

# **ASSESSMENT OF DISPROPORTIONATE COSTS IN WATER MANAGEMENT IN THE LIGHT OF THE EU WFD**

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## **Abstract**

The EU Water Framework Directive 2000/60 EC requires achievement of good status of all water bodies by 2015. However, meeting this environmental target brings substantial costs. In justified cases, member states may request an extension of the deadline based on disproportionality of the costs of meeting the WFD requirements. The member states most commonly apply the cost-benefit analysis (CBA) method to determine the cost proportionality threshold. However, calculation of benefits and costs of measures brings several methodological complications and uncertainties. The paper summarises approaches used in various countries, critically sets boundaries for application of exemptions, and describes the component steps of the cost-benefit analysis for assessing proportionality of costs of achieving good status of water bodies. In addition, the paper points out the methodological complications of economic analyses based on the cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA) methods.

## **Introduction**

With constantly increasing requirements on water quality, demand for good status of water bodies also grows. At the EU level, this effort culminated with the adoption of Directive 2000/60 EC on water policy (the Water Framework Directive, abbreviated to Directive or WFD). The Directive is the legislative definition of an integrated approach to protection and management of aquatic ecosystems, has a fundamental impact on watercourse management, and has become the most important and so-far the most comprehensive European legal document relating to water policy. The primary environmental objectives include the protection, enhancement and restoration of all bodies of surface, ground, brackish and coastal waters with the aim to achieve their good status by 2015. Good status of a surface water body is such condition where its ecological and chemical status is at least “good”. In the case of artificial and heavily modified bodies of water, member states are required to achieve their good ecological potential and good chemical status by 2015.

However, measures adopted to achieve good status of water bodies require costs, which may be disproportionate in many cases in contrast to the expected benefits. In these specific cases, member states may apply for a temporary exemption and extension of the deadline for achieving good status. Nevertheless, the Water Framework Directive grants a relatively high level of discretion relating to the definition of the cost proportionality threshold. Practical implementation of exemptions has thus become the subject of intense debate among the professional public across the EU.

The European Commission's report published in 2012 (European Commission, 2012) summarises the status of surface water bodies across the member states based on information contained in the first river basin plans. It states that 43% of the surface water bodies were in good ecological status in 2009, and estimates that only 53% of the water bodies should achieve good ecological status by 2015 (European Commission, 2012, p. 174). Moreover, the report says that member states request extension of the deadline for achievement of good status approximately for 72% of the surface water bodies not achieving good ecological status, and 88% of the surface water bodies not achieving good chemical status (European Commission, 2012, p. 177). It follows from the applications of potential exemptions across the EU member states (European Commission, 2012, pp. 178-199) that exemptions based on disproportionality of costs are applied separately only in 8% of the exemption cases, and in 30% of the cases in combination with other justifications (technical feasibility, unfavourable natural conditions). The reasons for the relatively low level of application of exemptions based on disproportionality of costs can be seen primarily in the lack of relevant data and experience for carrying out adequate analyses, the non-existence of national methodologies and the actual difficult interpretation of the exemption (Görlach and Pielen, 2007). The difficulty of practical application and interpretation of proportionality under the Framework Directive are confirmed by consultations with selected river basin managers and other concerned entities. The non-existence of suitable national methodological support as a tool for assessing proportionality of costs presents to the concerned entities prohibitively high time and monetary costs of performing a separate proportionality analysis. This is why exemptions based on disproportionality of costs are not wide applied even to water bodies where the costs of achieving their good status can be expected to be very high compared to the benefits.

This paper first presents existing experience of and approaches to application of the notion of proportionality of costs under the Water Framework Directive in selected EU member states. These are approaches applied in Denmark, Scotland, Italy and Germany. In the second section, the paper analyses available documents, including supporting methodologies to the Directive, and proposes a methodology for assessing proportionality of costs of achieving good status of water bodies with the objective to introduce a relatively simple tool applicable in the conditions of the Czech Republic. The final section focuses on a discussion of the methodological problems and complications when assessing proportionality.

## **1. Approaches to proportionality abroad**

Designing appropriate methodologies and procedures for assessing proportionality of costs has become a challenge and subject of debate among the professional public across the member states in recent years. Pilot countries include, among others, France, the United Kingdom and Germany. In the past 14 years since the Framework Directive entered into force, a number of international projects and national pilot studies have been carried out that included proportionality assessment (the REFRESH project under the Seventh Framework Programme can be mentioned as an example at the international level). Increased interest of water body managers in methodological support is an obvious consequence of the need for relevant justifications that can be included in catchment area plans without leading to potential sanctions for not meeting the environmental targets of the Directive. Moreover, the option to extend the period for achieving good status is limited to no more than two consecutive updates of catchment area plans, i.e., until 2027, with the exception of cases where objective natural conditions do not permit achievement of the environmental target. Non-existence of a unified methodology has led authorities in charge to develop a number of different methodological approaches to the implementation of this exemption, but they vary greatly and it is essentially up to each member state what approach it chooses. However,

justification of not achieving good status and application of exemptions based on economic analysis always has to be transparent enough.

The following section more specifically analyses the approaches applied in Denmark, Scotland, Germany and Italy. These countries belong among member states with proportionality assessment methodology in various stages of development or where more extensive studies exist. More approaches can be found, e.g., in France (Courtecuisse, 2005; Laurans, 2006), the Netherlands (Brouwer, 2005), England (Postle et al., 2004) and Scotland (Interwies et al., 2005).

### **The Danish approach**

Denmark belongs among those European countries in which the process of assessing proportionality of costs in connection with meeting environmental requirements contained in the Directive is already elaborated in more detail. A comprehensively conceived methodology for assessing proportionality and its application to Danish catchment areas is presented by Jensen et al. (2013). The study proposes a methodology based on so-called introductory review at the level of each catchment area, which involves an initial estimate and a comparison of benefits and costs. The purpose of this analysis according to Jensen et al. (2013) is primarily to identify catchment areas in which there is a high probability of existence of disproportionate costs of achieving good status. Based on this pre-selection, a more detailed CBA should be carried out for the identified catchment areas. In the case of catchment areas showing approximately identical benefits and costs, it is left to consideration and expert estimate whether to analyse these areas in more detail.

The introductory review and CBA analysis process as such involves 7 successive steps:

- 1) definition of geographical scope of the analysis;
- 2) identification of status quo of water bodies;
- 3) estimate of benefits from achieving good status;
- 4) estimate of costs of achieving good status;
- 5) calculation of social profit;
- 6) sensitivity analysis;
- 7) final recommendations.

Steps 3 and 4 are crucial for proportionality assessment. When estimating the benefits, the analysis should be based on primary pricing studies for the area. However, if no primary study is available, the author defends the application of the benefit transfer method, which is less time and money-intensive. However, the application of this method is conditioned by the existence of at least one suitable primary pricing study for the geographic scale chosen. When estimating the costs in step 4, the measures considered should be cost-effective. The comparison of the benefit and cost flows in step 5 should then be interpreted using expression of net present value (NPV) or net annuity.

Jensen et al. (2013) apply this proposed methodology on a geographic scale of all the 23 catchment areas of Denmark. The author explains this choice based on the existence of relevant data and studies that estimate benefits and costs in the Danish context on the catchment area level; the primary pricing study used as the basis for the benefit estimate is also designed at the catchment area level. It followed from the primary review that the costs are probably higher than the benefits in 3 of the catchment areas, the costs equal the benefits in 9 catchment areas, and the benefits are probably higher than the costs in the remaining catchment areas. In a next step, these results were subjected to a sensitivity analysis to account for the effect of the simplifying assumptions in the preceding steps and to maximise the elimination of the uncertainty effect. The study result is identification of 5 catchment areas with a high probability of disproportional costs and a recommendation for more detailed analysis.

From the methodological point of view, it is in order to mention the benefit identification procedure, which is based on an pre-existent study on one of Denmark's catchment areas: the Odense catchment area. In the original study, the benefits were priced using the choice experiment method and an econometric model. The original study considered improvement in two options from the "damaged" to "medium" status and from "good" to "very good". Jensen et al. (2013) then used the benefit transfer method to transfer the study results, expressed as willingness to pay (WTP), to the other 22 catchment areas of Denmark as a simple mean value. This WTP was then multiplied by the number of households in the respective catchment area, and the resulting estimate was expressed as a periodic payment that those who enjoy the benefit are willing to pay for good status of the water bodies in their catchment area.

### **The Scottish approach**

The Scottish principles of proportionality assessment are most commonly, and similarly to the above, based on interpretation of results of CBA (comparison of benefits and costs). Three significant methodology studies/designs have been made in Scotland in recent years. The first of the studies, Vinten et al. (2012), proposes application of the proportionality principle to reducing the contamination of Scottish lakes with phosphorus. The benefits, estimated using the choice experiment method, are compared with the most cost-effective means of reducing the contamination. Specifically, Hanley et Black (2005) deal with application of CBA in connection to the Directive implementation in Scotland. The study aims at comparing the costs and benefits at two levels. First of all, it makes an analysis on a "micro" level in the form of a case study on three rivers in Scotland. Then, it analyses the CBA application at the national "macro" level. In the micro analysis, the costs of generating hydropower are compared with marginal benefits from increased fishery incomes, or costs of loss of agricultural yields against benefits of improved environmental status of water bodies. The costs are compared with the benefits, and if the costs appear in the CBA to be higher than the benefits, the costs are identified as disproportionate. The analysis based on the national level of Scotland compares the costs of associated industries with the estimated national benefits of implementing the Directive. As with the Danish methodology, the benefits are estimated using the benefit transfer method from existing available literature. These benefits are then compared to discounted and aggregated induced costs for the affected sectors. In conclusion, the authors say that the benefits outweigh the costs and the policy therefore brings a net social profit, and that the application of CBA to assessment of suitability of measures appears to be an appropriate means for both the microeconomic and macroeconomic analysis level.

Aresti (2008) makes another contribution in the area of assessing proportionality of measures as part of implementation of the Directive. He proposes a methodology based on CBA, but among other things, he points out the possibility of using the financial affordability test. The methodology for assessing disproportionate costs proposed by Aresti (2008) involves four successive steps:

- 1) cost-effectiveness analysis (CEA) and expression of abatement cost curves;
- 2) estimate of feasibility and affordability;
- 3) estimate of benefits and expression of revenue curves;
- 4) comparison of costs and benefits (CBA).

In the first step of the methodology, the author recommends an analysis of the cost-effectiveness (CEA) for all the available agricultural measures for reducing water contamination. The next step, relatively innovative in assessing disproportionality of costs, is the so-called farm viability assessment and definition affordability to farmers. Aresti (2008) discusses the main focus of contemporary academic debates concerning proportionality on selection of tools and comparison of costs and benefits without paying attention to

affordability and pricing of financial impacts on the water users and the degree to which the costs of achieving good status may threaten their financial viability or sustainability. The purpose of this step is an effort to estimate the probable financial impact of acceptance of measures reducing diffuse contamination on the typical Scottish farmer. The study admits two options for estimating the costs using the determination of preferences: benefit transfer and choice experiment. Although the study primarily applies benefit transfer, it points out that even though this method may be quick and less costly, it does not include several specific variables and is not a better solution than an original pricing survey, which is why the choice experiment is applied simultaneously. This is followed by a comparison of the costs and benefits identified.

### **The Italian approach**

The Italian methodology for assessing disproportionate costs designed by Galioto et al. (2013) also involves the application of the CBA method modified into a model with 4 basic equations. The model can be applied to different water complexes, i.e., it always depends on the defined unit and the end type and area of measure being aimed at. This permits wide applicability of the model. In many respects, this methodology is very close to the Danish approach of Jensen et al. (2013), and it agrees in the sequence of steps. A significant difference exists in the estimates of costs and benefits, identified individually for each water body. Uncertainty is handled by means of sensitivity analysis. Finally, the results are aggregated at different levels. An important precondition of the methodology is technical feasibility of measures; it is assumed automatically for all types of measures.

In contrast to other methodologies, the relationship among measures is taken into account. Proposed measures affect one another, both positively and negatively, and these interactions therefore need to be consistently identified. Another level of interactions occurs among catchment areas (or water bodies). It is for these reasons that Galioto et al. (2013) point out the need to identify all interactions affecting the water body; it is necessary to determine the calculation of disproportionality of costs for both an entire region (catchment area) and the water body in question. The methodology also specifies that for each level of aggregation, the estimate of disproportionate costs should contain two different scenarios: one that assumes that improvement of the water body status will affect the entire region (catchment area) and another that assumes that the estimated assessment for the watercourse in question serves primarily the aggregation of impacts throughout the region.

In the following, the analysis of Galioto et al. (2013) selects an array of indicators used to identify costs of measures. It regards areal sources of nitrogen and phosphorus pollution as the biggest problem in achieving good status.

The Italian approach is connected with maximum effort to include costs, from additional costs (investment and operating costs of new measures) to costs arising from decreased profits due to having to implement measures (including possibility of compensatory payments), social costs (additional taxation to finance measures) and other indirect costs (increase/decrease in other sources of emissions). Moreover, there is a recommendation to include the costs of measures related to the various sectors of the economy.

The level of detail of inclusion on the benefit side is similar to that of costs. The benefit calculation has to include all effects (costs and benefits) of measures that overlap, as is there a need for adequate identification of interactions among the components and groundwater and surface waters. The methodology prices both utility and non-utility value.

This methodology has been applied to the Italian region of Emilia-Romagna, which belongs to three catchment areas. Disproportionality of costs is thus assessed on a regional scale, further subdivided into specific categories (lowlands, mountain zone and alpine zone). Moreover, certain simplifying assumptions were introduced. The results of the pilot

verification of the Italian methodology in the region of Emilia-Romagna are presented by the study authors as average expected costs and benefits per annum. The results serve both to identify regions with disproportionate costs and as a tool for selecting the most cost-effective measures to achieve good status. A pilot analysis analysed two possible scenarios of water status improvement. The benefits did not exceed 70% of the costs in neither of the scenarios and areas.

### **The German approach**

Options for assessing proportionality in a simple yet comprehensive way were sought in Germany as part of a project of Klauer et al. (2007). Besides the generally applied cost and benefit analysis method, an emphasis was put on partial criteria that could serve easier assessment of proportionality of costs. The research result was a definition of rules and criteria for assessing proportionality of costs at the microeconomic level, that is, the level of individual polluters. From that level, naturally, the analysis moves on up to the national impacts. The selected criteria are of an eliminative nature: their fulfilment results in an elimination from the assessment process and, thus, loss of opportunity to obtain an exemption based on disproportionality of costs. The proposed process is integrated into the water management and closely linked with catchment area plans.

Besides disproportionality of costs, the German study deals with the issue of application of exemptions from achievement of good status from various perspectives. Besides disproportionality of costs, it also deals with technical feasibility. The entire study considers application of more than 40 criteria for definition of disproportionality. The term criteria refers to comparison of various ratios of costs to other quantities with ratios for similar measures in other water bodies or expertly set values or percentage shares in turnovers or budgets of households businesses or the country. Klauer et al. (2007) distributed these criteria into three stages of assessment. Measures that are not eligible for an exemption due to disproportionate costs are eliminated in each stage. The remaining ones move on to the next stage. In the final step, measures suspected of disproportionality are subjected to a detailed cost and benefit analysis in an extent as proposed by, e.g., Jensen et al. (2013) in the Danish methodology. The final step is followed by the exemption definition process. As stated by Klauer et al. (2007), it has to be borne in mind that a certain increase in costs of achieving good status is acceptable with respect to the ambitious plans of the Directive. Klauer et al. (2007), too, recommend using benefit transfer for identifying the benefits.

## **2. Design of methodology conforming to WFD requirements**

The issue of designing a suitable, sufficiently transparent and practically utilisable methodology for assessing proportionality is very complex and intricate. The following section of the paper contains a methodology design that is based primarily on the requirements of the Water Framework Directive and the methodological documents (European Commission, 2009; De Nocker et al., 2007; WATECO, 2003), which seem to be crucial with respect to the methodology design. The methodology also takes into account the analysed approaches abroad in an effort to build on existing practical experience and best practice abroad.

### **Essential foundations for designing the methodology**

The generally applied principle of proportionality of regulation is most commonly assessment in terms of suitability, necessity and effectiveness of regulation (e.g., Veinla, 2004). In the Framework Directive, this principle and setting of the proportionality threshold are the result of normative political judgment. In order to assess disproportionality, however, an analysis of costs of benefits of measures leading to achievement of good status is necessary. It is not true that the disproportionality threshold can be set automatically where quantified costs of

measures simply outweigh quantified benefits. The assessment absolutely needs to include a qualitative assessment of the costs and benefits. The proportion in which the costs outweigh the benefits should be noticeable and should, in the case of exemption application, show a high degree of reliability. According to the European Commission (2009), application of an exemption should also be based on the ability to pay of those who should bear the costs. In the event of an excessive monetary burden on a certain group of entities, the assessment needs to include other relevant alternative financing mechanisms.

Thus, justification of extending the deadline based on disproportionality of costs has to be grounded in adequate economic analysis. The European Commission (2009) and De Nocker et al. (2007) summarise the preferred economic methods and approaches used for assessing the cost proportionality threshold: cost-effectiveness analysis (CEA), cost-benefit analysis (CBA), and other secondary cost and utility analyses. De Nocker et al. (2007) present the option of using the cost-benefit analysis method for assessing proportionality in their methodology. The main steps of such an analysis include:

- i. definition of difference between the present and desired status and scope of the analysis;
- ii. definition of intended objectives (qualitative or quantitative) and design of a combination of measures to achieve them;
- iii. evaluation and selection of tools and data for appraising the costs of the selected measures;
- iv. evaluation and selection of tools and data for appraising the benefits;
- v. comparison of the costs and benefits in a CBA.

The elaboration of a cost-effectiveness analysis (CEA) is a precondition for exemption application; it identifies cost-effective combinations of measures to achieve the desired objective. This analysis should serve an optimisation of the expended funds and avoidance of ineffective use of public funds. The question is whether to make a CEA separately for each pollutant or for groups of pollutants that can be reduced by means of a certain type of measure, or for a water body as such – that is, all the pollutants and the benefits associated with them in the next step.

The potential benefits of achieving good status differ primarily with reference to the type of water body concerned, its current uses and functions. Generally speaking, it holds according to the European Commission (2009) that some benefits, such as certain market benefits, can be expressed in monetary terms. Benefits difficult to appraise should be at least estimated or described qualitatively. As, e.g., Nocker et al. (2007) say, the main categories of benefits that have to be taken into account in the analysis include:

- 1) avoided costs of treatment of drinking water;
- 2) reduction of disposal costs for contaminated dredging material;
- 3) more and better opportunities for informal recreation (walking, cycling) and water sports; and,
- 4) improved health and living environments.

Moreover, it follows from the documents that the assessment process itself should not be disproportionately costly. In this respect, therefore, a pragmatic approach needs to be embraced, where it is not absolutely necessary, for example, to quantify all these benefits and costs. It is possible to base the analysis on qualitative information. Among other things, this approach allows the use of benefit transfer and suitable available studies and other data sources. Besides a quantitative comparison of costs and benefits, the CBA then needs to take into consideration the other, qualitatively described costs and benefits and assess their importance and impact on the cost proportionality.

Furthermore, it follows from the Framework Directive that where disproportionate costs exist and an exemption is applied, there must never be a situation where no measures are implemented. A combination of measures that are still proportionate should always be implemented in order to achieve the best possible water quality status. This leads to the application of the principle of setting less strict targets. For example, this may mean that less strict targets are retained for the majority of qualitative elements to a level corresponding to good status, although the overall status may be worse than good because there is a lingering influence of a qualitative pollutant and/or quality indicators. In such cases, the cost-benefit analysis is carried out for different indicator values (pollutant concentrations) and a level that is still cost-proportionate is sought.

It thus follows indirectly from the above that the process for a water body cannot include all pollutants at once. One has to proceed pollutant after pollutant, or group of pollutants (indicators) that can be resolved using "certain measures" (apparently at once). Therefore, for example, eliminating phosphorus from a water reservoir may be disproportionately costly, but it may be proportionately costly to reduce the emissions of suspended particulate matter in the same reservoir.

### **Design of a procedure for assessing cost proportionality**

The following approach to assessing proportionality is designed with reference to experience abroad and requirements of the Framework Directive and other EU documents. The procedure is divided into several steps that duplicate the division made by, e.g., Nocker et al. (2007). The primary prerequisite for assessing proportionality of costs is the existence and technical feasibility of measures to achieve good status.

In the initial phase of the analysis, it has to be determined in which parameters the water body does not achieve good status, and an exemption can thus be applied based on disproportionality of costs. Furthermore, the identified parameters have to be reviewed to see whether they should be achieved under any legislation other than the Framework Directive. If yes, an exemption may only be applied for the difference between the current status and what should have been met under pre-existent legislation (does not apply to countries with an exemption arranged in accession agreements). In connection to that, the difference between the desired status under the Framework Directive and what should have been met has to be identified. This step is important in respect of determining the costs, which will only relate to the identified difference in the cost-benefit analysis.

An exemption has to be applied for at the level of a water body. However, measures to achieve the target status are often implemented in an entire river basin upstream of the water body in question. In this respect, the synergic effects in the river basin need to be taken into account. A similar situation exists with the benefits, which also do not only concern the water body itself but additional water bodies beyond the one under assessment.

If no cost-effectiveness of suitable measures has been made previously as part of developing river basin plans, it is advisable to proceed to its elaboration at this point. The analysis should look at costs of achieving good status for the given pollutant/group of pollutants/environmental indicator. If a previous step identified a difference between the Directive objectives and pre-existence legislation, the resulting costs of fulfilling the Directive only have to include the equivalent portion. A classification, such as that made by De Nocker et al. (2007) is advisable for determining the costs. It is appropriate to divide the costs into direct costs of investment in induced measures, operating and administrative and any other indirect costs variously impacting on various sectors of the economy. The size of the total costs greatly depends on the method of their implementation, as well as the quantity of affected entities and their preferences, income and price levels, timing of measures, and discounting.

The appraisal process starts with the identification of costs of each measure. In general, there is a recommendation to take into consideration as many potential and known costs of a measure as possible. Due to the nature of the analysis and the uncertainty, it is impossible to estimate all the costs, which is why effort has to be made to identify those that are expected to have the greatest influence. As, e.g., Macháč (2014) points out, low, negligible and difficult-to-appraise costs can be excluded from the analysis in the first phase, but have to be returned to at the end when discussing the results and their importance and impact on the analysis results have to be assessed.

The next step is to identify the benefits arising from the adoption of measures leading to achievement of the desired target. At first, one needs to make a qualitative analysis primarily of the basic type of the water body and all its potential functions and significances in the area. Based on the type and characteristics of the water body, determine the potential influence of measures and status improvement on the different groups of benefits. The analyser identifies primarily the most important categories of benefits that are relevant for the water body and ought to be assessed. With respect to analysis of studies abroad and experience of elaboration of studies in the Czech Republic (e.g., Vojáček et al., 2013), the most important portion of the benefits comprises the three following categories, which should always be assessed according to the methodology:

- i. recreational and aesthetic benefits;
- ii. savings of costs of water treatment (benefits for water and sewage utility companies);
- iii. benefits to other ecosystem services.

The methodology assumes a qualitative evaluation of each of the three basic categories. For the recreational and aesthetic benefits and savings of costs of water treatment, the benefits have to be further quantified, e.g., using the benefit transfer method while reflecting local circumstances. The other benefits, particularly some ecosystem services, for which there are no suitable data or the appraisal of which would be biased with a high degree of uncertainty and generally difficult or disproportionately costly, have to be described at least verbally so that it is obvious that the author has dealt with them adequately and considered their importance and possibilities of appraising them.

Once the qualitative and quantitative assessment of the costs and benefits is complete, they are compared. The purely quantitative dimension comes first, followed by an analysis of the influence of those costs and benefits that have not been expressed in monetary terms. In case the benefits are clearly superior to the costs, i.e., the costs appear to be proportionate, the exemption has to be rejected. In case the costs are comparable to or higher than the benefits, i.e., an exemption based on disproportionate costs can be legitimately considered, the analyser has to justify adequately that it is impossible to achieve a reverse proportion of costs to benefits. In the next step, a target less strict than good status for which the benefits are higher than the costs has to be defined. Furthermore, an application for an exemption requires a justification that has to prove that the proportion at which the costs exceed the benefits is noticeable and shows a high degree of reliability. The analysed costs and benefits have to be specified along with the methods used for quantifying them or assessing them verbally. Since the appraisal on both the cost and benefit sides is associated with a high degree of uncertainty, it is advisable to carry out a sensitivity analysis – e.g., by defining multiple scenarios. In conclusion, it is necessary to describe measures that are cost-proportionate and will be applied to achieve the less strict target, and set a timetable for proportionality review.

## **Discussion**

The author of a proportionality analysis cannot avoid a certain degree of uncertainty, association with, e.g., assessing the water body status, selection and determination of

effectiveness of various measures, and the uncertainty of appraising the potential benefits arising from improved water body status. The suitability of applying this type of exemption will depend primarily on the experience of the entity in charge of exemption applications. Based on an administrative deliberation, it shall decide whether there are any sufficiently appropriate studies and materials reducing the money and time intensity of the proportionality analysis. This deliberation will be necessary separately for each water body concerned.

The requirements of the Framework Directive and other EU documents are not noticeably in contravention of the analysed national methodologies and pilot studies on assessing proportionality presented in this paper. However, the practical difference is in the scope of the analysis, where the pilot studies were carried out at the river basin level in some cases, although according to the methodological documents, it is advisable to apply for an exemption at the level of a water body. The endeavour to carry out the analysis at the river basin level is influenced by the fact that measures adopted and potential benefits are not delimited by the mere geographical definition of a water body, but that their impacts on the entire river basin need to be considered. As for costs, the entire area located upstream of the water body in question; for benefits, the water bodies lower downstream in the river basin. Therefore, proportionality of costs cannot be assessed without considering the entire river basin and the influences and impacts on it.

Another significant methodological complication is the large number of indicators and pollutants that have an effect on achieving good status, thus a large number of different and often mutually exclusive or interacting measures. In addition, the Framework Directive requires that if costs are disproportionate, at least such measures that are cost-proportionate be implemented. Technological development and all other changes of circumstances require that the disproportionality be reviewed over time and that the water body in question receive adequate attention in an effort to achieve its good status.

From the economic point of view, the optimum option appears to be the recommended combination of cost-effectiveness and cost-benefit analysis. The costs are then based on the proposed measures using costs of similar measures, various catalogues, etc. Although there is a high uncertainty deriving from the input data used, the costs still represent the easier side of the analysis. Significant complications are associated primarily with the benefit side, where it is difficult to assess for many indicators the potential effect of achievement of good status on each indicator. On the one hand, one may come across very detailed information on costs and, on the other hand, only a qualitative description of benefits, which are very difficult to appraise. A number of studies recommend using benefit transfer. However, relevant studies are not always available and local specificities are difficult to reflect. Nevertheless, it is impossible to carry out primary studies due to their time and money intensity.

## **Conclusion**

Although different member states try to apply a pragmatic approach to determining the cost proportionality threshold, there are still major methodological complications that make it more difficult to practically apply an exemption based on disproportionality of costs of achieving good status. The paper summarises existing approaches abroad to proportionality of costs of achieving good status of water bodies and describes the component steps of the economic analysis so that they are in compliance with requirements arising from Directive implementation documents. However, a specific application of an exemption will depend on tackling the methodological complications mentioned, which currently preclude entities in charge from practical interpretation of proportionality of costs in the context of planning regarding waters and the Framework Directive.

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