

THE ECONOMIC ANALYSIS IN THE IMPLEMENTATION OF THE WATER FRAMEWORK DIRECTIVE IN SPAIN

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ABSTRACT

One of the most innovative elements of the Water Framework Directive (WFD) is the important role that economic analysis is assigned in achieving its environmental objectives. In Spain, like in other European countries, a great effort has been put forth by river basin agencies and other institutions involved in water management to diagnose the current state of water resources and to implement the economic tools and principles required by the Directive. However, there have been a number of shortcomings in the way the economic analysis has been designed and applied during this process (as well as a significant delay in meeting the WFD's deadlines). The objective of this paper is to critically review the implementation of the economics of the WFD in Spain and to make suggestions on how to deal with the problems that have been encountered. Our review shows that shortcomings have occurred at several of the implementation stages. Some of the more important shortcomings are that the characterisation of water uses is mostly descriptive and lacks prospective analysis; that analysis of the potential for costs recovery of water services has incorrectly assumed that the financial costs of water provision are completely covered by the payment of the current legal tariffs; and that environmental and resource costs have not been included in analysis for the selection of the measures. The main reason for these problems is that water policy makers and water managers were unprepared for, and inexperienced with economic analysis. The most important recommendation of this paper to overcome the problems and improve future revisions of the River Basin Management Plans, is to strengthen the links between water planners and academics, in order to take advantage of the long experience of the latter with the tools and principles of economic analysis and move towards evidence based policy-making.

1 INTRODUCTION

In October 2000, Directive 2000/60/CE, better known as the Water Framework Directive (WFD), entered into force. It established a common framework for water management in Europe, and led to a deep and substantial reform of European water legislation. The main objectives of the WFD are to stop deterioration and improve the state of aquatic ecosystems, and to promote the sustainable use of water. To meet these

objectives, the WFD requires Member States to draw up management plans for all their river basins. These plans have to include a Programme of Measures (PoM) with which to establish the “good ecological status” of all water bodies. A key element of the WFD is the role that economic tools and principles have been assigned in achieving its objectives. This is where the Directive is most innovative and interesting, as the use of economics forms an integral part of its design and implementation. The explicit purpose of including economics is to create the integrated regulation necessary for a sustainable management of water resources.

Two phases of the economic analysis in the WFD can be distinguished. The first (already completed) entails the economic characterisation of the different water uses and the construction of future scenarios, as well as studying the potential for cost recovery of water services. In the second phase, which should have been finished by the end of 2009, but is still ongoing in some countries, the focus lies on identifying and selecting the measures to be included in the PoM. The results of the first implementation phase in Spain are reported on river basin authorities’ websites, and in a summary document prepared by the Ministry for the Environment (MIMAM, 2007a; 2007b). The preliminary results of the second phase can be found on the abovementioned websites, as well, under the title “Outline of Main Topic” (OMT). It will be a few months more before the final and approved PoMs will be available for analysis.

The objective of this paper is to critically review the use of the economic tools in the implementation of this new process in Spain, and to come up with suggestions on how to deal with the problems that have been encountered.

2 THE PLANNING PROCESS

In Spain, the WFD was transposed into national legislation through Article 129 of Law 62/2003 dated 30 December 2003. This transposition was somewhat precipitated due to the tight European timetable and a lack of foresight on the side of the Spanish legislator. Several parts of the Directive were literally adopted in this Law. However, other elements were designated to be dealt within the Water Planning Regulation (*Reglamento de la Planificación Hidrológica*)¹ and the Water Planning Instructions (*Instrucción de Planificación Hidrológica*, WPI)².

River basin management planning has the following four objectives: a) protecting water bodies and maintaining them in a good state, b) meeting water demands, c) harmonising regional and sectoral development with environmental protection, and d) minimising the effects of floods and droughts. The sustainable use of water is meant to be guided by integrated water management principles and the long-term general protection of water resources.

As stipulated by the Spanish legislation, the economic chapter of the management plans shall include: a) a summary of the river basin characterisation, including the

¹ Royal Decree 907/2007, 6th July 2007.

² Ministerial Order ARM/2656/2008, 10th September 2008. After the approval of these documents the implementation process started off with the request to all river basins to prepare a series of documents, including the *General Study of the River Basin*, the *Programme*, *Timetable and Consultation Plan* and the *Public Participation Plan* (MIMAM, 2007b). Afterwards, an *Outline of Main Topics* (OMT), was prepared in July 2010 as an intermediate step between the general characterisation of the river basin and the final management plans

economic importance of the water uses, and the prospective supply and demand of water and its impact on the economic activities, b) the estimations for the cost recovery for water services, and c) the PoM, including the results of the cost-effectiveness studies. In the following sections, we will critically review how each of these requirements has been dealt with in Spain.

Most river basin agencies are still currently preparing the Draft of River Basin Management Plans (DRBMP). Once finalised, these will be shared for consultation and public participation before final approval. As mentioned, Spain has failed to approve the RBMPs before the 31 December 2009 deadline fixed in the WFD. Moreover, given the obligatory public participation periods and the reporting requirements of the different institutions in the approval process, it is unlikely to expect the final publication of the majority of the RBMPs before the summer of 2012.

3 THE ECONOMIC CHARACTERISATION OF WATER USES

According to the WFD, the RBMPs should be based on detailed studies of the river basin, with regard to both its biophysical condition and its socio-economic characteristics. These studies should: a) identify the different water bodies within the river basin, b) determine the pressures and impacts of human activities on the state of the water bodies, and c) contain an economic analysis of the water uses.

The water use characterisation studies have the following goals (Berbel and Gómez-Limón, 2006):

- To classify the different economic activities in relation to the pressures they exert or the impact they have on water bodies.
- To identify the available technical and economic information in relation to human pressures.
- To provide relevant information for an impact assessment of the proposed measures.
- To create a baseline from which to construct future scenarios for the 2015 horizon
- To determine information gaps and suggest where new data gathering would have to take place in the future.

The activities with a major impact on the state of the water, i.e. water extraction for domestic use; irrigation and other agricultural uses; and industrial uses, have been studied for all Spanish river basins. Additional activities, for example related to electricity generation, tourism, aquaculture, recreation (golf courses, aquatic parks, etc.) or navigation, have additionally been analysed for a number of river basins where these activities have an important impact.

The economic characterisation studies have been based on secondary information from different official sources. Information was also drawn from business associations and water users, such as municipal water companies, energy companies, and irrigation cooperatives. The resulting compilation of an enormous amount of data provides a very complete view of the interdependencies between water and its different economic uses; a view which was previously unavailable. This would not have been possible without the explicit inclusion of economic analysis in water management as required by the WFD, and is considered as one of its main achievements (Maestu and del Villar, 2007; Gómez-Limón, 2009).

Despite this important achievement, the characterisations do have certain shortcomings that should be corrected in the future. First, an integrated database of the

information still has to be developed. Indeed, the OMTs of the different river basins also indicate that, despite the amount of information collected for the economic analysis of water uses, important information gaps remain. For instance, there are gaps with regard to water availability, the water volumes extracted by specific users, or the volumes of wasted water and water returned to water bodies. Another problem that was encountered, was that statistical information is defined by administrative units (e.g., regions, provinces, or municipalities), which can be difficult to link to the geographically demarcated river basins. This has limited the ability to link physical information about pressures and impacts (usually available for a geographical area), with the economic data (available for administrative units). A second weakness of the economic characterisation studies has been their largely descriptive nature. There has been insufficient analysis and interpretation of the collected information. The analysis has been limited to summarising and categorising the collected statistics, without applying methods for regional and sectoral analysis. For example, the economic importance of the different water-using sectors has been exclusively based on their contribution to GDP. Other, potentially more informative methods of analysis, based for instance on input-output tables, or social accounting matrices have been largely ignored. These other methods would have allowed a more detailed picture of the contribution of the different sectors to the economies and the development of the territories within the river basins (Duarte et al., 2002; Velázquez, 2006). Similarly, the studies estimate the productivity of water in different sectors by simply taking the ratio between the benefits of the activity and the volume of water it uses (apparent or partial productivity of water). This does not provide information on the real importance of water in the production process, and can lead to wrong results. In this regard, it would be advisable to look at total factor productivity.

The abovementioned shortcomings were mainly caused by a lack of experience with the use of this type of information at the river basin agencies. The creation in 2003 of the Economic Analysis Group for the WFD within the Directorate-General for Water of the Ministry for the Environment was meant to address this problem. This group was charged with the coordination of the economic studies in all river basins. Nevertheless, the final results have not been fully satisfactory. Partly this has been due to a lack of human and financial resources allocated to this group, and partly it has been the river basin agencies' lack of understanding of (and sometimes even interest in) this type of study that differs from their traditional technical and engineering type of work.

4 CONSTRUCTING FUTURE SCENARIOS

The WFD has put in place a number of environmental targets for 2015 and beyond. For surface water, the target is to reach a "good ecological status", while the target for groundwater is to have a "good quantitative status" (a balance between extractions and recharge) and to "improve the chemical status" (preventing or limiting contamination). These targets require that all water bodies are checked, not only with regard to their current status, but also looking at expected future developments for the 2015 horizon. In other words, it is necessary to identify the gap between the expected state in 2015 and the good status. This way, actions can be planned not only for water bodies that already need improvement, but also for those that are at risk of failing to meet the targets in future due to, for instance, the emergence of new pressures.

Because of limited human and financial resources, these future scenarios were constructed in Spain in a pragmatic way, by analysing past trends and expected future factors of influence for the most important water use sectors (agriculture, urban water provision, and industry). Trend analysis was performed extrapolating recent developments in these sectors. The expected future factors of influence were analysed by looking at how policies and public plans – both those already approved and those in the process of being approved – would influence these trends. As an illustration, in the agricultural sector, the important trends that have been taken into account are the development of rain-fed and irrigated agriculture, the distribution of crops, cattle numbers, farm size, agricultural employment, water use for irrigated crops (irrigation technology, the source and availability of the water), and the use of fertilisers. Part of the influencing factors were the National Irrigation Plan, which includes the programme for new irrigation schemes and the modernisation of the most obsolete irrigated zones, as well as the expected reform of the Common Agricultural Policy (CAP).

The major problem with this approach is that only a single deterministic scenario has been developed. In a world where changes are becoming increasingly difficult to predict and all economic sectors face a high degree of uncertainty, assuming a “predictable” and “single” future has little practical use and can lead to erroneous results. The limited usefulness of these deterministic scenarios has already become clear in the implementation stage. Due to the recent economic and social changes, especially the international economic crisis and its repercussions on urban and industrial development, the 2015 scenarios, which were published in 2007, already seem improbable. It is hard to see how such scenarios, despite the great effort invested in them, can aid decision-making.

In the economic literature, increased levels of uncertainty when studying future developments are dealt with through scenario analysis or strategic prospective analysis. Both approaches are based on the idea that there are several possible futures. Therefore, instead of “predicting” the future, the different alternative futures should be “explored” and analysed simultaneously in order to aid current strategic decision-making (Greeuw et al., 2000; Gordon and Glenn, 2003). Future river basin management planning will have to incorporate these methods. Without them the uncertainties faced by water using sectors cannot be properly taken into account, and appropriate strategic water management decisions cannot be taken.

5 COST RECOVERY AND WATER TARIFFS

5.1 Cost recovery studies

Article 9 of the WFD states that “Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle”. The Directive moreover requires the corresponding water pricing policies to be implemented from 2010 onwards, as part of the river basin management plans. The goal of including cost recovery was twofold (Maestu and Berbel, 2009; Pujol et al., 2009): a) to attain economic efficiency by internalising all costs of the resource in its price (taking both positive and negative externalities into account), and b) to improve the transparency of

the policies, avoiding the possibility of indirect, and potentially large subsidies. Subsidies may be warranted for certain activities, but they should be awarded in a transparent way, and through more appropriate instruments than water policy.

Studies prepared to comply with Article 9 on which the new water tariffs are to be based were part of the above mentioned General River Basin Studies, and a summary is provided in MIMAM (2007a). The results show a high variation in the rates that would be necessary for full cost recovery depending on the water uses and the river basin characteristics. In general the tariffs would have to rise below 50 percent compared to the current situation (e.g., for urban uses increases from 43% to 4% would be necessary, and irrigation tariffs would have to rise by 46% to 3%).

However, there are certain methodological issues that cast doubt on the validity of these results. First of all, only the financial costs of water services have been taken into account, ignoring the existence of environmental and resource costs. The stated reason for this omission has been the difficulty to quantify these costs (MIMAM, 2007a). This is not in line with the WFD nor with the Spanish regulation (WPI), which demand that all costs are included in the costs recovery estimates.

A further problem is that in calculating the recovery rates, it has been (incorrectly) assumed that the financial costs of water provision would already be covered if water users would pay the current legal tariffs. As shown by Ruiz Ojeda (2002); Mema et al. (2008); and Bielsa et al. (2009), this is not a very precise approximation. The method to calculate the water tariffs under the current Spanish Water Law ignores the losses caused by using interest rates far below the market rate. Therefore, the established tariffs contain hidden subsidies to water users in the form of non-recovered financial costs, and these subsidies are included in the published cost recovery rates.

Finally, the tariffs paid by water users of public water infrastructure (e.g., dams and reservoirs) do not include all costs, as this infrastructure is seen to contribute to the “general interest”, providing public services (i.e. flooding protection) that should be paid for from the general budget. The discounts of the tariffs (share of costs borne to the general budget) paid by water users vary between zero percent in the Duero River Basin and 51.42 percent in the Segura River Basin (MIMAM, 2007a). If these public works indeed provide social or environmental services, it does not seem justified that there are no discounts in some areas, while in others these amount to more than 50 percent. The variation in discounts creates the suspicion that, where they occur, they are actually hidden subsidies. Again, these subsidies do not appear in the presentation of the recovery rates mentioned before. All three problems discussed above have given the published rates a downward bias.

5.2 Exemptions from the cost recovery principle

The vague drafting of Article 9 of the WFD has led to an intense debate, in which some defend that it is “non-mandatory” to implement any water tariffs (Cabezas, 2009), while others belief that full cost recovery should be applied across the board. In this paper, we defend the mainstream opinion that the WFD requires a general application of the cost recovery principle, but that there is room for exemptions based on certain objective criteria (MIMAM, 2007a; Maestu and Berbel, 2009).

From the above, it should be clear that for the application of the cost recovery principle, the financial/economic sections of the Spanish Water Law will have to be adapted, taking into account both the real financial costs, and the environmental and

resource costs. This would lead to rises of around 100 percent compared to current tariffs, which, when in excess of water users' ability to pay might warrant exemptions from the general principle. The WFD itself offers this possibility, when it states that "Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected". However, any exemption does have to be sufficiently justified, and has to be shown not to detract from the environmental objective of the Directive (the good status of water bodies).

For Spain, the literature on this topic has clearly signalled that the new tariffs would be most problematic for irrigated agriculture in the heart of the peninsula, given the low productivity of its water use (Varela-Ortega et al., 1998; Berbel and Gómez-Limón, 2000; Riesgo and Gómez-Limón, 2006). It seems fair to partially exempt this sector to contribute to the development of these rural areas (Gallego-Ayala and Gómez-Limón, 2010), but it remains to be seen how such exemptions will be justified (e.g., by quantifying social, environmental and economic effects of cost recovery), and how wide the exemptions will be applied (to the whole river basin, or to specific extraction systems or irrigation areas).

Exemptions for other sectors (urban, industrial, or irrigated agriculture in the coastal zones) seem harder to justify from an economic point of view, given the small impact that tariff rises will have on their profitability. However, given the unpopularity of such tariff rises, and the current economic crisis, the "inability to pay" argument might be used often by the river basin agencies. This would allow it to more slowly, and with less opposition, raise tariffs in the coming years to the level where the costs of water provision are fully recovered. Section 7.3 will discuss this issue in more detail.

6 PROGRAMMES OF MEASURES

Article 11 of the WFD states that Member States have to create a PoM for each river basin, and Annex III requires that in this process Member States shall "make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures under Article 11 based on estimates of the potential costs of such measures". This requirement made the WATECO group propose cost-effectiveness analysis (CEA) as the most appropriate tool for selecting measures for the PoM (EC, 2003). Although the recommendations of the WATECO group are not binding, CEA has indeed been adopted in most national WFD guidelines (see e.g., Interwies et al., 2004 or DEFRA, 2007, in Germany and the UK respectively). Spain has also followed this line and has stipulated that the costs and effectiveness of each measure has to be estimated. For the PoM, measures are then to be added, starting from the one with the lowest cost-effectiveness ratio, until the environmental objectives are met. It is still too early to analyse how this method is being applied, especially considering that the RBMPs have yet to be published. However, it is possible to look at the guidelines for the analysis in the WPI and indicate the likely difficulties and limitations that are expected to be encountered.

6.1 Cost-effectiveness analysis

The cost of a measure is defined in the Spanish legislation (WPI) as its annual equivalent cost, which consists of the investment, and the operational and maintenance

costs, all converted into a annual sum. In theory, this cost concept should include social costs, such as environmental costs, so that all welfare losses associated with the measure are accounted for. However, the WPI only prescribes the inclusion of environmental costs as far as they can be quantified in monetary terms. Considering the difficulties of estimating environmental costs, and the lack of progress made with this until now (see Section 7), they are likely to be omitted from many of the RBMPs. If, as a result, only the measures' direct financial costs, incurred by public and private agents, will be included, this will cause a bias in the selection of measures. It should furthermore be noted that the use of the annual equivalent cost concept, as prescribed by the WPI, is shown in the literature to favour the selection of more expensive measures, in comparison to other cost concepts, such as marginal unit costs (Aulong et al., 2009).

With respect to the effectiveness of the measures, the WPI prescribes an evaluation based on the measures' "impact reduction" (e.g., the reduction in the nitrogen concentration in surface waters). However, it also allows effectiveness to be measured in terms of "pressure reduction" (e.g., nitrogen released into surface waters), when information about impacts is unavailable. Because of the difficulty to obtain impact information, river basin planners are likely to often fall back on these pressure calculations. On the scale of the river basin, the effects of measures can be quite different depending on whether they are measured in terms of impacts or pressures, leading to different cost-effectiveness ratios (Berbel et al., 2011).

There are two more key difficulties in applying CEA to select measures for the PoMs. The first is how to account for uncertainty, both with regard to the costs, and especially with regard to the effectiveness of the measures. The way this is done can have a big influence on the final ranking of the measures, and no clear method has been identified as of yet. Siegel et al. (2010) do discuss the effects of uncertainty on the implementation of the WFD in general, but the literature on how to deal with it in CEA is still scarce. In Spain, the Ministry for the Environment has addressed the issue by applying "optimistic", "realistic", and "pessimistic" scenarios to the cost and effectiveness calculations in its database of measures (MARM, 2009), but this information system is only in its early stages and still rather basic. In future CEA applications, uncertainty should receive detailed attention, going beyond a simple sensitivity analysis. Examples of valid methods that could be used are stochastic models (Guo et al., 2009), Montecarlo simulations (Brouwer and the Blois, 2008), or Bayesian models (Barton et al., 2005).

Another difficulty related to the CEA is the existence of possible synergy effects between the measures, such as the occurrence of economies of scale when applying measures in conjunction. These synergy effects could occur for both the costs and the effectiveness. For example, the modernisation of irrigation systems would facilitate other water saving measures, such as introducing volumetric pricing in agriculture (Berbel et al., 2011). Therefore, it is not sufficient to estimate the costs and effects of single measures. Instead combinations of measures should also be assessed, and this would require additional information.

6.2 Additional considerations related to the Programmes of Measures

As mentioned above, the WFD does not explicitly prescribe the use of CEA, and there are authors who believe its widespread adoption for the PoMs is mainly caused by the need to comply with a precipitous implementation process (Messner et al., 2006).

One inherent problem of CEA, as described by Berbel et al. (2011) is the lexicographic ordering of the measures. It does not reflect the trade-off between environmental and social objectives, nor does it quantify the benefits of the measures. Another weakness of the method is that it cannot deal with equity issues between the agents and sectors involved (Messner et al., 2006).

Considering the criticism, there are other methods that take a more broad view. For instance, in multi-criteria analysis (MCA) the aim is to comply with multiple, possibly conflicting criteria simultaneously. Although mentioned in some WFD guidelines (DEFRA, 2004), and having been applied in experimental case studies (Mesa et al., 2008), MCA has been largely ignored during the implementation of the WFD.

Finally, it should be mentioned that the WFD state that CEA should not be applied to those measures that have to be introduced in any case to comply with other European legislation (a collection of 17 Directives). These measures will have to be included in the PoM, without being submitted to either CEA or public consultation. This precludes a scrutiny of these measures with regard to both their costs and their effectiveness.

7 ENVIRONMENTAL COSTS AND BENEFITS IN THE WFD

As mentioned in the introduction, the role that economics plays in the WFD is very innovative. This is largely due to the inclusion of the concepts of environmental and resource costs and benefits. They play a key role in reaching the WFD targets to raise social welfare by achieving the good ecological status of all water bodies (Bateman, 2006; Hanley et al., 2006). Partly, the benefits of having a good ecological status are reflected in market prices, for example through reduced extraction costs if an aquifer's water levels rise, or through reduced treatment costs if its quality improves. Benefits that are not reflected in market prices are those associated with indirect use values, option values, or "non-use" values of the water. These non-market values have traditionally been ignored in water policies, leading to non-efficient water distribution. The WFD offers the opportunity to rectify this situation. However, although support has been organised at the European level to help policy makers dealing with the WFD to include non-market environmental benefits, real applications remain scarce, and have mostly occurred as experimental studies in the academic realm.

7.1 Definitions and conceptual difficulties

The WFD does not provide a definition of environmental costs and benefits, which has created discussion (Martin-Ortega and Berbel, 2009). The WATECO guidelines initially defined environmental costs as those related to the damage that water use inflicts on ecosystems and their users (EC, 2003). For example, these can be cost associated with pollution and the resulting reduction of ecosystem quality, or the cost associated with soil degradation due to salinisation. In the subsequent WATECO guidelines discussions, environmental costs were redefined as the value of the environmental loss caused by degradation and depletion of the resource as a result of its use (EC, 2004). Both definitions reflect the idea that society receives benefits – environmental benefits – when water bodies are in a good ecological state. Environmental costs then correspond to the "lost benefits" (opportunity costs) of not having the water in that state.

The Directive also refers to resource costs and benefits. Initially, WATECO defined

this as the opportunity cost of using a scarce resource beyond the natural recharge capacity, for example due to the over-use of an aquifer (EC, 2003). This definition was subsequently revised, and the emphasis in the definition came to lie on the difference between the economic value of the actual water use and the economic value of the optimal use (EC, 2004). This means that the concept is not restricted to the case where there is degradation or depletion of the resource, but that resource costs occur if there is an alternative use of the water that would generate higher economic value than the current or planned use.

What is important for the practical implementation of the WFD is the change in welfare related to a move from the current state of the water to a good ecological state. Environmental and resource benefits are then equal to the welfare arising from the environmental services that the river basin is able to supply as a result of it being in a good ecological state. Consequently, environmental and resource costs are equal to the loss in value if this state is not achieved, or in other words, equal to the lost benefits (Brouwer et al., 2009). The loss in value can occur when quality objectives are not met, but also when there are water shortages due to the allocation of water use, as can be the case in Mediterranean countries like Spain, which are submitted to water scarcity (Martín-Ortega et al. 2011).

7.2 Estimating environmental costs and benefits

Following the practical definition of environmental costs and benefits given above, they will have to be quantified by estimating the welfare increase associated with a move from the current state of the water – or an expected future state without extra measures – to a good ecological status.

In general, environmental goods and services can be evaluated from a benefit or from a cost point of view. In the latter case, the value of environmental goods is approximated by the cost of the measures necessary to prevent, restore or mitigate environmental damage. This assumes that the value of the environmental good is at least as great as the cost to protect or restore it. This is the approach taken in the Spanish legislation (WPI): “environmental costs will be valued as the costs of the measures employed to reach the environmental objectives, including both the costs made by the relevant public agencies, and the costs suffered by water users”. However, this approximation, which is used often because it is relatively easy to estimate, should not be mistaken for the value of the environmental good itself.

The alternative approach, starting from the benefits point of view, measures the value that society attaches to an environmental good, such as water and the services it provides, through the concept of “willingness to pay”. This approach allows the inclusion of non-market values, and thereby contributes to a more balanced allocation and management of resources. The approach would also allow the use of cost-benefit analysis (CBA), in which all costs and benefits of natural resource use can be included. As will be discussed in Section 7.3, this method cannot be applied if the cost perspective of the WPI is followed.

Valuing the environment with stated preference methods has two additional benefits. First, stated preference valuation uniquely allows the estimation of non-use values. Second, its use of public surveys means there is direct public participation in the estimation, which is in accordance with the principles of the WFD.

Despite the advantages of CBA over CEA, CBA applications in the context of the

WFD in Spain have so far only occurred as academic exercises. For Spain, case studies exist for the rivers Serpis (Del Saz-Salazar et al., 2009) and the Guadalquivir (Martin-Ortega et al., 2009; and Martin-Ortega, 2010). PoMs are therefore not expected to include estimates of the environmental costs and benefits, which will have important consequences with regard to potential derogation of the environmental objectives, as explained next.

7.3 Derogation of the environmental objectives

In Article 4, the WFD allows the derogation of environmental objectives if meeting them has “disproportionately high costs”. The following types of derogation can be granted: i) an extension of the deadline for reaching the good ecological status with up to two planning cycles, i.e. up to 2027; and ii) the setting of a lower target: reaching an “acceptable ecological state”.

The Directive further specifies “disproportionately high costs”. Costs can be disproportionately high: a) in relation to the financial ability to meet them, or b) compared to the benefits of meeting the objective. The first case is related to the ability to pay. In concurrence with Gómez (2006), we hold the position that this argument only warrants a postponement of the deadline, and cannot be a justification for setting a less ambitious target. The WFD allows Member States a certain flexibility to adopt a sector-specific and progressive approach, depending on the affected sectors’ ability to pay (Postle et al., 2004).

The appropriate tool to prove that costs are disproportionately high compared to the benefits, is CBA, in which direct use values, indirect use values, and non-use values should all be included. The Spanish legislation (WPI) is ambiguous in this respect. As mentioned, it prescribes that environmental benefits should be valued using the costs of the measures taken to achieve them. However, when it comes to derogation, it states that the costs have to be compared to all benefits, including the value of environmental services. It therefore recognises that environmental services can have a value, but apparently does not consider a loss of this value as a (opportunity) costs. This ambiguity leaves river basin planners without clear guidelines with regard to derogation. In fact, the WPI’s cost focus to estimate environmental benefits creates an unsolvable problem: if the environmental benefits of meeting the WFD objectives are equal to the costs of meeting them, how can costs and benefits be sensibly compared in any way?

Due to this problem we foresee that the “disproportionality” question will not be addressed by applying real CBA. At maximum, we expect market costs and benefits to be compared. This would mean that derogation decisions could be inefficient from an economic point of view. However, whether this problem will occur in practice remains to be seen. All evidence up to now seems to indicate that derogations to lower the environmental targets will actually be based on the “ability to pay” criterion, even though this goes against the principles of the Directive.

To deal with the abovementioned problems, we believe that the Postle et al. (2004) report provides sensible recommendation. In this report, which was commissioned by the UK Department of the Environment, Food and Rural Affairs (DEFRA), a number of rules and criteria are set up, upon which derogation decisions can be based. One of these is the establishment of cost-benefit ratio thresholds. Applying such rules and criteria would reduce the inherent subjectivity of derogation decisions.

8 CONCLUSIONS

The role of economic analysis in the management of water resources is one of most innovative elements of the WFD. Under this Directive, Member States have to protect and improve the ecological state of aquatic ecosystems, using the principles and tools provided by economic theory. This represents a big change from the way water management was previously addressed in the European Union, and gives a push towards a more sustainable and efficient use of this natural resource.

In Spain, a great deal of effort and resources have been invested in the first phase of the implementation of the Directive, and it is fair to say that Spain is mid-ranked against other countries, between the forerunners (e.g. UK and Norway) and the less advanced (e.g. Italy and Greece), (Balana et al., 2010). Water bodies have been mapped in geographical, social and economic terms, and the gaps between the actual and desired state of the water bodies have been identified. An enormous amount of information has been gathered in the process, providing a good overview of the river basins' conditions. However, there have been several shortcomings in applying the economic analysis of water uses. These include: a) the excessively descriptive nature of the analysis, which lacks regional or sectoral analysis that would have allowed a more solid characterisation; b) an incomplete prospective analysis, in which only a single deterministic future scenario has been developed; and c) a biased study of the potential for cost recovery, which failed to consider environmental and resource costs and uses an estimate of the financial costs which is too low.

With respect to the second phase of the implementation, the elaboration of the PoMs, it is still too early to evaluate how river basin planners will apply economic analysis, as not all management plans have been published. Nevertheless, we can already point out potential stumbling blocks by looking at how the Directive has been transposed into Spanish law. The lexicographic approach underlying CEA limits the analysis of potential trade-offs between those objectives and other, social or economic objectives that are in the public interest, as well. Furthermore, the treatment of uncertainty related to costs and effectiveness should be improved for future CEA. Finally, more effort should be afforded to determine the measures' effectiveness in terms of impacts, rather than in terms of pressures.

Another problem relates to the way in which possible derogations of the WFD's objectives are likely to be addressed in CBA. Environmental benefits that are not reflected in market prices are likely to be left out. These non-market benefits, which will have to be estimated from a demand perspective, have to be included to ensure that derogations will be economically justified.

To overcome the weaknesses in the current implementation, it would be advisable to strengthen the links between river basin managers and academia. Only strong two-directional communication between both will allow the already substantial scientific experience with the methodological complexities of the economics of the Directive to be put to useful practice into a strong evidence based policy-making. This way, more robust and workable methods could be made available to water planners, which would help improve water governance. Therefore, for any future improvement, environmental and resource economists should be placed with the river basin agencies, and they should be responsible for applying up to date scientific knowledge and skills in the elaboration of the management plans and their subsequent implementation. Only professionals will

be able to properly design the economics of the WFD and supervise its implementation. The Economic Analysis Group of the Ministry for the Environment should play a key role here. Together with academics, they should assess and select the methods with which to implement the new water policies in Spain, and coordinate their application by river basin agencies.

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