding). By extending farmers' incomes, such payments tend to reduce the incentives transmitted through the water pricing system.

Further it has to be noted that Art. 69 of the Reg. 1782/2003 offers Member States to retain up to 10 % of the component of national ceilings within several sectors (see Annex VI of the Reg. 1782/2003). In such case the Member State concerned shall make, on a yearly basis, an

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[62] Paul C. Westcott and C. Edwin Young (2004): Farm Program Effects on Agricultural Production: Coupled and Decoupled Programs, in: Decoupled Payments in a Changing Policy Setting/AER-838, Economic Research Service/USDA.

[63] Even more pressure is put on water due to the fact that several products covered under these aids need a high quantity of water for growing (e.g. rice, tabacco).

[64] Decoupled payments still might lead to intensive production. See section 4.3.

[65] In this context, a move towards decoupling seems to increase the effectiveness of water pricing policies. As Garrido (2005), p. 12 puts it: "Upon the reform of agricultural policy in the EU, a number of analysts have explored whether the incentives to use water would change as a result of more decoupled measures of agricultural income support. It is shown that more decoupled measures of support may make pricing policies more effective and less negative for farmers' benefits."

additional payment to farmers in the sector or sectors concerned by the retention. The additional payment shall be granted for specific types of farming which are important for the protection or enhancement of the environment or for improving the quality and marketing of agricultural products under conditions to be defined by the Commission. According to Regulation 795/2004 Member States have to communicate the details of the payment they intend to grant and, in particular, the eligibility conditions and the sectors. Depending on the design of the payments they can be part of all four categories.

A more detailed assessment of all payments under the CAP related to EQS on water is given in Annex 1.

Another general problem refers to the question of whether there should be financial support for meeting EQS. Such payments are from a strict point of view in contradiction to the **polluter pays principle (PPP)** since they support a polluter to reach environmental objectives that are defined by law. When studying the 2003 CAP reform, it should be noted that the reform conforms to some extent to the PPP as the payments linked to Cross Compliance are forcing farmers to pay for self-made environmental pollution[66]. Further, compared to earlier designs of the CAP, the new schemes are offering farmers the opportunity to be paid for producing 'environmental goods,' and in some cases for not producing negative externalities. In order to fully integrate the PPP into the CAP a new "social contract" is needed, that calls for the farmer to produce environmental public goods of value to society, for which society in return is willing to pay the farmer on an ongoing basis.

As the current CAP will be developed further within the next decades, there is a need to look at how the incentives it provides are likely to change in the future. WTO negotiations and other pressures (e.g. EU biomass action program) might create different CAP payments focussed on different objectives. This might influence the second (2016-2021) and further planning periods of the WFD.

4.3 The role of decoupling for water protection

As already mentioned above, one of the main elements of the latest CAP reform is "decoupling" under the single farm payment scheme (SPS). The main idea behind decoupling is to continue with income support to the agricultural community with less or no effects on what and how much is produced[67]. The solution proposed in economic theory is lump-sum transfers, which would not give rise to welfare losses as opposed to the effects of price support or input based subsidies[68]. Such a **fully decoupled** policy does not influence production decisions by the farmers, and permits free market determination of prices.
In other words, a farmer who received a larger entitlement in the past for a particular type of production e.g. for irrigated land or maize, would no longer be obliged to continue with this favoured type of production in order to take advantage of the higher payments. The farmer's decision on what to produce would be based more on the economics of the market than by any obligation established by the CAP.

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[66] How strong farmers will comply with the CC scheme will strongly depend on the control regime established in a Member State. See Müssner et al. (2006).

[67] The CAP also aims to help farmers, via rural development measures, to adjust their businesses and land management methods to changing agricultural practices, and to society's demands. Agricultural and rural development policy increasingly includes individuals and groups, other than farmers, who are active in rural areas. For further information see Dworak, et al. (2005).

[68] Andersson, F.C.A (2004): Decoupling: The concept and past experiences, available at http://www.sli.lu.se/IDEMA/WPs/IDEMA_deliverable_1.pdf.

Member States have two different options for how they calculate and make payments as shown in Table 1. In both cases, the basis for the decoupled payments is the average for the three years 2000, 2001 and 2002 for crops, beef and sheep payments.

Table 1: The two main SPS options[69]

	Basic (historic)	**Flat rate (regional)**
Reference amounts	Individual farmer's direct aids in period	Individual amounts not relevant. Regional amounts calculated in period instead
Payment entitlement allotment	Active farmers with historical reference (or with inherited entitlements; or entitlements from national reserve) when SPS applied by Member State (MS);	All active farmers using land in region when SPS applied by MS
Eligible hectares	All agricultural land except land used for permanent crops and land used for non agricultural activities	Idem

The main difference between the two systems lies in whether the SPS is calculated on the basis of individual farmers' direct payments during a past reference period, thus producing a patchwork of different payments, or whether all payments are averaged out and paid uniformly over a region or state[70].

If a member state introduces a "flat rate" model in the framework of the SPS, there would be no difference in the payments paid on an area basis in that region. In case of the application of the "basic" model, the payment entitlements take into account the payments received by a given farmer in the reference period. In this case if a farmer was "favoured" by higher payments in the past in areas concerned by those higher per hectare payments, this would result in a higher value of the payment entitlement.

When introducing the single payment system, Member States may opt for full **decoupling** as described above or its partial implementation in order to combat the abandonment of land (**partial decoupling**). In the case of partial decoupling, aid will be paid to farmers partly as a single payment (independent of production volume) and partly as an additional payment (dependent on the output produced). For arable crops, Member States may allocate per-hectare payments up to 25% of the total amount or up to 40% if they decide to retain the additional premium for durum wheat. For other products, different regulations exist.

Both, full and partial decoupling produce different incentives on the farmer and decisions on what to produce. This different incentives have to be considered when designing water pricing schemes to reduce water pollution. From a first rough assessment, the following picture can be drawn[71]:

- For full decoupling: When examining the overall effect of decoupling from an environmental and water management perspective, there is a need to distinguish

[69] Based on http://europa.eu.int/comm/agriculture/capreform/infosheets/paymod_en.pdf.

[70] An in-between system is also available which allows Member States either to operate a mixed historic/flat rate approach that stays the same over time ('static'); or they may choose a mix that alters over time ('dynamic'), usually so that the proportion of SPS based on historic references reduces as the flat rate element increases, offering a means to transit from the basic to the flat rate approach.

[71] Currently a there is a European Commission's Sixth Framework Programme research project (IDEMA - Contract No SSPE-CT-2003-502171) carried out, aiming to develop methods and tools to provide a comprehensive socio-economic assessment of the impact of decoupling on the EU farm sector. For further information please see http://www.sli.lu.se/IDEMA/idemahome.asp.

between the effects on water consumption and the effects on water pollution. Regarding water use, technically speaking decoupling has little effect on the incentives to save water as these payments increase farmers' incomes independent of production. Farmers production choices preliminary depend on the margins he can get for certain products on the market. As long as water is free of charge or prices are low, there is no need to save water as it does not affect a farmer's competitiveness. Rather, irrigation allows in general higher gross margins and reduces vulnerability of production, and may therefore increase in some areas[72]. In areas where the water prices are high, a shift from irrigated to dryland crops may be expected as the margins for dry land crops on the market will be higher as those for irrigated crops[73]. This would result in water savings. In other words decoupling provides the basis for making water pricing work.

Regarding water quality, only a few studies on the environmental effects of decoupling are available and further research is needed[74]. The above mentioned changes in farming practice are expected to help reduce levels of environmental pollution. These reductions may vary across a broad range of magnitudes and are expected to be greatest in less favoured areas. Nevertheless, on a regional basis and within specific catchments, decoupling will probably lead to more intensive practices (e.g. increases the use of fertilisers)[75].

- For partially decoupling: In general, the incentives caused by partial decoupling, should be similar to those through full decoupling. Nevertheless due to the fact that Member States can support farmers to a certain extend on a coupled base, farmers can attain different profit margins for products on the market. This means that CAP payments will influence the decision making process on what to produce on a farm level. Further, the price of water (price for m^3 of water abstracted or tax paid for the use of fertilisers, pesticides etc.) and other inputs (e.g. labour costs, soil quality) will influence such a decision as well.

  Therefore, there is a clear need to further assess the effects of partially decoupled payments more carefully. For water use, such an assessment has to consider the relation between agricultural products chosen and the related water use (e.g. for growing maize a rather high water consumption is needed, compared to arable crops). For water pollution, there is a need to assess the relation between agricultural products and the potential pollution resulting from growing them.

[72] Masarutto (2002).

[73] Fonseca, M. and Martinez, E. (2005): Modelling new EU agricultural policies: global Guidelines, local strategies.

[74] In 2004 the EC set up a research project called GENEDEC (FP 6- Proposal/contract no: 502184). It has been designed to assess the socio -economic and environmental impacts of the decoupling of direct payments decided in the framework of the Luxembourg agreement on the CAP reform. First results can be expected by 2007. For further information please see http://www.grignon.inra.fr/economie-publique/genedec/eng/home.htm.

[75] GFA-RACE Partners Limited in association with IEEP (2004); Schmid; F., Sinabell (2004); C. Ganzert, C. Hebauer, A. Heißenhuber, M. Hofstetter; J. Kantelhardt (2003).

Box 6: Possible effects from partial decoupling on the example of maize

The following example for maize production, should demonstrate the possible effects of partial decoupling on water use:

The "old" CAP (in Regulation 1251/1999), provided the possibility for a MS to separate irrigated and non-irrigated based areas and to establish a separate base area for maize (also irrigated and non-irrigated). The result of that was that by using higher reference yields for irrigated crops and maize, they could receive more payment per hectare – to the detriment of the other arable crops, as the per hectare payment was calculated by multiplying the historical reference yield (which could therefore be different) in a given region by the reference payment established in the Regulation.

If a MS were to chose the option of partial decoupling of the maize payments (Art 66) and pay 25% of the money based on real production of maize, they could continue to pay out this reduced coupled payment on areas for irrigated and non-irrigated maize areas separately, as was done through the "old" CAP but the amount of direct payments distributed on this basis would be much less than in the past.

As a **conclusion,** with the introduction of full decoupling, there is no longer a direct link between production and the amount of payments per hectare. Farmers will produce goods more according to market demand and production decisions on a farm level will be based on profit margins. Other factors such as prices for fertiliser, water or seeds will have a more prominent impact than they have up until now. This could result in lower or higher environmental impacts, depending on the local conditions, the incentives from the market and the type of business itself (e.g. small-large scale farmers, organic farming) In the case of partial decoupling, there is still a distortion on production decisions, keeping an incentive for water-consuming crops even if it is lower than under the "old" CAP.

4.4 Key Messages

- The CAP is one of the main EU policies and has a significant impact on the economy across the whole rural territory of the EU in terms of agricultural production patterns, land management methods, employment and wider social and economic conditions in rural areas. In this context the CAP also has a large impact on environmental quality.
- Hence the current CAP can help with the implementation of the WFD due to obligations such as cross-compliance rules and rural development policy. Further, it provides a wide range of payments under the two pillars of the CAP, setting different incentives for farmers to reach Environmental Quality Standards. In order to develop a proper water pricing system to fulfil WFD obligations, there is a clear need to understand these basic principles and payments of the CAP.
- In order to assess how the current system of agricultural subsidies affects the way in which farmers use water, and how they relate to the incentives transmitted through the water pricing system, it is necessary to distinguish between the different types of payments under the CAP. In general there are four types related to Environmental Quality standards which may influence a water pricing system and more importantly the methods of agricultural production:
  1) Payments to reach Cross Compliance standards linked to very specific conditions
  2) Payments under the income support scheme which can be distinguished between (i) "coupled payments" (linked to specific productions), (ii)"decoupled payments" (guaranteeing farmers a fixed income transfers not depending on the farmers' production choices, output levels, or market conditions) and (iii) "partially decoupled payments" (mix out of (i) and (ii)). Each type of payment influences a farmer's decision on what he/she produces and therefore the environmental effects differ.
  3) Payments to reach higher Environmental Quality Standards as set out in under the Cross Compliance regime (e.g. modernisation of irrigation system to comply with national standards).
  4) Payments to compensate for maintaining Environmental Quality Standards above Cross Compliance level (e.g. Art 38 RDR implementation of the WFD). These payments could be used to compensate for hardships resulting from the implementation of a water pricing system.
- Some of these payments may work against the incentives of a water pricing system by setting an incentive to use more water. In order to establish a common implementation strategy for the CAP and the WFD, an integration strategy must respect the fundamental principles and objectives of both policy areas, such as the Polluter Pays Principle for the WFD and the principle of secure food production under the CAP.
- While considering the **effects of decoupling on water protection**, the introduction of full decoupling has disrupted the direct link between production and the amount of payments per hectare. Farmers will produce goods more according to market demand and production decisions on a farm level will be based on profit margins. Other factors such as prices for fertiliser, water or seeds will have a more prominent impact than they have up until now. This could **result in lower or higher environmental impacts**, depending on the local conditions, the incentives from the market and the type of business itself (e.g. small-large scale farmers, organic farming) In the case of partial decoupling, there is still a distortion on production decisions, even if it is lower than under the "old" CAP.

- As the CAP will evolve in the future, the current payment system might change. Such changes will effect the later planning periods including programs of measures under the WFD.

5 Water Pricing under CAP and WFD - Key issues for further discussion

It is clear that the sustainable management of water resources and an effective water pricing policy must be in line with both the CAP and the WFD. Both of these policies have a major contribution to make towards the achievement of good status in European water bodies. The Commission finds that "overall, the combination of water charges and subsidies for environmentally-friendly investments and practices has often proven very effective in tackling environmental problems." (EU Commission (2000), p.18)

At the same time, besides the potentially mutually reinforcing incentive functions of activities for CAP and WFD implementation, it is crucial to understand in which ways CAP and WFD policies (in their current form) send out contradicting signals or have conflicting policy objectives, in order to make these difficulties transparent and, where possible, reconcile them.[76]

Therefore, the linkages and interactions between both policies have to be assessed in more detail. In order to initiate discussions, section 5.1 focuses on the linkages and interactions on the issue of the incentive effects of both policies on water related issues. Section 5.2 discusses ways for assessing the appropriateness of certain measures for WFD implementation affecting the agricultural sector, while section 5.3 presents possible options for linking payments in the context of CAP and WFD implementation in order to compensate for social and/or economic hardships in agriculture.

5.1 Linkages on incentives

To a large degree, farmers' decisions are based on the incentives that they face. Market prices for inputs (land, labour, fertilisers), the price farmers can achieve for agricultural products and the CAP payments set strong incentives for what decision is likely to be reached. Based on the various incentives coming from the CAP, farmers decide what crops are planted when and where and which farming practices are applied (e.g. organic farming). The 2003 reform, intends to reduce such incentives through de-coupling. These decisions can have a significant impact on the sustainability of water use, for example, a range of direct payment support the production of crops like sugar and rice in Southern Europe, leading to an over-abstraction of water (in the absence or non-implementation of appropriate abstraction rules).

The following issues need to be considered in more detail when looking at CAP payments that influence WFD implementation:

- The financial costs of water services can be partly covered by payments (e.g., CAP payments, structural and cohesion funds but also national payments), used for financing water service investments (e.g. construction of dams and irrigation systems). Therefore, there is a need to estimate the contribution of such payments to the costs of water services separately. Such payments fall under the category A (Payments to support the farmers in reaching the Cross Compliance standards) and C (Payments supporting higher standards as set out under Cross Compliance) according to the structure proposed in section 4.2.
- In some instances, the added value through agricultural water use (measured as financial added value per cubic meter) is significantly influenced by payments under the CAP payment system. Such payments (under category B (Payments under the

[76] See Varela-Ortega, C (2006) for a good overview.

income support scheme)) therefore strongly affect the decisions taken at the (micro) farm level on which agricultural products will be produced.

- If they are bound to specific crops or activities, subsidy payments necessarily have a distorting effect: by changing relative prices, they make certain activities more rewarding than others. From a (macro-)economic perspective, this may give rise to resource costs. In selecting activities, farmers follow the incentives transmitted to them through the price system. These activities need not be those where water (and other inputs to the farming process) create the additional value for society, but those where the highest returns are achieved (including the subsidy payment). From an economic perspective, however, the subsidies would need to be subtracted from the returns, since they are not added value but income transferred from tax payers. If this means that the water used for farming one crop could rather be used for another and create a higher value, then the subsidies give rise to resource costs.
- Finally, certain CAP payments aim at reducing the environmental costs linked to agricultural water use (A, C, D (Payments compensating higher environmental standards) category under section 4.2). While such payments offer incentives that are in line with the WFD, in the sense that they guide behaviour in the same direction, they function in a different way. Whereas the WFD, in line with the polluter-pays-principle, counts on a reduction of environmental costs related to a water use by ensuring that users contribute "adequately" to the cost recovery of water services (thus using a "stick" to create incentives for a more sustainable water use), the above mentioned CAP payments use the "carrot" of payments for certain investments.[77]

In general, if these payments significantly influence the incentive function of potential water prices and/or the cost recovery contribution of the water users to the occurring costs, it is important to have a better understanding of the specific contribution these payments have. A first step to this end is to separately indicate for example the contribution of payments for the added value of a specific agricultural production, the extent to which financial costs are covered through payments etc.

In addition and linking with the following section of this document, it is important to understand the reasons why these payments have been put in place (e.g., to prevent social and economic hardship for the agricultural sector, or to reach CAP objectives etc.) in order to better assess what changes in the structure of these payments might be possible. Such changes would aim at improving their incentive function (reducing their disincentive function) while assessing the effect of such a change on reaching the primary objectives of the payments.

5.2 Proportionality/acceptability of potential measures to increase cost recovery/incentive pricing

Besides the measures needed for the implementation of the Article 9 requirements of the WFD (see section 2.2), Article 11 of the WFD forces Member States to define and implement for each RBD a programme of measures to address the pressures on waters. These so called Programmes of Measures (PoM), will influence agricultural production in several ways.

The implementation of **both articles may lead to social/economic hardships** for the agricultural sector. For example, an increased incentive function of water pricing schemes and

[77] While positive incentives are generally better, the CAP payments are not fully in accordance with the polluter-pays-principle. Taxpayers finance a polluter to reduce his pollution, while the WFD principle of covering the environmental costs linked to a water use (leading to a partial internalisation of external costs at least) allocates the related costs to the polluter.

an increased cost recovery ratio of water services (changes in the tariff structure but also additional/modified environmental charges and taxes for the internalisation of external effects) might lead to a high financial burden for the agricultural sector. Further, PoM might include restrictions on agricultural production decreasing farmers income.

In order to **assess the occurrence** of social/economic hardships, both the provisions and objectives of WFD as well as the CAP will be needed for the evaluation process. Based on these, either the possible policy decisions will be altered in order to prevent such hardships or additional/altered compensatory activities will have to be put into place (see section 5.3).

The main elements to be considered for this evaluation are:

- what **social/economic effects for the agricultural sector** are to be expected from WFD measures considered for reaching the objectives of Article 9? Since the Member States may take into account these effects, these measures can be reconsidered in order to reduce their economic and social effects.
- since Article 9 interventions will support reaching the environmental objectives of the WFD, one would need to consider **what other measures/instruments would have to be put in place alternatively within the POM of Article 11**. The cost-effectiveness of such alternative measures would have to be compared as well as their social/economic effects;[78]
- Finally, and going beyond the social/economic effects in Article 9, one needs to check if the **use of exemptions according to Article 4** is justified (application of less stringent environmental objectives or extended deadlines under specific circumstances may be justified in cases when the most cost-effective combinations of measures for reaching the good status prove to be disproportionately costly[79] WFD[80].)

A crucial point when assessing the economic and social consequences of measures related to Article 9 implementation as well as the disproportionality of POMs for the agricultural sectors/individual farmers is the **existence of payment mechanisms under the CAP**. These do effect the above mentioned considerations (social/economic affects; (dis)proportionality of costs etc.) and therefore need to be considered. At the same time, examining the importance of **such payments separately** while considering e.g. social/economic hardship, will be beneficial in order to understand what effects potential changes in the extent and structure of the payment system under the CAP could have.

Finally, these considerations in the WFD context need to be put into relation with the objectives and concepts of the CAP. One of the basic principles of the CAP, is to provide farmers with a reasonable standard of living[81]. Therefore the CAP provides specific funding mechanism to avoid social/economic hardships (e.g. Art 38 rural development provides payments to compensate WFD implementation).

Therefore, there is the need to clarify in how far the objectives of the two policies are compatible in this regard as well as how the concepts of the proportionality of certain

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[78] Need to have a multi-sectoral approach for cost-effectiveness in order to assess the contributions of agriculture in relation to other sectors (and their relevant environmental impacts).

[79] There is at present no imperative requirement for a common methodology with regard to the assessment of "disproportionate costs".

[80] For further information on the application of exemptions, see the CIS DG Eco 1 Information Sheet on Economic Analysis and Crosnier, 2005.

[81] http://www.eu.int/pol/agr/index_en.htm.

measures for WFD implementation and the "reasonable standard of living" under the CAP can best be integrated.

5.3 Linking payments CAP-WFD: compensation function

Financial payments create direct or indirect incentives to affect actors' behaviour in a certain way (see section 5.1). In addition, financial payments can be used in various ways, e.g. as compensation payments in cases of social and economic hardship linked to a certain policy measure, or as support to investments in order to reduce water consumption.

On one hand the WFD does not foresee any compensation payments for hardships occurring due to its implementation[82], but it allows for exemptions (e.g. of less stringent objectives or extended deadlines under specific circumstances), e.g. if the measures required to achieve the ecological objectives would be disproportionately costly. On the other hand one of the major aims of the CAP is to secure farmers income. This "security function" includes beside others, the compensation of hardships.

There is no doubt that the WFD implementation will require some changes in agricultural practice, which may entail social and economic hardship. Bearing this in mind, the Commission introduced a new article under the upcoming Rural Development Regulation which aims to *"..compensate for costs incurred and income foregone resulting from disadvantages in the areas concerned related to the implementation of […] Directive 2000/60/EC"*[83].

Since agricultural practices are the main pressure on water quality and quantity in many areas, it can be expected that the provided funds will not be sufficient. Therefore, it is clear that there is a need to find additional sources of funding, while strengthening the incentive function of CAP payments toward more sustainable water use and in order to fully implement the PPP.

One possible option is the use of revenues generated by water-related green taxes and charges to specifically support adaptation measures in the agricultural sector. This can be envisaged in two ways:

- Earmarking revenue from the agricultural sector for agriculture-related measures as part of the "programme of measures" of the WFD: Other than "pooling" all revenues generated from water-related taxes and charges to pay for all WFD measures, one possibility is to use the tax revenue from the agricultural sector to specifically support water efficiency investments for farmers, or for other specific measures in the agricultural sector. In this way, the incentive function of water pricing could be retained, while leaving the group of farmers as a whole no worse off.
- Financing the national contributions to the rural development payments under the CAP regime: An alternative for the use of revenues from water-related taxes and charges would be to finance the national contributions that Member States have to make to rural development payments under the CAP regime

In both of these options, (part of) the revenue from water pricing schemes flows to the agricultural sector. If properly used and controlled, this would allow for a "double dividend": by correcting incentives and discouraging overuse of water resources, the pricing scheme

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83 See Council of the European Union (2005): Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

itself already has a positive effect. A second positive effect is achieved if the revenue is used to finance environmentally beneficial measures.

5.4 Key Messages

- Both the CAP and the WFD create different incentives for farmers. The CAP sets incentives on production (even if they are less than before the 2003 reform) and the WFD sets incentives for the sustainable use of water. It is crucial to better understand these incentives as they are to some extent be contradictory.
- CAP payments will influence the existing systems of water pricing. So the financial costs of water services can be partly covered by Rural development payments (or others) used for financing water service investments. In order to develop water prices and to estimate the contribution of the water users to cost recovery, it is important to estimate the contribution of such payments to the costs of water services separately.
- The WFD implementation will have social and economic effects on the agricultural sector. Both policies have mechanisms in place either to avoid social and economic hardship, or to compensate for it. There is a clear need to agree which mechanism should be applied in which instances. Further, there is a need to develop a common understanding of the WFD term “disproportional costs” and the CAP term “reasonable standard of living”.
- Due to the limited resources provided under the Rural Development Regulation it can be expected that the provided funds to compensate for social hardships will not be sufficient. Therefore, it is clear that there is a need to find additional sources of funding, while strengthening the incentive function of CAP payments toward more sustainable water use and to implement the PPP. One possible option is the use of revenues generated by water-related green taxes and charges to specifically support adaptation measures in the agricultural sector.

6 Summary and Conclusion

Agriculture constitutes a significant pressure on the state of water resources across large areas of the EU.[84] Changes in agricultural production therefore present a powerful option to protect water resources and, where possible, enhance its qualities and quantities.

The market alone is unlikely to deliver the necessary environmental improvements in agricultural production. One of the reasons is that, on the whole, only few consumers are willing to pay for products produced in an environmental friendly way; another reason is that farmers currently do not account for the external costs of agricultural production, such as the costs of water pollution with nutrients or pesticides. Instead, these external costs are largely borne by others (e.g., higher expenses for water purification and treatment for the water industry, and ultimately for water consumers). In some instances, external costs are not even paid for by the current generations (e.g., degradation of the water environment without material damage to water users). The existence of such external costs mean that, from the point of view of society as a whole, the market is working inefficiently.

Both agricultural and environmental/water policy have their own separate and legitimate objectives; integration implies the active pursuit of complementarities and synergies between them. This requires clarity about the respective roles of the two policies and the ways in which they can support each other[85].

The WFD provides for several mechanisms to reach its objective of "good status for all waters". Incentive water pricing aiming at the sustainable use of water, is one important part of WFD implementation, and is strongly linked to other economic concepts such as cost recovery and the polluter-pays-principle.

As the current application of incentive water pricing in the context of the WFD shows, there is a need to specify the main terms and concepts (cost categories, adequate contribution to cost recovery, adequate incentives) further in order to support practical implementation. Further there is need to share experiences among Member States.

While the main elements for setting up an incentive water pricing system can be established through water management (e.g. relating tariffs to actual, metered consumption, transparency etc.), the importance of other policies (e.g. agricultural sector) for developing changes of water pricing policies has to be considered.Many of these policies provide incentives to producers influencing decision on production or use of environmental resources. Where they exist, such policy interventions may be justified with policy objectives that are entirely unrelated to the objectives of water management. A water-pricing mechanism that aims at efficient water use needs to take these "exogenous" interventions into account.[86]

The CAP clearly has a large influence on the incentive and cost recovery aspects of water pricing. By providing a wide range of payments under the two pillars, the CAP sets different incentives to farmers regarding water use. In order to develop a proper water pricing system to fulfil WFD obligations, it is essential to understand these payments and their effect on farmers' decisions. Some of these payments work against the incentives that a sustainable

[84] See Herbke et al (2005).

[85] From http://europa.eu.int/comm/agriculture/envir/report/exec_en.pdf.

[86] As the European Commission (2000, p. 20) states: "Co-ordination and synergy between water pricing and other policy domains of the European Union are key elements for economic and environmental effectiveness. Several policy areas are clearly relevant in this regard."; these include, besides the CAP, horizontal policies like Structural and Cohesion policies and the European research policies.

water pricing system is expected to convey, e.g. by setting a incentive to use more water or by covering parts of the financial costs of water services. On the other hand the CAP provides payments which could soften social and economic hardships resulting from WFD implementation.

Water pricing is one possible link between the two, but it has to kept in mind that it is not the sole instrument that can solve water resources problems in Europe. However, pricing should be given due consideration so that it can be used to promote a more efficient and less polluting use of scarce water resources[87].

[87] EU-Communication (2000).

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Annex: List of CAP payments to farmers and their link to water quality standards

Table 2: Payments under pillar 1

	Payments to support the farmers in reaching the Cross Compliance standards	Payments under the income support scheme	Payments supporting higher standards as set out under Cross Compliance	Payments compensating higher environmental standards
Singe farm payment (except Art 69 payments)		X		
Other aid schemes		X		
Art 69 payments	Depending on the implementation within each MS			

Table 3: Payments under pillar 2

	Payments to support the farmers in reaching the Cross Compliance standards	Payments under the income support scheme	Payments supporting higher standards as set out under Cross Compliance	Payments compensating higher environmental standards
Rural Development Axis I				
Modernisation of agricultural holdings (Art. 26)	x		x	
Infrastructure related to the development and adaptation of agriculture and forestry (Art. 30)	x		x	
Meeting standards based on community legislation (Art.31)				x
Semi-subsistence farming (Art. 34)	(x)			
Rural Development Axis II				
Natural handicap payments in mountain areas and payments in other areas with handicaps (Art. 37)				x
NATURA 2000 payments and payments linked to the WFD (Art. 38)			x	x
Agri-environmental payments (Art. 39)				x
Non-productive investments (Art. 41)			x	
First establishment of agroforestry systems on agricultural land (Art. 44)			x	
First afforestation of non- agricultural land (Art. 45)				x
Natura 2000 payments (Art. 46)				x
Forest-environment payments (Art. 47)				x
Non-productive investments (Art. 49)			x	
Rural Development Axis III				