Economics and the Water Framework Directive

A User’s Manual

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Preface

ECONOMICS IN THE WATER FRAMEWORK DIRECTIVE: A POWERFUL TOOL FOR CHANGE

Economics is at the heart of the Water Framework Directive (WFD), and will play a uniquely central role in determining how and to what extent the WFD is implemented across Europe. From the perspective of those hoping that the WFD will result in major improvements in freshwater quality, coastal waters, and water habitats in general the economic components of the WFD should be regarded as a significant opportunity rather than a threat.

The economic analysis within the WFD can provide powerful justification for major beneficial changes in the management of freshwater in Europe. For example, well applied cost-effectiveness analysis may be able to demonstrate that land-use change and the construction of wetlands are more appropriate measures than end of pipe solutions. Equally, many of the changes required to meet WFD objectives are likely to encounter significant political resistance, and this can be countered with the robust use of economic arguments.

There remains, of course, the possibility that the economic components of the WFD may be abused by those sectors wishing to resist significant change. There is an important role for civil society in ensuring that this does not happen.

The purpose of this guide

The economic analysis envisaged for the WFD is essentially straightforward, and should represent a structured method for comparing and assessing the best options for achieving Good Status. Armed with this Users Guide, non-specialist economists should be able to engage fully with these debates and analyses.

The guide is intended both to assist environmental organisations to shape the way in which economic analysis will be conducted in each Member State, and to help individuals and groups wishing to participate in the analysis itself when it is undertaken. The guide sets out the basic role of economics within WFD implementation and points out key issues to watch out for. It also seeks to explain some of the jargon that economists are so fond of.

The guide is divided into a number of chapters:

- Chapter 1 provides two checklists that can be used to assess the economic analysis. The first checklist is designed to assess whether the economic analysis is being adequately conducted; the second provides a list of possible measures that should be considered for inclusion in the analysis.
- Chapter 2 seeks to set out a basic map of the role of economics within the WFD
- Chapter 3 is the core of the guide, and includes briefing notes on the three key components of the economic analysis: cost-effectiveness analysis; disproportionate cost analysis; and water pricing and the recovery of costs of water services.
- Chapter 4 seeks to answer the most frequently asked questions concerning economics within the WFD.
- Chapter 5, lastly, sets out key references for those looking for further information.
1. Do-it-yourself: Two WFD Economics Checklists

While this guide provides a more detailed introduction of the range of roles that economics plays within the WFD, there will be a number of key points that will determine whether the economic analyses envisaged by the WFD successfully promote the achievement of Good Status. This checklist highlights these key issues: if any of these cannot be positively answered, there should be grounds for concern over the way in which economic analysis is being undertaken.

CHECKLIST 1. ECONOMICS AND THE WFD

☐ Are the economic analyses being conducted clearly, openly, without political influence and with the full involvement of all stakeholders?

☐ Is there sufficient independent scrutiny of the estimates provided by economic sectors (eg. industry, agriculture) of the costs of potential measures?

☐ Is the level at which measures are judged to be ‘disproportionately expensive’ being set high enough, and are social and environmental benefits considered in making this decision?

☐ Is the full range of possible measures being considered in the analysis? (See Checklist 2)

☐ Where possible measures have been ‘screened out’ before the cost-effectiveness analysis, has this been done in a transparent manner with sufficient reasons given?

☐ Is sufficient consideration being given to the polluter pays principle in deciding who should pay for the proposed measures?

☐ Are sufficient assessments and subsequent steps being taken to ensure that water pricing policies provide adequate incentives for the efficient use of water resources?

☐ Are attempts being made to assess and include in the analysis the economic benefits of environmental improvements?

☐ Is a clear distinction being made between the assessment of which measures are the most cost-effective, and the assessment of whether measures are disproportionately expensive?

☐ Is capacity-building being undertaken so that both technical staff and stakeholders can understand and meaningfully engage with the process of economic analysis?

☐ Are sufficient resources being devoted to the analysis, in particular to filling important gaps in knowledge over the costs or effectiveness of measures?
CHECKLIST 2. MEASURES FOR RIVER BASIN MANAGEMENT PLANS

The following list can be used to check whether a broad enough range of measures has been considered for River Basin Management Plans and included within the cost-effectiveness analysis. This list is not exhaustive, but it gives an idea of the type of measures that should be considered.

**Hydro-morphological pressures**

- Wetland restoration
- River restoration
- Managed re-alignment of flood-risk coastal land
- Tidal exchange
- Grip blocking
- Gully repair
- Removal of land drains
- Removal of livestock and/or soil rewetting to prevent/reverse compaction
- Removal of redundant obstructive structures (weirs, old dams etc)
- Stock fencing from water courses

**Abstraction pressures**

- Water efficiency projects – including retrofit programmes
- Water metering
- Restrictions on use (domestic, industrial, commercial and agricultural)
- Product labelling
- Sustainable building regulations / codes
- License variation or revocation
- Wetland restoration above aquifers, especially over shallow sand and gravel aquifers, to increase recharge
- Water pricing mechanisms to encourage efficient use
- Education projects to promote wise water use and efficiency
- Land use change in the catchment – eg. remove/prevent water hungry crops from being grown
- Groundwater and surface water protection zones so that drinking water supplies are not contaminated with nitrates/pesticides/other pollutants requiring alternative and potentially damaging abstractions from elsewhere eg. de-intensification of agriculture, re-wilding of the area within the protection zone
- Leakage control (thorough mains replacement and customer supply pipe repair programmes)

**Diffuse pollution pressures – rural**

- Extensification of farming practices – reduced livestock and inputs
- Appropriate manure storage and management
- Manure spreading regulations
- Creation of semi-natural habitats (eg. woods and wetlands) to absorb pollutants
- Soil management to avoid compaction, and ensure ploughing and cultivation are at appropriate times
Small farm retention ponds
Big buffer strips (9m to be effective)
Appropriate cropping regimes (location and time)
Manure processing technologies
Safe disposal mechanisms for farm chemicals and plastics
Input taxes
Improved farm regulation
Universal soil, nutrient and pesticide management planning as part of cross compliance
Improved farm advice
Sheep dip alternatives

**Diffuse pollution – urban**

- Sustainable Urban Drainage Scheme (SUDS) and rainwater recycling and storm retention tanks
- Swales next to roads
- Retention ponds and wetlands in urban areas
- Drainage systems that separate storm water from sewage

**Point source pollution pressures**

- Phosphate free detergents
- Reedbeds at small sewage treatment plants and septic tanks
- Septic tanks to be connected to treatment systems
- A life-cycle approach to replacing lead pipes
- New technologies?
- Phosphate stripping at Sewage Treatment Wastewater plants (STW) in some catchments and re-use of treated effluent
- Sheep dip alternatives

**Alien species**

- Regulation of the pet and aquarium trade
- Trapping
- Eradication
- Reintroduction of predators!
2. The role of Economics in the Water Framework Directive

The role of economic analysis in the WFD

The use of economics is envisaged at a number of places within the WFD, from the preliminary analysis of current and future threats on water bodies, through to the assessment of objectives set and the best measures by which they can be achieved. Finally, economic instruments are a component of the programmes of measures themselves. The role of economics can best be understood by dividing it broadly into two categories.

1. Economics as a contribution to decision-making

Economic assessment will play a crucial role in contributing to key decisions over the objectives and measures that will be put in place for the WFD. In particular:

- **Cost-effectiveness analysis** will be central to the choice of which of a range of possible measures should be included in river basin management plans.
- **Disproportionate cost assessment** will be used to assess whether proposed measures are too costly, thereby justifying delays to the achievement of Good Status or allowing less ambitious objectives. Disproportionate cost assessment will also contribute to the designation of Heavily Modified Water Bodies (HMWB) and allowance of new modifications.

It is important to note that while important, economic methods and tools are only envisaged as making a *contribution* to decision-making, rather than dictating any decision. Hence, social and environmental issues should also be considered in deciding on programmes of measures and assessing disproportionality.

2. Economic instruments as measures for meeting the WFD

In addition to contributing to the decisions over WFD measures and objectives, a range of economic instruments are likely to be considered and required as part of the programmes of measures for achieving the environmental objectives of the WFD. As required by its Article 9, the Directive specifically mentions the use of water pricing, requiring that water pricing policies provide adequate incentives for efficient use of water. In the context of the WFD efficient use of water includes both quantity and quality/pollution aspects. Thus, the use of taxes on fertilisers or pesticides as a means of reducing pollution risk is clearly relevant to the application of Article 9 of the WFD.
Implementing Economics in the WFD

While economics will play a role on a number of occasions within the WFD timeframe, three particular stages can be highlighted:

1- Analysing existing water uses, impacts and pressures. Analysis to investigate cost-recovery, and incentive pricing (Article 5 analysis)

2- Choosing measures (Cost-effectiveness analysis)

3- Assessing time derogations and alternative environmental objectives (Disproportionate cost analysis)

River Basin Management Plans (including water pricing measures)

The process of choosing measures and deciding on alternative objectives (derogations) will by necessity be an iterative process. If a programme of measures is judged as being disproportionately expensive, it will be necessary to review the programme of measures by removing the measures that are least cost-effective, or by choosing the next most cost-effective programme of measures. In a few cases it might be worth repeating the whole process.

Integration with technical and environmental analyses

Economic analysis will not be able to contribute meaningfully to decision-making unless it is based on and integrated with good technical analysis. For example, cost-effectiveness analysis requires a good understanding of the consequences of a range of measures, while the application of the polluter-pays principle requires analysing who is responsible for pollution and on what scale. Very few analyses performed to date for the WFD have managed this crucial integration.
3. Briefing Notes: Key Elements of Economics in the Water Framework Directive

A. COST-EFFECTIVENESS ANALYSIS – CEA

Summary

Cost effectiveness analysis (CEA) will be one of the key mechanisms used to select which measures will be used to achieve Good Status. Properly implemented, CEA should identify the best approaches to meeting Good Status and provide important support to innovative approaches.

The role of cost effectiveness analysis within the WFD

The WFD is about achieving Good Status in European water bodies. A wide range of different possibilities exist for achieving this objective. CEA helps select among these possibilities and choose a programme of measures that need to be put into place to achieve Good Status in those water bodies at risk. It gathers information on the costs and effectiveness of individual measures (or package of measures), on how they interact with each other And it identifies which combination of measures achieves Good Status at lower costs.

CEA becomes relevant when there are different ways to achieve Good Status. For example, we can reduce phosphates in a catchment area by building a water treatment plant or by focusing on land-use practices. CEA assesses which of these two approaches would most effectively achieve phosphate reduction at the least cost per unit of reduction.

How the CEA is designed and conducted will influence the programme of measures to be implemented. It is important to understand what CEA is designed to achieve and what it is not. CEA tries to find the lowest cost way to achieve a fixed objective, in this case Good Status. It does not attempt to compare the costs of measures with the potential benefits. The task of comparing costs and benefits for the purpose of deciding on possible alternative objectives (derogations) is undertaken by Disproportionate Cost Analysis, undertaken after CEA.

It remains unclear what role CEA will have in assessing morphological improvements, for example the removal of weirs. With pollutants or issues around water quantity, there are likely to be a variety of measures that could be used to achieve the same objective, and CEA represents a tool for choosing between these alternative measures. This is less obviously the case with morphological change, where there might often be just a single restoration option.

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1 The WFD is a law that has been agreed by all EU member states and its default objectives are not up for discussion.
Implementing cost-effectiveness analysis

The steps we need to take to come up with a cost-effective programme of measures can be summarised in a straightforward way:

1. Identify the nature and scale of the problem
2. List potential measures needed to achieve Good Status
3. Assess the costs of individual (or package of) measures
4. Assess the effectiveness of individual (or package of) measures
5. Combine costs and effectiveness information for ranking measures based on their cost-effectiveness ratio
6. Combine the most cost-effectiveness measures so as to reach Good Status;

In practice, these steps become more complicated. The following challenges are common to all countries.

Scale: At which level?

CEA may be conducted at different scales for different measures. For example, cost and effectiveness might be assessed for each sub-catchment, or across a whole nation. In some cases, there may be considerable disparities between costs and benefits in different locations, which may be either revealed or hidden depending on whether assessment is conducted at the appropriate scale.

The correct approach depends on the nature of the problem, and on the type of solution. In some cases, it might be better to conduct CEA at a national level (ie. for legislation setting a standard level of phosphates in detergents, etc), whereas for others, a local approach will be more suitable (eg. relocating a fish farm).

Which costs should be included?

A series of different costs should be included in the CEA:

- The costs to business of implementing the measure (materials, labour, changes in levels of production, etc).
- The costs to government spending for implementing the measure (eg. flood defence spending).
- The costs to the regulator (set-up, administration, enforcement, monitoring, etc).
- Any non water-related environmental costs resulting from the implementation of the measure (eg. emissions, habitat loss).

Note that ‘water environmental costs’ are not included in the CEA because they are the ones addressed by the measures under consideration. Programmes of measures – if effective – will achieve Good Status, and hence, water environmental costs will not arise.

As well as costs, any measures taken to achieve Good Status could result in non-water related benefits or adverse impacts (side-effects). Side-effects need to be recorded and be factored into the analysis. Non-water benefits might include recreation opportunities resulting from land use
changes (eg. buffer strips and habitat restoration to reduce to reduce diffuse pollution and sediment loading) or better landscapes resulting from changes in farming practices.

**How is effectiveness assessed?**

The effectiveness of measures or combinations of measures can be assessed by the magnitude, speed, intensity, and characteristics of their effect. It is important to assess effectiveness changes when measures are combined (synergistic, antagonistic effects, etc). However, there is likely to be high uncertainty in the effectiveness of some measures. For example, how much phosphorus will be removed by a 10 m buffer strip of riparian vegetation? Assessing effectiveness in such cases is a significant challenge.

Mis-handling uncertainty can lead to the selection of inappropriate measures. For example, it may be easier to assess the effectiveness of engineering solutions, thereby biasing analysis in favour of such approaches rather than more sustainable measures such as land management.

It is also realistic to consider the practicality or feasibility of implementing measures as a key factor in deciding whether to use them or not. Although this is important, again there are risks of misuse. For example, politically challenging measures, which might require new legislation or planning systems put into place, may be discarded, even if they are the most cost effective for society.

**Monetary and non-monetary costs – Adding up apples and pears**

CEA is a complex process that requires many sources and types of information. Not all costs will be available in monetary terms. Equally, effectiveness of alternative measures cannot always be measured in the same units (for example, kg of Nitrates removed). As a result, data on costs and effectiveness will be in various forms, not always comparable and not always additive. In particular, non-water related environmental costs and side-effects are hardly ever estimated in monetary terms, whereas other costs are.

All this information needs to be made available to the decision-maker. The results of a CEA should usually be presented, therefore, as a ranking of cost-effectiveness, along with any relevant information which has not been integrated in the “cost” or the effectiveness side. There is a significant risk that costs and benefits which can’t be expressed in monetary terms, including important social and environmental issues, will not be taken into account if only monetary measures are included in the final assessment.

**Simplification and screening – Is the CEA really cost-effective?**

Conducting CEA is costly and time-consuming. There may be an infinite number of solutions, or combinations of measures. Ironically, doing CEA for all of them would certainly not be cost-effective. Therefore, we may need to simplify, in particular by screening out some measures. While screening out is important, there are again dangers that good measures may be screened out too early in the process on the basis of inappropriate criteria. If screening of measures is to take place, it should follow well-defined and objective criteria.
Communication, public participation and transparency

CEA methodology can be complex. Good communication and proper training are crucial to the correct implementation of CEA. Equally, stakeholders play a key role in the CEA process. They not only provide essential information and ideas for solutions but their involvement in the measures appraisal process also ensures the success in the implementation of measures. Involvement of stakeholders needs to take place as early as possible in the implementation process. This needs to be supported by a transparent CEA process. Decisions taken on the screening, selection or non-selection of measures should be recorded and available so that they can be easily tracked.

Key things to look out for

1. Misreported Costs. It is usually the case that sectors over-report the costs to them of conducting certain measures (not necessarily intentionally), thereby decreasing the likelihood that measures that adversely affect them will be adopted.

2. CEA vs. cost-benefit assessment. CEA should not be used as a mechanism to decide whether it is too costly to achieve an objective. That is the role of disproportionate cost analysis.

3. Engineering solutions. The uncertainties associated with many land-based mechanisms may lead to a bias in favour of engineering-based, end-of-pipe solutions, even where land-based solutions may be more effective.

4. Screening. Good measures may be inappropriately screened out before the CEA is conducted, for example for political reasons.

5. Non-monetary costs and benefits. It will not always be possible to express all of the costs and side-effects of a measure in monetary terms. For example, the use of wetlands to filter diffuse pollution may create wildlife habitats. Non-monetary effects should not be lost in the final analysis.
B. DISPROPORTIONATE COST ANALYSIS – DCA

Summary

Disproportionate cost analysis can be used to justify alternative objectives to the achievement of Good Status by 2015. Well applied, it can ensure equitable, fair and even-handed implementation of the Directive. If abused, however, disproportionate cost analysis has the potential to significantly thwart and undermine the objectives of the WFD.

The role of disproportionate cost analysis in WFD

While the overall objective of the Directive is the achievement of Good Status by 2015, the achievement of this in all water bodies of the EU is clearly unrealistic. The Directive therefore provides a number of alternative objectives. Disproportionate cost analysis (DCA) plays a central role in determining when these alternatives can be justified, and should take place following cost-effectiveness analysis if it is to be used. A DCA is not applied to all Programmes of measures, but only in certain cases.

The Directive envisages the use of DCA on four particular occasions, which can be considered in two categories. Where DCA justifies an alternative environmental objective this must be specified in the River Basin Management Plan.

1. **Extended deadlines.** Extension of the deadline from 2015 for one or two further updates of river basin plans (i.e. until 2021 or 2027) is permitted where achievement of the objectives by 2015 would be disproportionately expensive (Art 4.4).

2. **Less Stringent Environmental Objectives.** Less stringent objectives may be pursued where the achievement of Good Status objectives would be disproportionately expensive (Art 4.5) even with an extended deadline. (WATECO said that these should be considered in this order)

In these two cases, the costs of the proposed measure or measures are considered to assess whether they are compared disproportionate. Where costs are judged as disproportionate, alternative approaches to the achievement of the relevant environmental benefit should be investigated.

3. **Designating Heavily Modified Water Bodies.** A water body may be designated as heavily modified when the beneficial objectives served by the modified characteristics cannot be met by alternative means that are not disproportionately costly (Art 4.3).

4. **New Modifications.** New modifications that cause status deterioration are permitted when the beneficial objectives served by the new modification cannot be met by alternative means that are not disproportionately costly (Art 4.7). (Such new modifications must also satisfy a series of further conditions, including that they be of overriding public interest, and ‘sustainable’).

In these two cases, the alternative environmental objectives are only adopted if the activity in question, and all alternative approaches, are disproportionately costly.

There are different ways in which cost disproportionality can be assessed, eg. by comparing costs of existing measures with costs of supplementary measures required for reaching the
environmental objectives of the WFD; by comparing the costs of measures with ability to pay, or by comparing total economic costs to overall benefits. There are also questions with regard to the level at which costs are deemed to be ‘disproportionate’ – and how disproportionality will be judged will play an absolutely central role in determining the extent to which significant improvements to the freshwater environment will be achieved. If relatively modest measures are judged as being ‘disproportionate’, the Directive may ultimately result in little action being taken. This aspect is further developed in the following paragraphs.

**Implementing Disproportionate Cost Analysis (DCA)**

**What is meant by ‘disproportionate’?**

One of the significant challenges posed by DCA is that there is no accepted definition of what is actually meant by ‘disproportionate’, either within the Directive or the practice of economics more generally. The overall purpose of DCA within the Directive is clear: to prevent unrealistic and excessive measures that would entail unacceptable social and/or economic costs. This clearly involves some kind of attempt to evaluate the comparative costs and benefits of a proposed measure.

The difficulties arise when an attempt is made to specify more precisely exactly what should be considered in assessing the comparative costs and benefits, and how great costs should be before they become ‘disproportionate’. There are a range of possible interpretations of what might constitute disproportionate costs, for example:

- Where the economic costs of a programme of measures are greater than the benefits. If so, how much greater and how do we measure the ‘value’ of environmental benefits in a way that allows us to compare them with costs?
- Where a measure would involve significant adverse social impacts, for example loss of employment or impact on low income groups.
- Where one sector is asked to bear a very high proportion of implementation costs.

Conventional economic analysis typically uses cost-benefit analysis (CBA) in evaluating decisions. CBA is a well recognised technique with an established and rigorous methodology for comparing economic costs and benefits in monetary terms. Proposed projects receive approval only where benefits are judged to exceed costs. Because costs and benefits are compared to aid decision-making, DCA is in a way a modified form of cost-benefit analysis. However, unlike conventional CBA, DCA should allow for the inclusion of non-monetary information. In addition, in DCA there should not be a presumption that a proposal is rejected as soon as monetary costs exceed monetary benefits.

There are significant voices across Europe suggesting that disproportionately starts where monetary costs exceed monetary benefits, as is the case in CBA. **Any attempt to suggest such an approach to DCA should be resisted strongly, and such an approach would lead to limited implementation of the Directive.**

The clearest statement of what DCA should comprise is provided in the European Commission’s Common Implementation Strategy (CIS) Guidance on Economics and the Environment (commonly known as the WATECO guidance). It is worth quoting at length because it is clear and likely to become important:
“Whether an improvement is found to be disproportionately expensive or ‘other means’ disproportionately costly will be decided by individual Member States on a case-by-case basis. Ultimately, disproportionality is a political judgement informed by economic information. Given the uncertainty around estimates of costs and benefits, bear in mind that:

- Disproportionality should not begin at the point where measured costs simply exceed quantifiable benefits;
- The assessment of costs and benefits will have to include qualitative costs and benefits [i.e. non-monetary] as well as quantitative;
- The margin by which costs exceed benefits should be appreciable and have a high level of confidence;
- In the context of disproportionality the decision–maker may want to take into account the ability to pay of those affected by the measures.”

How do we define benefits?

Whatever approach is taken to the definition of disproportionality, it is important that disproportionality tests are based on a comparison of some form of the costs and benefits of proposed measures. However, while the costs of the programme of measures might be comparatively easy to define, it is often harder to evaluate benefits precisely in a way that can be compared to costs. For example, where costs are largely financial while benefits are mainly social and environmental, attempts at a comparison are clearly not straightforward.

One approach often adopted within economics is to ascribe a monetary value to both costs and benefits, thereby providing a common basis for comparison. A range of approaches exist for placing a monetary value on environmental improvements. These assess both the value of ecosystem functions such as the provision of clean water, but also attempt to assess the value to society of the existence of healthy ecosystems in their own right.

While there is an important role for the description of benefits in monetary terms, there are a number of limitations to such an approach. These include:

- Significant methodological problems with the valuation of certain ecosystem values, in particular the social and ‘existence’ values of healthy freshwater ecosystems
- Difficulties in capturing the full range of benefits of environmental improvement, including significant scientific uncertainties
- Difficulties in assigning a value to marginal improvements in environmental quality

DCA should, therefore, include both monetary and non-monetary assessments of benefits.

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Key things to watch out for

1. **DCA and CBA.** Disproportionate cost analysis is **not** Cost-benefit analysis, whatever anyone may try to suggest. The WATECO guidance can be used as a reference for this.

2. **Undervaluing benefits.** The difficulty of placing a monetary value on the benefits of improvements in ecosystems leads to a risk that they will be undervalued in DCA.

3. **Misreporting costs.** Affected sectors have a clear interest in inflating the costs to them of a particular measure, thereby increasing the likelihood that the measure will be adjudged as disproportionate. The same issue applies to cost-effectiveness analysis.

4. **Time ‘derogation’.** The use of extended deadlines can be a good thing. Often, while the achievement of Good Status by 2015 would be disproportionately costly, the same might not occur if Good Status is only to be achieved by 2021 or 2027. But this does not justify inaction as delaying measures also delays benefits and environmental improvements!

5. **Less stringent objectives.** Where disproportionate cost is used as a justification for the achievement of less stringent objectives, the highest possible state that can be achieved without incurring disproportionate costs must still be achieved; and the establishment of these less stringent objectives must be specifically mentioned in the river basin management plan.
C. WATER PRICING AND THE RECOVERY OF THE COSTS OF WATER SERVICES

Summary

The WFD requires Member States to ensure sound and robust pricing policies aimed at supporting the achievement of the environmental objectives of the WFD. In particular, the WFD requires that prices should take account of the costs of water services, including environmental and resource costs. The implications of this requirement are profound, and most Member States are being required to investigate water pricing policies from an environmental angle for the first time.

The role of Water pricing the WFD

In addition to the use of economics as a tool to support decision-making in the WFD (ie. cost-effectiveness analysis and disproportionate cost analysis), the WFD proposes the application of economic instruments in water management and policy. The most important of these concern the pricing of water use and water services (Art. 9). The WFD sets out a number of principles:

1. **Application of the principle of cost recovery.** This principle suggests that prices should reflect the full range of costs involved in the provision of water and water services. Note that the Directive only requires member States ‘to take account’ of this principle. (Art. 9.1)

2. **Environmental and resource costs should be considered in assessing cost recovery.** Environmental costs are the costs of damage to the environment due to water services and water uses, while resource costs are the foregone values of alternative use of water. Both of these costs should be considered in cost-recovery and, therefore, pricing. For example, where abstraction causes significant damage, this should be accounted for in the price paid for that water service. (Art. 9.1)

3. **Ensuring adequate contribution of different water uses (disaggregated into at least agriculture, industry, households) to the costs of water services based on the polluter-pays-principle.** This principle implies that where different sectors are responsible for different costs, this should be reflected in the prices paid by that sector. For example, where agriculture is responsible for nutrient pollution, the principle suggests that the agricultural sector should be responsible for the associated costs (eg. a de-nitrification plant). (Art 9.1)

4. **Ensuring that water-pricing policy provides adequate incentives for efficient use of water resources.**

These apparently technical requirements have profound implications for water management in many European countries. The Directive requires that these be achieved by 2010. The first implementation step with regards to cost-recovery and pricing is the characterisation of river basin districts (Article 5 report). These should provide an inventory of the present status with regards to cost recovery and the incentive dimensions of current pricing.

It is important however to stress that the WFD does not require a full recovery of the costs of water services. In some cases, Member States can justify existing pricing policies on social, economic and environmental grounds. Overall, transparency in (i) who uses and pollutes, (ii) which services are put in place, (iii) what are their costs, and (iv) who pays for these costs, is the main objective of Article 9. Combined with Article 14 and the consultation/participation of
interested parties, transparency is expected to stimulate changes in cost-recovery and pricing policies that are more in line with the achievement of the environmental objectives of the WFD.

**Implementing Cost-recovery and incentive pricing**

**What should be considered as water services?**

While the very important principle of cost-recovery applies to water services, there remains a debate over what precisely should be counted as a water service. Article 2 of the WFD defines water services as: “all services which provide for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface or groundwater; (b) waste water collection and treatment facilities which subsequently discharge into surface water.”

It is clear that activities such as water abstraction and waste water discharge (and thus water supply and waste water services) have to be included in the definition of water services. Other water services such as those developed for flood protection (construction and maintenance of dykes), navigation (dredging of rivers and specific infrastructure built), hydropower (building and operation of dams) or agriculture (drainage and land improvements infrastructure) are also water services to which cost-recovery assessments can be developed.

Much discussion has taken place on whether cost-recovery assessment should consider self-services or only services provided by a third-party (public or private operator). Self-service occurs when water users provide water services to themselves, in particular through direct abstraction of water from water bodies or groundwater or direct waste water treatment and discharge to the ecosystem.

It is important that these self-services be included as they may be responsible for significant environmental damage (e.g. lowering the groundwater table). Environmental taxes and charges might then be put in place to reflect the environmental costs users are causing. Self-service users may also receive subsidies from the state, thereby encouraging water overuse. Any significant subsidy would violate the principle of cost recovery.

**What kind of costs should be considered?**

According to the WFD, financial, environmental and resource costs are all to be considered in assessing cost-recovery of water services. Financial costs are the costs of providing and administering services, and can be broken down into a number of elements:

- **Operating costs**: all costs incurred to keep a facility running.
- **Maintenance costs**: costs for maintaining existing assets in good functioning order till the end of their useful life.
- **Capital costs**: costs of new investment expenditures and associated costs, depreciation costs and opportunity costs of capital (an estimate of the rate of return that can be earned on alternative investments).
- **Administrative costs**: administrative costs related to water resource management

While these financial costs can be evaluated comparatively easily, there are greater challenges in assessing levels of environmental and resource costs.
- **Resource costs** are the costs of foregone opportunities that other uses suffer due to the depletion of the resource. For example, extensive abstraction for public water supply will prevent use of water for agriculture.

- **Environmental costs** represent the costs of damage that water uses impose on the environment and ecosystems. This may include lost production or consumption opportunities as well as non-use values.

A variety of methods exist for attempting to assess the level of environmental and resource costs. These methods have their own uncertainties and limitations, and the integration of results obtained from these methods into policy making is rare in Europe. Assessing the costs of (restoration) measures required for bringing water back to Good Status is one method that can provide a proxy to the value of environmental costs. This method appears well-suited to support the revision of water pricing and integrate environmental costs in the bills of users of water services.

**Looking at subsidies**

Subsidies are allocated to water service providers and users in different ways.

- Subsidies can be paid directly by governments to providers of water services in the form of investment subsidies or co-financing of the operation of the infrastructure. These subsidies reduce fixed and variable costs respectively.
- Subsidies can be paid directly to water users, thus lowering the price or charges paid by these users.
- Subsidies might exist in the form of soft loans or loans with preferential interest rates (as compared to the market rate).

These subsidies must be accounted for in assessing whether the prices paid by water users reflect the full cost of the water service. This is important because water services are often highly subsidised in Europe, leading to damaging overuse of water.

**Users vs. uses**

The WFD makes a distinction between (i) users and (ii) uses.

- **Users** are individuals or organisation to which a *water service* is provided, eg. households or industries connected to the public water supply and sewerage system, or electricity company using a dam (the service) for hydropower electricity generation.
- **Uses** are *all* activities that have an impact on the aquatic environment. All users are (whether directly or indirectly) uses. But some uses are not users of services. For example, agriculture that is polluting groundwater through fertiliser application (diffuse pollution) is considered as a use because it has an impact on the freshwater environment, even though it may not be a user of a specific water service in that context.

The implications of the WFD for each are somewhat different. However, in both cases, the WFD suggests that the costs imposed on the water environment should be accounted for in the prices paid by sectors.
**What should be the geographic scale of cost recovery assessment?**

The Directive specifies that reporting of the results of the cost recovery assessment is required at the river basin district scale for each category of water services that has been identified. However, it does not specify the scale at which the assessment is to be performed. Information currently available on costs is usually available at different scales. For example, financial costs and revenues will typically be collected for water service areas, which will not necessarily coincide with river basins.

For the assessment environmental costs, it is important that the scale at which environmental impacts take place is considered. Indeed, if a specific wastewater treatment plant has a negative impact on river quality for a 10 km stretch, environmental costs will need to be computed for this stretch. For the assessment of the contribution of uses to the costs of water services, the scale at which the impact of the use (eg. diffuse pollution from agriculture) on water status is recorded will guide the analysis.

**Incentive pricing – some elements**

One of the principles set out by the WFD is that water-pricing policies provide adequate incentives for efficient water use as a contribution to the achievement of WFD objectives. A price or tax is considered as providing an incentive to reaching the environmental objectives of the WFD if users/uses to which the price/tax applies effectively consider the tax/price in reducing their pressure on the aquatic environment. For example, a tax might reduce water use and abstraction, or pollution to a river.

Two important aspects are to be considered in this context.

- Firstly, the **structure** of the tax/charge/price needs to account for the volume of water abstracted or the pollution discharged. Hence, flat-rate irrigation prices defined per unit of land irrigated provide no incentive for more efficient water use. On the other hand, a volumetric water price dependent on the quantity of water used provides an incentive to the user to use water more efficiently.
- Secondly, the **price or tax needs to be sufficiently high** (eg. as compared to other production or consumption costs or as compared to income) so that users effectively consider it into their decisions. If it is too low, it will not lead to behaviour change.

Little attention has been given so far in Europe to this incentive dimension of water pricing in a WFD context.

**Key things to watch out for**

1. **Defining water services.** The definition of water services should be sufficiently broad to include not just public water supply, but also the range of other services including self-service. Affected sectors are likely to wish to avoid being included.

2. **Contribution of water uses.** Most cost-recovery analyses have focused on the recovery of the costs of water services from the users of these services alone. However, the WFD also requires that the impact of water uses be considered: linking uses (pressures on
water resources) and water services, and assessing the contribution of water uses to the costs of water services, is required. This enables for a comparison of the pressures from different uses with their financial contribution to solving problems.

3. **Environmental and resource costs.** Because of the methodological difficulties with valuing environmental costs, limited efforts have been made by Member States in this field. It is important to make sure they are adequately considered.

4. **Incentive pricing and the selection of measures.** Changes in pricing policies will need to be considered as a potential option in defining the programme of measures. Discussions have to be initiated with governments soon to ensure adequate consideration is given to water pricing as a tool for more effective use of water resources.
4. Frequently Asked Questions

A. Can alternative objectives be applied to protected areas?

B. What is the relationship between disproportionate cost analysis, cost effectiveness analysis, and cost benefit analysis?

C. What is the difference between basic and supplementary measures, and how does economic analysis apply to each of them?

D. Should economic analysis be conducted of individual measures or programmes of measures?

E. What are water and non-water environmental costs, and how are these accounted for in the analysis?

A. CAN ALTERNATIVE OBJECTIVES BE APPLIED TO PROTECTED AREAS?

The quick answer is: NO.

One of the principal characteristics of the WFD is the ability to use alternative objectives to the achievement of Good Status by 2015. These alternative objectives include the adoption of a later time objective (up to a final limit of 2027), and the adoption of less stringent standards than the achievement of Good Status. In each case, the alternative objective can be applied where the achievement of Good Status by 2015 would be disproportionately expensive, and allow for the ambitious objectives of the WFD to be balanced against alternative social and economic objectives.

However, the WFD is clear (art. 4.1 [c]) that these alternative objectives do not apply in the case of protected areas specified in terms of European Directives, in particular the Habitats and Birds Directives. There are a number of important points to note about this:

- The only alternative objectives that will be permitted for such protected areas are the objectives provided for in the original directives. In the case of the Habitats and Birds Directives, failure to achieve the objectives can only be achieved on the grounds of ‘overriding public interest’, a far more stringent test than the WFD test of disproportionate expense.
- The WFD provision applies to ‘protected areas’ not just ‘water bodies’. Hence, the provisions apply not only to water bodies but also to all freshwater dependent ecosystems such as fens, bogs, grazing marshes and other water-dependent habitats designated under European legislation.
- Where WFD objectives are more stringent than the objectives contained within existing legislation, then the WFD objectives will apply (eg. no deterioration from High Ecological Status).

The implications of this are profound. Unless overwhelming public interest can be demonstrated, measures to ensure that protected area objectives are met must be included in the first river basin management plans and be operational by 2012.
B. WHAT IS THE RELATIONSHIP BETWEEN DISPROPORTIONATE COST ANALYSIS, COST EFFECTIVENESS ANALYSIS, AND COST BENEFIT ANALYSIS?

Disproportionate cost analysis, cost effectiveness analysis, and cost benefit analysis are each techniques to aid decision making, and each involves measuring costs. However, they are used in different situations, and the use of the wrong approach can have significant adverse impacts on the environment.

Cost Effectiveness Analysis. CEA tries to find the lowest cost way to achieve a fixed objective. In the case of the WFD, that objective is Good Status. Crucially, CEA takes as given that a specified objective will be achieved, and then seeks the best way to achieve that objective. CEA should therefore gather information on the costs and effectiveness of combinations of measures, and identifies which combination of measures would achieve Good Status at a lower cost.

Cost Benefit Analysis. Unlike CEA, CBA does not take the achievement of a particular objective as given. Instead, CBA compares the costs and benefits of carrying out a particular action or project in order to decide whether it should be undertaken or not. The action or project is carried out if the benefits outweigh the costs. CBA traditionally only assesses monetary values, as this allows for a direct comparison between costs and benefits. As environmental and social benefits cannot always easily be converted into monetary terms, they are often underestimated in CBA.

Disproportionate cost assessment. DCA attempts to assess whether carrying a particular action or project is “disproportionately costly”. Such analysis will be a key aspect of the economic analysis envisaged for the WFD, where alternative objectives such as time delays and less stringent environmental objectives can be justified where these are disproportionately expensive. DCA can be regarded as a type of CBA as it compares costs and benefits. However, there are a number of important differences between CBA and DCA. With DCA, a proposal should not be regarded as disproportionately costly simply at the point where measured costs simply exceed quantifiable benefits. Equally, non-monetary information should be included in any DCA. Any attempt to use conventional CBA in the place of DCA in implementing the WFD should be strongly resisted.

C. WHAT IS THE DIFFERENCE BETWEEN BASIC AND SUPPLEMENTARY MEASURES?

A distinction between “basic” and “supplementary” measures is made in Article 11 of the Directive. Basic measures are those targeted to achieving the requirements set by current environmental legislation such as the Nitrates and Bathing Waters Directives. This includes measures which might have already been planned, designed or implemented on the ground. Supplementary measures are those additional measures needed on top of basic measures to achieve the WFD objectives.

It is clear that CEA should be carried out for supplementary measures only – as basic measures are compulsory measures. However, CEA applied to both basic and supplementary measures might help prioritising resources and implementation – putting resources first for measures that are the most cost-effective and deliver the largest environmental improvements. As a guiding principle, whether basic measures are already in place or not might help deciding how to treat them in the CEA. If “basic” measures are already into place then CEA would look at supplementary measures taking account of the effectiveness achieved or expected to be
achieved by basic measures. If “basic” measures are not into place, then it would make more sense to conduct the CEA including both basic & supplementary measures so as to come up with the most cost-effective measures to achieve WFD goals (as long as these include all other objectives).

**D. SHOULD ECONOMIC ANALYSIS BE CONDUCTED OF INDIVIDUAL MEASURES OR PROGRAMMES OF MEASURES?**

The WFD objective of Good Status will require a range of measures if it is to be achieved. Many of these measures are likely to interact with each other, impacting on their effectiveness: there will be measures that will complement each other, others which will overlap, and some which might cancel each other out. As a consequence, it is the effectiveness of the whole Programme of Measures designed to achieve WFD objectives that needs to be assessed.

However, in practical terms, it may be useful to gather information initially on costs and effectiveness of individual measures. It is essential, nevertheless, to analyse how these measures interact with each other.

**E. WHAT ARE WATER AND NON-WATER ENVIRONMENTAL COSTS, AND HOW ARE THESE ACCOUNTED FOR IN THE ANALYSIS?**

The objective of the WFD is to achieve Good Status. However, many WFD measures will have impacts beyond the water environment, for example leading to improvements in biodiversity in the case of wetland restoration, or increased environmental damage if an increase in energy intensive water treatment is required. How far should these ‘non-water’ issues be considered in WFD implementation, and where do we set the boundaries of the economic analysis?

The WFD addresses this issue by creating a distinction between water and non-water environmental costs and benefits:

- Water environmental costs or benefits refer strictly to the water environment. They include environmental costs – damage done to the aquatic ecosystem – of not having the water in Good Status, or environmental benefits of having it in Good Status.
- Non-Water environmental costs or benefits refer to all the impacts to the environment which don’t take place in the water (ie. air, biodiversity in nearby habitats).

Of course, water constitutes a continuum embedded into all ecosystems, so it is often hard to define a clear frontier between the water & non-water world.

The focus of cost effectiveness analysis is to find the least costly way to achieve Good Status for waters. But the measures considered are very likely to have impacts (negative or positive) on the non-water environment. For example, building a waste water treatment plant will bring environmental costs in the form of air pollution & CO₂ emissions, plus possible loss of biodiversity & habitat depending on where the plant is built. On the other hand, restoring floodplains to diminish flood risk will create valuable habitat and increase biodiversity in a non-water environment.

While these non-water environmental costs and benefits must be fully considered in the cost effectiveness analysis and in the disproportionate cost analysis there is considerable debate as to how this should best be done.
5. Key References

The European Commission’s WFD page

http://www.oieau.org/west/index.html
Extensive training materials on economics and the WFD, in English and French

http://www.defra.gov.uk/environment/water/wfd/economics/index.htm
UK Government extensive WFD economics research programme

www.biodiversityeconomics.org
WWF and IUCN Biodiversity Economics portal site, with access to a huge environmental economics library of technical and non-technical material.

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