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Development and Implementation of the Concept of Disproportionate Costs in Water Management in Central Europe in the Light of the EU WFD

Jan Macháč

Faculty of Social and Economic Studies, J.E. Purkyně University in Ústí nad Labem, Ústí nad Labem, Czech Republic; jan.machac@ujep.cz

Jan Brabec

Faculty of Humanities, Charles University, Prague 5, Czech Republic; and Faculty of Social and Economic Studies, J.E. Purkyně University in Ústí nad Labem, Ústí nad Labem, Czech Republic; brabec@e-academia.eu

Ondřej Vojáček

Faculty of Social and Economic Studies, J.E. Purkyně University in Ústí nad Labem, Ústí nad Labem, Czech Republic; ondrej.vojacek@gmail.com

ABSTRACT: Many Central European water bodies that failed to achieve the good ecological and chemical status required by the Water Framework Directive in the first management cycle are expected to again fail in the second cycle. An exemption from achieving good status may be applied for under certain circumstances but must be justified. One option is to show that achieving good status is not cost proportionate, but no uniform methodology for assessing proportionality exists in the EU. The paper maps the existing approaches to this type of justification in the Central European countries. The methods used to justify exemptions differ significantly among the countries. A large majority of reports mention monetary cost–benefit analysis, although a range of other methods such as distribution of costs, affordability and criterial cost–benefit analysis are also utilised. The findings show that countries that have experience with proportionality assessment from the first management cycle or have created clear and easy-to-use methodologies (or none) are more likely to justify the exemption by citing disproportionate costs; on the other hand, a higher complexity of methodology – such as used in the Czech Republic – creates incentives to avoid using the disproportionate-cost justification and to instead utilise other available types of justification.

KEYWORDS: Water Framework Directive, good status, exemption, cost proportionality, Central Europe, justification

INTRODUCTION

As a result of a growing demand for clean water and because of more integrated water body management in the EU, the Water Framework Directive (WFD) was implemented in 2000. One of the main objectives of this comprehensive directive was increased water protection; this was to have been secured by the achievement of the 'good status' of all water bodies within the EU member states no later than 2015 (Giakoumis and Voulvoulis, 2018). The WFD defined five possible categories of the status: high, good, moderate, poor and bad. The designation of good status was associated with ecological and chemical indicators that were, at most, only slightly distorted compared to natural conditions. Achieving this good status/potential (hereafter referred to as good status) turned out, however, to be challenging; only 39%

of the surface water bodies at the EU level achieved at least good ecological status in the first management cycle and only 44% are expected to achieve at least good status in the second management cycle, with lakes and coastal waters usually having better status than rivers or transitional water bodies. The share of water bodies that achieve good chemical status is even expected to decrease from 37 to 31% between the two cycles (European Environment Agency, 2018a; European Commission, 2019a). A proper justification is required for this low level of achievement of targets.

Applying the WFD 'one-out-all-out' rule only adds to the challenge. This rule states that the final status of a water body is determined based on the score of the worst criterion instead of an average score; this means that a failure to satisfy even one of the many indicators leads to an inability to achieve good status, even if the remaining criteria attain the highest score. Prato et al. (2014) argue that this rule increases the occurrence of a type I error, meaning that a water body may be classified as below good even though it, in fact, achieves good status; Hering et al. (2010), meanwhile, admit that the rule reduces the chance of a type II error – a water body that does not achieve good status being incorrectly classified as good – but disapprove of a single criterion being able to determine the quality of an entire ecosystem. Additional criticisms aim at the inconsistency of environmental quality standards for some substances across the member states (Arle et al., 2016), which makes it more difficult in some states to achieve good status. Significant differences among the member states in the monitoring of priority substances were still reported almost 20 years after the implementation of the directive (European Commission, 2019b).

In order to mitigate the challenging nature of the task, the WFD does not strictly require achievement of good status at all costs. Five types of possible exemptions are defined in Article 4 of the WFD; these allow water basin management bodies to not achieve good status by 2015. Categories of exemption include 1) classifying a water body as 'heavily modified' or 'artificial' in order to maintain the useful functions that it provides; 2) delaying the achievement of good status until 2021 or 2027; 3) agreeing to achieve less stringent objectives; 4) allowing the temporary deterioration of the water body status as a result of a natural cause or force majeure; and 5) being in the process of implementing modifications to the physical characteristics of a surface water body.

Regardless of the type, the exemption must be justified using one of the following reasons. Heavily modified or artificial water bodies may use arguments of 1) lack of technical feasibility because of it being impossible to provide certain functions in a different way; 2) cost disproportionality, that is, the excessive cost of using a significantly better environmental option to achieve the same benefits that are currently being provided by the water body. If the water body is not classified as heavily modified or artificial, failure to achieve good status within the timeframe may be justified for reasons that include: 1) lack of technical feasibility of carrying out anything other than a phased achievement of good status; 2) cost disproportionality of achieving the good status within the set timeframe; 3) natural conditions that do not allow timely achievement of good status. None of these situations, however, allow worsening of the current water body status; it must be at least maintained.

Although several options are still available for justifying an exemption from achieving good status, the only allowable justifications for granting an exemption beyond 2027 will be less stringent environmental targets due to disproportionate costs along with the situation of a heavily modified water body affected by significant pressures (Carvalho et al., 2019). No exact definition of proportionality was present in the WFD, however, and, as Brouwer (2008) says, disproportionate costs are not a standard concept used in economics; the assessment is thus subjective and political. Martin-Ortega et al. (2014) argue that the vagueness of the definition has resulted in an inconsistent approach to disproportionality in Europe. When the WFD was first publicised, the only requirement for illustrating disproportionate cost was an economic assessment. Only through some of the subsequently issued Common Implementation Strategies (CIS) did proportionality gradually take a more specific form. The first CIS specified that the benefits included in the economic assessment should be not only financial, they should also include additional non-financial benefits (European Commission, 2003). Later, CIS 20 specified that inability to pay for required measures does not automatically indicate cost disproportionality (European

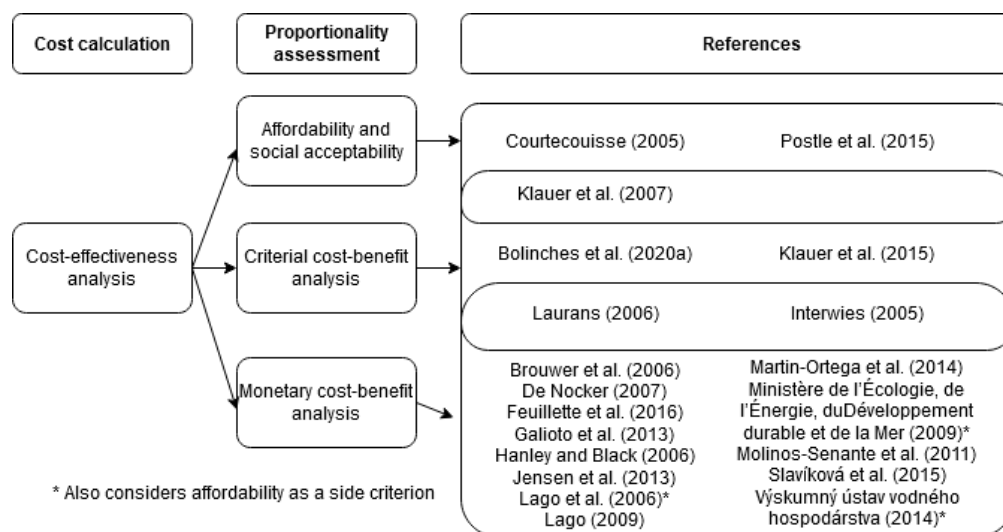
Commission, 2009); this practically ruled out one of the approaches suggested for proportionality assessment (see the following section). The definition stated in the WFD provided more freedom in the conducting of the economic assessment but, at the same time, may have discouraged water basin managers from pursuing this option due to lack of clarity; the absence of a clearly defined procedure may therefore have limited the potential use of this justification for an exemption. Water basin managers and other relevant stakeholders from individual EU member states were often afraid to use unknown and untested procedures. They chose to apply for other exemptions that required less work and were more likely to be granted. Based on a meta-analysis of 89 articles performed by Boeuf and Fritsch (2016), it appears that the politics of exemptions remains understudied in the EU as do other related issues such as environmental costs or benefits.

The goal of this paper is to introduce the existing approaches to disproportionality assessment that are applied in order to justify an extension of the deadline and the adherence to less stringent environmental objectives. The paper compares the methodologies used in five Central European countries (Austria, the Czech Republic, Germany, Poland and Slovakia) and examines the use of these methodologies to justify exemptions based on disproportionate costs. The following section of the paper presents the existing approaches in Europe; the section after that maps the current achievement of the goals laid out by the WFD in the Central European countries studied; implementation of justifications in these countries is the objective of the fourth section and the final two sections discuss the findings and offer a conclusion.

EXISTING APPROACHES

As a result of the vagueness of the definition of cost proportionality in the WFD and no strict requirements on features of the evaluation process, many different approaches to assessing proportionality have emerged across Europe. Based on the text of the WFD and on other documents, the above-mentioned economic assessment 1) should not consider costs to be disproportionate strictly at the point at which they exceed benefits; 2) should consider costs and benefits both qualitatively and quantitatively; 3) should make sure the disproportionality in costs is clear and robust; and 4) should be allowed to include an evaluation of the ability to pay by those who bear the costs of achieving the good status (see, for example, Macháč and Brabec, 2018). Macháč and Brabec (ibid) also identified three main categories of the existing approaches; Figure 1 categorises the methodologies and their applications.

Figure 1. Overview of existing approaches to cost proportionality.



Source: Based on Macháč and Brabec (2018).

It is a good starting point that the different approaches agree on how to assess the costs of achieving good status or, more specifically, the costs of implementing the necessary measures. A methodology for performing a cost-effectiveness analysis (CEA) is even recommended by the EU (European Commission, 2003) for the measure-selection process. The CEA ranks all the available measures on an effect-per-monetary-unit basis (Macháč and Slavíková, 2016), allowing for a direct comparison of the effects of large and expensive measures relative to less expensive small-scale measures. As a result, the same set of measures should be recommended for a specific water body regardless of the methodology used.

Many case studies have been carried out since the introduction of the WFD (Martin-Ortega, 2012). According to Klauer et al. (2015), the most widely used approach is based on a monetary cost-benefit analysis (CBA). The core of this CBA approach is a comparison of the costs associated with the selected/implemented measures and the expected benefits generated after achieving good status. Regardless of the method chosen to select the measures to be implemented, it is important to first set the goal (for example, kilograms of phosphorus or nitrogen inflow reduction). The next steps in the CBA process may differ slightly in individual countries; we use the Czech methodology here, however, to illustrate the process (Slavíková et al., 2015). When the target is agreed upon it becomes possible to identify the measures that can be used to meet it using CEA. These measures are all associated with the costs of their implementation and operation; they should be annualised and then ranked based on their unit efficiency. The other side of the equation is represented by the expected benefits generated after achieving good status. Slavíková et al. (2015) specify that these should include recreational benefits, lower costs of drinking water treatment and other effects of improved ecosystem services; this is not, however, a definitive list of all possible benefits, and other forms of benefits may enter the calculation in different countries such as, for example, an increase in property values. Primary valuation methods such as stated or revealed preferences are recommended for the assessment. Carson et al. (1996) showed that the difference among these methods is negligible; on the other hand, in some cases it may be too costly to adopt primary valuation methods and using a benefit transfer is encouraged. Brouwer et al. (2016) found their values to be transferable between Hungary and Romania, but not between those two countries and Austria. The last step of the analysis is the comparison of associated costs and expected benefits and the final decision regarding proportionality. This decision may differ based on the methodology used; Feuillette et al. (2016), for example, state that the costs are considered proportionate if the benefits generated cover at least 80% of the costs, while Klauer et al. (2015) require the benefits/additional spending to simply fall short of the costs in order to recommend the exemption; Slavíková et al. (2015) do not define the required share of covered costs and believe that the decision should be based on the discretion of the decision-making body. This inconsistency only supports the argument made by Martin-Ortega et al. (2014) that a purely monetary analysis may not provide sufficient information for an appropriate policy decision as attention should also be paid to distributional effects or equity.

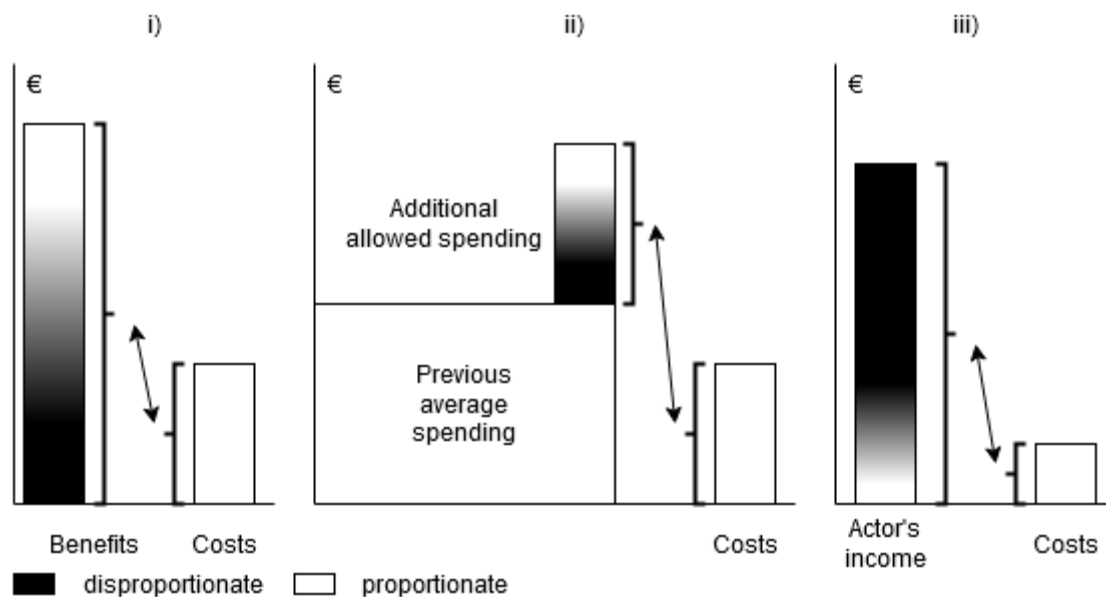
Because of the complexity of monetisation of benefits, some analyses avoid the benefit calculation and use a criterial CBA instead (Ammermüller et al., 2008); this means that the costs of achieving good status are compared to some other value such as, for example, additional allowed spending, as in the case of the "new Leipzig approach" (Klauer et al., 2015). In the case of the new Leipzig approach, the additional spending is determined using 1) average prior spending on water quality proportionate to the total basin area; 2) objective distance to good status; 3) additional benefits generated. Both the objective distance and the additional benefits consist of several subcategories, which are each ranked on a scale of 0 to 3. The further the water body is from good status and the more benefits generated after achieving it, the higher the justifiable allowed spending on the given water body and the more likely it is that the spending will be viewed as proportional. The approach was tested on many water bodies in Germany (Klauer et al., 2016, 2017) and in the Czech Republic (Macháč and Brabec, 2018). Several arguments may be used against methodologies that are based on criterial analysis – prior spending not being always attributable to water quality or the hardship of assigning an integer value to the individual subcategories,

as discussed by Macháč and Brabec (2018). This methodology certainly has its merits, however, as it is not very time intensive and as individual applications are directly comparable. The methodology was recently modified in Spain (Bolinches et al., 2020a), where it was proposed that past expenditures should be Europe-wide and that they should be expressed in terms of past spending per GDP instead of per square kilometre in order to make sure that more emphasis is put on densely populated areas. In an attempt to rely on objective criteria only, the proposed methodology also removes additional benefits from the calculation.

The last branch of approaches is based on social affordability; these include a consideration of the suitability of measure implementation that depends on, for example, household income (Courtecuisse, 2005) or the cost to the private owner of the land (Klauer et al., 2007). The European Commission was not in favour of this approach, however, because the benefits generated represent positive externalities and not investors’ private benefits; its use was rejected especially in the case of less stringent environmental objectives (European Commission, 2009).

As indicated above, and as illustrated in Figure 2, even the assessment of cost proportionality differs between the three main methods. In the first approach – a monetary CBA – costs and benefits are directly compared. When a criterial CBA approach is used, costs are compared with another non-benefit value. In the case of the new Leipzig approach, this refers specifically to additional allowed spending; in the case of an approach that is focused on affordability and social acceptability, costs are compared to the ability to pay.

Figure 2. Proportionality assessment under different approaches.



Source: Authors’ own construction.

In the countries of Central Europe, the use of the approaches illustrated above varies somewhat; as shown in Table 1, however, the approaches are not mutually exclusive. Their combination is often suggested (Macháč and Brabec, 2018) and approaches used in individual basins may vary within a single country. The approach applied to a water body in a transboundary basin is affected by the best practices of the neighbouring state. It is also clear that most of the methodologies studied agree on using CEA to find the most cost-effective combinations of measures; Boeuf and Fritsch (2016), however, conclude that even CEA has not received enough attention so far.

Table 1. Applications for exemptions due to disproportionate costs.

Country	Disproportionate costs justified in the second cycle by:	Publicly accessible methodology	References
Austria	CEA, distribution of costs and affordability	Not available	-
Czech Republic	Not applied, current method is based on CEA and a monetary CBA	Yes	Slavíková et al. (2015)
Germany	Primary: CEA, distribution of costs and criterial CBA (new Leipzig approach)	Yes	Klauer et al. (2015)
Poland	Not fully clear from the reports	Not available	-
Slovakia	CEA, affordability, social and sectoral impacts and benefit assessment	Yes	(Výskumný ústav vodného hospodárstva, 2014)

Source: European Environment Agency (2018a).

Detailed descriptions of the methodologies used was available only for the Czech Republic, Germany and Slovakia. The low level of transparency of justification is criticised by the European Environment Agency (2018a), not only in the case of some Central European countries such as Austria and Poland but also in other European countries. Martin-Ortega et al. (2014) warn that deficient economic analyses may have a harmful effect on achieving environmental targets. Analyses that are not transparent in their methodology only add to this fear.

CURRENT SITUATION IN SELECTED CENTRAL EUROPEAN COUNTRIES

This paper focuses on five Central European countries. The current state of achieving the EU WFD requirements was analysed based on data from the European Environment Agency (2018a). Table 2 shows the results for both ecological and chemical status from the first management cycle, the expected results from the second management cycle, and the European average.

Table 2. Share of surface water bodies achieving good or higher ecological/chemical status.

Country	Ecological status		Chemical status	
	First management cycle (%)	Second management cycle (%)	First management cycle (%)	Second management cycle (%)
Austria	42	47	99	0
Czech Republic	17	19	70	69
Germany	9	8	88	0
Poland	2*	30	3*	59
Slovakia	63	57	95	98
EU	39	44	37	31

Source: European Environment Agency (2018a).

Note: * = most of the values were unknown.

It is apparent from Table 1 that there has been hardly any improvement in water quality between the first and the second cycles. The share of water bodies with good or higher ecological status has increased marginally in Austria and the Czech Republic and there has in fact been a slight drop in Germany and Slovakia. The share of water bodies with good chemical status has deteriorated as well in most of the

countries studied, falling to 0% in Austria and Germany; the share is higher for Slovakia and Poland, but the increase in the case of Poland is attributable mainly to the fact that most of the data were unknown during the first management cycle.

Comparing the achievement of good chemical status in the two management cycles is complicated by, 1) more pollutants being monitored in the second management cycle; 2) changes in definitions, especially of chemical status or of the standards applied in reporting (European Environment Agency, 2018b); specifically, standards laid out in Directive 2008/105/EC (European Commission, 2008) were not as strict as the standards in the 2013 Priority Substances Directive (European Commission, 2013). Based on the European Environment Agency (2018b), Germany and Austria applied the environmental quality standard for mercury in biota and belong to a group of states where all monitoring samples contained a certain level of mercury; this result was extrapolated to other non-monitored water bodies (European Commission, 2019c). Based on an application of the one-out-all-out rule, all the surface water bodies failed to achieve good status.

The above data suggests that a high rate of exemption applications should be observed because all the water bodies not achieving good status must apply for at least one. During the current second management cycle, all the reasons for justifying an exemption that are listed in the introduction are available and basins are free to choose the one they deem easiest to conduct or most likely to succeed. That means there may not be a high demand for a proportionality assessment as technical feasibility or natural conditions may be used instead.

OVERVIEW OF EXEMPTIONS IN SELECTED CENTRAL EUROPEAN COUNTRIES

Exemptions in the first management cycle

During the first management cycle, a significant number of exemptions were applied in the EU as a whole because of the low achievement of good status. In the EU overall, 61% of the surface water bodies did not achieve good ecological status and approximately 63% did not meet the requirements connected with good chemical status. As stated by the European Commission (2012a: 181), "the extensive use of exemptions may reflect the low level of ambition in many of the plans as regards achieving the environmental objectives". The EC report (European Commission, 2012a) stated that deadline extension (Article 4.4 WFD) was the exemption that was most often applied in the EU in the first management cycle.

Approximately 66% of the justifications of the exemptions under WFD Articles 4.4 (extension of the deadline) and 4.5 (less stringent environmental objectives) were based on technical feasibility, 19% were based on disproportionate costs, and 15% were based on natural conditions. The significant share of technical feasibility justifications is due to either the lack of necessary data for carrying out a sufficient analysis or to the difficulty of interpreting national conditions (European Commission, 2012a). More than one justification for an exemption at a single water body could be applied. The low share of disproportionate-cost exemptions could have two reasons: 1) the non-existence or vagueness of national-level guidelines for assessing costs using EU-approved methodologies (Martin-Ortega et al., 2014); and 2) the complicated and time-consuming nature of performing a sufficient analysis (Macháč and Brabec, 2018).

Table 3 presents the justification of exemptions in selected Central European countries. Exemptions based on deadline extension were used more often than the EU average (99% of all justifications in Central European countries, as compared to 95% at the EU level). In Austria, Germany and Poland, all three possible justifications were used and mostly combined, while in the Czech Republic and Slovakia exemptions were justified based only on technical feasibility.

Table 3. Justification used in selected European countries in the first cycle.

Country	Extension of the deadline			Less stringent environmental objectives	
	Technical feasibility	Disproportionate costs	Natural conditions	Technical feasibility	Disproportionate costs
Austria	4015	3773	4012	0	0
Czech Republic	974	0	0	0	0
Germany	5806	692	5352	78	6
Poland	1287	396	747	29	23
Slovakia	19	0	0	0	0

Source: European Commission (2012b).

It is obvious that the countries (and their water authorities) who had previous experience or adequate national support in the form of clear methodologies used the disproportionate-cost justifications very often as a relevant tool; such was the case in Germany as well as in other non-Central European countries such as the United Kingdom, France, the Netherlands and Estonia (European Commission, 2012b). On the other hand, in 2012 when this data was collected, the Czech Republic and Slovakia had not yet created such methodology and therefore it was very complicated for their water authorities to apply for an exemption using this justification (UJEP, 2014); even more to the point, Martin-Ortega et al. (2014) report that Swedish justifications of disproportionate costs were only explained qualitatively without using any calculations.

Based on the EU reports (for example, European Commission, 2012b), the exemption justifications during the first management cycle were insufficiently appropriate or transparent and national reports did not contain clear criteria on which to base the decision about exemptions. There was no clear indication of the time it was expected to take to achieve good status or of the measures required to meet the lower objective, nor did management plans include any apparent programme for the achievement of good status (European Commission, 2012a).

Exemptions in the second management cycle

For the second planning cycle, CIS 20 (European Commission, 2009) was elaborated to provide more detailed information and thus a better common understanding of the practical application of the WFD; it included a more detailed definition of disproportionate costs. Compared to the first management cycle, the discussion of proportionality led to (further) development of national methodologies in many countries such as Germany, the Czech Republic and Spain (Klauer et al., 2015; Slavíková et al., 2015; Bolinches et al., 2020a).

In the second management cycle, 56% of the surface water bodies at the EU level did not achieve good ecological status and approximately 69% did not meet the requirements for good chemical status (European Environment Agency, 2018a). Although there was an improvement in the status of single indicators between the first and second management cycles (European Commission, 2019a), it was necessary to apply a higher number of exemptions in the second management cycle due to the one-out-all-out rule (for example, the worsening situation with mercury in the case of chemical status). The cycles are not fully comparable due to the significant changes in a number of rivers in some countries (European Commission, 2019c). It is also necessary to take into account the slow reaction of ecosystems, which may cause a delay between the implementation of a measure and its effect. Considering the application of the one-out-all-out rule, it is difficult to see an improvement based on the aggregated data regarding good status.

As with the first management cycle, deadline extension (Article 4.4 WFD) was the most frequently applied exemption at the EU level and technical feasibility was the most commonly used justification of

the extension. According to the EC report (European Commission, 2019a), the applications for exemptions in the second management cycle were generally more detailed and more consistently reported than they were in the first management cycle.

The dominant usage of technical feasibility as justification for deadline extensions also persists in the selected Central European countries. A current overview of the use of exemption and its justification is presented in Table 4. The table was created using the authors' own analysis based on the EU report (European Commission, 2019c). This time, the number of exemptions in the EU report was presented in relative values. The absolute number of exemptions was calculated based on the total number of surface water bodies in individual countries and the share of a given exemption that was applied in each individual country.

Table 4. Justification used in the selected countries in the second cycle.

Country	Extension of the deadline			Less stringent environmental objectives	
	Technical feasibility	Disproportionate costs	Natural conditions	Technical feasibility	Disproportionate costs
Austria	12,384	11,900	4257	18	18
Czech Republic	1251	0	0	452	0
Germany	12,065	1339	5760	62	6
Poland	2914	1166	18	36	23
Slovakia	391	338	7	1	1

Source: Authors' own analysis based on European Commission (2019c).

Among the Central European countries studied, the total number of justifications in the second management cycle almost doubled from that of the first. In terms of relative value, the number increased the most in Slovakia (from 19 in the first cycle to approximately 740). The biggest increase in absolute terms was in Austria and Germany; this increase was caused primarily by deterioration of chemical status and partially by the increase in the number of surface water bodies in Austria (10%) and Germany (1%) from the first management cycle (European Commission, 2019c). In the other Central European countries, the number of surface water bodies was almost the same (Poland) or decreased (in the Czech Republic by about 2% and in Slovakia by about 14%)(European Commission, 2019c). As in the first management cycle, more than one type of justification could be applied at a single water body, bringing the total number of justifications above the total number of water bodies.

With the exception of the Czech Republic, the share of individual justifications changed significantly in these countries. Although the most frequent justification is still technical feasibility – whose share increased from 44% in the first management cycle to 54% in the second – the application of an exemption due to natural conditions decreased from 37.5% in the first management cycle to 18.5% in the second. This decrease was compensated for by a more frequent application of the disproportionate-cost justification. In general, a wide range of exemptions was used, the reason possibly being the experience gained from the first cycle and, as discussed below, the clearer definition of the conditions and development of national methodologies.

Although in general the 2019 report (European Commission, 2019c) provides information on improvements in quality in the context of the exemption reporting, there are persistent recommendations for more transparent justifications of exemptions in almost all Central European countries. The European Commission lacked a more detailed description of how the exemption assessment was carried out and required more transparency in justification in the form of definition of criteria and description of methods used. This was a common recommendation for all countries, especially Austria, Germany and Poland.

In Austria, all the possible reasons were used to justify an extension of the deadline and less stringent environmental objectives. According to the European Commission (2019c), all three possible justifications were applied without detailed information being provided. In the case of deadline extension, there was no information on when good status would be achieved. The cost disproportionality was assessed based on affordability, distribution of costs and CEA. More details, including links to the methodology, were not available.

In the Czech Republic, only a small amount of change between the first and second cycles had been achieved and all the exemptions were justified using technical feasibility, which led to deadline extensions; moreover, Article 4.5 was also applied due to technical feasibility in the second cycle. Based on current predictions, a significant number of water bodies will not have achieved good status by 2027 and it will thus be necessary to apply exemptions in the next cycle. The current report of the European Commission (2019c) states that natural conditions for surface water bodies might be used as a new reason in the third cycle. A methodology for the assessment of disproportionality of costs was certified in 2015 (Slavíková et al., 2015) and offers the potential to apply for exemptions due to disproportionate costs.

In Germany, all the possible justifications were applied in the second cycle. Technical feasibility and natural conditions were used the most while disproportionate costs were used less frequently. Based on the European Commission (2019c), the methods of justifying disproportionate cost differ across Germany; there has been an application of the justifications of cost-effectiveness analysis, distribution of costs, and other arguments such as "limiting factors from market mechanisms" and "excessive burden for beneficiaries"(ibid).

In Poland, the situation is the same as in Austria and Germany, meaning that all justifications have been used when applying for an exemption. The justifications were not described in more detail, thus it is not evident from reports and available documents (European Commission, 2019c) which approach was used to assess disproportionality of costs.

In Slovakia, most of the exemptions were justified by technical feasibility and disproportionate costs, with the rare use of natural conditions (ibid); only general information was provided about the justification of natural conditions. Slovakia is one of the countries that has developed its own national methodology for economic explanation of exemptions under Articles 4.4 and 4.5 of the WFD. This approach (Výskumný ústav vodného hospodárstva, 2014) is based on cost-effectiveness analysis, affordability, social and sectoral impacts, and benefit assessment.

DISCUSSION

The paper introduces the main approaches to assessing cost proportionality under the Water Framework Directive and the application of these approaches in selected Central European countries. As many authors state, economic assessment of cost proportionality is vague and more work needs to be done in order to achieve a sufficient level of certainty about the results (see, for example, Martin-Ortega et al., 2014; Maia, 2017; Berbel and Expósito, 2018). It turns out that the share of exemptions due to disproportionate costs differs significantly among the studied countries and between the management cycles. There are several aspects that may affect the choice of how to justify the exemption from achieving the good status of a water body. First, the aggregated statistics might be skewed if the number of water bodies studied in an individual country changed from the first management period to the second, which (as indicated in Table 5) is partly the case (European Commission, 2019c). Second, individual member states may have used more methodologies to justify exemptions because of the deteriorating status of water bodies between the two periods; this is the case with, for example, changes in mercury monitoring processes in European waters (European Environment Agency, 2018b). Third, given the transboundary nature of river basins, some types of justification may be used more often in

certain states simply because they are favoured by a neighbouring state whose methodology is used to assess the shared parts of the basin.

Table 5. Changes in selected Central European countries between the first and second management cycles, related to justification of exemptions based on proportionality.

Country	Change in ecological status between first and second cycles (%)	Change in chemical status between first and second cycles (%)	Share of proportionality justification in total reasons used in first cycle (Art.4.4 and 4.5) (%)	Share of proportionality justification in total reasons used in second cycle (Art.4.4 and 4.5) (%)	Change in number of river and lake water bodies between first and second cycles (%)	Published methodology
Austria	+5	-99	32	42	+10	No
Czech Republic	+2	-1	0	0	-2	Yes
Germany	-1	-88	6	7	+1	Yes
Poland	+28	+56	17	29	+0.1	No
Slovakia	-6	+3	0	46	-14	Yes

Source: Authors' own construction based on Tables 2 to 4.

Fourth, the other factor that may affect the use of different justification types is the distance of a water body to the achievement of good status. Bolinches et al. (2020c) expect that water bodies that fail to achieve good status by only a small margin will have to apply for an exemption on the basis of disproportionate costs as presumably the final step is technically feasible. This might not be true in the case of small water bodies where all possible measures have been exhausted but are still insufficient to achieve good status. Using technical feasibility is justifiable in this situation but it is unlikely to be so for most water bodies. It is much easier to see that all the cost-proportionate measures have been implemented and that only the achievement of the final step requires additional disproportionate measures. Bolinches et al. (2020c) show, however, that there seems to be no relationship between the distance to the achievement of good status and the choice of justification; they found no evidence to suggest that the less-impacted water bodies are less likely to apply for an exemption due to technical feasibility. This suggests that the explanation of the utilisation of different methodologies must be found elsewhere.

Fifth, the explanation could possibly be found in the complexity and availability of the respective methodologies, which may be illustrated using a comparison between the two management cycles. During the first management cycle, there were no reported cases of exemptions due to disproportionate costs in the Czech Republic and Slovakia as the methodologies were only being prepared at that point; Germany, on the other hand, used its original methodology (Klauer et al., 2007) and in Austria and Poland the situation was rather unclear. With the exception of Austria, in these countries exemptions due to disproportionate costs were used but much less so than exemptions due to technical feasibility or natural conditions.

The situation evolved after the first management cycle. During the second management cycle, justification of exemptions using disproportionate costs became more popular than it was during the first management cycle in Austria, Poland and Slovakia but remained unused in the Czech Republic. This increased use in Austria and Poland may be attributed to the fact that basin managers realised that the ambiguous nature of the methodology allowed them to apply for an exemption due to disproportionate costs with relatively little effort. In the Czech Republic and Slovakia, on the other hand, basin managers had to learn to work with the new methodologies. The absence of reported Czech cases shows clearly

that basin managers viewed the methodology as too complicated and time-consuming and that they thus maintained their focus on technical feasibility (UJEP, 2014).

This argument may be backed by comparing the two methodologies. While the Slovak one describes disproportionality in a broader sense and does not request any specific steps to be taken, the Czech methodology provides strictly formulated guidelines of how the assessment should proceed and what costs and benefits to include. While the Czech methodology may result in an assessment that is much more robust than the ones carried out in the other countries, the motivation to do so is also very weak due to the associated costs; this suggests that the most complex and precise methodology may in fact be harmful in that it may not be utilised if another opportunity to obtain the required exemption exists. The Czech methodology also defies the recommendation suggested in CIS 20 (European Commission, 2009) that the effort put into conducting a CBA should be proportionate to the size of the problem. The Czech methodology, unfortunately, does not take this into account and even small water bodies that fail to achieve good status by only a small margin are required to carry out a full CBA in accordance with the methodology. There is a justifiable fear in the Czech Republic of spending valuable resources on the cost-proportionality assessment only to find out that the results show that the costs are not disproportionate. The analysis is complex and the narrow guidelines do not allow any of the 'tricks with numbers' that might be possible under different methodologies; river basin managers therefore choose the easy way out in the form of technical feasibility. This raises the question of whether the achievement of good status truly is not technically feasible or whether there are other barriers that basin managers apply to this justification such as, for example, property rights or a small budget, which managers partially confuse with technical availability. To a certain extent, this may lead to a situation where the available and suitable solution is not implemented due to other barriers and is justified as technically unfeasible. This raises the question of whether to harmonise definitions and approaches at the EU level not only for disproportionate costs but also for other justifications of exemptions such as technical feasibility (Bolinches et al., 2020b).

This option, however, will not be available after 2027 (Carvalho et al., 2019); one may ask whether the EU wants to allow many different approaches that will differ in 1) the level of discretion as to what to include in the analysis; 2) the costs of carrying out the analysis; and 3) the robustness of the results. If this question is not answered, the situation after 2027 may severely disadvantage member states that restrict discretionary power. The states with less strict or more flexible methodology may avoid paying for implementation of the measures necessary to achieve good status by taking advantage of exemptions that would not be available in states with stricter methodologies.

CONCLUSIONS

The paper illustrates the current situation in five Central European countries regarding justifications of exemptions from achieving good status as laid out by the Water Framework Directive. It turns out that there are significant differences in both approaches to cost proportionality and the rate of utilisation of this justification of an exemption. The share of using cost proportionality as a justification differs from over 40% in the cases of Austria and Slovakia to not even a single case in the Czech Republic. This disparity may be the result of transboundary relations, different degrees of pressure at the level of water bodies, or the different methodologies applied in the given states.

The lack of clarity and knowledge about economic instruments in methodologies used in different states has especially been the subject of constant criticism both from scholars (for example, Martín-Ortega et al., 2014; Boeuf and Fritsch, 2016; Maia, 2017; Berbel and Expósito, 2018) and in official EU documents (European Commission, 2012c). The authors call for a shared methodology and for harmonisation of the existing approaches to proportionality assessments. We suggest that harmonisation is at least necessary in the case of transboundary basins, where a consistent approach to proportionality

should be applied. Without a doubt, a common methodology would bring more clarity and fairness into the exemption granting process.

The question arises, however, whether the time is right for the creation of a common methodology. Clearly, 2027 marks a significant year because the member states will be forced to use the disproportionate-cost justification more often (Carvalho et al., 2019). As shown above, the current level of experience with proportionality assessment differs significantly across the EU member states, meaning that it is difficult to gather the best parts of individual methodologies and combine them into a working and all-embracing methodology. It is unclear whether it is advisable to hear the call for a unified methodology now only to possibly find out after 2027 that the methodology does not fulfil the requirements, or whether it is better to maintain the status quo with possible small amendments to the existing methodologies and then introduce an all-European methodology once there is enough experience from all the member states. As discussed by Boeuf et al. (2016), the task of unifying the approaches is too overwhelming and the EU should find another way to limit the exemptions.

Although calls for extending the deadline and introducing an additional management period exist, it was recently decided that the WFD will not be revised, despite it now becoming clear that the WFD goals are too ambitious to be fulfilled in just three management periods. This only underlines the fact that the exemption granting process remains a topic warranting further exploration (Boeuf and Fritsch, 2016).

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REFERENCES

- Ammermüller, B.; Fälsch, M.; Holländer, R.; Klauer, B.; Sigel, K.; Mewes, M.; Bräuer, I.; Grünig, M.; Ehlers, M.H. and Borchardt, D. 2008. Entwicklung einer Methodik zur nicht-monetären Kosten-Nutzen-Abwägung im Umsetzungsprozess der EG-Wasserrahmenrichtlinie. *Ecologic Institut für Internationale und Europäische Umweltpolitik*.
- Arle, J.; Mohaupt, V. and Kirst, I. 2016. Monitoring of surface waters in Germany under the Water Framework Directive – A review of approaches, methods and results. *Water* 8(6): 217, <https://doi.org/10.3390/w8060217>.
- Berbel, J. and Expósito, A. 2018. Economic challenges for the EU Water Framework Directive reform and implementation. *European Planning Studies* 26(1): 20-34, <https://doi.org/10.1080/09654313.2017.1364353>.
- Boeuf, B. and Fritsch, O. 2016. Studying the implementation of the Water Framework Directive in Europe: A meta-analysis of 89 journal articles. *Ecology and Society* 21(2), www.jstor.org/stable/26270408
- Boeuf, B.; Fritsch, O. and Martin-Ortega, J. 2016. Undermining European environmental policy goals? The EU Water Framework Directive and the politics of exemptions. *Water* 8(9): 388, <https://doi.org/10.3390/w8090388>.
- Bolinches, A.; De Stefano, L.D. and Paredes-Arquiola, J. 2020a. Too expensive to be worth it? A methodology to identify disproportionate costs of environmental measures as applied to the Middle Tagus River, Spain. *Journal of Environmental Planning and Management* 0(0): 1-23, <https://doi.org/10.1080/09640568.2020.1726731>.
- Bolinches, A.; De Stefano, L.; Paredes-Arquiola, J.; Valerio, C. and Garrido, A. 2020b. Setting the threshold: An analysis of different approaches for the definition of exemptions to water quality objectives in the European Union. EGU General Assembly 2020, online, 4-8 May 2020, <https://doi.org/10.5194/egusphere-egu2020-9045> (accessed 12 August 2020)
- Bolinches, A.; Paredes-Arquiola, J.; Garrido, A. and De Stefano, L. 2020c. A comparative analysis of the application of water quality exemptions in the European Union: The case of nitrogen. *Science of The Total Environment* 739: 139891, <https://doi.org/10.1016/j.scitotenv.2020.139891>.

- Brouwer, R. 2008. The potential role of stated preference methods in the Water Framework Directive to assess disproportionate costs. *Journal of Environmental Planning and Management* 51(5): 597-614, <https://doi.org/10.1080/09640560802207860>.
- Brouwer, R.; Bliem, M.; Getzner, M.; Kerekes, S.; Milton, S.; Palarie, T.; Szerényi, Z.; Vadineanu, A. and Wagtendonk, A. 2016. Valuation and transferability of the non-market benefits of river restoration in the Danube river basin using a choice experiment. *Ecological Engineering* 87: 20-29, <https://doi.org/10.1016/j.ecoleng.2015.11.018>.
- Brouwer, R.; Hess, S.; Bevaart, M. and Meinardi, K. 2006. The socio-economic costs and benefits of environmental groundwater threshold values in the Scheldt basin in the Netherlands. BRIDGE Deliverable D26. 24 November 2006. Institute for Environmental Studies (IVM), Vrije Universiteit Amsterdam. Institute for Environmental Studies (IVM), Vrije Universiteit Amsterdam.
- Carson, R.T.; Flores, N.E.; Martin, K.M. and Wright, J.L. 1996. Contingent valuation and revealed preference methodologies: Comparing the estimates for quasi-public goods. *Land Economics* 72(1): 80-99.
- Carvalho, L.; Mackay, E.B.; Cardoso, A.C.; Baattrup-Pedersen, A.; Birk, S.; Blackstock, K.L.; Borics, G.; Borja, A.; Feld, C.K.; Ferreira, M.T.; Globovnik, L.; Grizzetti, B.; Hendry, S.; Hering, D.; Kelly, M.; Langaas, S.; Meissner, K.; Panagopoulos, Y.; Penning, E.; Rouillard, J.; Sabater, S.; Schmedtje, U.; Spears, B.M.; Venohr, M.; van de Bund, W. and Solheim, A.L. 2019. Protecting and restoring Europe's waters: An analysis of the future development needs of the Water Framework Directive. *Science of The Total Environment* 658: 1228-1238.
- Courtecuisse, A. 2005. Water prices and households' available income: Key indicators for the assessment of potential disproportionate costs-illustration from the Artois-Picardie Basin (France). *Vortrag auf der International Work Session on Water Statistics, Wien* 20: 22.
- De Nocker, L.; Broekx, S.; Liekens, I.; Görlach, B.; Jantzen, J. and Campling, P. 2007. Costs and benefits associated with the implementation of the Water Framework Directive, with a special focus on agriculture. Study for DG Environment – Final Version. 2007/IMS/N91B4/WFD. 2007/IMS/R/0261.
- European Commission. 2003. Common Implementation Strategy for the Water Framework Directive – Progress and Work Programme for 2003 and 2004 European Commission, 17 June 2003, <https://ec.europa.eu/environment/water/water-framework/objectives/pdf/strategy2.pdf> (accessed 3 August 2020)
- European Commission. 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, <https://eur-lex.europa.eu/eli/dir/2008/105/oj> (accessed 11 August 2020)
- European Commission. 2009. Common Implementation Strategy for the Water Framework Directive – Guidance Document No. 20 European Commission, 2009, https://circabc.europa.eu/sd/a/2a3ec00a-d0e6-405f-bf66-60e212555db1/Guidance_documentN%C2%B020_Mars09.pdf (accessed 3 August 2020)
- European Commission. 2012a. European overview – Commission staff working document: Report From The Commission To The European Parliament And The Council on the implementation of the Water Framework Directive (2000/60/EC) river basin management plans 2012, https://ec.europa.eu/environment/water/water-framework/impl_reports.htm (accessed 1 April 2020)
- European Commission. 2012b. Country-specific assessments for EU Member States and Norway (Volumes 3-30) 2012, https://ec.europa.eu/environment/water/water-framework/impl_reports.htm (accessed 1 April 2020)
- European Commission. 2012c. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the REgions – A Blueprint to Safeguard Europe's Water Resources 14 November 2012, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0673&from=EN> (accessed 3 August 2020)
- European Commission. 2013. Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32013L0039> (accessed 11 August 2020)
- European Commission. 2019a. European overview – River basin management plans. Accompanying the document Report from the commission to the European parliament and the council implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC) second river basin management plans,

- first flood risk management plans 2019, https://ec.europa.eu/environment/water/water-framework/impl_reports.htm (accessed 1 April 2020)
- European Commission. 2019b. Report from the Commission to the European Parliament and the Council on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC) European Commission, 26 February 2019, https://ec.europa.eu/info/sites/info/files/com_report_wfd_fd_2019_en_1.pdf (accessed 3 August 2020)
- European Commission. 2019c. Country-specific assessments for EU Member States' second river basin management plans: Austria, Czech Republic, Germany, Poland and Slovakia 2019, https://ec.europa.eu/environment/water/water-framework/impl_reports.htm (accessed 1 April 2020)
- European Environment Agency. 2018a. Ecological status of surface water bodies 2018, www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/ecological-status-of-surface-water-bodies (accessed 1 April 2020)
- European Environment Agency. 2018b. European waters assessment of status and pressures. Report No. 72018.
- Feuillette, S.; Levrel, H.; Boeuf, B.; Blanquart, S.; Gorin, O.; Monaco, G.; Penisson, B. and Robichon, S. 2016. The use of cost-benefit analysis in environmental policies: Some issues raised by the Water Framework Directive implementation in France. *Environmental Science & Policy* 57: 79-85.
- Galioto, F.; Marconi, V.; Raggi, M. and Viaggi, D. 2013. An assessment of disproportionate costs in WFD: The experience of Emilia-Romagna. *Water* 5(4): 1967-1995.
- Giakoumis, T. and Voulvoulis, N. 2018. The transition of EU water policy towards the Water Framework Directive's integrated river basin management paradigm. *Environmental Management* 62(5): 819-831, <https://doi.org/10.1007/s00267-018-1080-z>
- Hanley, N. and Black, A.R. 2006. Cost-benefit analysis and the water framework directive in Scotland. *Integrated Environmental Assessment and Management: An International Journal* 2(2): 156-165.
- Hering, D.; Borja, A.; Carstensen, J.; Carvalho, L.; Elliott, M.; Feld, C.K.; Heiskanen, A.-S.; Johnson, R.K.; Moe, J.; Pont, D.; Solheim, A.L. and van de Bund, W. 2010. The European Water Framework Directive at the age of 10: A critical review of the achievements with recommendations for the future. *Science of The Total Environment* 408(19): 4007-4019, <https://doi.org/10.1016/j.scitotenv.2010.05.031>
- Interwies, E.; Gorchach, B.; Strosser, P.; Ozdemiroglu, E. and Brouwer, R. 2005. The case for valuation studies in the Water Framework Directive. SNIFFER Project WFD 55.
- UJEP (Jan Evangelista Purkyně University in Ústí nad Labem). 2014. Workshop with water managers from river basins in the Czech Republic, Prague.
- Jensen, C.L.; Jacobsen, B.H.; Olsen, S.B.; Dubgaard, A. and Hasler, B. 2013. A practical CBA-based screening procedure for identification of river basins where the costs of fulfilling the WFD requirements may be disproportionate – Applied to the case of Denmark. *Journal of Environmental Economics and Policy* 2(2): 164-200.
- Klauer, B.; Mewes, M.; Sigel, K.; Unnerstall, H.; Görlach, B.; Bräuer, I.; Pielen, B. and Holländer, R. 2007. Verhältnismäßigkeit der Maßnahmenkosten im Sinne der EG-Wasserrahmenrichtlinie-komplementäre Kriterien zur Kosten-Nutzen-Analyse.
- Klauer, B.; Schiller, J. and Sigel, K. 2017. Is the achievement of "good status" for German surface waters disproportionately expensive? – Comparing two approaches to assess disproportionately high costs in the context of the European Water Framework Directive. *Water* 9(8): 554.
- Klauer, B.; Sigel, K. and Schiller, J. 2016. Disproportionate costs in the EU Water Framework Directive – How to justify less stringent environmental objectives. *Environmental Science & Policy* 59: 10-17.
- Klauer, B.; Sigel, K.; Schiller, J.; Hagemann, N. and Kern, K. 2015. Unverhältnismäßige Kosten nach EG-Wasserrahmenrichtlinie. *Ein Verfahren zur Begründung weniger strenger Umweltziele. UFZ-Bericht* 1.
- Lago, M. 2009. Investigation of regulatory efficiency with reference to the EU Water Framework Directive: An application to Scottish agriculture, <https://era.ed.ac.uk/handle/1842/3941>
- Lago, M.; Moran, D. and MacLeod, M.J. 2006. Exploring the meaning of disproportionate costs for the practical implementation of the Water Framework Directive. *Scotland's Rural University College – Land Economy & Environment Research Group Working Paper*, <https://doi.org/10.22004/ag.econ.46005>

- Laurans, Y. 2006. Implementing cost-effectiveness analysis: Perspectives based on recent French pilot studies. *Vortrag auf der Messe Wasser Berlin* 5.
- Macháč, J. and Brabec, J. 2018. Assessment of disproportionate costs according to the WFD: Comparison of applications of two approaches in the catchment of the Stanovice Reservoir (Czech Republic). *Water Resources Management* 32(4): 1453-1466.
- Macháč, J. and Slavíková, L. 2016. Appropriateness of cost-effectiveness analysis in water management: A comparison of cost evaluations in small and large catchment areas. In Špalková, D. and Matějová, L. (Eds), *Proceedings*, pp. 320-309. Šlapanice u Brna, the Czech Republic: Masaryk University: Brno, the Czech Republic.
- Maia, R. 2017. The WFD Implementation in the European Member States. *Water Resources Management* 31(10): 3043-3060, <https://doi.org/10.1007/s11269-017-1723-5>.
- Martin-Ortega, J. 2012. Economic prescriptions and policy applications in the implementation of the European Water Framework Directive. *Environmental Science & Policy* 24: 83-91.
- Martin-Ortega, J.; Skuras, D.; Perni, A.; Holen, S. and Psaltopoulos, D. 2014. The disproportionality principle in the WFD: How to actually apply it? In Bournaris, T.; Berbel, J.; Manos, B. and Viaggi, D. (Eds), *Economics of water management in agriculture*, pp. 214-256. CRC Press, <https://doi.org/10.1201/b17309-14>
- Prato, S.; La Valle, P.; De Luca, E.; Lattanzi, L.; Migliore, G.; Morgana, J.G.; Munari, C.; Nicoletti, L.; Izzo, G. and Mistri, M. 2014. The "one-out, all-out" principle entails the risk of imposing unnecessary restoration costs: A study case in two Mediterranean coastal lakes. *Marine Pollution Bulletin* 80(1): 30-40.
- Postle, M.; Salado, R.; Le Crom, Y.; Palladino, M.; Elding, C.; Upson, S.; Hull, S.; King, R. and Strosser, P. 2015. Assessing affordability of measures to meet Water Framework Directive requirements in England. Defra, 27 February 2015, https://rpaltd.co.uk/uploads/report_files/wfd-affordability.pdf (accessed 3 August 2020)
- Slavíková, L.; Vojáček, O.; Macháč, J.; Hekrle, M. and Ansorge, L. 2015. *Metodika k aplikaci výjimek z důvodu nákladové nepřiměřenosti opatření k dosahování dobrého stavu vodních útvarů*. Výzkumný ústav vodohospodářský TG Masaryka, vvi.
- Výskumný ústav vodného hospodárstva. 2014. Ekonomické zdôvodnenie výnimiek podľa čl. 4(4) RSV uplatnených v plánoch manažmentu povodí pre druhý plánovací cyklus (2016-2021)2014, <https://bit.ly/2ZcyDIk> (accessed 1 April 2020)

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