Economic data related to the implementation of the Water Framework Directive and the Floods Directive and the financing of measures

Final study

November 2021

With the support of Pierre Strosser (ACTeon), Gonzalo Delacamara (IMDEA), Rianne van Duinen, Gloria De Paoli (ACTeon), Ilona Kirhensteine (Wood)

EUROPEAN COMMISSION

Directorate-General for Environment
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EXECUTIVE SUMMARY

The European Commission (EC) has launched a **study for strengthening the knowledge base on costs and investments** (the demand for financial resources) **and on financing mechanisms** (the supply of financial resources) that support the implementation of EU water policy. The objective of the study is to provide a **comprehensive overview of publicly available economic data** related to the implementation and financing of the Water Framework Directive (WFD) and the Floods Directive (FD), and thus to identify and highlight knowledge gaps that hinder making informed financing and investment decisions in the water sector in Europe. The study builds in particular on: Member States' (MS) reporting; (socio-economic) studies carried out to support the implementation of the two directives; available literature (scientific and otherwise); feedback from MS representatives and experts/economists (before, during and after a virtual workshop organised in Brussels on October 6, 2020).

The collected evidence indicates that the **costs of achieving the environmental objectives of the WFD are significant (i.e. to arrive at good status or potential** for all water bodies in Europe). In total, the **capital investment costs of the measures** planned in the 2nd RBMPs **of the WFD reach at least EUR 142 billion**. However, the **knowledge base on the costs of planned measures is heterogeneous and incomplete**. Cost estimates often tend to cover capital investment costs only, with no corresponding estimates for the annual operational and maintenance costs in many countries; and they often tend to be only partially available, namely for some measures, some areas or some sectors, varying across countries. In general, the knowledge base across countries is stronger for the costs of supplementary measures (capital investment costs as well as operational and maintenance costs) in comparison to the costs of basic measures, partly because costs tend to be assessed for measures for which funding needs to be sourced. Finally, the majority of countries assess the costs of measures proposed in their Programmes of Measures (PoMs), with only a **few countries assessing the total costs of achieving water policy goals**. This incomplete knowledge base limits countries' capacity to support long-term financing strategies in relation to the implementation of the WFD.

In order to arrive at a "cost-effective combination of measures in respect of water uses," the WFD prompts MS to carry out an economic analysis "based on the estimates of [their] potential costs" (WFD, Annex III). While the WFD does not explicitly refer to any specific **economic appraisal methods,** most countries employ Cost-Effectiveness Analysis (CEA) of planned measures, but in many instances, the analysis is applied to a sub-set of measures and in combination with qualitative appraisals. Furthermore, an integrated assessment of different types of measures is rarely applied, with CEA largely focusing on pollution mitigation measures.[1] Fully-fledged Cost-Benefit Analysis are rarely carried out by countries.

In the **context of flooding**, the formulation of flood risk management objectives concerns the quantification of flood risk levels, and the definition of time horizon, concerned areas, impacts targeted, measure types, and coordination efforts. This has been taken up in varying degree across countries. Generally, objectives are not **quantified and measurable** hindering the estimation of the required level of effort and their linking to measures, as well as the estimation of costs and the cost-effectiveness of measures. The national FRMPs set out the measures aiming to reduce the adverse consequences of floods for human health, the environment, cultural heritage and economic activity. They require substantial capital investment and maintenance costs. **Total flood risk mitigation costs**

[1] This may be due to art 16(7), which sets the only explicit requirement on cost-effectiveness for the pollution control of priority substances emissions into water

planned in the 1st FRMPs amount to at least **EUR 14 billion.** However, these figures should be interpreted with caution as the reporting and knowledge base on costs are incomplete and also vary in robustness across countries, risk type and measures. Not all countries report costs in their 1st FRMP and the available cost estimations are often incomplete / limited, only covering specific types of measures, areas or cost categories. Detailed information on **costs per flood risk component** (prevention, protection, preparedness, and recovery) or per type of measure (structural/non-structural) is lacking. Few countries report on future **investment needs** and, based on the disparate information in the reports, the use of time horizons and scenarios varies considerably across countries.

A wide range of flood risk reducing measures are applied across countries targeting specifically prevention, protection, preparedness, and recovery. There seems to be a specific emphasis on structural measures. The **costs and effectiveness of non-structural measures** are often difficult to quantify and, therefore, these types of measures are often discarded in economic ranking procedures. Few countries provide detailed information about the application of **natural flood management options**. Most countries apply some form of **economic appraisal approaches** to evaluate measures. However, in many cases it is unclear whether the results have been used for **the selection and prioritisation of measures**, and, if so, how. When countries apply **cost-benefit analysis,** they differ in terms of level of detail and rigour of the exercise. **Environmental benefits** are rarely considered, even though they can be especially important for the evaluation of non-structural measures and natural flood management options. In these cases, the **combination of cost-benefit analysis with multi-criteria analysis** seems to be promising because it allows capturing the environmental benefits that can be decisive.

As regards **financing the management of water ecosystems/resources and floods**, data and information are scattered and heterogeneous across MS, in terms of both the amounts available from different funding sources and the time horizons considered (e.g. yearly allocations or allocations over the whole planning period). This renders it difficult to get a good understanding of the current situation as well as of the challenges and bottlenecks in delivering the financial resources matching the ambition level of both directives. The most important funding sources for water management in Europe are **water and sanitation tariffs** (reflecting that many MSs still need significant investments in drinking water and wastewater treatment infrastructure) as well as **EU funds and national public funds**. **Abstraction and pollution charges** are in place in several MS and generate significant revenues. The revenues from such charges are not always earmarked to water management, and thus as part of government's "general revenue," they go into the Central Government's or regional, local or municipal budgets. **Private investments** to support the implementation of the two Directives are limited in size, suggesting the need to investigate further if there is an untapped potential of private funding to support WFD and FD measures and investments. Some Member States make use of **innovative funding arrangements**, such as for example Payments for Ecosystem Services (PES) schemes, or financial assistance schemes combining public funding and financial participation by recipients (e.g. farmers), or an environmental fund financed by hydropower companies.

Nine Member States have a full financial cost-recovery, as the **financial cost-recovery levels** for the water and sanitation sector (excluding irrigation) are equal to or higher than 100%. Five MS record cost-recovery rates between 90 and 100% and six other MS have cost recovery levels between 80 and 90%. Finally, cost recovery levels are below 80% for four MS. For an additional three MS, there is no information on the extent of cost-recovery. This points to the challenges that MS face in applying the cost-recovery principle (and the related polluter-pays principle), an area that deserves better attention. The comparison between cost recovery levels and the affordability of water and sanitation expenditures in the EU suggests that **full cost recovery levels** – and also cost-recovery levels between 90 and 100% - **do not compromise the average affordability of water services** –

although affordability issues may still be experienced by some households. Only in a very few countries may full cost-recovery entail some affordability issues for low-income groups, which will need to be carefully assessed and addressed through specific accompanying measures (e.g. social tariffs).

When it comes to **water supply to irrigation**, the assessment suggests that the financial aspects of the provision of irrigation water seem to get less attention across the EU. Data are often spread across different sources and/or incomplete, and the implementation of the cost-recovery principle is often weak.

The assessment illustrates the **current application of economic assessment methods** in the frame of the WFD and WD implementation. Some economic knowledge receives **very limited attention** in the planning process of RBMPs and FRMPs, and water policy making in general. These include *inter alia* the information on: the **operational and maintenance costs** of the majority of measures (apart for measures related to water services); the **costs of the FD measures,** when these are carried out at the local levels; the **non-financial economic impacts** of measures, including their macro-economic impacts; the costs of **measures proposed for addressing hydro-morphological** pressures[2]; and the costs (and benefits) of **multifunctional measures** (nature-based solutions) that can serve different key objectives within the WFD and the FD. Consequently, solid estimates of the **total costs required for achieving either the WFD or FD objectives or both** are often lacking. An insufficient accounting for future climate impacts and socio-economic impacts (on equity) compounds the problem.

There is very limited evidence on **how the results of economic assessments are used for or support the selection and prioritisation of measures as well as their financing**. In some cases, it is clear that the outcome of economic assessments cannot have informed the choice of measures. In some situations, a set of measures (among the basic measures) have to be implemented anyway in order to meet the minimum requirements and they would take up the bulk of (readily) available (public) financial resources; the economic analysis can then help to choose the most cost-effective set of basic measures. In other cases, economic assessments are carried out *ex-post*, i.e. after the process of selecting of measures, such as to respond to reporting requirements. In the majority of cases, the selection of measures to be included in the PoMs (for both RBMPs and FRMPs) carried out at the river basin scale, takes account of the financial resources seen as readily available. It concerns the amounts reserved in or readily available out of public institution budgets or the direct revenues from water-related charges (in both cases with only a few basic iterations between cost assessment and the search for financial resources). Thus, priorities in investments rarely affect directly the choice of financing sources and financing instruments since the changes in financing instruments mostly originate from nationally driven policy / political processes.

Finally, as investment and financing decisions are mostly decided at (water use) sector level or even per individual water management challenge, it is unlikely that the proposed measures and investments proposed are cost-effective (either considering each of the two directives individually or combined, thus taking account of their interconnections). Combined with the absence of a (systematic) prioritisation of cost-effective measures (e.g. treating problems at source, soft measures supporting changes of practices instead of high-cost infrastructure, nature-based solutions…), this raises the question of the (order of magnitude of the) cost-saving potential that MS could seize upon in order to reduce the implementation costs.

Nevertheless, in various MS, **(new) instruments** (e.g. environmental charges and taxes, payment for ecosystem services, environmental funds financed by hydropower

[2] These costs are often very dependent on local conditions including access to land.

operators…) are emerging, including mechanisms that involve the private finance sector (e.g. loans, or private participation schemes such as PES or others). Sharing experience among MS on how they are designed and implemented, and on how they perform in terms of their effectiveness in raising the additional financial resources, could help supporting their wider implementation.

The financial resources that such instruments can provide, combined with more attention given to cost-effective measures, could help to reduce the number of water bodies, where less stringent environmental objectives are proposed on the basis of expenses considered disproportionate (pursuant to Article 4(5) of the WFD), resulting in less stringent environmental objectives in those areas. This would be an important boost for achieving the WFD's overall objectives.

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1. BACKGROUND

From its first efforts in regulating the management of water resources in the second half of the 1970, in particular with the adoption of Directives addressing the quality of surface, bathing or drinking waters, the European Union has progressively established a comprehensive policy framework supporting the integrated and sustainable management of water resources and aquatic ecosystems. The **Water Framework Directive** (2000/60/EC)[3] and the **Floods Directive** (2007/60/EC)[4] are two pillars of this policy framework:

- Adopted in 2000, the Water Framework Directive (WFD) builds on the integration of economic and ecological perspectives with the aim to achieve by 2015 good water status for all surface, groundwater, estuarial and coastal waters in Europe. The Directive has provisions for extending the 2015 deadline to 2027;
- Adopted 7 years later, the Floods Directive (FD) aims at reducing the risks of flood damage within the EU, a goal that has gained political attention in light of recent increased flooding across Europe and of climate change.

While the two Directives have different (complementary) policy objectives, they have much in common. They **share similar management philosophies**: river basin districts as the geographical entity to define water and flood risk management action; 6-year management cycles that aim at guiding efforts (in terms of more sustainable practices, infrastructure investments, incentives to water transition, et cetera); a strong reliance on sound assessments to monitor progress and to support management decisions; prioritising the critical issues accounting for progress in implementation and identifying new, emerging challenges; the role given to stakeholder consultation as means to support the implementation process; and the consideration given to economic principles, assessments and instruments. They also share a **high level of ambition** requiring significant efforts to reach their objectives although with different time frames (by 2027 for the WFD, not specified for the FD).

After more than a decade (already two for the WFD) of policy framework building and implementation, this high ambition has not been fully realised, judging the progress already made towards achieving their objectives. Despite significant efforts and improvements in several water status parameters, the majority of Member states (MS) fail to achieve good water status for all waters[5]. Although there has been progress on many indicators, the improvements in the water bodies' status from the first to the second WFD river basin management cycle have been limited, highlighting the **many challenges MS are facing in implementing this Directive**[6].

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[3] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

[4] Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32007L0060

[5] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

The value includes the UK. Note that the very limited improvements in good water status overall may to some extent be explained by the application of the "one-out-all-out" principle which requires all parameters defining water status, in accordance with the WFD Annex V, to be in good status for the whole water body to be classified as in "good water status". The overall classification may therefore in some cases "conceal" progress that may have been achieved for many, yet not all parameters, in a certain water body, unless thoroughly justified on the basis of disproportionate costs/technical feasibility, all parameters must meet the objectives/threshold/standard.

[6] For an analysis of the challenges relevant to the WFD implementation, see for instance: "Integrated Assessment of the 2nd River Basin Management Plans: EU-wide storyline report," 2018, report by Wood, ACTeon at alia on behalf the European Commission.

One of these challenges relates to the **insufficient** resolution **given to economic and financial issues** and solutions in the implementation process.

- Although many MS carry out **economic assessments** of measures proposed for both Directives, the soundness of these assessments and the use of their results for supporting the prioritisation and selection of actions is unclear. The 2019 WFD & FD implementation report[7] stresses that: "*Significant gaps remain in translating… economic analysis into concrete measures. Further progress in the economic underpinning of the Programme of Measures (PoM) would greatly facilitate water-related decisions and investments."* The integrated assessment of the WFD[8] reaches the same conclusion, stating that: "*It is also unclear how economic assessments… play a role in the selection and design of measures."*
- The insufficient mobilisation of financial resources and the bottlenecks faced by the administrations in charge of implementing the two Directives, in **securing adequate financial resources** for supporting measures and investments have also been highlighted. While the management plans of both Directives often identify, albeit sometimes rather elementarily, the funding sources that can be mobilised for supporting implementation, the effective financial resources allocation from these sources remains unclear. As stated by the integrated assessment of the WFD[9]: "*Financing and the availability of sufficient financial resources is seen as a key factor impacting the implementation of measures, in particular (but not only) in MS when there are no financing mechanisms dedicated to water or to the environment…. New sources of financing will need to be identified to supplement existing (sometimes limited) funding."*

The limited attention to economic and financing issues may contribute to, and at the same time, may partly owe its existence to a limited **economic and financial knowledge base** (in terms of both "quantity" and "quality"), with difficulties in accessing the relevant economic and financial data. This is reflected in the formal reporting mechanisms of both Directives as they have produced rather scant economic and financial datasets lacking homogeneity. Thus, while many recognise the significant financial efforts necessary to achieve the overall objectives of both Directives, the evidence demonstrating the short-term and long-term costs, and thus the magnitude of the required efforts to the decision makers at national and European level, is not readily available.

The MS WFD reports do not complement their information on current cost-recovery levels with information on the financial revenues from water-dedicated economic instruments, and how these revenues are used (or not) to support measures that significantly contribute to the achievement of the defined environmental objectives. In addition, the financial resources effectively secured or potentially available to support water and flood management are unknown, in particular when coming from other sectors financing (e.g. agriculture, energy, biodiversity, et cetera). Without sufficient sound economic and financial knowledge, the strategic long-term planning and priority setting that need to underpin the progress towards achieving the two Directives' overall objectives, cannot materialise.

[7] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[8] See the reference in footnote 6.

[9] See the reference in footnote 6.

2. THE STUDY IN A NUTSHELL

The European Commission (EC) has launched a **study for strengthening the knowledge base on costs and investments** (the demand for financial resources) **and on financing mechanisms** (the supply of financial resources) that support the implementation of EU water policy. The objective of the study is to provide a **comprehensive overview of publicly available economic data** related to the implementation and financing of the Water Framework Directive (WFD) and the Floods Directive (FD), highlighting in particular the knowledge gaps that need to be filled for supporting informed financing and investment decisions in the water sector in Europe[10].

This study builds on previous efforts to develop and structure the water economic knowledge base in Europe, specifically MS reporting in the WISE database and the EC-funded Blue 2 study; WFD/FD compliance assessments; integrated assessment of the 2nd RBMPs; and the Fitness Check of the WFD and FD. It feeds into the cooperation between the EC and the OECD to assess solutions for closing sustainably the financing gaps that the European water sector experiences. In particular, the study (a) mobilises the results obtained during the first stage of this EC – OECD cooperation on the financing of the water (service) sector; and (b) contributes to further efforts to identify financing solutions that can support the WFD and FD implementation.

The study has carried out the following activities:

- A compilation and presentation of an **overview of the current situation and challenges faced by water and flood management** in MS – combining information on the state of waters, key pressures imposed by human activities, socio-economic development, as well as the level of efforts (current expenditure) for addressing these challenges;
- Using a common template[11], the **gathering and structuring of data** on the economic and financial aspects of water and flood management (in particular in relation to costs, economic assessments, benefits, financial sources and revenues, cost-recovery, et cetera). This has helped to develop an overview of the existing economic and financial knowledge and of the major knowledge gaps. It has also contributed to the identification of barriers faced by MS in the use of economic methods and in taking steps to address the financing needs, thus supporting the cost-effective achievement of both Directives' overall objectives;
- The **(peer) review of the economic knowledge** collated through: (1) a survey among MS representatives and experts/economists;[12] and (2) presenting (partial) results at a (virtual) workshop organised in Brussels on October 6, 2020[13]. The workshop has helped to consolidate the knowledge base through a collation of the received feedback and additional information sources. It has also helped to identify and discuss mechanisms and solutions that could help strengthen strategic approaches to financing the WFD and FD implementation. The received feedback

[10] The study focuses in particular on the economic aspects of the WFD and FD implementation, and it does not intend to explicitly tackle the financial aspects of water scarcity and droughts and of flood damages.

[11] **This has led to the compilation of country fiches** conceived as internal background documents, pre-filled with publicly available information. The study has not intended to further elaborate them into public documents, in view of the additional efforts.

[12] Via the Ad-hoc Task Group (ATG) on "Water Economics" under the Common Implementation Strategy (CIS)

[13] https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/36226ee2-d311-401f-8b7c-35b3b4d21990?p=1&n=10&sort=modified_DESC

has helped to revise and consolidate the information on the economic and financial dimensions of the WFD and FD;

- The **development of a study** (the present study) that synthesises the gathered information throughout the project and that highlights, in particular, the key knowledge gaps that need to be bridged for supporting sounder investment and financial decisions.

Launched in January 2020 and ending in January 2021, the study has been implemented by a consortium led by Wood, with ACTeon as technical lead and IMDEA Water, the Baltic Environmental Forum, Denkstatt, the Institute for European Environmental Policy, Oikos, the National Technical University of Athens and VITO as partners.

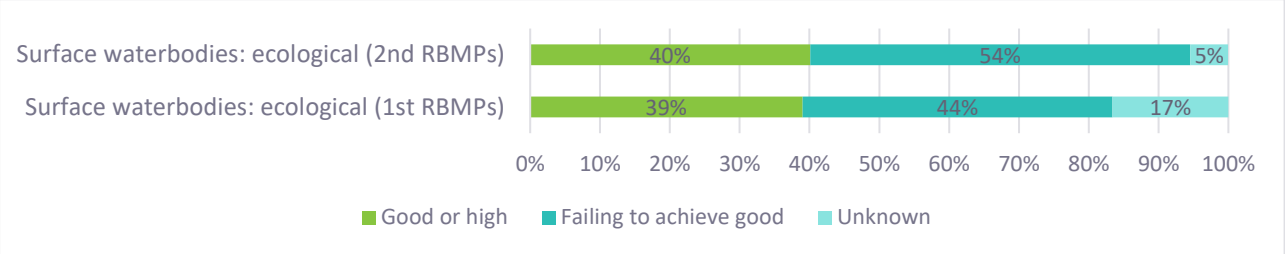
3. SETTING THE SCENE

3.1. State of water resources

The WFD aimed to achieve good status or potential of surface and groundwater bodies across the EU by 2015 (except for exemptions).

In the 2nd river basin management planning (RBMP) cycle, **40% of surface waters** (rivers, lakes and transitional and coastal waters) **are in good ecological status or potential** (up from 39% in the 1st RBMPs) as presented below in Figure 3-1.

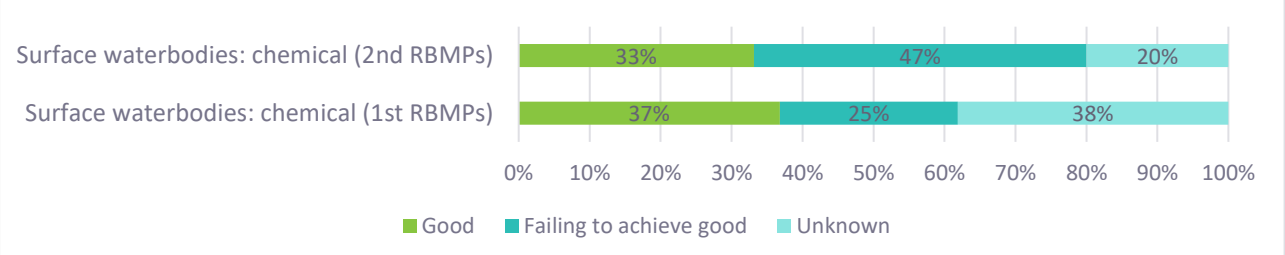
Figure 3-1 Ecological status of surface water bodies in EU27



Source: SWBs (ecological); to be accessed here;
Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "unpopulated". Number of WBs has decreased between 1st and 2nd RBMPs.

At the same time, only **33%[14] of surface waters are in good chemical status** (down from 37% in the 1st RBMPs, largely due to improved monitoring) as illustrated below in Figure 3-2.

Figure 3-2 Chemical status of surface water bodies in EU27



Source: SWBs (chemical): to be accessed here;

Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "unpopulated". Number of WBs has decreased between 1st and 2nd RBMPs.

In most MS, a few priority substances account for the prevalent poor chemical status of water bodies, the most common being mercury. If mercury and other ubiquitous priority substances were omitted, only 3% of surface water bodies would fail to achieve good chemical status. Improvements as regards the concentration levels for individual substances show that MS are making progress in tackling sources of contamination. Improvements are usually visible at the level of individual quality elements or pollutants but often they do not translate into improved status overall.[15]

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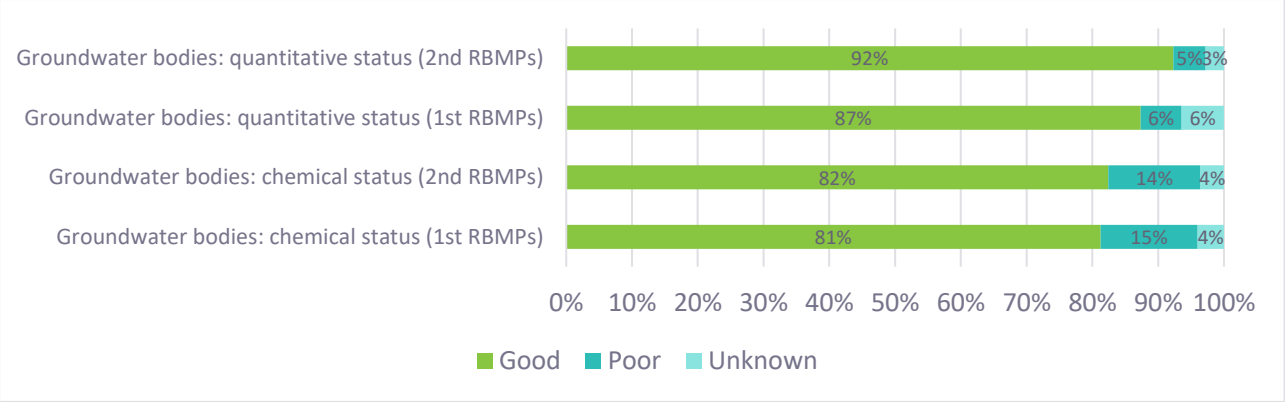
[14] The EEA report "European waters – assessment of status and pressures 2018," reports that 38% are in good chemical status as the numbers are inclusive of the UK.

[15] EEA, 2018, "European waters. Assessment of status and pressures 2018"

The proportion of water bodies with unknown status has decreased and the confidence in status assessment has grown as regards both ecological and chemical status/potential of surface water bodies, reflecting the monitoring and assessments efforts made by MS while implementing the first RBMP.

At the same time, **92% of groundwater bodies are estimated to be in good quantitative status** (up from 87% in the 1st RBMPs) and **82% in good chemical status** (up from 81% in the 1st RBMPs) (see Figure below)

Figure 3-3 Quantitative and chemical status of groundwater bodies in EU27



Source: GWBs (quantitative by number): to be accessed here; GWBs (chemical by number): to be accessed here

Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and Norway, excluding unpopulated, number of WBs increased between 1st and 2nd RBMPs)

For most of the groundwater bodies, the expected achievement of good status or potential is anticipated by 2027 or beyond, demonstrating the long time lag between the implementation of measures and their effectiveness in groundwater quality[16].

Overall, despite significant efforts by many MS and despite the reversal of a decades-long decline, the improvements in water status between the first and second RBMPs have been marginal relative to the gap towards achieving the WFD objectives.

3.2. Key pressures on water resources

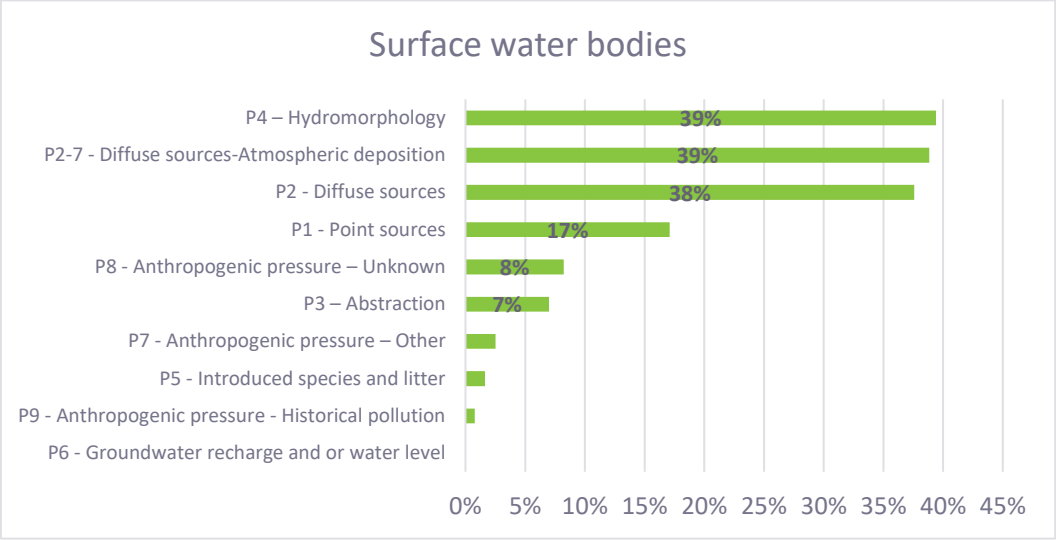
European waters remain under significant pressure from diffuse pollution (e.g. generated by agriculture, transport infrastructure and atmospheric deposition), point-source pollution (e.g. generated by industry or remaining wastewater discharges that have not yet been adequately treated), over-abstraction and hydro-morphological changes stemming from a range of human activities.[17]

The 2nd river basin management planning cycle indicates the relative importance of these different pressures, with **hydro-morphology changes, atmospheric deposition and diffuse sources of pollution** being by far the main pressures on surface water bodies in terms of percentage of surface water bodies affected.

[16] European Commission, 2019, "Fitness Check Evaluation of the Water Framework Directive and the Floods Directive," report by Trinomics on behalf the European Commission.

[17] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Figure 3-4 Significant pressures on surface water bodies in EU27

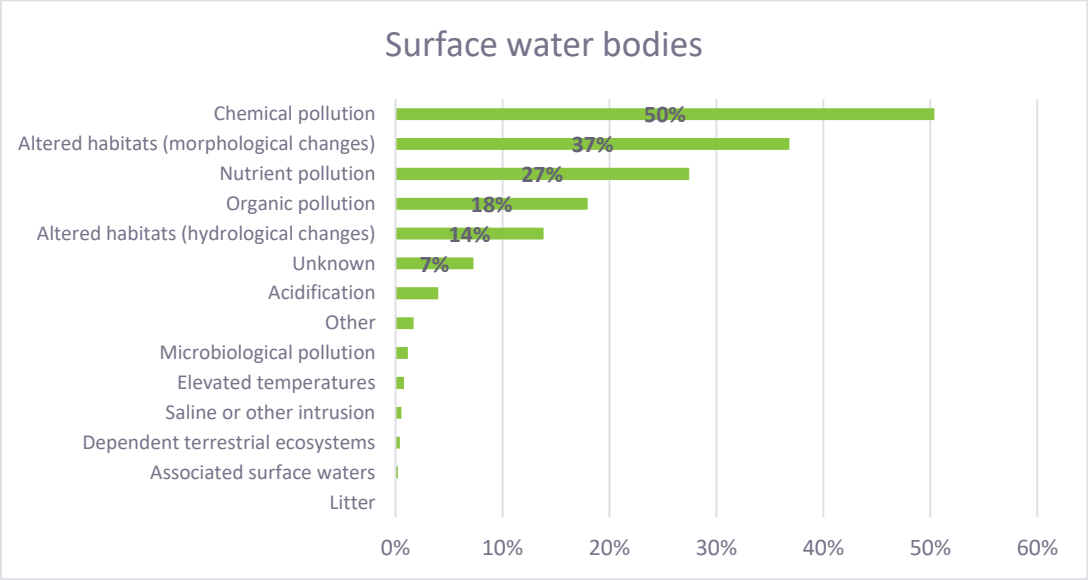


Source: https://www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/pressures-and-impacts-of-water-bodies

Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "no significant anthropogenic pressure" and "unpopulated[18]". Number of WBs has decreased between 1st and 2nd RBMPs

The main **impacts on surface water bodies** are **chemical pollution** (50%), **altered habitats due to morphological changes** (37%) and **nutrient pollution** (27%) (See below in Figure 3-5).

Figure 3-5 Significant impacts on surface water bodies in EU27



Source: https://www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/pressures-and-impacts-of-water-bodies

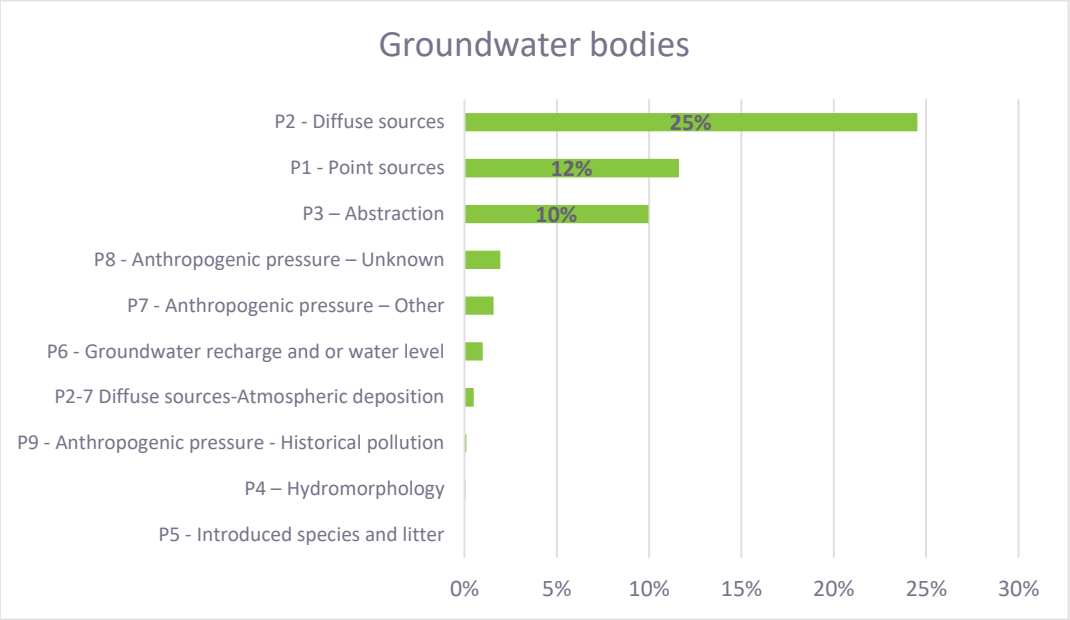
Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "none" and "unpopulated[19]". Number of WBs has decreased between 1st and 2nd RBMPs

[18] Pressure type - all except Unpopulated/Category - all except Unpopulated /Type - all except Unpopulated/ Ecological status - all except Unpopulated / Chemical status - all except Unpopulated/ EU27 (total excluding UK)

[19] Impact type - all except Unpopulated /Category - all except Unpopulated /Type - all except Unpopulated /Ecological status - all except Unpopulated /Chemical status - all except Unpopulated /EU27 (total excluding UK)

At the same time 25% of groundwater bodies were affected by **diffuse sources**, 12% by **point sources** and 10% by **abstraction pressures**[20] (see Figure below).

Figure 3-6 Significant pressures on groundwater bodies in EU27



Source: EEA, to be accessed here.
Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "no significant anthropogenic pressure" and "unpopulated[21]". Number of WBs has decreased between 1st and 2nd RBMPs

Specifically, **agricultural activity** is the main cause of the failure to achieve good chemical status for groundwater bodies, as it leads to diffuse pollution from nitrates and pesticides. Other significant sources are wastewater discharges that are not connected to a sewerage treatment system, and contaminated soil sites or abandoned industrial sites.[22]

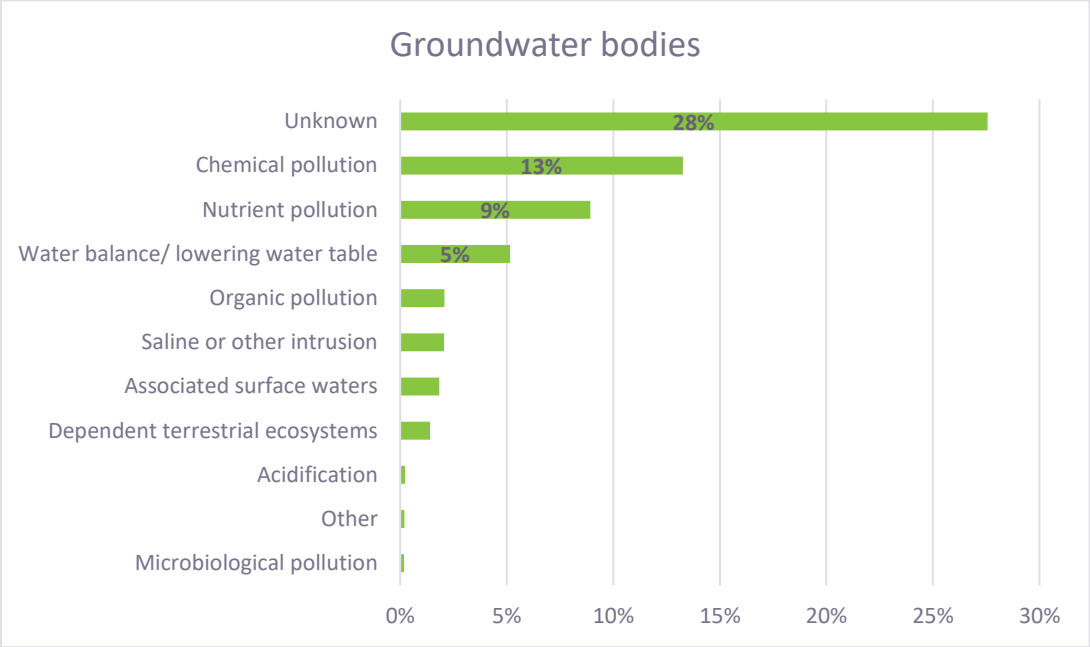
The main **impacts on groundwater bodies** are **chemical pollution** (13%) and **nutrient pollution** (9%) (See below in Figure 3-7). However, still a very high number of groundwater bodies (28%) are affected by unknown impacts.

[20] The values are different to those reported in the EEA report "European waters. Assessment of status and pressures 2018," 2018, as the latter include the UK.

[21] Pressure type - all except Unpopulated/Category - all except Unpopulated /Type - all except Unpopulated/ Ecological status - all except Unpopulated / Chemical status - all except Unpopulated/ EU27 (total excluding UK).

[22] European Commission, 2019, "Fitness Check Evaluation of the Water Framework Directive and the Floods Directive," report by Trinomics on behalf the European Commission.

Figure 3-7 Significant impacts on groundwater bodies in EU27



Source: https://www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/pressures-and-impacts-of-water-bodies

Notes: EEA WISE reporting on EU27 countries (NUTS0), excluding UK and excluding "none" and "unpopulated[23]". Number of WBs has decreased between 1st and 2nd RBMPs

3.3. Flood risk

In recognition of the significant impacts from flooding, the Floods Directive (FD) entered into force in 2007 aiming to establish a framework for the assessment and management of flood risks and to reduce the adverse consequences of floods for human health, the environment, cultural heritage and economic activity. The Directive requires for the 2nd planning cycle (2021-2027) that MS:

- Undertake **preliminary flood risk assessments** (PFRA) leading to the identification of areas that are at significant risk of flooding - areas of potential significant flood risk (APSFR) (by 2018);
- Prepare **flood hazard and risk maps** (FHRM) showing how far floods may extend, the depth or level of water and the potential impacts on human health, the economy, environment and cultural heritage (by 2019); and
- Prepare **Flood Risk Management Plans** (FRMP) (by 2021).

In the process of developing the 1st cycle PFRAs and FRMPs, **MS have identified 7,906 areas of potential significant flood risk** (APSFRs) falling within 209 Units of Management[24] or UoMs[25].

[23] Impact type - all except Unpopulated /Category - all except Unpopulated /Type - all except Unpopulated /Ecological status - all except Unpopulated /Chemical status - all except Unpopulated /EU27 (total excluding UK)

[24] MS should prepare one FRMP for each RBD or UoM that contain APSFRs, or a set of FRMPs coordinated at the level of the RBD (Article 8.1).

[25] European Commission, 2019, –"European Overview - Flood Risk Management Plans," SWD(2019) 31

The risks of flood damages are expected to increase in the future as a result of increased magnitude and frequency of floods due to climate change (higher intensity of rainfall and rising sea levels) as well as increasing numbers of people and assets in flood risk zones.[26]

Under the no-adaptation scenario (i.e. assuming a continuation of the current protection against river floods up to a current 100-year event), the EU damages from the combined effect of climate and socioeconomic changes are projected to rise from EUR 6.9 billion/year to EUR 20.4 billion/year by the 2020s, EUR 45.9 billion/year by the 2050s, and EUR 97.9 billion/year by the 2080s.[27]

[26] European Commission, 2019, "Fitness Check Evaluation of the Water Framework Directive and the Floods Directive," report by Trinomics on behalf the European Commission.

[27] European Commission, 2019, "European Overview - Flood Risk Management Plans," SWD(2019)31

4. FINANCING STRATEGIES TO SUPPORT THE ACHIEVEMENT OF WATER POLICY GOALS: MAIN ISSUES AND ELEMENTS OF A LOGICAL FRAMEWORK

In July 2020, the EU leaders reached a deal on a EUR 750bn plan (titled "Next Generation EU") to reconstruct the EU's pandemic-stricken economies. The so-called Recovery and Resilience Facility comes on top of the EU's upcoming EUR 1.074 tn 7-year budget (Multiannual Financial Framework, MFF), and thus it can lead to less stringent financial constraints on water resource management in the EU. MS are currently working on their own national Recovery and Resilience Plans pledging to reform their economies in order to unlock their allocated share of this funding, to be disbursed in the period 2021-2023. Undisputedly, this unprecedented, coordinated fiscal stimulus will have sizeable impacts. However, it is evident that the liquidity or the availability of financial resources overall is a necessary condition to support the green recovery and transition, but it is by no means a sufficient one. In the absence of sound financing strategies in particular, financial resources may not deliver the expected results.

"Strategy" refers to how financial resources are to be deployed through a combination of measures aimed at ensuring an efficient utilisation of funds and the timely achievement of goals. Financing is thus a critical link between strategic plans (such as River Basin Management Plans under the WFD or Flood Risk Management Plans under the FD) and their actual implementation. Strategic financial planning addresses roles and responsibilities of government agencies (including multi-level governance across levels of government and the coordination of financing decisions and mechanisms), policy priorities and the related legislative and regulatory reforms in order to ensure that the proposed PoMs (Programme of Measures) are underpinned by a realistic financing (OECD, 2011[28]). When translated to water resources management, strategic financial planning, conceived as an iterative process, can help anticipate the financial needs in the medium and longer term, in terms of both the upfront capital investment costs and the operational and maintenance costs. Often, water policy tends to be driven by crisis management (droughts, floods, pollution incidents, et cetera) as much as by planning itself, and takes the form of a reactive (hence *ex post*) attempt to remediate impacts. Thus, strategic financing is a binding requirement to move from that *ad-hoc* approach towards an *ex-ante*, pre-emptive and proactive one, largely aimed at managing risks and opportunities while also being able to respond to unintended and unplanned outcomes of extreme events. Strategic financing matches policy ambitions with financial resources (OECD, 2012[29]).

4.1. Why is a (more strategic) financial approach to water resources management (WRM) needed?

The need for governments to **strengthen the financial dimension of WRM** and water services delivery is pervasive worldwide and hence, it is not limited to the EU and its MSs. Financial constraints are sometimes the result of the lack of money, especially in countries in the EU under severe fiscal consolidation efforts or facing drawbacks to leveraging private funding. However, they are also the outcome of a lack of effective and efficient financing mechanisms able to properly address equity concerns. Financing should not be an add-on but rather a critical element for a sounder WRM, clearly connected with the water policy goals and the wider social and economic development objectives. Strategic financial planning can contribute to match policy goals with the available financial resources, as well

[28] OECD, 2011, "Meeting the Challenge of Financing Water and Sanitation. Tools and Approaches."

[29] OECD, 2012, "A Framework for Financing Water Resources Management."

as to shed light on how much money is needed and how much is actually available (or could be made available).

Strategic financing should be designed in such a way that it provides a systematic way of thinking about a number of issues:

- **Necessary investments** to achieve Good Ecological Status (GES) and Good Ecological Potential (GEP) for water bodies (preventing or alleviating pollution, tackling hydro-morphological alterations, conserving biodiversity and the provision of aquatic ecosystem services), and to manage floods and flood risks, but also droughts and drought risk while anticipating and adapting to climate change;
- The potential **compensation for welfare losses** that may occur as a result of implementation gaps in the WFD and FD (such as downstream users being affected by pollution or over abstraction);
- Delivering adequate **burden (and risk) sharing** across public and private actors;
- Factoring in **affordability concerns** (for individual water users and for society overall in light of the costs of the PoMs developed for achieving the objectives of the WFD and FD) and sectoral (or nationwide economic) competitiveness;
- Mobilising additional resources also serves to deliver effective opportunities to coordinate sectoral policies, vertically and horizontally. These efforts are meaningful at both MS and EU level, and as part of a more determined effort to strengthen the link in practice between, on the one hand, the WFD, and, on the other hand agricultural policy (CAP) and the chemicals regulation REACH. The latter can improve the protection of human health and the environment from the risks stemming from chemicals, or between biodiversity conservation and natural flood management, et cetera.

4.2. Why is it critical to connect financing to WRM in a more determined way?

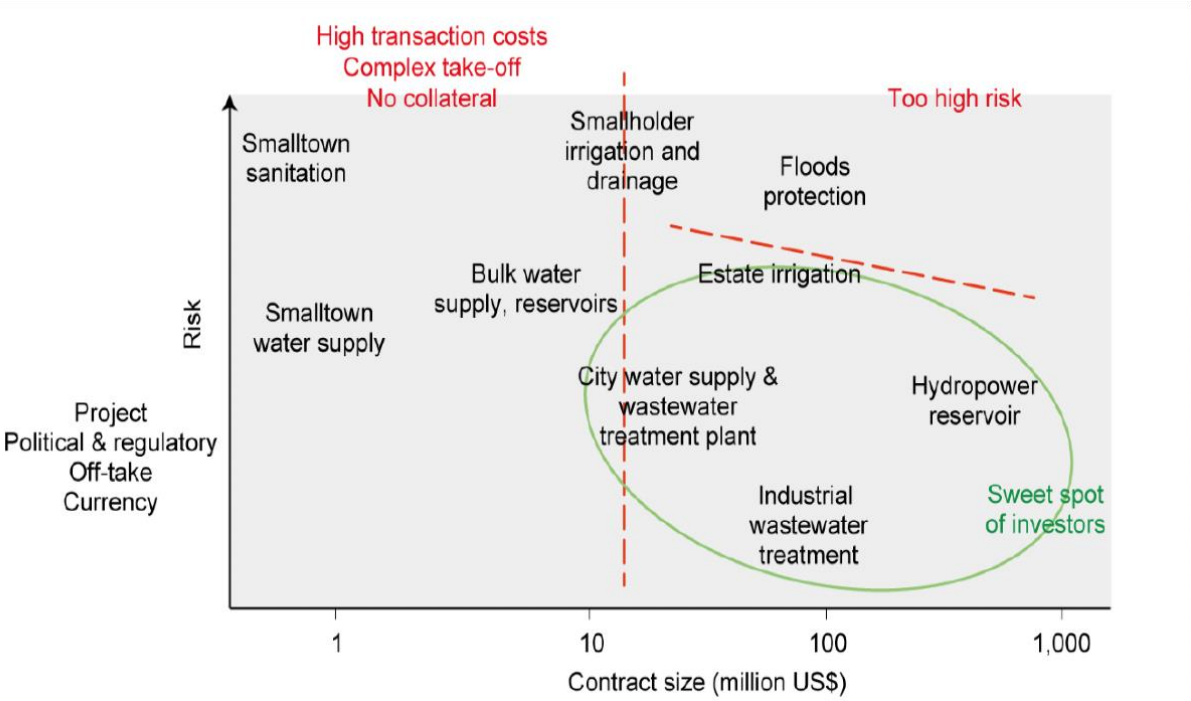
Making the economic case for investments that contribute to the long-term water policy objectives including water security (i.e. via increased water use efficiency, diversification of water supply sources, aquatic ecosystem restoration, et cetera) is of critical importance, particularly in the context of water scarcity and climate change. Climate change adaptation is today a general concern touching upon all water policy initiatives, even when still weak as regards its evidence base. The "water transition" to a sustainable water use (e.g. equivalent to that of the "energy transition" that will deliver decarbonisation) will require significant additional financial resources.

Government budgets seem more likely to pay for traditional public infrastructure (i.e. water supply and sewage collection networks as well as wastewater treatment plants, all of them able to generate income flows once in operation), with other investments being side-lined including those by private investors, given the preference of commercial financiers for a sub-set of water projects (See Fig. 4.1). The availability of commercial finance largely depends on asset class, investment size and risk profile.

One would expect investment finance to grow proportionately with the sector's prominence and needs. However, this may not always be the case. Lately, international finance for climate-related purposes has grown significantly, but over 80% of disbursements are geared to mitigation programmes in the energy and transport sectors (UNEP, 2016), with limited financial resources allocated to climate adaptation ends, including the investments in supporting resilience in water management.

Even when capital and operational expenditures are ensured, significant weaknesses emerge in the area of capital (asset) replacement, a critical issue in relation to infrastructure development at different levels (urban water management, major irrigation infrastructures, et cetera). (Physical) asset management tends to be a common challenge in many, if not all MS, although to a different extent.

Figure 4-1 Investment appetite for commercial finance in the water sector



Source: Alaerts, 2019, "Financing for Water—Water for Financing: A Global Review of Policy and Practice."

4.3. Why money is not the only constraint: challenges in fund absorption

The public sector exhibits a limited absorption capacity (i.e. administrative capacity and human resources) to effectively translate allocated budgets into physical infrastructure and other types of investments. A number of reports[30] indicate the following causes: design problems; a lack in the capacity to provide the required co-financing out of the national budget; the incompatibility, inconsistency and instability of national regulations, especially on sectoral policy; land acquisition and environmental safeguards; weaknesses and lack of readiness of the implementing organisations and related institutions. Over all MS, the absorption of grants exceeded 90% rates after a delay of up to 5 years. In some cases, it was less than 50% (European Court of Auditors, 2018). This puts the effectiveness and purposefulness of some of the investments in doubt, especially in cases when there is an urgency to comply (with set policy objectives) or to use available financial resources. The pressure to use funds often leads to *ad-hoc* projects that have not been assessed against a sound set of prioritisation criteria.

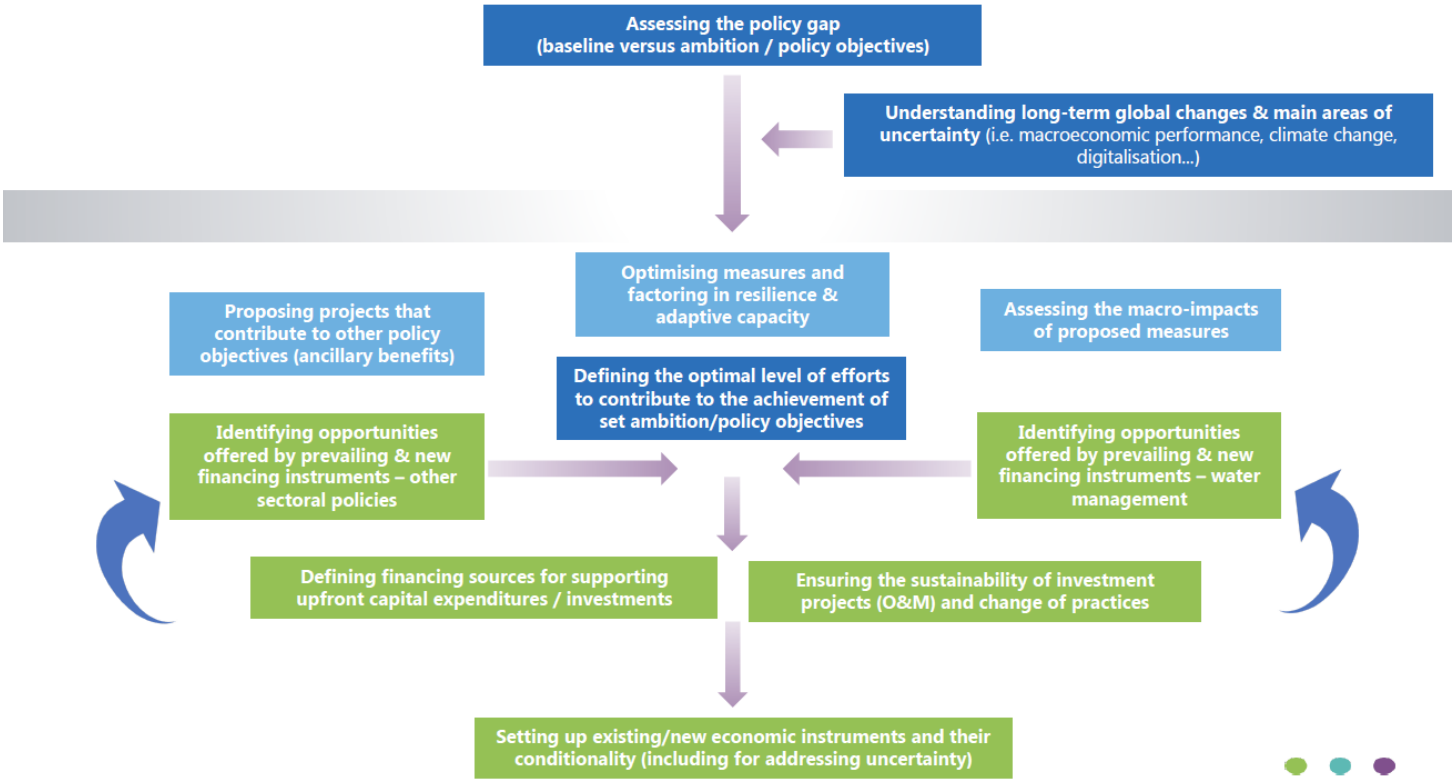
[30] See for instance: European Parliament, 2011, "Report on absorption of Structural and Cohesion Funds: lessons learnt for the future cohesion policy of the EU" (2010/2305(INI)); to be accessed here.

This source does not focus specifically on the water sector, but highlights an overall absorption challenge in the EU.

4.4. The different dimensions of strategic water financing

A strategic financing framework will need to consider a number of dimensions that are summarised in Figure 4.2 below. The following chapters will investigate them in more detail, assessing the availability and quality of information available for the different blocks.

Figure 4-2 Strategic financing framework for water resources management



Source: Own elaboration.

Assessing the level of application of this framework will require looking in particular at four transversal dimensions that are further detailed below.

As depicted in Fig. 4.2 above (see the boxes in dark blue), water management's strategic financing efforts should be driven by an adequate assessment of policy gaps. Such an assessment is often constrained by the definition of baseline scenarios (sometimes perceived as the current situation rather than the projection of what would happen in the absence of new actions), and by a weak analysis of drivers in planning documents. Currently, decisions are made within a context of cascading uncertainty, not only stemming from global climate models and scenarios, and their downscaling to regional climate models, but also from the assessment of their potential impacts in socio-economic modelling. However, as reflected in Fig. 4.2, climate change is far from being the only source of uncertainty: the overall macroeconomic performance and the structural change in the economy as a result of digitalisation are also major sources of uncertainty. As explained above, strategic financing approaches allow to explicitly connect the level of (financial) effort to policy objectives.

Measures stemming from this analysis cannot only be those that result from a conventional financial appraisal or a least-cost exercise (in line with the economic analysis prescribed in the EU WFD Art. 9), no matter how important that is. Precisely on the basis of the acknowledgement of the layers of uncertainty mentioned in the previous paragraph, it is

also of chief importance to consider the wider, ancillary benefits, thus moving away from least-cost towards best-value solutions for society (see boxes in light blue).

Within this context, the consideration of the following dimensions is of paramount importance.

Dimension 1 – Ensuring capital investment (and its funding) to address the policy gap

- The estimation of the long-term funding needs is critical to connect the discussions on financing and those on cost estimates, policy needs and societal challenges.
- When assessing costs required for achieving policy goals, one should pay sufficient attention to the potential to reduce overall costs, through water use efficiency, circular economy, asset management, the implementation of nature-based solutions that contribute to the objectives of both the WFD and the FD, et cetera.
- Whether revenues from water-related financial instruments should be earmarked for water expenditure (following the principle that water should fund water), should also receive attention.
- It is also critical to ascertain what role the private sector (i.e. commercial financiers) can play and how. Private preferences in terms of investment processes and policy priorities may diverge (for example as regards the financing of grey infrastructures versus nature-based solutions). Part of the challenge is to increase the number of bankable projects in a sub-set of actions that may attract the attention from commercial banks in support of public funds. This can be done by strengthening the development and preparation of projects that can be accommodated by existing investment processes, as well as through de-risking projects in order to render them more attractive to investors.
- How to account for the value of water services not provided by the market (i.e. some ecosystem services) is also an important element in designing the financing of water projects.
- Given the need to connect the water policy goals with the wider social and economic development goals, one should include as investment criteria their ability to contribute to macroeconomic performance and to social and territorial cohesion, bridging the gap in terms of inequality, competitiveness and productivity.

Dimension 2 – Ensuring long-term financial sustainability / sufficiency

- Given the possible drawbacks to attaining higher cost-recovery rates[31] (such as those perceived in agriculture), it is critical to address simultaneously the (investment-related) funding needs and the financial revenues to cover operational and maintenance costs. These obstacles include the lack of metering infrastructure, resistance from water users to higher water pricing levels, the unintended outcomes of a number of subsidies, the lack of enforcement of pollution and abstraction charges, et cetera.

[31] Such potential drawbacks include:

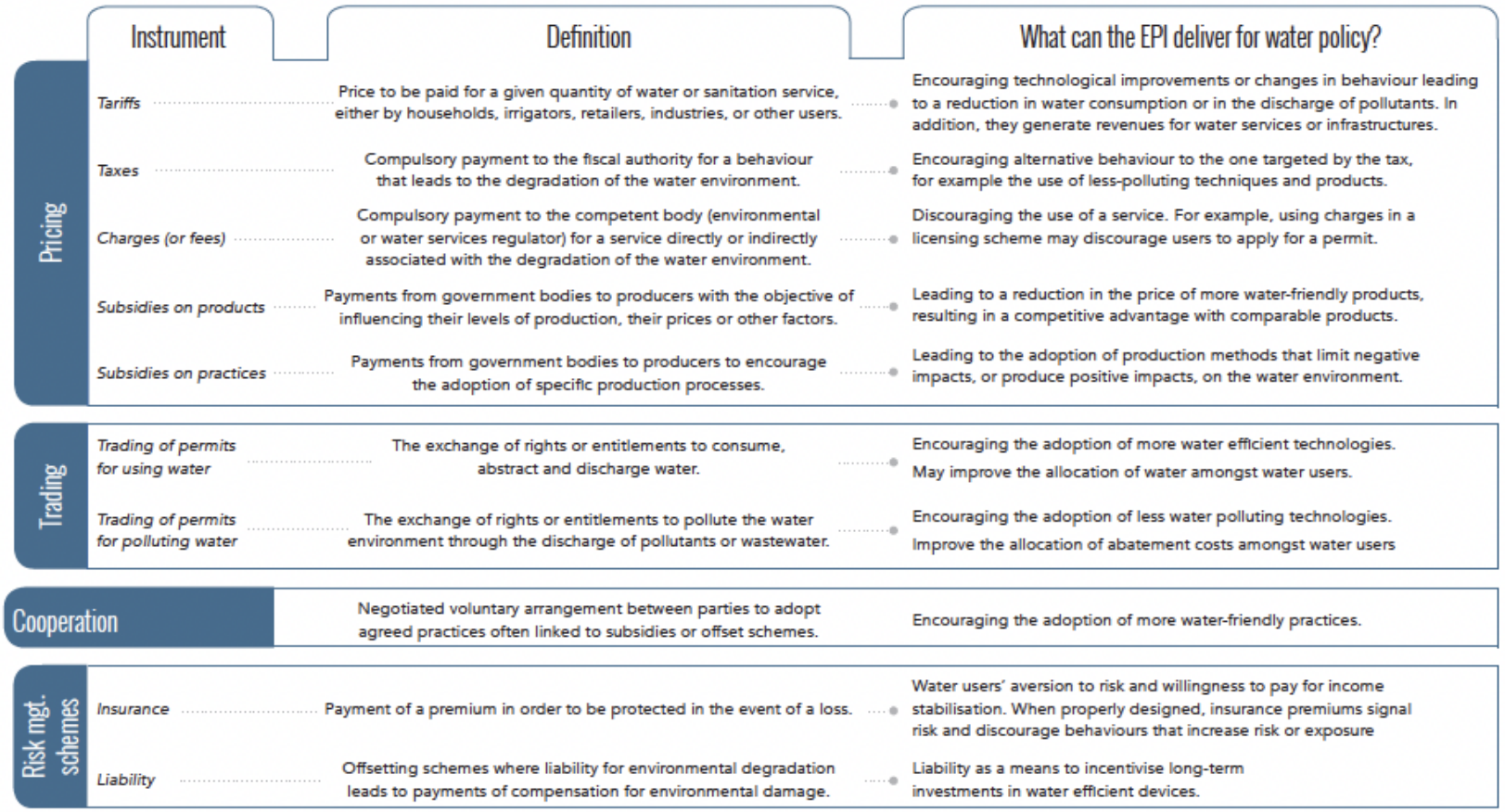
- drawbacks related to the rigidity of water allocation (and reallocation) schemes, such as the existence of senior water use rights that prevent more efficient and innovative farmers from performing at better levels, thus with the potential to reach higher cost recovery rates;
- the reluctance of some farmers to pay more (if at all) for water abstractions; and
- drawbacks stemming from the assessment of cost-recovery rates, such as in the case of deficit and supplementary irrigation, or when resource costs are largely unknown (as often the case), or when there are feedback effects from national and international markets on the price of crops.

- Financial appraisals should feed into the decisions on cost-, benefit- and risk-sharing schemes and risk management structures.
- The strategic reflections on long-term financial sustainability help to identify relevant issues concerning procurement practices (i.e. public procurement of innovative solutions, circular procurement, et cetera).
- Reflecting on ensuring financial sufficiency is also instrumental for the identification of new revenue streams. A good example of this concerns the circular economy approaches, where new revenues can arise from material and energy recovery.
- Financial sustainability needs to take account of the quality of water services delivered to *inter alia* households, farmers and industries. Low quality can lead to low recovery of operational expenses that often leads to increases in new capital investments.
- Aligning individual efficiency gains and the wider social objectives requires specific attention, as illustrated by the financing of investments in the modernisation of irrigation systems that deliver significant savings at individual level, but not necessarily so at the basin level.

Dimension 3 – The role of economic incentives

- The role of economic policy instruments is of paramount importance both in terms of funding capital expenses and of financially sustaining the PoMs. This entails facing a number of challenges, in terms of both the design and implementation of those instruments. Their delivery mechanisms and governance are important pre-conditions for success.
- Economic policy instruments never perform in isolation, but rather interact with other policy instruments as part of complex policy mixes, including information mechanisms (i.e. metering) or command-and-control mechanisms (i.e. pollution standards).
- Existing and new economic instruments that support the achievement of the WFD and FD goals (see figure 4.3 below) cannot only contribute to fund raising but also send signals in terms of water use efficiency and long-term water security (i.e. the diversification of water supply sources in order to enhance resilience and adaptability, the restoration of aquatic ecosystems, et cetera).

Figure 4-3 Wide range of economic policy instruments (EPIs) for sustainable water management[32]



[32] The figure mentions trading schemes; according to a commenter to this report, this may be a sensitive and controversial issue. Trading schemes are often criticised by civil society organisations, who fear a potential commodification of water resources (see also recent public declarations of the new UN Rapporteur for the right to water), and by environmental NGOs, who see it as a potential gateway for a relaxation of environmental standards in the context of the existing over-exploitation of the resource, et cetera).

Dimension 4 – What is needed for a sustainable financing approach to deliver what would be expected?

- Strategic financing is inherently linked to strategic thinking. This implies investigating: the alternatives available to make use of current and future financial resources; the mechanisms and solutions that can reduce future financing needs; and the solutions that help harnessing additional financing sources, including from other sectors.
- Strategic financing does not deliver a set package of finance options. It rather supports potential pathways to bridging financing gaps while responding to, and accounting for, new challenges and societal demands.

5. ASSESSING THE EFFORTS (COSTS) REQUIRED FOR ACHIEVING WATER POLICY GOALS

5.1. What do we know about costs and future level of efforts?[33]

Water Framework Directive

Objectives

The WFD aimed to achieve good status or potential for the surface and groundwater bodies in the EU by 2015. This concerns over 111 000 surface water bodies (e.g. rivers, lakes, coastal waters) and over 13 000 ground water bodies. Achieving "good status" encompasses good ecological and chemical status for surface waters and good quantitative and chemical status for ground water bodies. However, the Directive allows for extensions beyond the 2015 deadline up to 2027, on the grounds of technical feasibility, disproportionate costs or natural conditions (Article 4), unless natural conditions prevent reaching the WFD objectives within the time limits set. In order to achieve the set environmental objectives, MS have developed and implemented Programs of Measures (PoMs) defining basic and supplementary measures[34].

Costs of measures

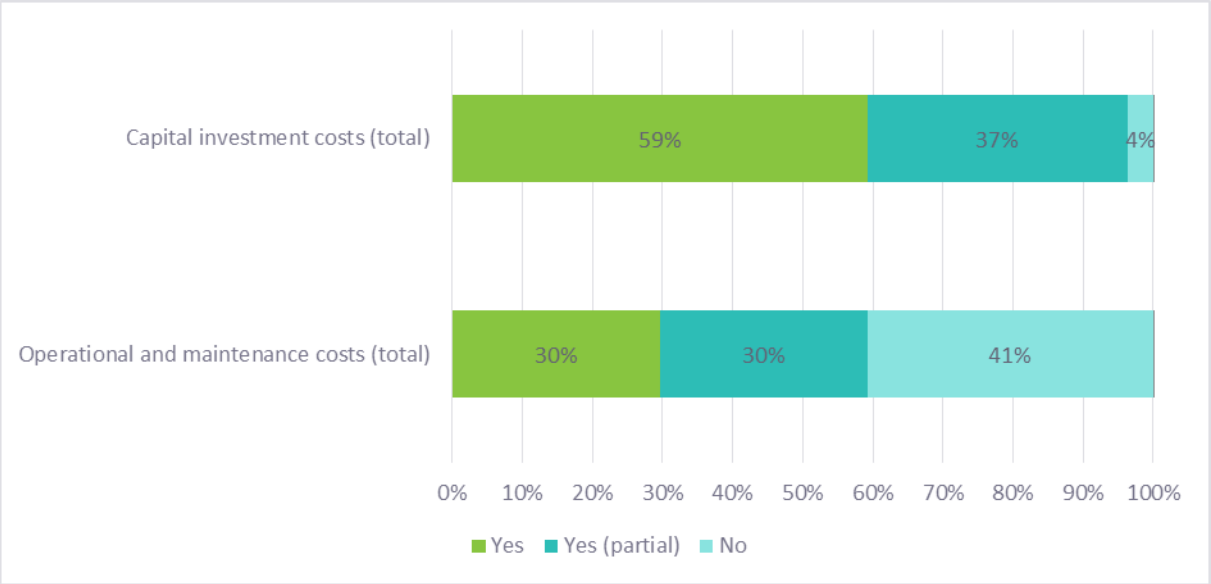
Most countries estimate and report costs (CAPEX and OPEX) of planned measures in their RBMPs. The **knowledge base on costs of planned measures is**, however, **heterogeneous and incomplete** across the EU. First of all, cost estimates of measures included in the 2nd RBMPs are partial, covering mainly capital investment costs with no corresponding estimates of annual operational and maintenance costs that are known in less than a third of the countries (see Figure 5-1 below).

[33] Discussions at the ATG "Economics" meeting on 26 March, 2021, highlighted that the study tends to overlook the costs of staff needed to monitor and implement some measures. This is because data on this are often unavailable. However, these costs can be important, and would merit further investigation.

[34] According to WFD Article 11.3, **basic measures** are defined as "the minimum requirements to be complied with and shall consist of" the following: "measures required to implement Community legislation for the protection of water" (Article 11.3(a)), such as the Urban Waste-water Treatment Directive, the Nitrates Directive, the Drinking Water Directive et cetera, and other basic measures (Article 11.3(b-l)), such as measures to implement Article 9 (cost recovery), measures to protect drinking water quality et cetera).

According to Article 11.4 and 11.5, **supplementary measures** are defined as "those measures designed and implemented in addition to the basic measures, with the aim to achieve the [environmental] objectives [of the WFD]." Supplementary measures can include additional legislative and administrative instruments, economic or fiscal instruments, emission and abstraction controls, research projects, educational campaigns, et cetera, that go beyond the basic measures and that are deemed necessary for the achievement of objectives.

Figure 5-1 Knowledge base – number of countries estimating total costs of measures in the 2nd RBMPs (2016-2021)



Note:
- "Yes" cover MS that report costs of measures in the 2nd RBMPs;
- "Yes, partial" cover MS that provide costs of measures only partially, e.g. for selected RBDs rather than the country;
- "No" cover MS that do not report costs of measures in the 2nd RBMPs

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC(2019)[35], EC(2019)[36])

In many instances where **cost estimates** (CAPEX and OPEX) are available, they **are partial** in terms of:

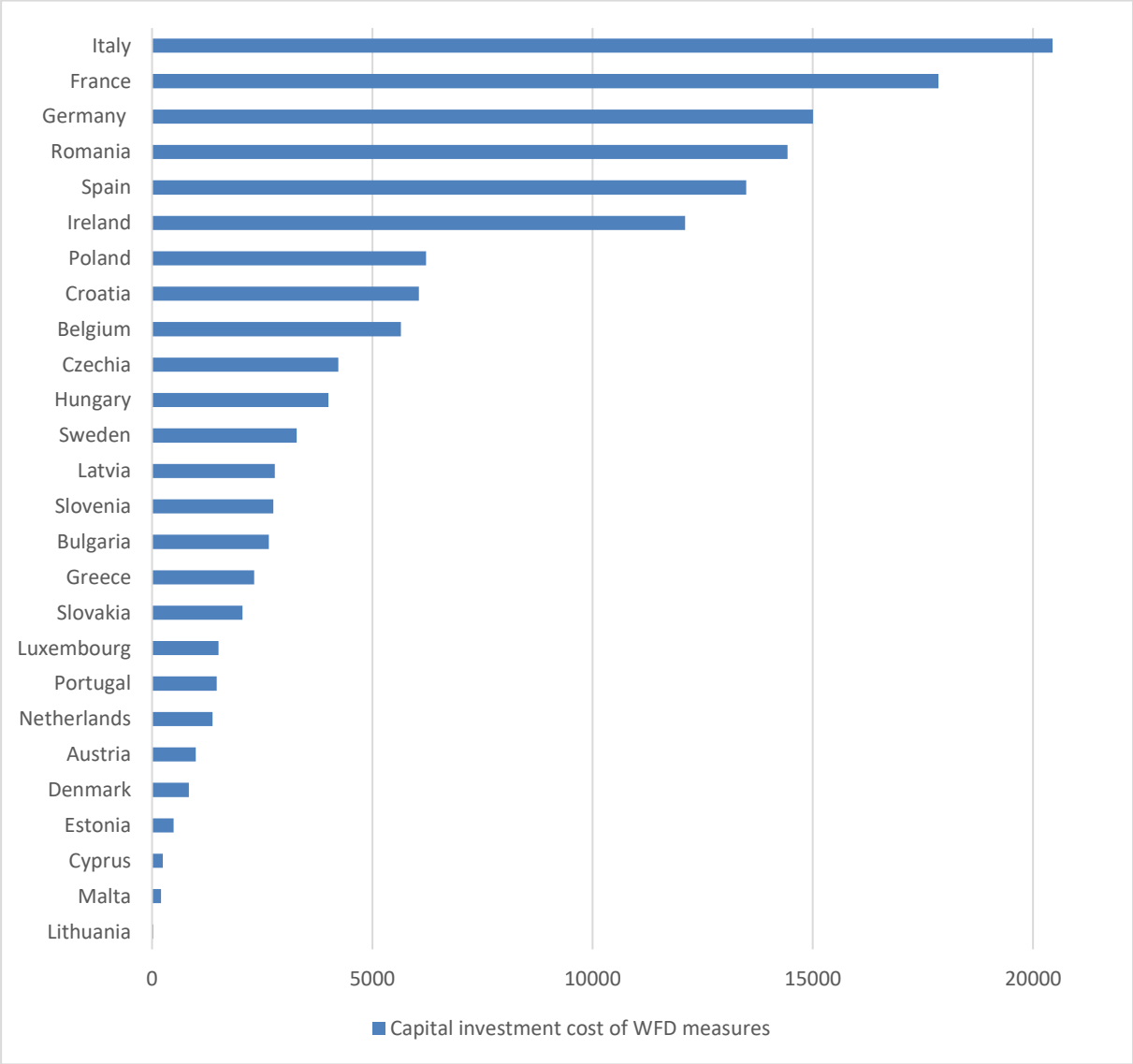
- The *types of measures*, providing the costs for some types of measures only. For example, the costs of basic measures are not reported by Belgium, the costs of supplementary measures are not reported by Luxembourg;
- Selectiveness in *measures*, providing cost estimates for some individual measures but not for others;
- Selectiveness in *areas* – estimating costs in selected River Basin Districts only;
- Selectiveness in *sectors* – excluding certain types of costs from the cost appraisals, e.g. private industry costs associated with abatement measures, or the non-financial costs of measures implemented by farmers (e.g. loss of yields).

Available estimates of capital investment costs of measures included in the 2nd RBMPs are presented below in Figure 5-2. The cost estimates, however, should be treated with caution, because for some countries, they are partial (for the reasons stated above). For instance, the values for Belgium, Netherlands and Lithuania only encompass costs of supplementary measures, while the cost estimates for Luxembourg only cover basic measures.

[35] European Commission, 2019, "European Overview – River Basin Management Plans", SWD(2019) 30.

[36] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans,". COM(2019) 95.

Figure 5-2 Capital investment costs of all measures in the 2nd RBMPs (2016-2021) (EUR million)



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[37], EC (2019)[38]) Finland is not included as only provides annual costs (EUR 1.6 billion per year). Germany did not report total costs of the 2nd RBMPs and total value was provided separately by stakeholders.

In total, the **capital investment costs** of the measures planned in the 2nd RBMPs reach **at least EUR 142 billion** (likely an underestimation in light of the comments made above). This has a similar order of magnitude as the total capital investment costs estimated in the 5th WFD Implementation report[39] of EUR 115.6 billon[40] and may reflect updated information since[41].

[37] European Commission (2019), "European Overview – River Basin Management Plans," SWD(2019) 30.

[38] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

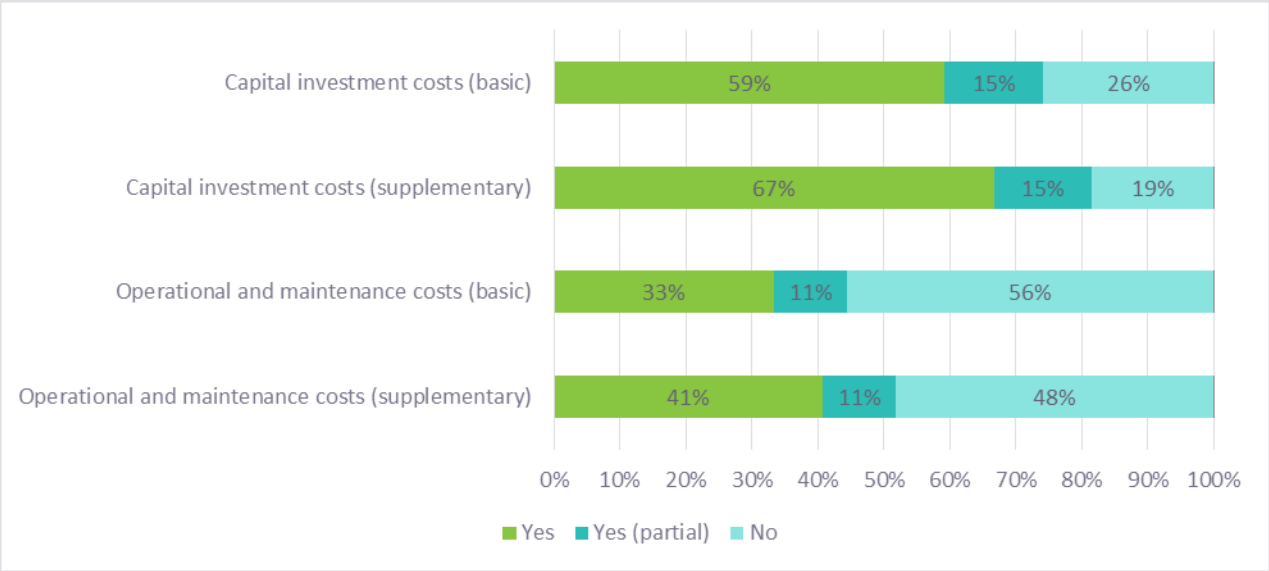
[39] European Commission, 2019, Report from the Commission to the European Parliament and the Council "on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC); Second River Basin Management Plans First Flood Risk Management Plans," COM(2019) 95.

[40] As a result of manual aggregation of costs in some RBMPs as part of this study.

[41] It is also noted that the OECD reports that by 2030 the additional expenditures for water supply and sanitation would amount to EUR 289 billion for the 28 MS. The values differ due to differences in the scope and timeline of

The knowledge is even more partial when considering **available cost data** (CAPEX and OPEX) **separately for basic measures** (as defined in Art 11(3)(a)) and **supplementary measures**[42] (Art 11(3)(b-l), 11(4) and 11(5)), as included in the 2nd RBMPs (see below in Figure 5-3).

Figure 5-3 Knowledge base – number of countries reporting costs of basic and supplementary measures separately in the 2nd RBMPs (2016-2021)



Note:
- "Yes" cover MS that report costs of basic and supplementary measures separately in the 2nd RBMPs;
- "Yes, partial" cover MS that provide costs of basic and supplementary measures separately but partially, e.g. for selected RBDs rather than the country;
- "No" cover MS that do not report costs of basic and supplementary measures separately in the 2nd RBMPs

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[43], EC (2019)[44])

In general, between 59% and 67% of the MS reported estimates for the capital investment costs of different types of measures in their 2nd RBMPs (2016-2021). The knowledge base on operational and maintenance costs is relatively poorer, ranging from 33% to 41% of MS reporting these costs for basic and supplementary measures. It should, however, be noted that some countries do not separately estimate and report on the costs of basic measures as these form part of ongoing budgetary expenditures.

the assessments. See for the OECD estimates: OECD, 2020, "Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options," OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/6893cdac-en

[42] It is noted that the allocation of measures to basic or supplementary measures may differ across and within countries.

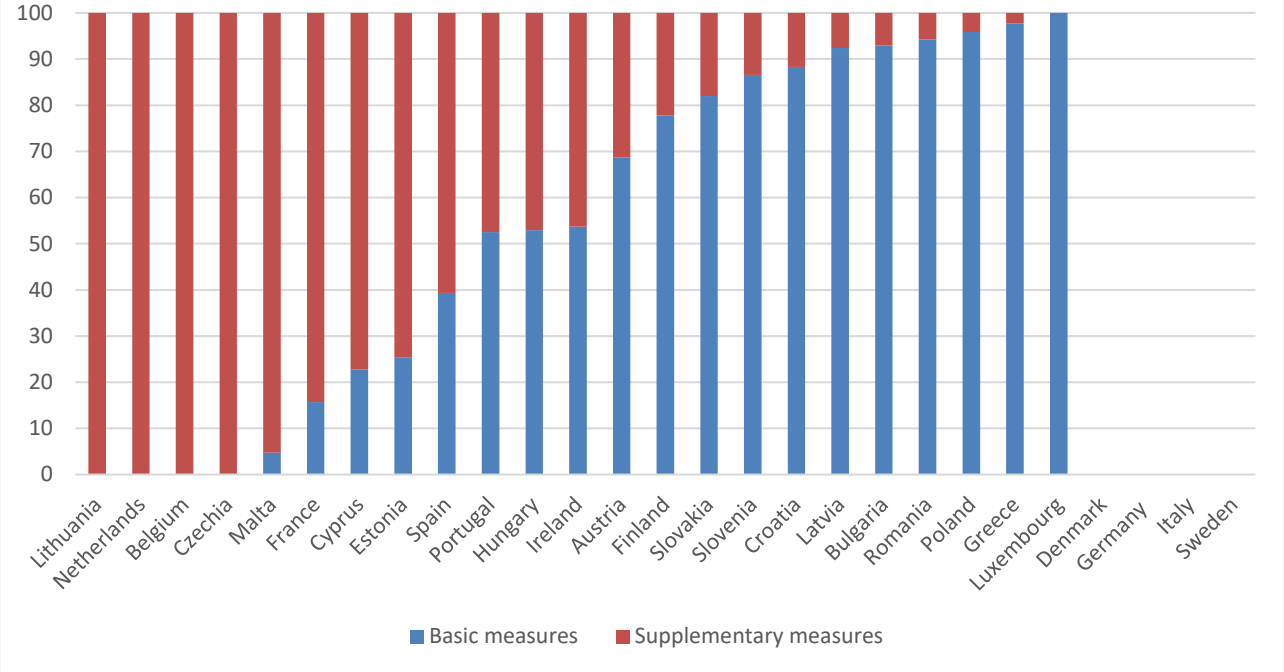
[43] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[44] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

The 5th WFD Implementation report[45] estimated that in the planning period 2016-2021, for the basic measures (as defined in WFD Article 11(3)(a)), the total capital investment costs amount to at least EUR 56 billion. For the supplementary measures (i.e. those required by Articles 11(3)(b-l), 11(4) and 11(5)), they amount to at least EUR 59.6 billion. This represents a 48% versus 52% balance between the different types of measures in aggregated terms.

Across the Member States, there is a **significant fluctuation in the shares for the basic and supplementary measures in the total capital investment costs of measures** included in the 2nd RBMPs (see Figure 5-4 below).

Figure 5-4 Capital investment costs of measures - share of basic and supplementary measures in the total costs of 2nd RBMPs (2016-2021)



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[46], EC (2019)[47])

The shares for basic and supplementary measures respectively range from 5% and 95% in Malta to 98% and 2% in Greece[48]. In general, the countries in Central and Eastern Europe still report significant capital investment costs related to the implementation of basic measures in the water supply and sanitation sectors.

Finally, very **few countries assess the total costs of achieving the water policy goals**, i.e. the costs of achieving the environmental objectives set by the WFD, as the majority of countries report the costs of their PoMs covering a 6 year period (see below in

[45] European Commission, 2019, 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); Second River Basin Management Plans First Flood Risk Management Plans," COM(2019) 95.

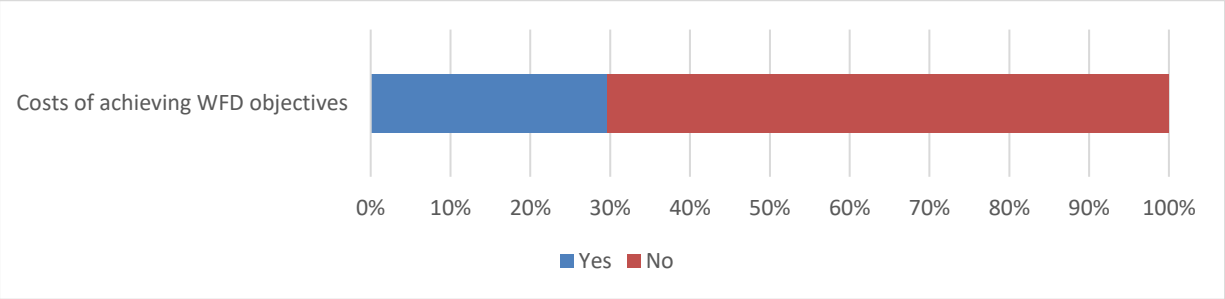
[46] European Commission, 2019, " European Overview – River Basin Management Plans," SWD(2019) 30.

[47] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[48] When excluding the countries that only provide cost estimates either for basic measures (Luxembourg) or for supplementary measures (Belgium, Netherlands, Lithuania). Czechia reported EUR 0 as the costs for basic measures.

Figure 5-5)[49]. Some countries, like Belgium, employ scenario approaches to estimate the costs of achieving objectives while other countries (such as Estonia and Slovakia) focus such assessments on the investments in water supply and sanitation infrastructure (again see Figure 5.5).

Figure 5-5 Knowledge base – number of countries estimating costs of achieving WFD's environmental objectives



Note:

- "Yes" cover MS that assess costs of achieving the WFD's environmental objectives;
- "No" cover MS that do not assess costs of achieving the WFD's environmental objectives

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[50], EC (2019)[51])

[49] Separately, Germany informed that the total costs for the implementation of the WFD for 2010-2015 amounted to EUR 12 billion and that for the period 2016-2021, they would be EUR 15 billion Euro. Meanwhile, further data on German costs have been published in the reports of the river basin management plans, for example in the RBMP for the German River Basin District.

[50] European Commission, 2019, "European Overview –River Basin Management Plans," SWD(2019) 30.

[51] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

BOX 5.1 ASSESSMENT OF INVESTMENT NEEDS TO FULLY ACHIEVE WFD OBJECTIVES

- In **Belgium**, all three regions defined maximum scenarios in the RBMPs to estimate the costs required to achieve the objectives set by each region by 2027. However, whether or not these scenarios would be sufficient to fully reach the WFD objectives is uncertain due to the intrinsic uncertainty about the effectiveness of measures. In Flanders and Brussels, the additional costs for the maximum scenarios are high (EUR 10 billion), while in Wallonia the additional costs are limited:
  - Capex of EUR 9.7 - 14.5 billion in Flanders for achieving the maximum scenario. The costs of baseline "efficient" scenario included in the 2nd RBMPs (2016-2021) amount to 2.7 billion Euro.
  - Capex of EUR 5 - 9 billion in Brussels for achieving the maximum scenario. The costs of baseline "efficient" scenario included in the 2nd RBMPs (2016-2021) amount to 1.5 - 3 billion Euro.
  - Capex of EUR 1.1 billion in Wallonia for achieving the maximum scenario. Costs of baseline "efficient" scenario included in the 2nd RBMPs (2016-2021) amount to 0.8 billion Euro. The net additional costs are limited (0.3 billion Euro) due to the better current water status.
- In **France**, the investment gap that would need to be filled for achieving good status is estimated at EUR 66.65 billion.
- In **Hungary**, the investment needs to ensure full achievement of the WFD objectives by 2027 amount to EUR 10.17 billion (of which basic measures: EUR 5.86 billion; supplementary measures: EUR 4.09 billion; and, preparatory measures: EUR 0.23 billion). The estimation was made in the 1st RBMP.
- In **Lithuania**, the achievement of the WFD goals has been postponed mainly as a result of natural conditions. According to the RBMPs, the achievement of good status or potential for water bodies will require more than EUR 240 million of investments for relevant state and municipal institutions as well as individual (private) operators. About EUR 46 million per year will be needed for pollution reduction and other improvement measures yearly (2016–2021);
- In **Romania**: The analysis of the total investment gap to ensure full achievement of the WFD objectives (for the period 2021-2027) will take place in the context of the 3rd planning cycle for delivering the 3rd RBMPs;
- In Italy, total estimated investment needs are EUR 16.7 billion Euro, of which:
  - EUR 8.7 billion (52% of the total) for waste water treatment investments
  - EUR 4.7 billion (28% of the total) for investments in aqueducts
  - EUR 3.2 billion (19% of the total) for investments in impoundments.

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[52], EC (2019)[53])

[52] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[53] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

In some countries, the **assessments of future investment needs have a strong focus on** those for the **water supply and sanitation infrastructure** (see Box 5.2 below).

BOX 5.2 FOCUS ON WATER INFRASTRUCTURE

- In **Estonia**, the "Water Infrastructure Investment Plan" estimated that 1.1 billion Euro should be invested in the water management infrastructure in the next 12 years. In order to maintain or achieve compliance with the requirements of the UWWD and DWD, around 893 million Euro will be required, out of which 434 million Euro in the next 4 years and 459 million Euro in the next 5-12 years.
- In **Slovakia**, cost estimates for upgrading the sewerage networks and wastewater treatment plants (WWTPs) by 2027 are 1.56 billion Euro. Cost estimates for improving public water supply by 2027 are 656.60 million Euro.

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[54], EC (2019)[55])

Measures

The 2nd RBMPs include a wide range of measures to address pressures caused by:

- **Abstraction and water scarcity**, for example the improvements in flow regime, water efficiency measures, drinking water protection measures, water pricing policy measures, et cetera;
- **Non-agricultural pollution sources**, for example construction or upgrades of urban wastewater treatment plants and industrial wastewater treatment plants, remediation of contaminated sites (historical pollution including sediments, groundwater, soil), measures tackling Priority Substances and Priority Hazardous Substances, et cetera;
- **Pollution from agriculture**, for example measures to reduce nutrient pollution from agriculture, measures to reduce pesticides pollution from agriculture, the phase-out or the reduction of the emissions of Priority Hazardous Substances / Priority Substances, and drinking water protection measures; and
- **Hydro-morphological alterations**,[56] for example improving longitudinal continuity, improving hydro-morphological conditions of water bodies (e.g. river restoration), improvements in flow regime and/or establishment of ecological flows, natural water retention measures.[57]

The majority of countries estimate and report costs of planned measures by sector or by type of measure in their RBMPs (see below in Figure 5-6).

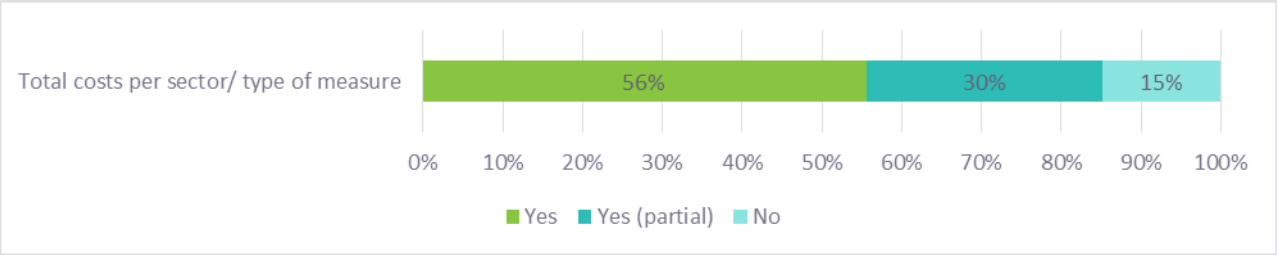
[54] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[55] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[56] During the ATG "Water Economics" meeting on 26 March, 2021, a representative from PIANC - WFD Navigation Task Group noted that, in the case of hydro-morphological modifications, there is a need to link the delivery of measures to the requirements of articles 4(3) and 4(7) (exemptions) and to cost-recovery. This was not explicitly planned during the present study, and hence this is an area for further investigation.

[57] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans, COM(2019) 95.

Figure 5-6 Knowledge base – number of countries reporting costs of measures (CAPEX and OPEX) **by sector or type in the 2nd RBMPs**



Note:

- "Yes" cover MS that report costs of measures by KTM, sector or other national categorisation;
- "Yes, partial" cover MS that provide costs of measures by type or sector but partially, i.e. for selected RBDs rather than the country, for specific types of water bodies (e.g. groundwater), for selected sectors or supplementary measures only;
- "No" cover MS that do not report costs by sector, type or other form of disaggregation

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[58], EC (2019)[59])

There is, however, a **substantial heterogeneity** in the available information on the **costs of measures** (CAPEX and OPEX) **by sector or by measure type,** hindering comparisons between countries. Depending on the countries, cost estimates are presented by:

- Sector (agriculture, industry, urban sector et cetera);
- The (national categorisation of) type of measures;
- Key Types of Measures (KTM);
- Other categorisation comparing basic and supplementary measures, surface water bodies and groundwater bodies, costs of measures implemented for different spatial units (e.g. different (sub)-basins).

The divergence in the lists of sectors, types of measures and other groupings to estimate and report costs of measures (CAPEX and OPEX) in the 2nd RBMPs, has rendered the comparison of cost estimates for different measures challenging. The situation is somewhat better for the measures that address wastewater treatment / drinking water supply, and the measures proposed for reducing agricultural pollution (see the examples in Box 5.3).

Despite the fact that hydro-morphological alterations are one of the main pressures on water bodies, there is a limited focus on assessing the costs of measures that improve hydro-morphological conditions. Where these costs are estimated, they represent a limited share of the total costs, in some cases stressing the gap between the recognition of the importance of addressing hydro-morphological pressures for achieving good water status and the selection of measures that remain focused on pressures traditionally addressed by the EU legislation such as point-source pollution. On the other hand, the lower costs associated with hydro-morphological measures (in absolute terms) may also reflect their cost-effectiveness in contributing towards status improvements in comparison to further wastewater treatment.

[58] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[59] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

BOX 5.3 COSTS OF MEASURES BY SECTOR OR TYPE

- In **Belgium (Flanders)**, the costs of measures that improve water supply and sewerage account for 90% of total costs, followed by the costs of hydro-morphological measures (3.3%).
- In (mainland) **Portugal**, reducing/eliminating pollution load accounts for 75.85% of costs (between 2016-2027) while minimising hydro-morphological alterations accounts for 15.45%.
- In **Romania**, the costs of measures in urban agglomerations account for 89% of total costs, followed by agriculture accounting for only 4.1% of total costs.
- In **Hungary**, the costs of agricultural measures account for 51.5% of total investment costs, followed by water supply and sanitation (29%).
- In **Slovakia**, the measures in water supply and sanitation account for 40.60% of total costs, followed by measures for **nature protected areas** (27.8%), agriculture (13.6%) and industry (9.80%).
- In **Cyprus**, **pollution control measures** (urban areas and transport) account for 46% of total costs, followed by measures targeting **water efficiency** (31%).

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[60], EC (2019)[61])

Floods Directive

Objectives

The Floods Directive aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage, and economic activity. The Floods Directive requires EU MS to prepare Flood Risk Management Plans (the FRMPs) at the scale of river basin districts (or Units of Management (UoMs)). The FRMPs present flooding risk, measures for reducing this risk and they set out how stakeholders will cooperate to manage flood risk.

Countries report objectives for flood risk management in their Flood Risk Management Plans. The information collated from the MS shows **that the formulation of flood risk management objectives is heterogeneous across the EU**. In many instances, objectives are defined qualitatively and the lack of **quantified and measurable objectives** represents an important **knowledge gap**[62]. Several countries present general objectives related to the quantification and reduction of flood risk (hazard, exposure, vulnerability) through prevention, protection and preparedness measures, while other countries set more detailed, measure-oriented objectives such as on non-structural measures (Hungary, Czechia), spatial planning measures (Estonia, Spain, Portugal), awareness raising (e.g. Austria, Spain, Portugal) or additional research (Spain). Some countries (e.g. Sweden, Latvia, Romania) specify objectives in terms of avoided negative impacts, in particular impacts on human health, the environment, nature loss, cultural

[60] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[61] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[62] European Court of Auditors, 2018, "Floods Directive: progress in assessing risks, while planning and implementation need to improve," ECA Special Report 25.

heritage, and economic activities. Finally, some countries aim to strengthen the coordination (1) between the FD and the WFD (Spain, Portugal), (2) with neighbouring countries (Hungary), or (3) among all actors involved in flood risk management (Spain).

Previous studies have also highlighted that there is scope to better spell out the flood risk management objectives and to explain more clearly how measures will be effective in achieving the objectives.[63,64] Poorly elaborated objectives may hinder tracking implementation progress as well as the evaluation of the contribution of individual measures to the achievement of objectives. Quantified and measurable objectives are key to estimating the level of effort and associated costs and they set a basis for the quantification of future flood investment needs accounting for climate change and socio-economic developments.[65] Box 5.4 illustrates the practice of Sweden that has proposed an articulated system of objectives, with four overarching objectives set at national level and three types of objectives – specific, measure-oriented and knowledge objectives – set in individual FRMPs.

BOX 5.4 SETTING OBJECTIVES FOR FLOOD RISK MANAGEMENT

All five FRMPs of **Sweden** define objectives that contain specific and measurable elements. Examples include the following objectives from the FRMP for Älvsbyn:

- No cultural heritage objects or areas classified as cultural heritage of national interest shall be permanently damaged due to a flood;
- Electricity distribution installations should not be affected by floods with a 100-year return time.

The FRMPs for Falun and Kristianstad also include 'measure-oriented' objectives. For example, the FRMP for Falun has an objective that by 2018, the Falun municipality has established forms of cooperation on flow regulation and preventive measures regarding the smaller streams of the municipality (examples of preventive measures may be the preservation of wetlands and the maintenance of streams).

The 'knowledge' objectives found in the Falun, Karlstad and Kristianstad FRMPs can also be linked to measures. For example, the Karlstad FRMP contains the following objective: developing detailed knowledge about the flow levels in Klarälven and water levels in Vänern that can lead to serious flooding consequences for cultural heritage.

All the FRMP objectives set specific aims or actions that can be measured. The measures shall be achieved during the 1st implementation cycle 2016-2021.

Source: Commission Staff Working Document. First Flood Risk Management Plans – MS: Sweden. Accompanying document.

[63] European Commission, 2019, "Fitness Check of the Water Framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive," SWD(2019) 439.

[64] See also European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

[65] See also CIS WGF workshop, 2019, Report on "setting and measuring objectives and measures for flood risk management," 16-17 October 2019; available on: Circabc (europa.eu).

Costs

Most countries estimate and report total costs of planned measures (CAPEX and OPEX) **in the 1st FRMPs**. Some countries do not report costs as the prioritisation and implementation of measures fall under the responsibility of local or regional authorities and consequently the results and cost estimates have not been aggregated at the national scale (for example Denmark, Sweden, France). Other countries (Germany, the Netherlands) do not present costs as they are estimated and reported in national flood management plans or strategies that are complementary to FRMPs[66].

However, **the reported knowledge base on costs is heterogeneous and incomplete** across EU countries. Where cost estimates are available, they provide a partial view on total costs, in particular:

- Some MS report costs for some types of measures only (e.g. Croatia includes estimates for infrastructure measures only);
- Some MS report costs for selected river basins only (e.g. Italy reports cost estimates for three River Basin Districts);
- Countries rarely provide cost estimates for different categories of costs (e.g. the breakdown of capital costs and operational costs is not provided, and it is unclear if operational costs have been considered at all);
- Different time periods underpin the cost estimates (e.g. the 6 years of the planning period, or a longer time period required for reducing flood risk levels to set objectives); sometimes the period considered is not specified.

Figure 5-7 below reports the estimated total costs of measures included in the 1st FRMPs for the countries that reported costs. These cost estimates should therefore be interpreted with caution for the reasons mentioned above. Furthermore, previous studies have highlighted heterogeneity in cost estimates across countries because[67]:

- MS set their own objectives and select appropriate measures accordingly; consequently, MS setting higher levels of flood protection will incur higher implementation costs.
- The large geographical variability in climate translates into a large variability of costs and benefits across countries.
- Some countries may have invested a lot in the past and may therefore have limited investment requirements in the programming period of the 1st FRMP (or vice versa). Therefore, the reported costs cannot be interpreted as a benchmark of the importance a country attaches to flood protection.

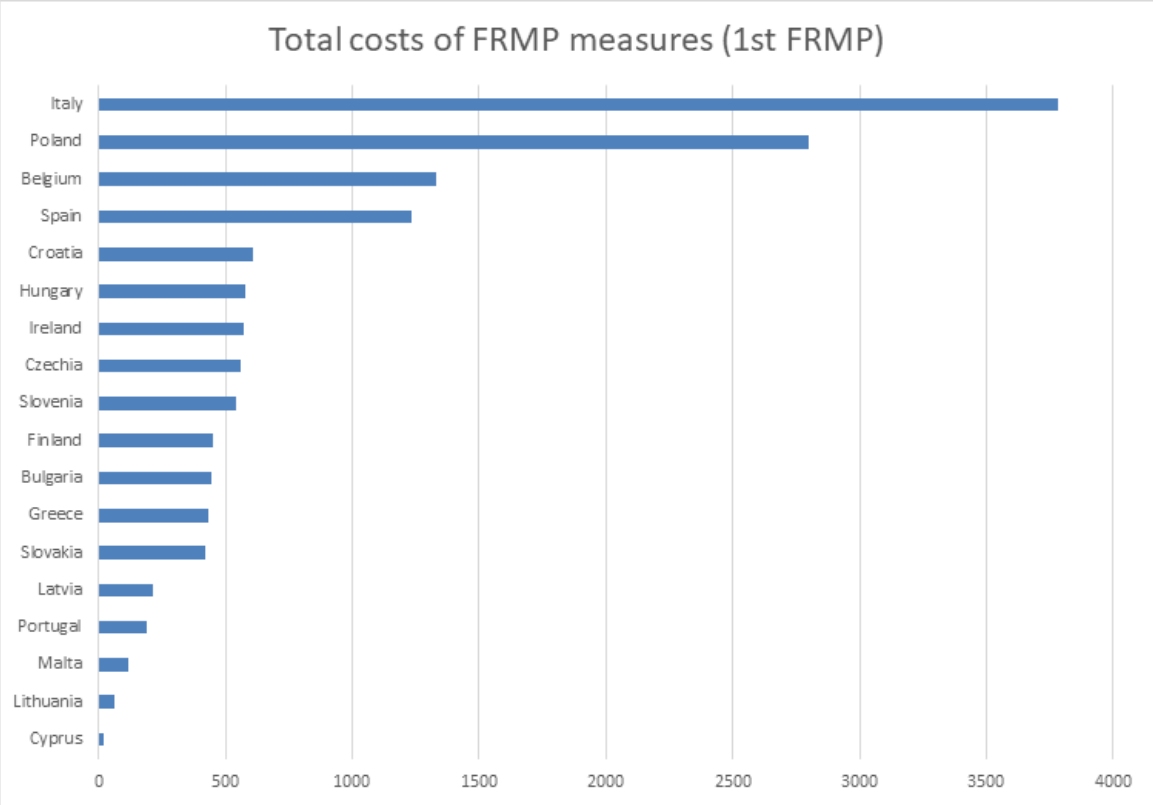
In total, **flood risk costs planned in the 1st FRMP reach at least EUR 14 billion**[68].

[66] The Netherlands applied a wider approach and therefore did not present separate numbers for the FD. The country invests quite a bit of money each year in flood protection, but they do not report them separately as costs of Flood Directive measures. Figures on annual costs of water management and who pays for them in NL, can be found in a dedicated report (https://edepot.wur.nl/364993; in Dutch). In particular, the Table on page 5 of this report shows that the Netherlands pay for flood protection ('Waterveiligheid') EUR 1051+118 = 1.169 million annually.

[67] See European Commission, 2019, "Fitness Check of the Water Framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive," SWD(2019) 439.

[68] The Fitness Check reports that the measures reported in the Flood Risk Management Plans cost in total amount to EUR 12.5 billion between 2016 and 2021.

Figure 5-7 Total costs of measures reported by MS (EUR million)



Source: Information provided by the MS in the context of this study (including 1st FRMPs and EC (2019)[69], EC (2019)[70])

There is very **limited information available on the costs (CAPEX and OPEX) of individual measures or individual measures types** (prevention, protection, preparedness, and recovery). Only a few countries provide costs estimates per measure type, see Box 5.5. Undoubtedly, more information on the relative costs per measure type in the PoMs would elucidate their relative importance in financial terms, even though some types of measures are location specific and thus the corresponding cost estimates less suitable for extrapolation over other countries.

BOX 5.5 COSTS OF MEASURES BY TYPE

- In **Cyprus,** protection measures make up to 99% of the total costs of the PoM.
- **Greece** reports that 382 measures are included in the Greek FRMPs. These are structured along four axes (prevention, protection, preparedness, and recovery). The costs of prevention measures account for 86.1% of the total costs of measures, with the costs of preparedness measures, costs of protection measures and costs of recovery accounting for 7.1%, 5.4% and 1.4% of the total costs, respectively.

Source: Information provided by the MS in the context of this study (including 1st FRMPs and EC (2019)[71], EC (2019)[72])

[69] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[70] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

[71] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[72] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

Few countries report on the total **future** investment needs to achieve flood risk objectives. In the cases where the **investment needs are reported** (see Box 5.6), this information is **heterogeneous** and built on current expenditures (through the assumption that current expenditure levels are sufficient to reach FD objectives in the future). For the estimation of the short-term investment needs (i.e. until 2027), these figures may be accurate, but for long-term projections, climate change and socio-economic developments should be factored into the analysis.

BOX 5.6 ESTIMATED INVESTMENT NEEDS TO REACH FD OBJECTIVES

- **Belgium** reports costs estimates:
  - For Flanders, it can be deduced that the yearly capital expenditures for flood measures is EUR 55 – 60 million per year in the period 2016 – 2019.
  - For Brussels, the CAPEX ranges from EUR 1.3 and 1.7 billion over the period, or between EUR 93 and 112 million annually; this is based on a maximum scenario in the 2nd RBMP/1st FRMP, reflecting future investment needs.
- In **Austria**, the federal state invests around EUR 200 million per year into protection against natural hazards. The larger part of this amount is used for structural measures and maintenance, followed by hazard zone planning and the compensation of flood damages. In total, around EUR 400 million Euro is invested per year in flood risk management measures.
- In its Water Sector Development Programme, **Lithuania** reports financing needs by 2023 of EUR 72 million, of which EUR 18 million are high priority, EUR 32 million low priority and EUR 22 million earmarked for additional road protection measures.
- In the **Netherlands,** the existing expenditures on flood risk management are approximately EUR 1 billion annually or 13% of total water expenditures. The national water plan mentions additional investment needs of EUR 19 billion before 2050 based on the Delta program 2015.
- **Slovakia** estimates a total cost of EUR 1 287 million for flood protection measures until 2027, of which EUR 866.548 million for FD measures after 2021.
- The first FRMP of **Slovenia** mentions an expenditure between EUR 263.2 and 326.2 million for investments in flood risk management measures, with EUR 75 million allocated to flood remediation on the basis of past experience. EUR 60 to 125 million is planned for the maintenance of flood protection infrastructure.

Source: Information provided by the MS in the context of this study (including 1st FRMPs and EC (2019)[73], EC (2019)[74])

[73] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

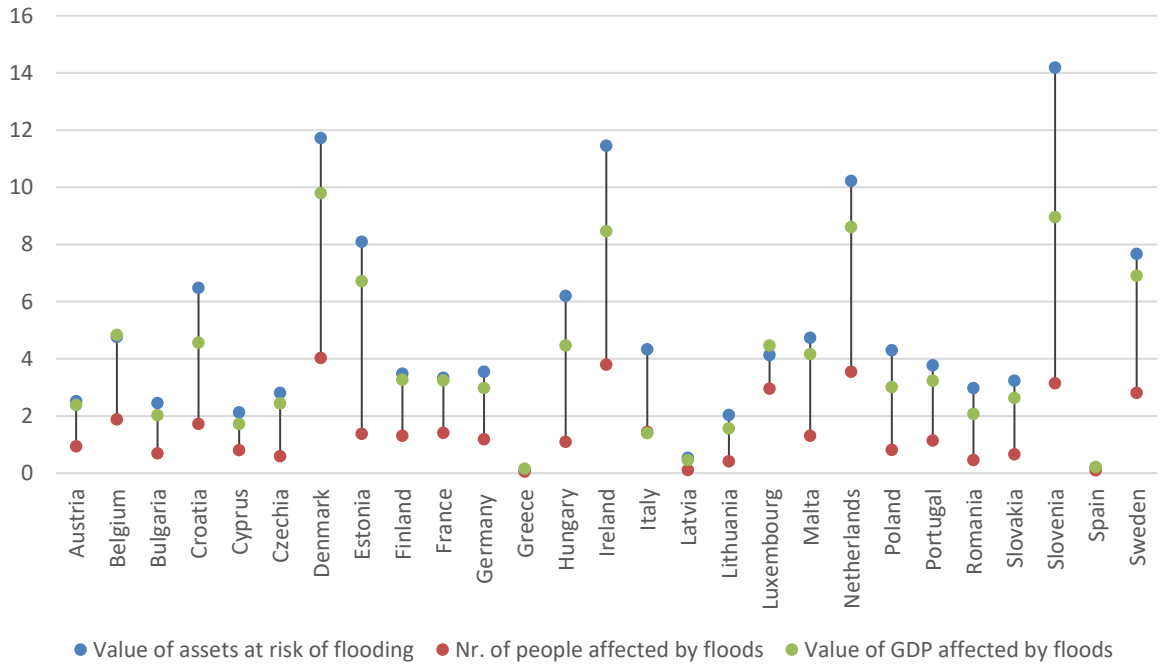
[74] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

In the context of the OECD study on "Financing Water Supply, Sanitation and Flood Protection: Challenges in EU MS and Policy Options"[75], additional future expenditures for flood protection were projected (but not monetized) for EU MS based on WRI data from Aqueduct Floods[76]. Box 5.7 briefly explains the key assumptions and type of results from this study that could set the basis for any future investigations into this topic.

BOX 5.7 - PROJECTING ADDITIONAL EXPENDITURES FOR FLOOD RISK PROTECTION

Due to the paucity of data, the additional expenditures on flood protection are projected but not monetized. Projections reflect the respective impact of climate change and of socio-economic developments (economic and demographic growth). These impacts are projected on three variables: 1. the value of assets at risk of flooding, 2. the number of people affected by floods and 3. the value of GDP affected by floods. The analysis assumes that the costs of mitigating flood risks rise at the same rate as the share of the population at risk, the value of assets or GDP exposed to floods.

The figure below shows the growth factors for the three indicators. A growth factor is defined as the factor by which current flood risk expenditures should be multiplied in order to maintain current flood risk protection standards in the future (by 2080).



Source: OECD study on "Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options"[77] and WRI data from Aqueduct Floods[78].
Note: The value of assets at risk of flooding and the value of GDP affected by floods are in EUR billion; the people affected by floods are in number of people.

[75] OECD, 2019, "Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options," Available in the OECD Library.

[76] https://www.wri.org/publication/aqueduct-floods-methodology.

Note that results are based on rough estimations that are not always reliable at local and regional scale.

[77] OECD, 2019, "Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options," Available in the OECD Library.

[78] https://www.wri.org/publication/aqueduct-floods-methodology.
Note that results are based on rough estimations that are not always reliable at local and regional scale.

Measures

The Floods Directive stipulates that an FRMP must contain the measures to achieve the objectives the Member State has set for the areas at risk, and that these measures should cover all aspects of flood risk management: prevention, protection, preparedness, and recovery. The reported information on the types of applied flood measures is **heterogeneous and partial** across EU countries.

Many countries report the total number of planned measures (e.g. Germany 17 568 measures, Italy 8 346, Poland 2 429, Finland 410, Czech Republic 60, Hungary 46, Cyprus 38, Slovenia 20). Others give a differentiated overview of planned measures per main type of measure (prevention, protection, preparedness, and recovery measures). For example, Austria, Cyprus, Luxembourg, and Hungary provide an estimate of the number and percentage of planned measures per main measure type. The Commission evaluation report on the submitted FRMPs highlights that the numbers of reported measures cannot be compared across MS due to many different reporting approaches[79].

The FRMPs seems to have **a specific emphasis on structural protection measures** (such as dikes, polders, diversion channels, and dams) (, even though non-structural flood risk measures (such as land-use change, early warning systems, risk communication and emergency management), have a high flood risk reduction potential and can be flexible, cost-effective solutions compared to structural measures. For instance, in Luxembourg 94%, mainland Portugal 81%, Poland 87%, structural measures account for respectively 94, 81 and 87 % of the total amount of measures. Often, a persisting knowledge gap follows from the difficulties to quantify the costs and the effectiveness of non-structural flood risk management options, since their effectiveness depends on socio-economic changes and governance arrangements.[80,81] This is also reflected by the evidence that several countries report they consider only structural measures in economic ranking procedures (e.g. Cyprus, Estonia, Finland, Hungary, Lithuania). The lack of information and practical illustrations is potentially hindering their implementation.

The EU asks for **"natural flood management options" or "nature-based solutions"** to align the Floods Directive with the wider objectives of the environmental acquis, for example those formulated by the Water Framework Directive and Habitats Directive. The Commission recently published a guidance document on green infrastructure aimed at scaling up investments[82]. In the information received from MS, some countries mention the integration of natural flood management measures (e.g. Natural Water Retention Measures or green infrastructure) replacing or complementing grey measures in their Programs of Measures. Some **countries provide detailed information on the interaction between**, on the one hand, **these types of measures and**, on the other hand, **nature conservation (environmental impacts) and contributions to the objectives of the Water Framework Directive**. Box 5.8 provides examples of the integration of natural flood management measures in the PoMs for Portugal and Luxembourg.

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[79] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

[80] Shah M.A.R, Rahman A., Chowdhury, S.H., 2018, "Challenges for achieving sustainable flood risk management,". Journal of Flood Risk Management, vol. 11, issue 51.

[81] Dawson, R.J., Ball, T., Werrity, J., Werrity, A., Hall, J.W., Roch, N., 2011, "Assessing the effectiveness of non-structural flood management measures in the Thames Estuary under conditions of socio-economic and environmental change," Global Environmental Change vol. 21, issue 2.

[82] European Commission, 2019, "Guidance on a strategic framework for further supporting the deployment of EU-level green and blue infrastructure," SWD(2019) 193.

BOX 5.8 THE INTEGRATION OF NATURAL FLOOD MANAGEMENT MEAUSRES IN POMS

- **Portugal** has reported 38 measures for natural flood management, a category equivalent to NWRMs or nature-based solutions. Within this category, Portugal proposed in the Douro FRMP measures for the establishment of connectivity between lagoons and the river Tâmega; the stabilisation of the banks and bed of this river in order to minimize the risk of floods; the restoration of the natural state of the Samaiões riverbank.
- In **Luxembourg,** Natural Water Retention Measures (NWRMs) have been planned in catchments (3 measures) and in wetlands (725 measures), as well as for the reduction in impermeable surfaces (1 measure), rainwater management (2 measures) and restoration of flood plains (16 measures). NWRMs comprise the lion's share (about 90 %) of individual measures.

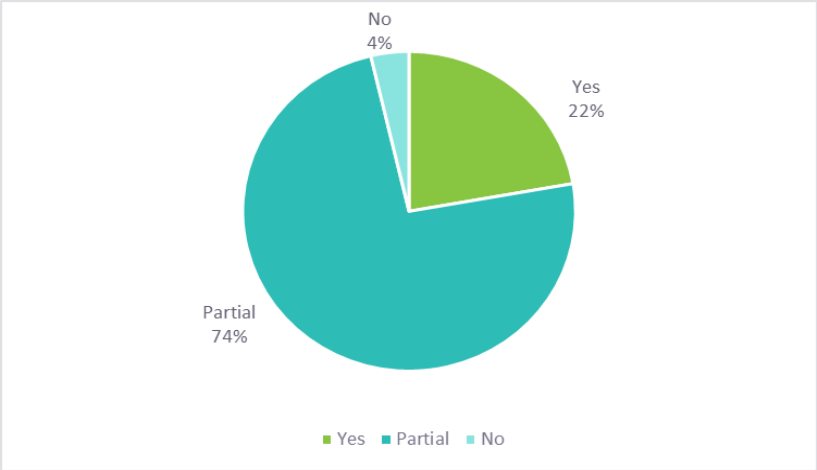
Source: Information provided by the MS in the context of this study. Completed with information from the European Commission's evaluation of the set of FRMPs submitted by the Member States, specifically: 1. European Commission "First Flood Risk Management Plans – Member State: Portugal," SWD(2019) 77;and 2. European Commission " First Flood Risk Management Plans – Member State: Luxembourg," SWD(2019) 73.

5.2. Which current practice in applying methods and tools for assessing costs?

Water Framework Directive

The WFD stipulates that PoMs need to include a cost-effective set of measures. **Almost all countries employ** (at least partial) **Cost-Effectiveness Analysis (CEA) of planned measures** in their RBMPs (see Figure 5-8 below).

Figure 5-8 Knowledge base – number of countries using Cost Effectiveness Analysis in the 2nd RBMPs



Note:

- "Yes" cover MS that used CEA of measures in the 2nd RBMPs;
- "Yes, partial" cover MS that used CEA of measures but partially, e.g. for selected types of measures or selected RBDs;
- "No" cover MS that did not use CEA of measures in the 2nd RBMPs

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[83])

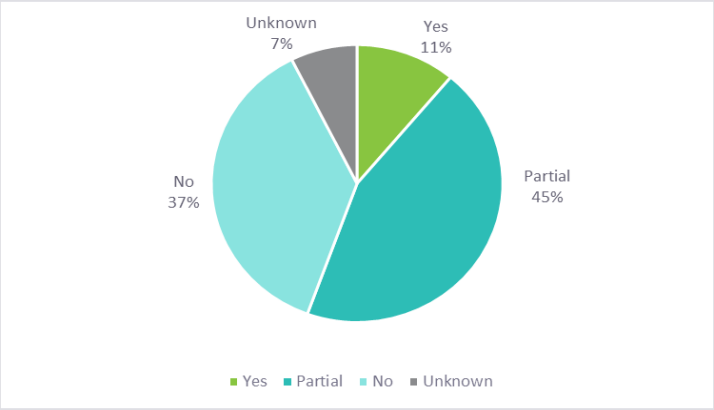
In many instances, CEA is applied to a sub-set of measures and in combination with qualitative appraisals. Furthermore, an integrated assessment of different types of measures is rarely applied with CEA largely focusing on pollution mitigation measures and on the quantitative management of water resources when water scarcity is a priority water management challenge (e.g. Malta). This is in line with findings of the European Commission's RBMPs evaluation report[84], which stresses that the MS do not appear to be widely using quantitative cost effectiveness analysis techniques as a tool in the measures' selection process. Furthermore, the evaluation notes that it was not always possible to easily identify from the information provided by the MS, their methods to prioritise measures, and how cost effectiveness analysis fits into this process, suggesting room for further improvement. While the use of economic assessment methods such as CEA and MCA (Multi-Criteria Analysis) is common, countries rarely use fully fledged Cost-Benefit Analysis (see below in Figure 5-9).

In practice, MS use a combination of MCA and CEA to prioritise measures for the inclusion of the RBMPs (see Box 5.9 below).

[83] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[84] For more information: European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

Figure 5-9 Knowledge base – number of countries using Cost Benefit Analysis in the 2nd RBMPs



Note:

- "Yes" cover MS that used CBA of measures in the 2nd RBMPs;
- "Yes, partial" cover MS that used CBA of measures but partially, e.g. for selected types of measures; in combination with wider MCA and semi-quantitative criteria;
- "No" cover MS that did not use CBA of measures in the 2nd RBMPs
- "Unknown" cover MS for which no conclusions could be drawn due to lack of information on the methods employed.

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[85])

BOX 5.9 METHODS APPLIED FOR MEASURE SELECTION AND PRIORITISATION IN RBMPS

- In **Belgium** (Flanders), **MCA and CEA** were combined to select the necessary measures: i) Cost-effectiveness analysis was used only for the prioritisation of sewage infrastructure and wastewater treatment projects; and ii) Multi-criteria analysis was used for all other types of actions. It was mostly expert driven and included criteria such as cost effectiveness, feasibility, public support and coherence with other actions. In Wallonia, effectiveness was expressed as the amount of water bodies that would reach objectives as a result of the implementation of measures.
- In **Austria**, a **qualitative CEA** of measures was applied using a concept of "step-wise reaching of objectives" by designating areas/regions as "priority areas" with different time-frames for achieving objectives while focusing on the main pressures (hydro-morphological).
- In **Cyprus**, measures were ranked in terms of effectiveness based on **multiple criteria** such as the importance of the measure, the time required for implementation and for delivering results, the number of water bodies influenced, the relevance of the measure to climate change and cost where applicable (for measures for which capex/opex could be estimated).
- **In Sweden**, new tools and **studies** are being developed, e.g. new tools to aid decision-making and to identify cost effective measures, including a study on Swedish households' willingness to pay for improved water quality in lakes, streams and the coastal zone (SwAM, 2019).

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[86])

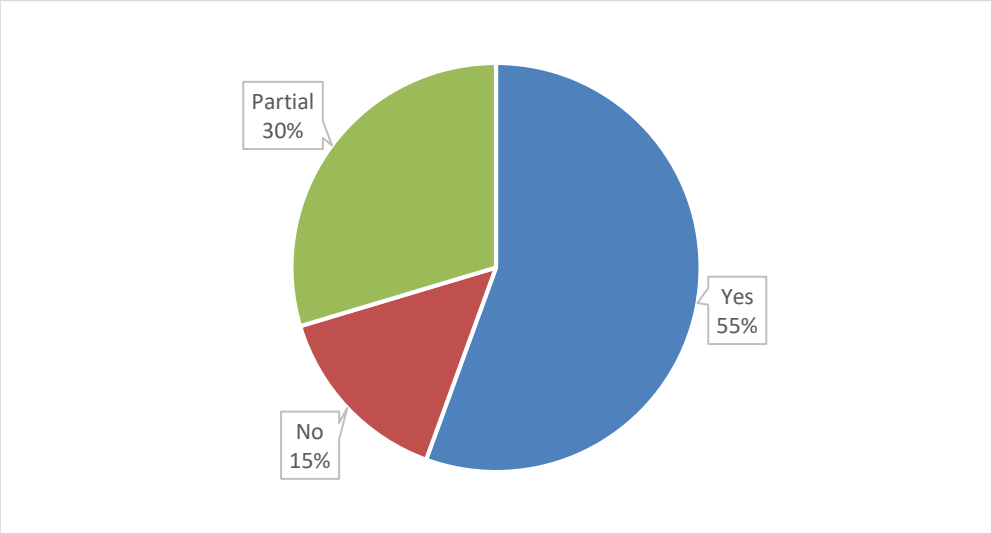
[85] European Commission, 2019, "European Overview – River Basin Management Plans, SWD(2019) 30.

[86] European Commission, 2019, "European Overview –River Basin Management Plans," SWD(2019) 30.

Floods Directive

The Floods Directive requires that countries prioritise measures in accordance with their flood risk management objectives outlined in the FRMPs. **The majority**, 55% of the MSs, **report systematically applying economic assessments**, such as cost-benefit analysis, multi-criteria analysis, or cost effectiveness analysis to evaluate flood risk mitigation measures in their FRMPs, see below Figure 5-10. Furthermore, 30% of the countries partially apply economic evaluation methods. This can mean that expert judgement is used to prioritize measures on the basis of their economic implications (Austria, Czech Republic); that economic methods are not systematically applied in all FRMPs (Belgium, Denmark); that only a subset of measures (protection measures mainly) are considered in economic assessments (Cyprus, Czech Republic); and that the economic analyses' results are neither aggregated nor reported in FRMPs (France, Latvia, Malta, Spain).

Figure 5-10 Application of economic ranking procedures to select and prioritize flood risk measures



Source: Information provided by the MS in the context of this study (including 1st FRMPs and EC (2019)[87] and EC (2019)[88])

Even though the majority of MSs apply some form of economic evaluation to rank and prioritize measures, applied methods are heterogeneous between and within countries.

In the case of Belgium, Bulgaria, Estonia, Lithuania, and Romania, the results of cost-benefit assessments (benefit/cost ratios) are used as a criterion for the prioritization of measures. However, for the majority of MSs that reported applying economic assessments, it is **unclear** from the FRMPs if and how exactly the results of economic analyses have been used in the **selection and prioritization of measures**. Box 5.10 below presents the example of Bulgaria that systematically prioritizes all flood measures based on a common national methodology across all river basin districts.

[87] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[88] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

BOX 5.10 THE USE OF COST-BENEFIT ANALYSIS TO SELECT AND PRIORITIZE FLOOD MEASURES IN BULGARIA

In Bulgaria, CBA was used for the prioritisation and planning of all measures included in the four FRMPs. A national CBA methodology was applied in all FRMPs based on the 'Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020'.

To select the most appropriate combination of measures for each specific APSFR (Area of Potential Significant Flood Risk), a Multi-Criteria Analysis (MCA)was used to evaluate the various flood risk management options in that APSFR. The assessment is based on the application of several basic criteria. The evaluation criteria include:

- Effectiveness of the selected combination for risk reduction;
- Cost comparison of measures;
- Comparison of benefit / cost ratio between different combinations of measures;
- Impact of the relevant combination of measures on the environment;
- Impact of the relevant combination of measures on public well-being / social impact;
- Impact on other social aspects such as the development of transport and employment;
- Impact on society opportunities for recreation.

Source: FRMPs and 'Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014 - 2020'.[89]

The completeness of cost-benefit analyses differs across applications in terms of the benefits considered. Most cost-benefit analyses consider the avoided damage as the main benefit category, probably as a result of data availability (e.g. Cyprus, Finland, Greece, Lithuania, Slovakia). Due to methodological difficulties, **the environmental benefits of measures are rarely considered** in such analyses even though they may have an important effect on the outcome of cost-benefit analyses. This is in line with findings of the Commission's evaluation report, which stresses that across all MS, there is little reference to impacts on ecosystem services[90].

The inclusion of environmental benefits in economic appraisals matters in particular for the evaluation of nature-based solutions ("natural flood protection measures", Natural Water Retention Measures, Green Infrastructure or alike) which simultaneously reduce flood risk and produce various environmental co-benefits as a result of their multi-functionality. To consider potential co-benefits in economic assessments, some MS **combine cost-benefit analysis with multi-criteria analysis** (e.g. Bulgaria, Finland, Ireland, Lithuania, Romania). Multi-criteria analyses are particularly relevant when only part of the environmental (and other non-market) benefits can be captured in monetary terms and when it is expected that these impacts will be decisive for assessment results and measure prioritization. There is a need to build a coherent analytical framework to better support decision-makers in their choice amongst green, grey and hybrid infrastructure solutions[91].

[89] Bulgarian Ministry of Environment and Water, FRMPs

[90] See for more information: European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

[91] See for more information: European Commission, 2019, "Guidance on a strategic framework for further supporting the deployment of EU-level green and blue infrastructure," SWD(2019)193.

The coordination of the Floods Directive and Water Framework Directive requires an integrated approach in order to identify the cost-effective measures that serve multiple objectives from both Directives and that can result in the identification and implementation of **"win-win measures"**. The WFD and the FD have a high level of synergy. For example, natural flood measures can contribute to the achievement of both FD and WFD objectives and conversely, WFD measures to restore the hydro-morphology of water bodies can contribute to reducing flood risk.

However, **economic assessment methods to prioritise synergistic measures in the appraisal of PoMs are currently lacking.**[92, 93] Few examples exist of MSs applying economic appraisal methods that explicitly account for synergies. Box 5.11 present two examples from Luxembourg and Cyprus. Several countries indicated that there is a need to develop approaches to measure selection and prioritisation that account for synergies between the WFD and the FD (Belgium, Sweden).

BOX 5.11 THE USE OF COST-BENEFIT ANALYSIS TO SELECT AND PRIORITIZE FLOOD MEASURES

- In **Luxembourg**, the relevance of selected measures to the WFD's environmental objectives was assessed in a semi-quantitative effectiveness analysis resulting in five categories of effectiveness (scale from zero to ++++).
- In **Cyprus,** specific FRMP measures have been identified that provide synergies with RBMP measures and that support WFD objectives. An assessment has been carried out on the adverse environmental impacts of measures proposed for the FD, in particular in terms of WFD objectives, in order to identify potential impacts and undertake remedial actions. Cost-effectiveness and cost-benefit assessments, including the consideration of multi-benefits (specifically for WFD objectives), were conducted for proposed measures.

Source: Information provided by the MS in the context of this study (including 1st FRMPs and EC (2019)[94])

[92] The European Commission report "European Overview – Flood Risk Management Plans" (SWD(2019) 31) also highlights that relatively few indications were found that multi-benefits were considered in economic appraisals. See also the draft "Scoping Report" on "the interaction between the Floods and Nature Directives," submitted to the 27TH meeting of the CIS Working Group on Floods, 29 October 2020.

[93] European Commission, 2014, "EU policy document on Natural Water Retention Measures," (By the drafting team of the WFD CIS Working Group Programme of Measures (WG PoM)), Technical Report - 2014 – 082.

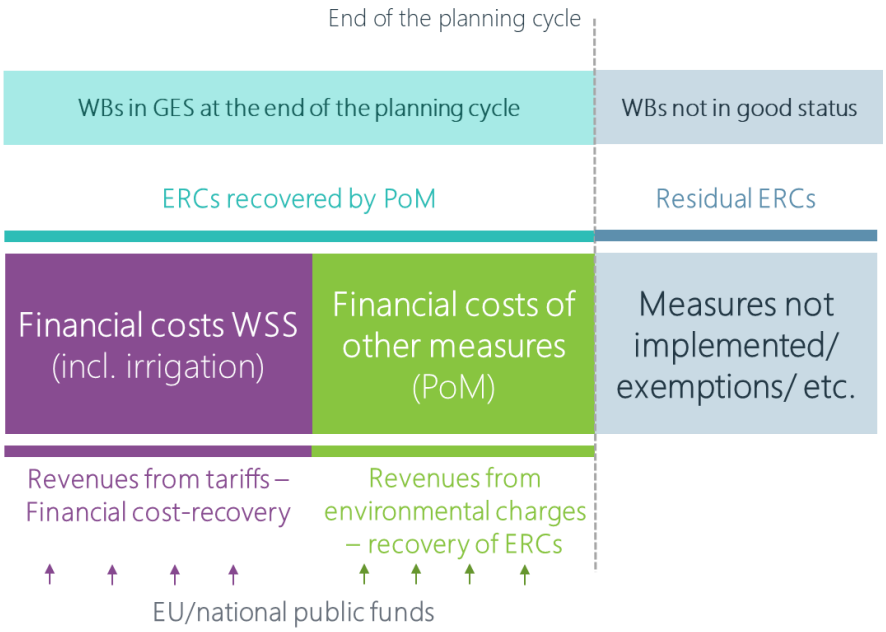
[94] European Commission, 2019, "European Overview – Flood Risk Management Plans," SWD(2019) 31.

6. MOBILISING FINANCIAL RESOURCES TO SUPPORT THE ACHIEVEMENT OF WATER POLICY GOALS

6.1. What do we know about financing?

This study focuses on the economic aspects of WFD (and FD) implementation as a whole, thus including water and sanitation services (WSS) as a subset of the overall Programmes of Measures. This distinction is particularly important for funding water management, as usually a lot is attention is given to WSS and water tariffs. Figure 6-1 below illustrates the different costs involved in the WFD implementation and the corresponding recovery (i.e. funding) mechanisms.

Figure 6-1 Financing the Programme of Measures: types of costs and corresponding recovery mechanisms



Water and sanitation services are a large subset of water management, and **water tariffs** are the instrument designated to recover their costs. However, **the Programme of Measures is much wider than just WSS, and this involves additional costs**: the selected instruments to recover these costs are **environmental charges** – including not only abstraction and pollution charges but also charges on other significant water uses. The Guidance that the CIS WG on Economics produced in 2015[95], considered the Environmental and Resource Costs (ERCs) as follows:

- The total ERCs are the costs of having all WBs in good status or potential at the end of the planning period;
- Due to exemptions or lack of implementation of some measures, the PoM will likely result in only a percentage of WBs in good status or potential: the costs of the PoM can be considered as the ERCs recovered by the PoM;

[95] CIS WG Economics, 2015. A guidance for assessing Environmental and Resource Costs and their recovery in the context of the Water Framework Directive. Internal document.

- The difference between the costs of reaching good status or potential in all WBs and the actual costs of the PoMs can be considered as the residual ERCs of the planning period.

Thus, environmental charges are the instruments to recover ERCs of water use other than the financial costs involved in the provision of WSS. In the case of WSS, there may be externalities that other measures in the PoM need to address, such as for example groundwater pollution by nitrates and pesticides in the case of agriculture. They constitute the ERCs of WSS.

Of course, public funds (at the European, national and local level) can intervene in covering a part of the costs of WSS and those of other measures.

Funding and financing concern another area where **data and information are scattered and heterogeneous across MS.** This limits the feasibility of quantitative analysis, e.g. the ability to rank with precision the relative importance of funding sources, as data are often incomplete and non-comparable. Nevertheless, data collected from MS contain a wealth of qualitative and quantitative information, from which one can gain important insights.

When talking about the water management's financial aspects, especially expenditures, both CAPEX and OPEX as well as funding, there usually is a wealth of quantitative information available on water and sanitation services, since it concerns a well-developed sector in all EU MS, which attracts a large share of the financial resources deployed for water management as a whole.

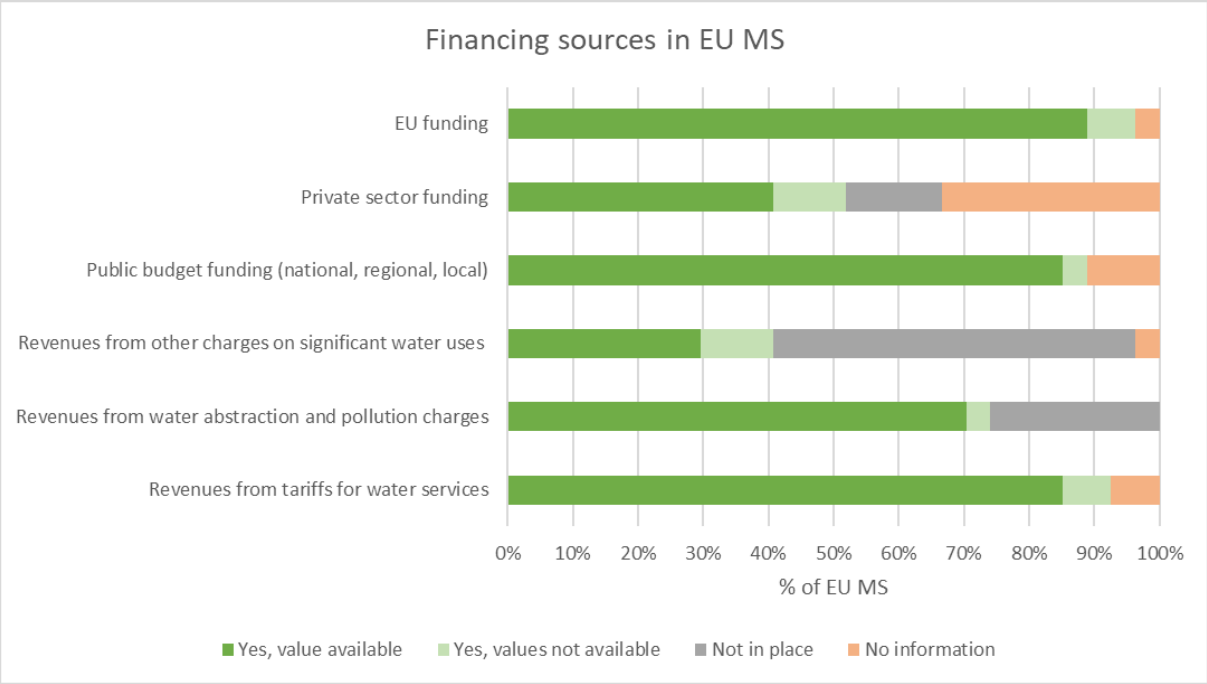
The OECD has collected data on projected expenditure needs in EU MS in order to comply with the Drinking Water, Urban Wastewater Treatment and Flood Directives. Although these data only include water and sanitation services, they provide a good indication of the expenditure trends for the coming years. They indicate that all EU countries need to increase the current expenditure levels for water supply and sanitation by 20% or more, although some MS face the challenge of much larger finance needs, such as for example Finland (+85%), Bulgaria (+100%) and Romania (180%). Additionally, it is likely that finding the additional funding sources for these future investment needs will become more challenging, as past investments have likely used up already the more easily accessible funding sources (OECD, 2020). Taking a comprehensive outlook on water management, thus including for example the management of agricultural pressures, the restoration of aquatic ecosystems, flood protection measures, et cetera, implies even larger additional financing needs as compared to those today, in view of climate change adaptation and pollution challenges that need to be addressed.

In this light, it is of crucial importance to have an overview of current financing practices in EU MS, especially to identify the **untapped or emerging sources** that could contribute to respond to the growing financing needs.

Figure 6-2 provides an overview of the financing sources used in EU MS, as well as the data gaps. In most countries, quantitative figures could not be found for the different funding sources, i.e. as regards the amounts allocated to water management by funding sources in a reference period[96]. In some cases, qualitative information suggests that a funding source is in place in the country, but annual quantitative figures are not available. In other cases, the funding source is not in place or no information on its use has been found.

[96] Please note that reference periods vary across Member States as well as within one country, across funding sources. Often, even within the same country, financing figures for the different sources are taken from different data sources. This is why data are not comparable across countries, and sometimes even within the same country.

Figure 6-2 Financing sources in EU MS – percentage of MS where a funding source is in place and type of information available



Notes: quantitative, i.e. yes in place and value available/qualitative, i.e. yes, but value unavailable
Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[97], EC (2019)[98])

The observations emerging from the assessment of the available information on financing are as follows:

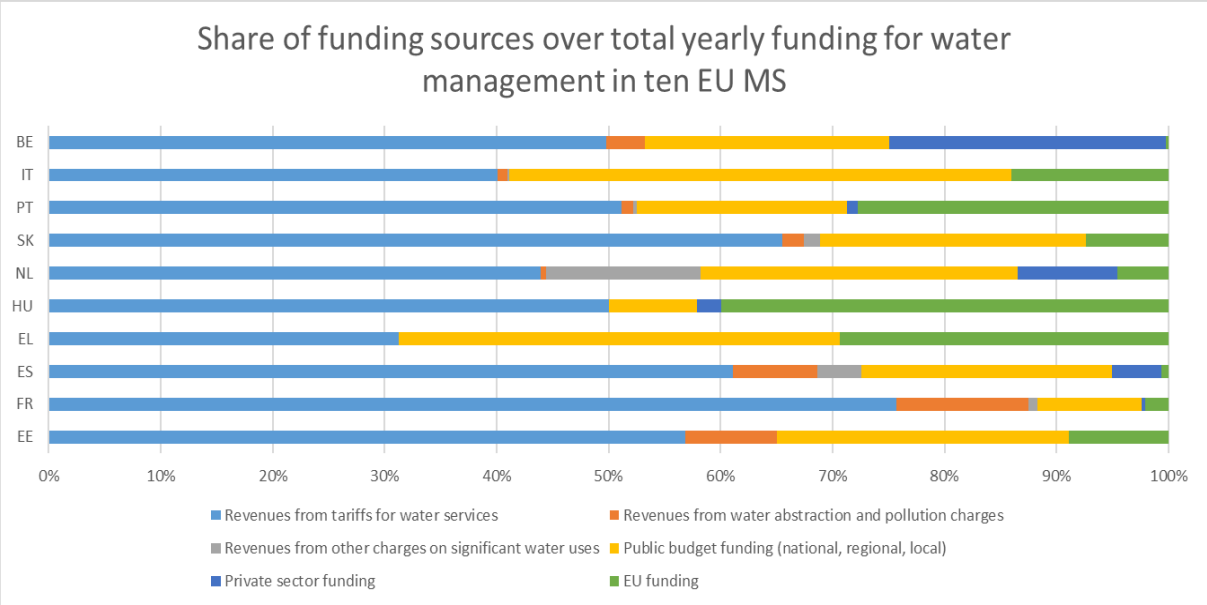
- The most widely mobilised funding sources used to finance water management in Europe concern EU funding (96% of MS), the revenues from tariffs from water and sanitation tariffs (93%) and the public budget (89% of MS);
- Abstraction and pollution charges and taxes are in place in 75% of countries. However, only a part of the collected revenues are re-directed to water management, as shown later in this chapter;
- Private funding was reported in only 52% of MS, whereas private funding is surely not in place in 15% of MS - no information on the use of this funding source was found in the remaining 33% of MS;
- Other types of charges on significant water uses, such as a nitrogen tax, are in place in 41% of MS.

Thanks to the quality of available data, it is possible for ten EU MS (BE, EE, FR, EL, ES, IT, HU, NL, PT, SK) to provide a more detailed analysis of the different funding sources' relative importance in the annual total funding for water management – see Figure 6-3 below.

[97] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[98] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Figure 6-3 Share of funding sources over the total yearly funding for water management in ten EU MS



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[99], EC (2019)[100]).
In Italy, data on revenues from abstraction and pollution charges are incomplete

These country-level data reflect differences in funding sources across countries, not only as regards the relative availability of the different financial resources, but also as regards the governance structure of water management (including direct public management, public or private delegated management and direct private management), for example:

- The revenues from water and sanitation tariffs take up at least 50% of the total financing mix in all countries, with the exception of Greece and Italy. In these two countries, national and EU funds have a larger role in water management as compared to other MS;
- Public funds still play an important role in financing of water management in several countries. This is hardly surprising, as water management is a domain of public interest. There are three exceptions: (i) Hungary, where EU funds have a larger role; (ii) Belgium, where the private sector provides a significant contribution to the financing of water management as compared to the other MS; and (iii) France, where the public sector contribution is equivalent (slightly lower) than the financial resources provided by abstraction, pollution and other charges; in fact, Water Agencies are mostly self-funded through user charges;
- Private sector funding has a slightly more important role in only two countries: (i) the Netherlands, where some business operators recur to self- water supply and treatment; and (ii) Spain, where private funds are invested in the urban water cycle;
- With the exception of France, water abstraction and pollution charges (when in place) contribute to only a small share of the total expenditure in water management – it is slightly higher in Estonia and Spain;

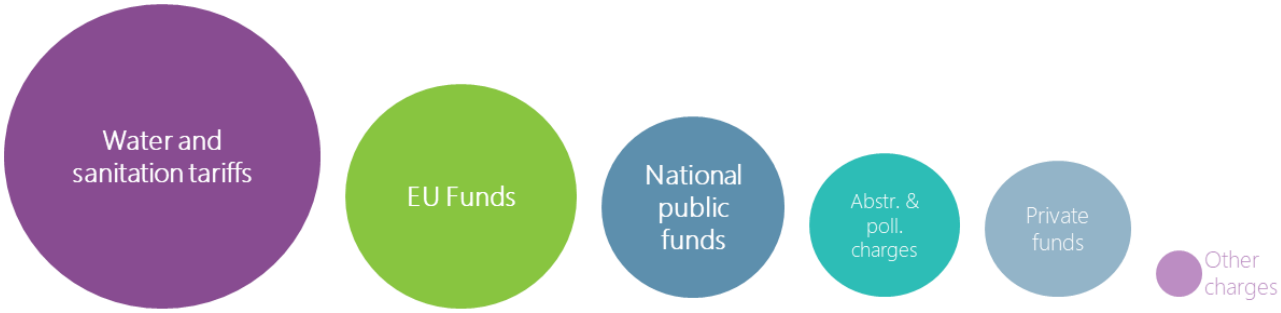
[99] European Commission, 2019. "European Overview – River Basin Management Plans," SWD(2019) 30.

[100] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

- Similarly, other charges on significant water uses have a minor role in the total financing for water management – with the notable exception of the Netherlands (for more details, see box 6.4 further down in this chapter.

Overall, these results suggest that public funds at all levels and water tariffs are well-established financing sources and that they represent, in terms of financial volumes, the largest funding sources deployed by MS for water management, as illustrated in Figure 6-4 below. One should note that this figure can only provide an illustration of the relative sizes of funding sources, because the data on the revenues from the various financing sources are hardly comparable across the Member States. As shown in more detail later on, in the section on cost-recovery, public funds tend to be used more in funding other measures other than WSS provision, whereas water tariffs usually recover a large share of the WSS costs.

Figure 6-4 Financial volumes from the different sources at the EU level – Illustrative only due to heterogeneous data across MS



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[101], EC (2019)[102])

These figures illustrate that, at present, **private financing and charges on other relevant water uses** are rarely applied, or, at least, rarely reported in official documents (e.g. RBMPs). This suggests that these two sources can offer some **untapped potential for funding** and thus that they have the potential to play a larger role in MS financing strategies for water management.

The evidence reported in the MS fiches suggests that **private funding**, when used, has a subsidiary role in the financing of water management, complementing revenues from water and sanitation tariffs and public funding at all levels. This is corroborated by the fact that information on it is scarce and, when available, is often incomplete.

Private funding is usually deployed in the water and sanitation sector, rather than in other types of measures. In this respect, the recent OECD report[103] on the investment needs in the WSS sector can provide additional information that does not emerge from the MS data collated in the context of this study, in particular on debt (reimbursable) finance. Loans are typically employed to contribute to the upfront financing of capital investments when cash flow may be insufficient for on-balance sheet financing or when borrowing conditions

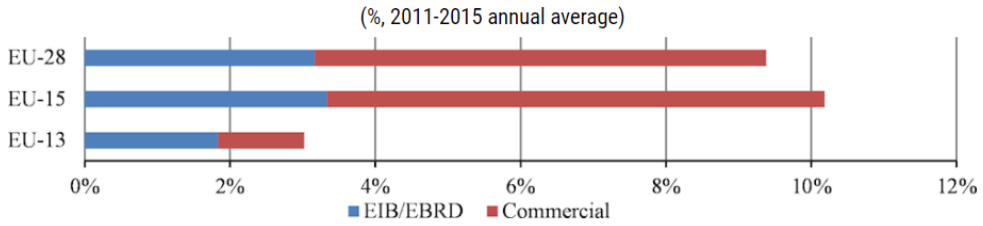
[101] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[102] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[103] OECD, 2020, "Financing Water Supply, Sanitation and Flood Protection; Challenges in EU Member States and Policy Options," OECD Studies on Water.

Figure 6-5 Share of debt finance in estimated total expenditures for water supply and sanitation for the EU-20, the EU-15 and EU-13

Figure 2.11. **Share of debt in estimated total expenditures for water supply and sanitation for the EU-28**



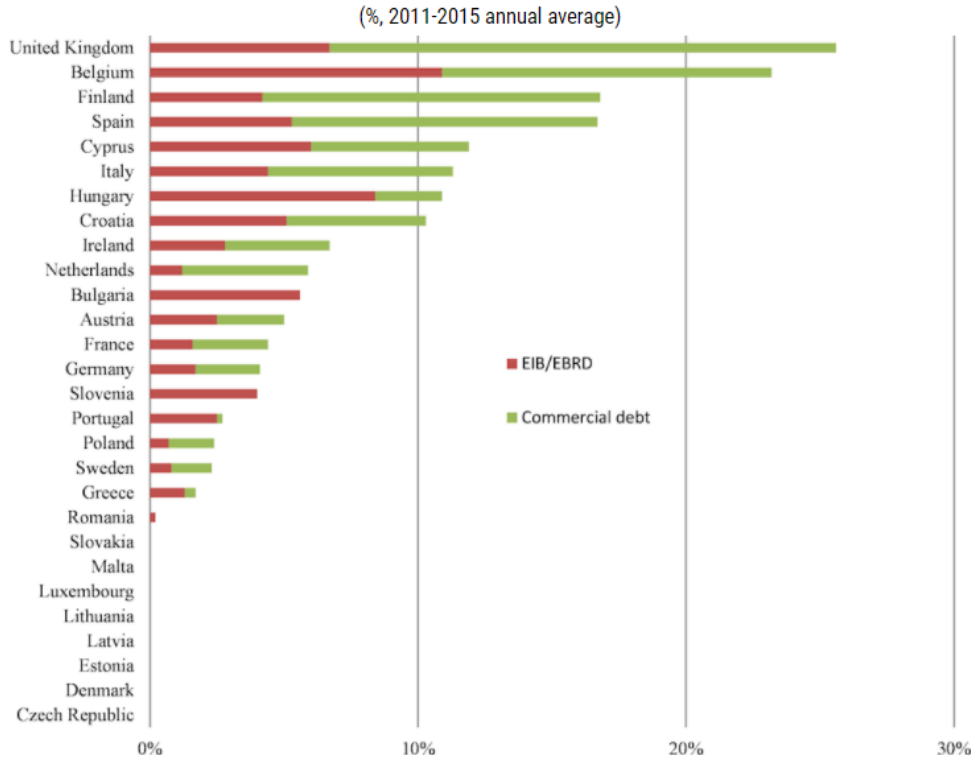
Note: Debt is assumed to be repaid by either (and therefore not additional to) government or household expenditures presented in previous figures

Source: EUROSTAT (for past estimated expenditures), European Investment Bank (loan database), European Bank for Reconstruction and Development (loan database), Commercial databases (IJ Global, Thomson Reuters, Dealogic).

Source: OECD, 2020

Figure 6-6 Share of debt in estimated total expenditure for WSS, by MS[104]

Figure 2.12. **Share of debt in estimated total expenditures for water supply and sanitation per member state**



Note: Debt is assumed to be repaid by either (and therefore not additional to) government or household expenditures presented in previous figures.

A study by DANVA (2019) documents debts of water utilities in Denmark. It shows that levels of debt of utilities to KommuneKredit has been rising since 2007 and reached EUR 2 billion at the end of 2017.

Source: EUROSTAT (for past estimated expenditures), European Investment Bank (loan database), European Bank for Reconstruction and Development (loan database), Commercial databases (IJ Global, Thomson Reuters, Dealogic).

Source: OECD, 2020[105]

[104] A reviewer noted that private investment may not be an option when water infrastructure is public, stressing that this is a political choice.

[105] OECD, 2020, "Financing Water Supply, Sanitation and Flood Protection; Challenges in EU Member States and Policy Options," OECD Studies on Water.

are particularly attractive[106]. The graph in Figure 6-5 reports the share of debt finance in the estimated total expenditure for water and sanitation services (WSS) for the EU-28, the EU-15 and the EU-13, distinguishing between loans provided by the EIB/EBRD and commercial loans. Debt finance occurs a bit more in the EU-15 (over 10%) than in the EU-28 (around 9%). Overall, commercial banks provide a larger share of loans than the EIB and EBRD. The graph in Figure 6-6 reports the share of debt finance in estimated total expenditure at MS level.

It is important to note that there is a positive correlation between **cost-recovery levels and access to debt finance**: in fact, loans are typically granted to entities and projects able to demonstrate a reliable ability to pay back. For WSS providers, this ability is dependent on the ability to recover supply costs through WSS tariffs. The entity's financial health will also play a major role in its ability to attract commercial loans (OECD, 2020[107]).

The EIB in particular is sometimes referred to as the largest lender worldwide to the water sector. Thanks to its **public nature**, the institution can work with longer term maturity and low returns, the two characteristics that are specific to the structure of asset management of the water sector. More in general, **all public banks** operate with a mandate for the general interest, so that there are clear **synergies with water operators** – and public operators in particular. This provides opportunities to strengthen the sectors and positively affect the local and national economies. Some examples of such synergies concern (Aqua Publica Europea, 2019[108]):

- An EIB loan of EUR 200 million to Sardinian operator Abbanoa (Italy) to support the operator's infrastructure investment plan to with a strategic focus on new technology and hydraulic and energy efficiency;
- In the context of its sustainability strategy and its Green Finance Framework, and in collaboration with the Belgian bank Belfius, SWDE (Wallonia, Belgium) announced the emission of EUR 10 million of Green Bonds through which the operator aims to attract new investors looking to support sustainable projects. The financing concerns in particular renewable energy and energy efficiency projects, as well as resource protection, amongst others.

[106] More detailed information could not be found, so it was not possible to discern whether loans are used to finance CAPEX or OPEX.

[107] See previous footnote.

[108] Aqua Publica Europea, 2019, "The public water services of the future within society for sustainability," 10-year publication, 2019 issue.

BOX 6.1 USE OF PRIVATE FUNDING FOR FLOOD RISK MANAGEMENT IN BELGIUM

In Belgium, most of the measures are financed by the public sector. Specific information on private sector financing are not available and are not reported in the RBMPs. However, it is estimated that in Flanders in 2017 EUR 2.6 billion were spent on water (an increase from EUR 2.3 billion in 2014), 25% of which concerned private expenditures, mostly by industrial companies on water provision (pumping) and wastewater treatment and by agriculture on manure management. In general, both public and private expenditures have increased during the last two decades.

Service	**Private expenditures (million Euro, 2014)**	**Private expenditures (million Euro, 2017)**
Water supply	243	296
Water sanitation	334	351
Water management and regulation (incl. flood risk management)	6	7
Total	583	653

Source: De Nocker en Broekx, 2017 ; De Nocker en Broekx, 2019

Note: private expenditures are roughly based on unit costs derived from interviews and literature, and the amount of different types of water consumed by the different sectors.

In addition to debt finance and commercial loans, the assessment of current MS financing practice shows that the situation is evolving with some new (innovative) funding arrangements being developed including with the involvement of private entities (see Box 6.2).

BOX 6.2 INNOVATIVE FUNDING ARRANGEMENTS IN EU MS

Payments for Ecosystem Services (PES) schemes in France

In accordance to the national Biodiversity Plan (measure 24), Water Agencies can provide financial support to test the interest for Payments for Ecosystem Services (PES) on pilot sites, through a dedicated funding of 150 million EUR in total for all Water Agencies over three years (2019-2021). The schemes must target the agricultural sector. This measure aims to support the agro-ecological transition, and to address biodiversity losses and water quality issues. Several entities can apply to Water Agencies' tenders and implement a PES project, including for example local communities and municipalities, drinking water and river basin syndicates, groups of economic and environmental interest, cooperatives of collective interests, Natural Regional Parcs, Conservatories des Espaces Naturels.

In 2019, Water Agencies launched tenders for setting up PES studies and schemes (such as for example the Artois-Picardie and the Seine-Normandie Water Agencies). As of June 2020, about 100 PES schemes were at the project stage. The setting up of pilot PES scheme in the different RBDs is supported by the development of a national methodology, which includes the definition of national guide-values for environmental services.

Targeted Agricultural Modernisation Schemes (TAMS) in Ireland

Ireland's Targeted Agricultural Modernisation Schemes (TAMS) provide grant assistance to farmers for investments in the pig and poultry sectors, dairy equipment and the storage of slurry, wastewater and other farmyard manures. Funding of EUR 395 million has been allocated to these investments, which will leverage a further EUR 500–600 million in investment by farmers. Of TAMS' budget of EUR 395 million, about half, EUR 190 million, is specifically targeted at two schemes: the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Over the period of the next river basin planning cycle, they will lead to a significant investment by farmers in nutrient storage, and to improved nutrient utilisation.

Sweden: two "electric" initiatives

- The eight largest hydropower companies in Sweden have agreed to establish a Hydropower Environmental Fund, and to invest SEK 10 billion over 20 years with the aim to improve the environmental quality in the Swedish hydropower industry, through a national plan (NAP) in the context of the holistic Energy Agreement.* The latter includes several energy policy objectives and guidelines, including hydropower. At the same time, Sweden has decided to gradually lower the real estate tax in the hydropower sector from 2,8% to 0,5% of the taxation value. Following that agreement, the hydropower companies set up the fund**. In 2020, the Swedish government adopted the national hydropower plan that *inter alia* notes the importance of hydropower production and prioritizes the rivers according to the ecological potential and production flexibility. Now, the fund is starting its operation.
- "Good environmental choice" label for electricity: There are voluntary initiatives such as the eco label "good environmental choice", where customers pay extra for electricity with this label. An amount per kWh renewable electricity is destined for finance restoration measures and/or energy efficiency measures.

* *Energiöversekommelsen 11.6.2016, https://www.government.se/articles/2016/06/agreement-on-swedish-energy-policy/*

** *More information on the fund https://vattenkraftensmiljofond.se/ (in Swedish)*

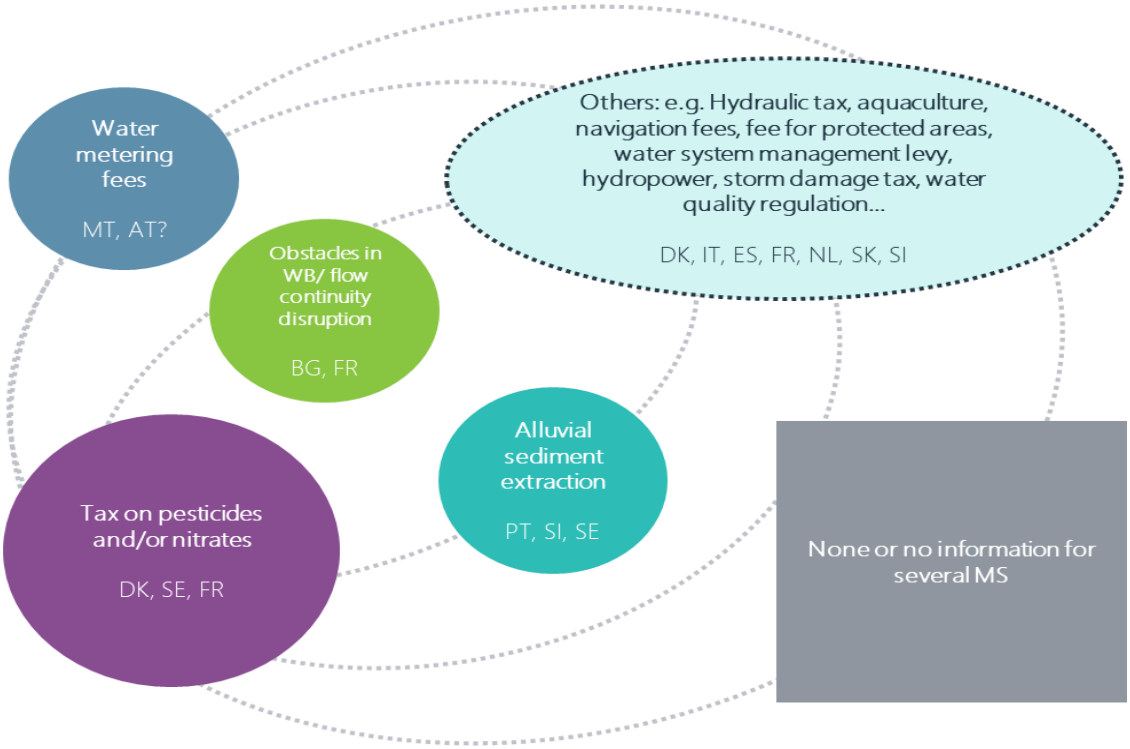
In the case of WSS, the involvement of private operators or investors is rather straightforward. In contrast, it can be challenging to identify the potential of other measures that private finance may be interested in to invest in and for which reasons, considering that many measures in the PoMs have a clear "public good" nature (e.g. nature-based solutions). This can be an area for further investigation.

In times of tight constraints on public budgets, **charges on significant water uses**, other than water abstraction and polluting discharges, could offer a solution to raise revenues and to strengthen the application of the polluter-pays or user-pays principles. As noted above, such charges are in place in less than half of the MS. The picture emerging from the review of all instruments in place across MS is that of a plethora of different instruments, including:

- Taxes on pesticides and/or nitrates are in place in three MS in slightly different formats. As this tax addresses a commonly found water management issue in Europe, these existing instruments are described in more detail in Box 6.3 below;
- Water metering fees;
- A charge on obstacles in water bodies or, according to another name, on flow continuity disruption;
- A charge on alluvial sediment extraction; and
- Several other different instruments, such as a hydraulic tax, a charge on aquaculture, navigation fees, et cetera.

Figure 6-7 below illustrates this variety of instruments; Box 6.3 provides an insight on the existing taxes and charges on nitrates and pesticides.

Figure 6-7 Other charges on significant water uses in place in the different MS



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[109], EC (2019)[110])

[109] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[110] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

BOX 6.3 TAXES ON NITRATES AND/OR PESTICIDES

Taxes on nitrates and/or pesticides exist in Denmark, France and Sweden; they are aimed at reducing pesticides and/or nitrates use. Thus, revenue raising is not the main objective of these instruments, but rather a positive "collateral" effect. The fee is charged on the quantity of phyto-sanitary products used (rates per kilogram). It can be charged either on producers/ importers or on final consumers (farmers), but in both cases the charge is reflected in the final retail price of products, thus providing an incentive for a reduced product use.

In **Denmark**, the pesticide tax is part of the Danish Pesticides Strategy adopted for 2017-2021. The strategy is focused on four pillars: (i) an approval system for pesticides, (ii) the control of substances, (iii) the increase of knowledge through research and information, and (iv) guidance. Following the introduction of the Danish pesticide tax, the sales of pesticides in Denmark have decreased by almost one-third (31%) between 2011 and 2018. In addition to the pesticide tax, the Danish Pesticides Strategy aims to support research on unintended and undesirable effects of pesticides on the environment and human health, and on the promotion of the development and use of alternatives to chemical pesticides. Finally, the Danish Pesticides Strategy supports specific regulations for greenhouses as well as for sites for the filling and washing of spraying equipment, and the establishment of protection zones in the vicinity of wells in order to further minimize the risk of water contamination.

In **France**, the fee is charged on both pesticides and nitrates. It is managed and collected by Water Agencies. Different rates are set, based on the risk level of phyto-sanitary products, with higher rates for riskier products. As for 2017, around 70% of the revenues collected entered in the Water Agencies' budget (for the financing of measures to preserve and protect water resources). The remaining 30% was directed to the French Office for Biodiversity (OFB) to fund the Ecophyto Plan (this plan goes 100% to the agricultural sphere, directly or indirectly, although around EUR 1 million is intended for amateur gardeners)

In **Sweden**, the pesticide tax is also based on the weight of the product. In this case, revenues from the tax go to the general State budget and are not earmarked for specific uses.

Although not yet in place, a fee for diffuse pollution from agricultural sources has been proposed by the Minister of Agriculture and Food in **Bulgaria**.

As reported in Box 6.3, although nitrates and pesticides are one of the main water management issues in the EU, only three countries have a specific charge in place to address the problem, and another one is planning to implement it. This reveals **weaknesses in the implementation of the polluter-pays principle** in the EU – in the absence of specific charges, the environmental costs of using nitrates and pesticides are born by the society as a whole, or by other users' groups.

BOX 6.4 ECONOMIC INSTRUMENTS ON OTHER SIGNIFICANT WATER USES IN THE NETHERLANDS

The Netherlands derive 14% of total funding for water management from taxes and charges on significant water uses other than abstraction and pollution charges, mainly from the **water system management charge**. The Water Authorities levy this charge on households, industry, agricultural land and nature areas. They use the revenues for water quantity, flood protection, and surface water quality measures. Households pay a levy depending on the value of the houses. Industry pays a levy depending on the value of the real estate. Agriculture pays a levy depending on the value of the agricultural land. Owners of natural areas pay a levy depending on the size of the natural land.

The Netherlands are also the only EU country where a **tradable phosphate rights** system is in place, to ensure that phosphate production from the agricultural sector remains below the set phosphate ceiling. It is not a levy or a charge, and thus it is not a revenue-raising instrument. However, it is worth mentioning as an innovative economic instrument to cap and reduce diffuse pollution from agriculture.

Revenue figures alone do not say much about the **revenues actually allocated to improvements in water management** and thus **contributing to the achievement of current water policy goals.** As shown in Table 6-1 below, the revenues from water abstraction and pollution charges are mainly used to fund water management, with a variety of arrangements in place.

In France, for example, water abstraction and pollution charges are the main financing source for Water Agencies, which directly levy and collect payments. In Bulgaria, the revenues from abstraction and pollution charges are received by the Enterprise for Management of Environmental Protection Activities (EMEPA) and used for water management. Similarly, in Croatia, the revenues from abstraction and pollution charges (the latter is called water protection fee) are levied and collected by Croatian Waters and used for financing of the RBMP measures and related operational costs of Croatian Waters.

In other cases, revenues are partly re-allocated to water management and partly to the general state budget. In the Czech Republic, fees are set for groundwater abstraction. The revenue from the fee on the amount of groundwater abstracted is split in two halves, with one halve going to the budget of the region where the abstraction of groundwater takes place, and the other halve going to the budget of the State Environmental Fund of the Czech Republic[111]. In the Czech Republic, there are also fees for surface water abstraction. The revenues are used to pay for the management of watercourses and river basin management.[112] The revenues from the fee on the discharge of wastewater into surface waters may be used to support the construction and upgrade of water management infrastructure and to cover the costs of the authorised laboratory selected by the State Environmental Fund of Czechia and professionally qualified persons to conduct measurements. The revenues from the fee on the permitted discharge of wastewater into groundwater go into the budget of the municipality where the discharge takes place, with no specific requirements on how the fee must be used.

[111] These fees are regulated by § 88 to 88l of Act No. 254/2001 Coll., On Waters and on the Amendment of Certain Acts (Water Act).

[112] These fees are regulated by § 101 of Act No. 254/2001 Coll

In some cases, however, the revenues go into the general State, regional, local or municipal budgets, without an earmarking for water management purposes.

Table 6-1 Reallocation of revenues from water abstraction charges in those EU MS where the charge is in place

Revenues go to...		EU MS
Financing water management (or environment)	SW GW	BG FR HR LU PL PT RO SK SI BE CZ
General State budget	SW GW	EE LT LV HU
Regional, local or municipal budgets	SW GW	EE LT LV CZ
No information/ unclear/ several uses		DE ES IT

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[113], EC (2019)[114])

Table 6-2 Reallocation of revenues from water pollution charges in those EU MS where the charge is in place

Revenues go to...		EU MS
Financing water management (or environment)	SW GW	BG EE DE FR LT LU PL PT SK CZ LV NL RO HR BE
General State budget	SW GW	HU* LT DK LV NL
Regional, local or municipal budgets	SW GW	CZ
No information/ unclear/ several uses		ES SI

* In specific cases, the charge is collected by the local governments of the municipalities, and revenues collected are used for qualitative and quantitative protection of soil and the sub-surface water and groundwater.

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[115], EC (2019)[116])

In some cases, the revenues from other charges on significant water uses are also allocated to water management (see for example the case of Netherlands as described in Box 6.4 above). However, the information on the allocation of these revenues is in most cases not available.

In France, these charges are all used to finance water management, although in different ways:

- The revenues from the navigation fee are used to maintain facilities such as sewage disposal, water points and electricity charging points (unclear which institution is in charge);

[113] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[114] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

[115] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[116] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans, COM(2019) 95.

- The Hydraulic Fee is paid by all the managers of a structure or a management that takes or discharges water within the public river domain or uses its driving force. Revenues are collected by Voies Navigables de France, the institution in charge of managing fluvial transport, contributing to global land and water management in the country, and make up to 25% of its budget;
- The diffuse pollution charge is charged and collected by the Water Agencies. Around 70% of the collected revenues enter into the Water Agencies' budget (for the financing of measures to preserve and protect water resources), and 30% into the budget for the French Office for Biodiversity (OFB) to fund the "plan Ecophyto" (this plan goes 100% to the agricultural sphere, directly or indirectly, despite around 1M Euro intended for amateur gardeners).
- The "GEMAPI tax" is a local fee for the management of aquatic environments and flood prevention. It is an optional tax and its revenues can only be used for flood protection purposes.

In Portugal, all water-related charges are components of the TRH, the Water Resource Tax; water abstraction and pollution charges are also components of this tax. The TRH includes a component for the aggregate extraction within the public water domain and another one for land occupation within the public water domain. Individuals or organisations carrying out actions that correspond to the base of the various tax components pay the tax. Payments are collected by the water management organisations that are responsible for providing the services, and they are subsequently sent to the respective River Basin Authorities (regional departments of the Portuguese Environment Agency, which is the National Water Authority).

In Slovakia, the charge for use of hydropower potential is paid to the Slovak Water Management Enterprise to cover maintenance costs.

Table 6-3 Reallocation of revenues from other charges on significant water uses – such as for example on pesticides and nitrates, hydropower production, sediment extraction, etc: - in those EU MS where the charge is in place

Revenues go to…	**EU MS**
Financing water management (or environment)	FR, NL, PT, SK
General State budget	SE
Compensation to farmers and research on pesticides pollution	DK
No information/ unclear/ several uses	BG, IT, MT, SI, ES, AT

Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[117], EC (2019)[118])

An innovative way to increase financial resources available for water management is the creation of **attractive investment cases** benefiting people and nature. This is the case with restoration projects, green infrastructures and nature-based solutions. As often mentioned, these measures pursue multiple purposes and deliver multiple benefits (e.g. water purification, flood protection, support to biodiversity, et cetera), so they are usually indicated as cost-effective measures. This can be brought a step forward, through designing strategies and measures addressing not only environmental challenges, but also

[117] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[118] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

pursuing social and/or economic objectives – thus attracting funding sources usually employed in other policy areas. For example, in the Weser catchment area, several local authorities along the rivers Werre and Else decided to combine water restoration measures with job opportunities. A joint, integrated programme was established and run in cooperation with other relevant bodies (such as the employment administration). As a result, more than 100 long-term unemployed people were (temporarily) employed and – simultaneously – gained a qualification. Furthermore, at least one fifth of the employees got a long-term job following their work on this project (EEB, 2015[119]).

In some countries, the revenues from abstraction and/or pollution charges as well as (some) revenues from other water-related charges are allocated to **Water (or Environmental) Funds**, which are then used to finance water management or, in some cases, environmental management as a whole. This is the case of Belgium, Luxembourg, Portugal, Slovakia and Slovenia.

In Slovakia, in particular, the revenues from groundwater abstraction and water pollution charges feed the Environmental Fund, and thus they are used for environmental purposes at large. In contrast, the revenues of surface water abstraction charges are received by a river basin authority directly, namely the Slovak Water Management Enterprise, a state-owned company who is the administrator of watercourses and river basins in Slovakia.

6.2. What are implications on cost-recovery?

As shown in the previous section, the revenues from tariffs on water supply and sanitation (WSS) constitute the largest funding source for water management in the EU. In fact, within water management as a whole, WSS is the sector with the largest financial flows from both public and private funding. The information on how the WSS are financed, is largely available, and thus also on financial cost-recovery for WSS.

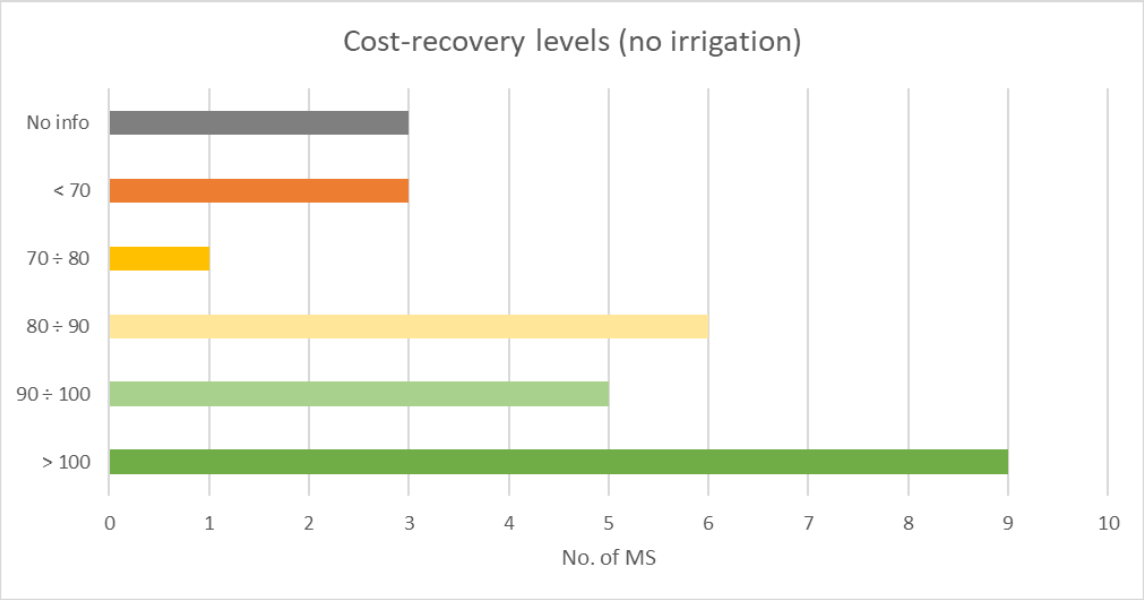
Therefore, this section focuses on the financial recovery of water and sanitation services. Figure 6-8 below provides an **overview of financial cost recovery for water and sanitation services in the EU.**[120] Please note that this diagram does not include irrigation, as in several MS irrigation water is managed independently (e.g. by irrigation consortia) from water and sanitation services for households, industry and services. As a consequence, specific data for the irrigation sector are not available in several countries (as shown later in this section).

In one third of the MS (namely 9 out of 27), cost recovery is 100% or higher, with cost-recovery between 90 and 100% in 5 additional MS. In 6 MS cost recovery levels are between 80 and 90% and in 4 MS, they are below 80%. Information that can support cost-recovery assessment, was not available in 3 MS. Overall, the implementation of full cost-recovery still presents some weaknesses at the EU level, although improvements have taken place since 2006, following the WFD implementation.

[119] European Environmental Bureau, 2015, "2nd River Basin Management Plans; Healthier rivers, less dams, dykes and Nitrogen; a campaigning paper."

[120] Average cost-recovery levels including both water supply and wastewater collection and treatment

Figure 6-8 Cost-recovery levels in EU MSs



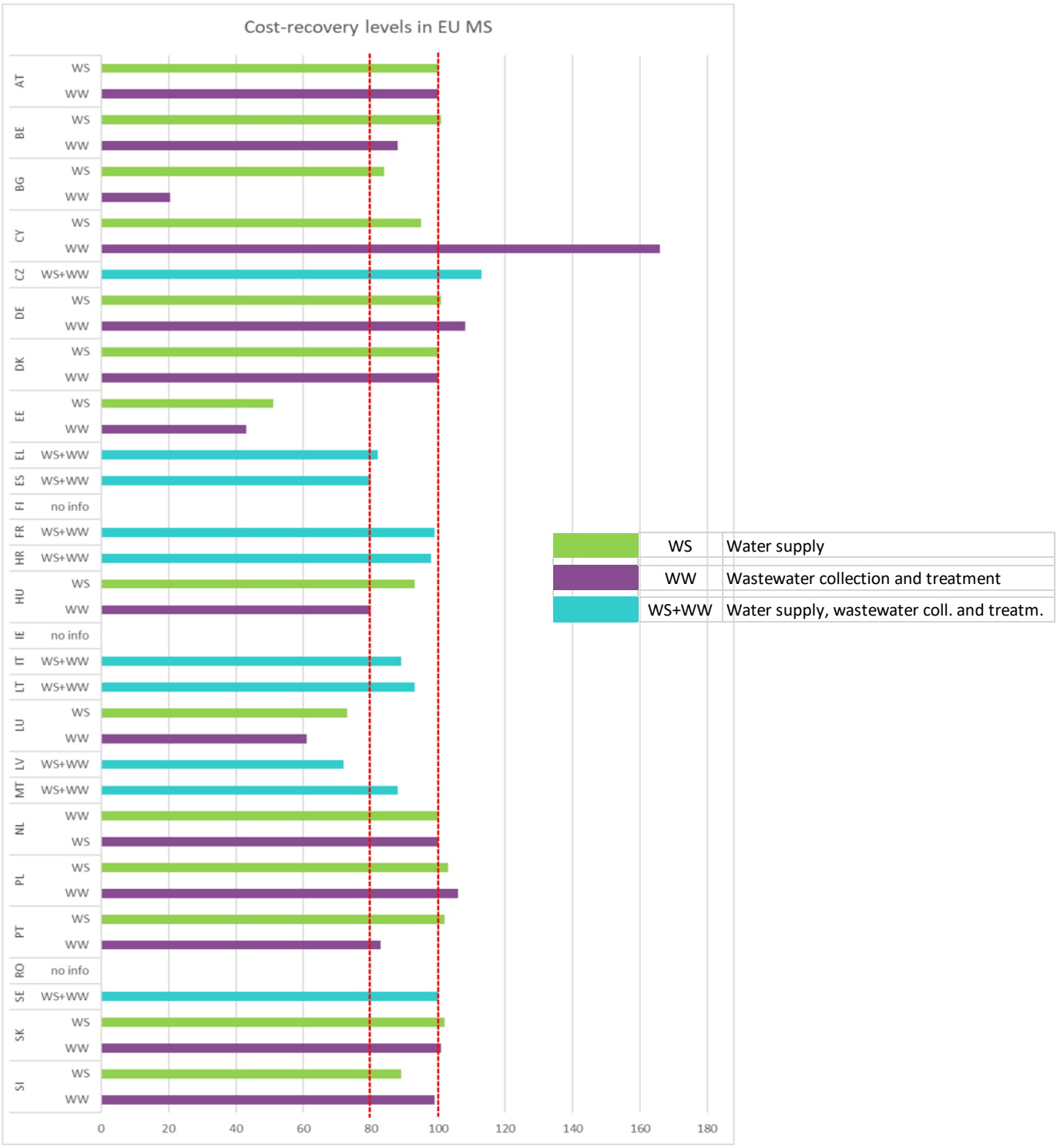
Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[121], EC (2019)[122])

Figure 6-9 below provides individual **cost recovery levels in each EU MS**, reflecting data availability. In some countries, separate cost recovery levels are available for water supply and for wastewater collection and treatment, whereas in other countries only an aggregated cost-recovery level is available.

[121] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[122] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Figure 6-9 Cost-recovery levels in EU MSs (the red lines indicate the levels of 80% and 100%)[123]



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[124], EC (2019)[125])

[123] In France, the cost-recovery rate provided in the data fiche (and in the diagram of Figure 6-9) is in fact the rate of the domestic sector as calculated in RBMPs – and thus it refers to water management costs as a whole, not to domestic WSS. This rate does not include financial transfers from other users' sectors.

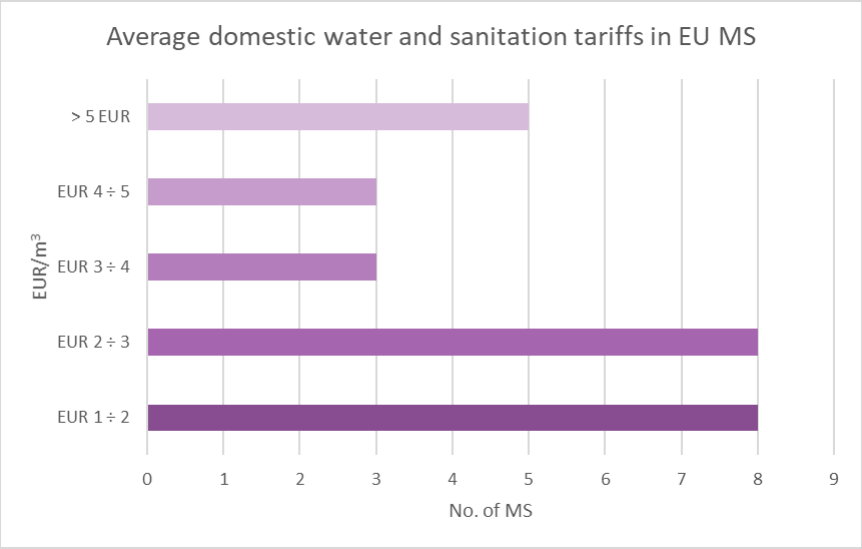
[124] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[125] European Commission, 2019, 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): Second River Basin Management Plans and First Flood Risk Management Plans, COM(2019) 95.

In most countries, the revenues from water and sanitation tariffs are the major, if not the only source of funding for these services. But what are the **implications of high cost-recovery rates on affordability of water and sanitation services**? The following diagrams summarise the available data and thus attempt to answer this question.

The first diagram, in Figure 6-10 below, provides an **overview of the average domestic water tariffs in EU MS** – the data exclude irrigation and combine water supply, sewage collection and wastewater treatment; **separate information on industrial water tariffs is not available in several countries**, which is why here only domestic tariffs are presented. In most countries, the average price includes households, industry and services. In 8 MS out of 27, water supply and sanitation tariffs are set between 1 and 2 EUR/m^3, in 8 MS between 2 and 3 EUR/m^3; and in 5 MS, tariffs above 5 EUR/m^3.

Figure 6-10 Average domestic water and sanitation tariffs in the EU - overview



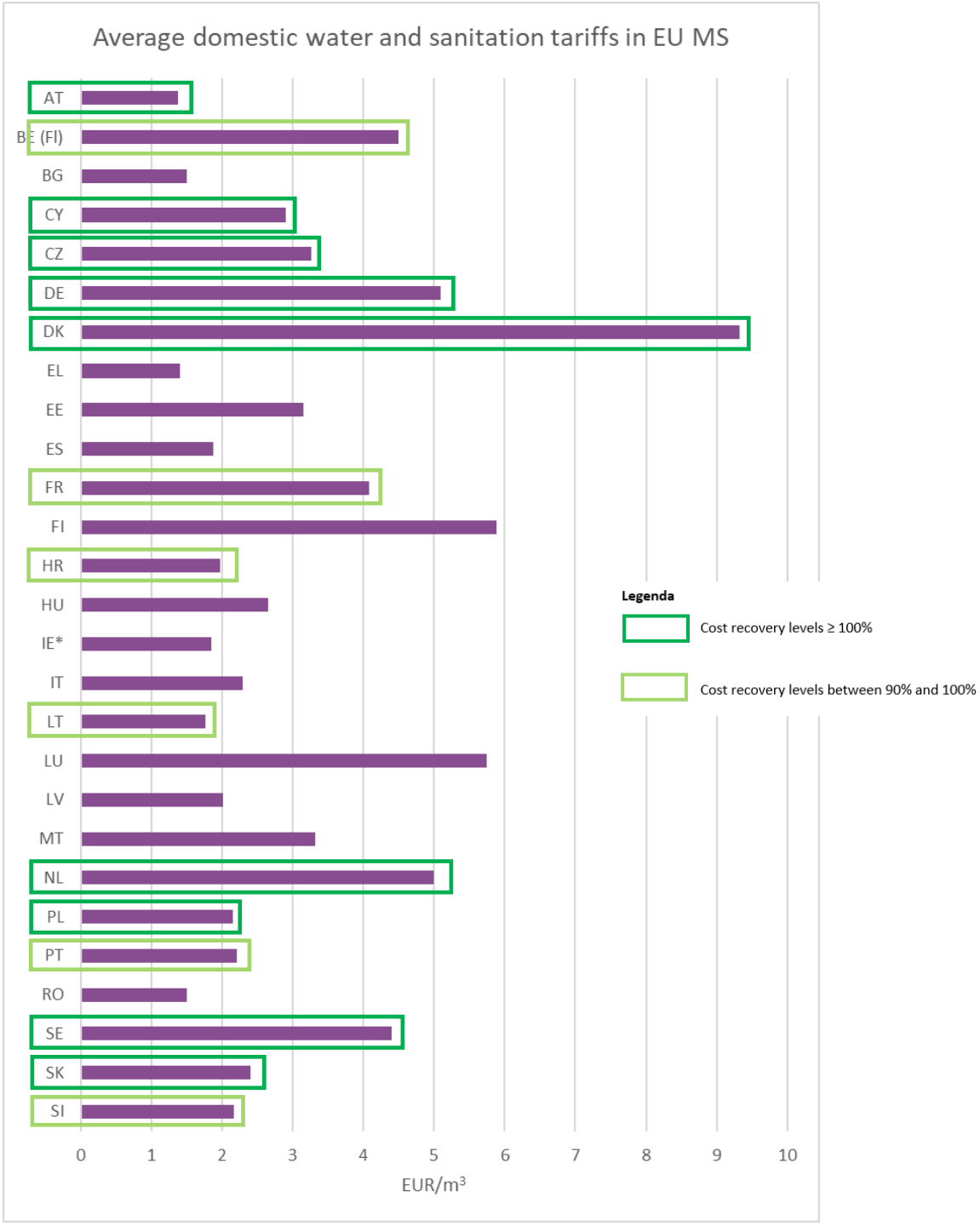
Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[126], EC (2019)[127])

The next figure, Figure 6-11, presents **water tariffs at the MS level**, combined with **information on financial cost recovery levels**: MS with cost recovery levels equal to or higher than 100% are highlighted in dark green, whereas MS with cost recovery levels between 90 and 100% are marked in light green. Different rates allow for achieving full or high cost recovery levels. This mightreflect a difference in the costs of water management across the MS, but it can also highlight different levels of cost-effectiveness in the management of water and sanitation services. The data collected in the context of this study do not allow for an analysis distinguishing these two causes. Hence, this is something that would merit further investigation in future economic studies of water management in the EU.

[126] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[127] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Figure 6-11 Average domestic water and sanitation tariffs in EU MS[128] and countries with cost-recovery levels ≥ 100% and between 90% and 100%



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[129], EC (2019)[130]) * In Ireland, households pay water tariffs only for volumes exceeding 213 000 l/year.

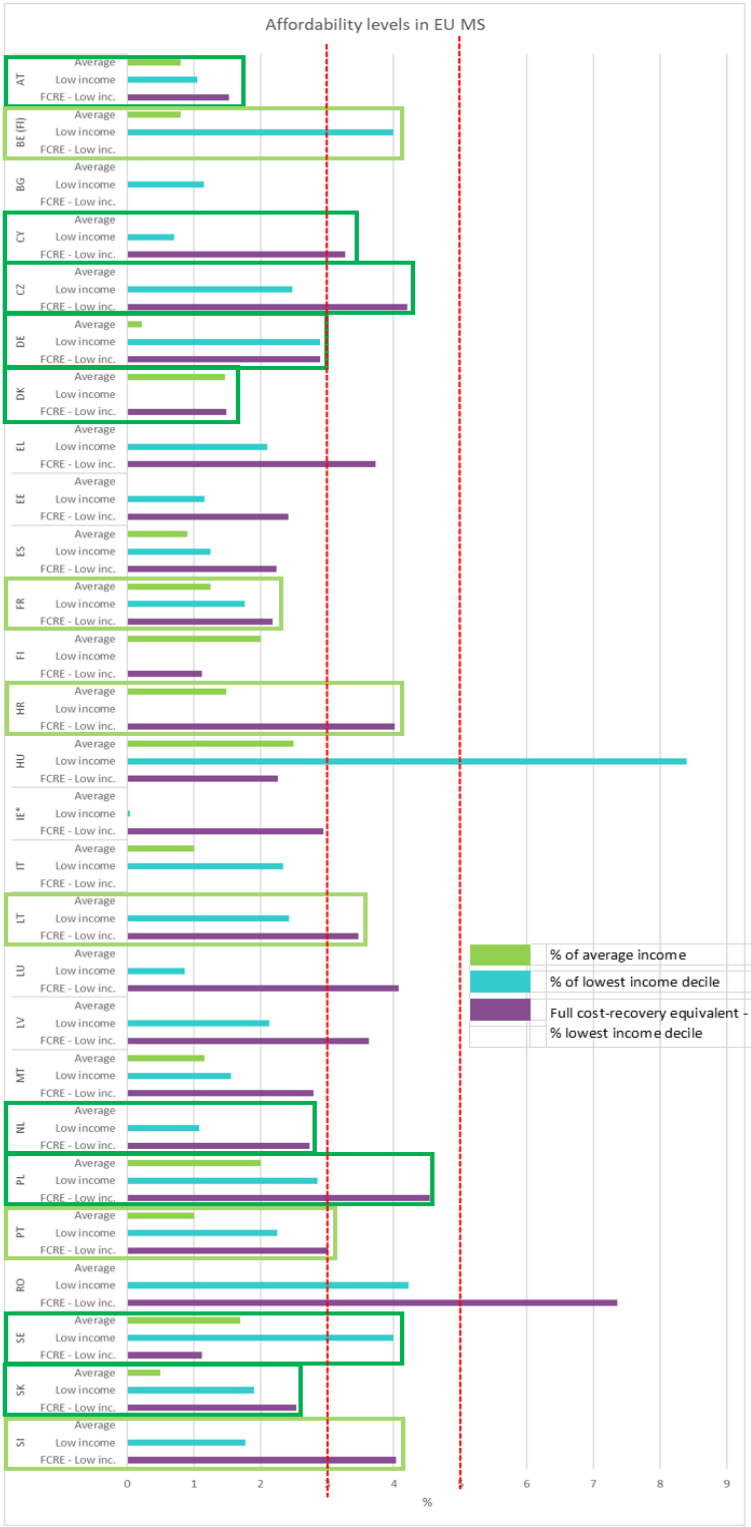
[128] When available, Eureau data (2018) were used to build the graph, to achieve the best comparability of data. EUREAU data were included in MS fiches whenever available.

[129] European Commission, 2019," "European Overview – River Basin Management Plans," SWD(2019) 30.

[130] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Figure 6-12 reports on the **affordability levels in EU MS.** The diagram presents average affordability levels, expressed as the percentage of the average water bill over the average income in the country, and the affordability levels for the vulnerable groups, expressed as the percentage of the average water bill over the lowest income decile. In the latter case, the average water bill is considered, and not the actual water bill which would include social tariffs and other affordability measures, which are in place in several countries. The graph also includes the projected affordability levels for the lowest income decile in the (hypothetical) case full cost recovery (full cost-recovery equivalent).

Figure 6-12 Affordability levels in EU MS[131] (Red lines - 3% and 5% thresholds; dark and light green boxes indicate MS with 100% and 90÷100% cost recovery levels respectively)



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[132], EC (2019)[133])

[131] Whenever available and possible, OECD data on affordability were used as source data, to improve data comparability across countries. The source for all full cost-recovery equivalent rates is always the OECD.

[132] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[133] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

Overall, **water and sanitation tariffs in the EU do not present particular affordability concerns on average**, as the expenditures for WSS by households in the lowest income decile remains below 5% in all MS, with the noteworthy exception of Hungary (8.4%). In the case of Romania, full cost recovery in the WSS sector would result in low-income households spending 7.3% of their budget; this will deserve further attention in the context of water pricing policies aiming to achieve full cost recovery, for example by introducing social tariffs to protect lower income groups. In two further MS (Belgium-Flanders and France), continued specific attention would be needed: for current cost-recovery levels (between 90 and 100%), the lower-income groups spend between 4 and 5% of their income on water and sanitation services. This cost burden may rise if prices were to increase to achieve full cost recovery levels, so current support mechanisms to vulnerable groups might need to be adapted (social tariffs in Belgium and Housing Solidarity Fund in France). Continuous attention is already provided in Belgium: economically vulnerable customers (based on social security support categories) are granted a 80% discount on the water bill in Flanders. The criteria to identify these customers are defined by the law. In 2015, 8% of the families in Flanders received support on the water invoice (WAREG, 2017).

Overall, a clear message emerges from the figure above: **full cost recovery levels** – and also cost-recovery levels between 90 and 100% - **do not seem to compromise the affordability of water services overall**. In all these MS, water and sanitation services are affordable for almost all, including many households in the lowest income decile, while still some vulnerable groups might be challenged, including in countries where average affordability does not seem challenging.

However, **this is a high-level analysis based on average data** (e.g. water bills, income, lowest income decile), which delineates overall trends but hides **difficult situations that still exist in the EU.** Some EU citizens have problems to pay their water bills. Reportedly, this may become clearer when considering the poorest 5% of the population[134] - which is why measures to address affordability concerns (in place in several MS) are still important and need to be maintained and constantly revised or adapted if needed.

So far, the analysis has focused on the domestic sector, i.e. the sector for which the most and better-quality information is available in several MS. When it comes to **irrigation water tariffs and cost-recovery**, the overall picture becomes scattered and incomplete. There are for several reasons for this: information is often missing; there are large differences within the same country regarding both tariffs and cost-recovery levels; irrigation is not in place in some countries; tariffs are not in place in some countries or only water abstraction fees are charges on farmers for irrigation; and, finally, the basis for charging is different (volumes or irrigated area), often within the same country.

Table 6-4 below attempts to provide a summary of this complex situation, reporting average data whenever possible or at least ranges of values. One should note that, in some MS, no information was provided by the MS or found otherwise, although it is likely that irrigation plays a minor role in these countries (e.g. MS with abundant precipitation). In addition, one should keep in mind that some irrigation water is self-abstracted in case of need. In other cases, the country fiche clearly reports that water is self-supplied and that only an abstraction charge is paid by farmers; this is reported in the table as well.

[134] Affordability issues deserve further study and discussion. According to some European experts, present at the CIS ATG "Water Economics" meeting on 26 March 2021, the affordability of drinking water is still an issue in the EU for the poorest 5% of the population. However, this study has only considered affordability levels for the lower income decile as a whole.

Table 6-4 Irrigation water tariffs and cost-recovery in EU MS – Overview of data and information provided by the MSs

Country	EUR/m3	EUR/ha	Cost-recovery (CR)	Comments
AT	no info	no info	no info	
BE	no info	no info	no info	
BG	0,11	61,36	no specific info	
CY	0,01	No	56%	Only abstraction charges
CZ	no info	no info	no info	
DE	no info	no info	no info	
DK	no info	no info	no info	
EE	rates not available	No	Not applicable	Abstraction charges on self-supply
EL	0,005 - 0,115	90 - 210	56,50%	
ES	0,06 - 0,9	60,36	78,10%	Rates depend on RBD
FI	no irrigation	no irrigation	no irrigation	
FR	0,08	Rate not available	87%	
HR	No info	No info	8%	
HU	No info	No info	25,20%	
IE	No info	No info	No info	
IT	0,54	0,62 - 2000	56,00%	CR rate includes irrigation and reclamation fees, estimated average - CR for O&M costs is reported as 100%
LT	0,003	No	Not provided for irrigation	Only abstraction charges
LU	no info	no info	no info	
LV	No info	No info	100%	CR provided in RBMPs for own supply
MT	No charges	No charges	No charges	Self supply only
NL	unclear	No	CR calculation in RBMPs not differentiated by sector	
PL	0,015 - 0,088	No	No (self-abstraction only)	Abstraction charges on self-supply, rates on GW and SW respectively
PT	0,02	120	92,20%	
RO	unclear	unclear	unclear	Fiche unclear
SE	No	No	No	Water supplied by municipalities not used for irrigation
SK	0,001	No	No (self-abstraction only)	Abstraction charges on self-supply
SI	unclear	unclear	0,1% (?)	Fiche unclear

	Data available
	No data available
	Only water abstraction charges
	Not in place

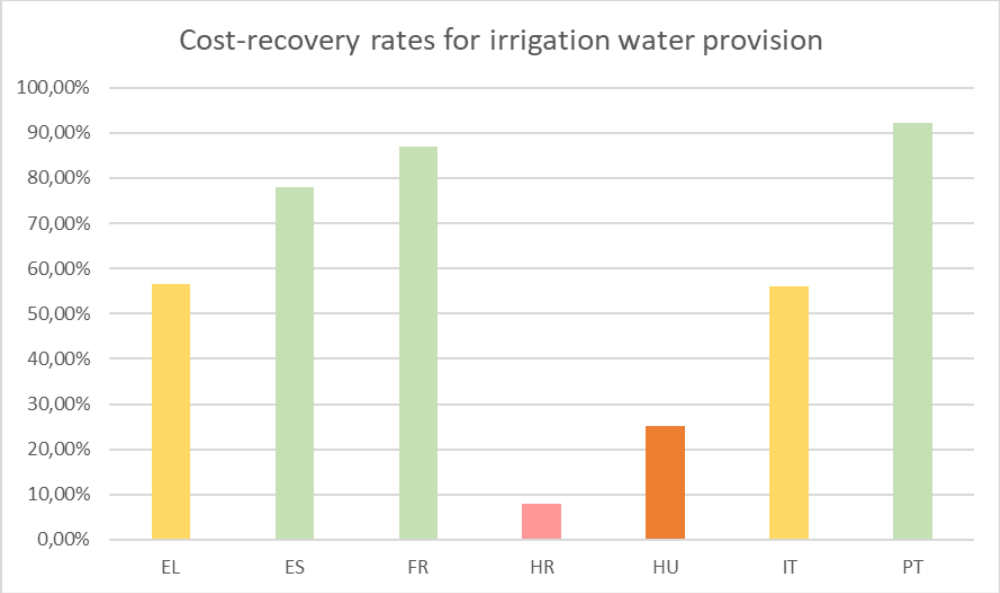
Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[135], EC (2019)[136])

[135] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[136] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

With such fragmented data, it is difficult to come up with some overall considerations. Nevertheless, it is still possible to make a synthesis of financial cost-recovery levels in those countries, where irrigation tariffs are placed on top of water abstraction charges. Thus, the synthesis excludes those countries where only water abstraction fees are charged on farmers, since these fees are not aimed at recovering the financial costs of water provision, but rather to cover the environmental costs of water abstraction.

Figure 6-13 Financial cost-recovery rates for irrigation water provision in those countries where irrigation water tariffs are in place



Source: Information provided by the MS in the context of this study (including 2nd RBMPs and EC (2019)[137], EC (2019)[138])

As compared to the domestic sector, where detailed financial data are generally available in several MS, and where cost-recovery issues have received a lot of attention, **the financial aspects of the provision of irrigation water seem to get less attention at the EU level**. Data are often scattered, and the implementation of the cost-recovery principle is often weak.

[137] European Commission, 2019, "European Overview – River Basin Management Plans," SWD(2019) 30.

[138] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," COM(2019) 95.

7. PUTTING MAIN RESULTS INTO A WIDER PERSPECTIVE

7.1. Main results: Assessing the costs of the Water Framework Directive

In spite of the progress achieved in improving the **status of surface and groundwater bodies** in the EU since the first cycle of river basin management planning, further work and investment are required to improve the condition of aquatic environment.

In particular, in the 2nd river basin management planning cycle, **40% of surface waters** were in **good ecological status or potential** and **33% in good chemical status**. It should be noted that in most MS, only a few priority substances (e.g. mercury) account for poor chemical status. MS are making progress in tackling sources of contamination, but due to the one-out-all-out principle, these improvements are usually visible only at the level of individual pollutants and often not at the aggregate level of the overall status. In addition, the proportion of water bodies with unknown status has decreased and the confidence in status assessment has grown as regards both ecological and chemical status/potential of surface water bodies.

Overall, surface water bodies were affected by **pressures** from hydro-morphological changes (39%), diffuse sources (39%), point sources (17%) and abstraction pressures (7%). The main **impacts** on surface water bodies include chemical pollution (50%), altered habitats due to morphological changes (37%) and nutrient pollution (27%)

In comparison, **92% of groundwater bodies were in good quantitative status** and **82% in good chemical status**. Similarly to the surface waters, groundwater bodies were affected by **pressures** from diffuse sources (25%), point sources (12%) and abstraction (10%). In particular, in the EU, agriculture is the main cause of groundwater's failure to achieve good chemical status, as it leads to diffuse pollution from nitrates and pesticides. The main **impacts on groundwater bodies** are chemical pollution (13%) and nutrient pollution (9%).

The costs of achieving good status or potential for over 111 000 surface water bodies and over 13 000 groundwater bodies in the EU27 have been significant. In total, **capital investment costs of the measures** planned in the 2nd RBMPs **reach at least EUR 142 billion** (noting that these cost estimates are incomplete). While the majority of countries estimate and report costs of planned measures in their RBMPs, the **knowledge base on the costs of planned measures is heterogeneous and incomplete** across the EU27. First, many cost estimates are partial, because they cover capital investment costs with no corresponding estimates of the annual operational and maintenance costs (the latter are known in about one third of the countries).

Furthermore, in many instances where **cost estimates are** available for the countries, they **are partial** because they only cover *selected types of measures* (e.g. basic or supplementary), *selected measures* (i.e. cost estimates not available for all measures include in the PoMs), *selected areas* (i.e. for some River Basin Districts only) and / or *selected sectors* (e.g. costs to public sector only).

The knowledge is even more partial when considering **available cost data for basic measures** (Art 11(3)(a), (b-l)) and **supplementary measures** (Art 11(4) and 11(5)). In general, the knowledge base across the countries is stronger for the costs of supplementary measures (capital investment and operational and maintenance costs) in comparison to the costs of basic measures. This is due to the practice that in some countries, the cost estimates only cover the additional costs of measures for which funding needs to be sourced.

On a country basis, there is a **significant fluctuation in the shares of basic and supplementary measures in total capital investment costs of measures.** The shares

for basic and supplementary measures respectively ranges from 5% to 95% in Malta to 98% and 2% in Greece for basic and supplementary measures respectively[139]. In general, countries in Central and Eastern Europe focus their capital investment efforts on basic measures (including water supply and sanitation sector measures).

Finally, **few countries assess the total costs of achieving water policy goals** (i.e. the costs of achieving environmental objectives as opposed to the costs of measures included in the PoM). Some countries (e.g. Belgium) employ scenario approaches to estimate costs of achieving environmental objectives, while in other countries (e.g. Estonia, Slovakia), such assessments of future investment needs strongly focus on water supply and sanitation infrastructure.

A **wide range of measures** is included in the 2nd RBMPs, including measures aiming to address pressures caused by abstraction and water scarcity, pollution from agriculture, point sources and hydro-morphological alterations, showing overall consistency with significant pressures and impacts.

While the majority of countries estimate and report costs of planned measures by sector or by type of measure in their RBMPs, there is a substantial heterogeneity in the available information on costs of measures by sector or type. Countries are using different lists of sectors, types of measures and other groupings to estimate costs of measures limiting comparability. However, one should note that in many countries the measures in the water supply and sanitation sector account for a large proportion of the costs (e.g. 90% of total in Belgium). Measures aiming to reduce diffuse agricultural pollution also feature in PoMs accounting for up to half of total costs (e.g. in Hungary ~52%).

At the same time, measures aiming to alleviate hydro-morphological pressures, while included in the PoMs, attract a relatively small proportion of planned investments (e.g. ~3% in Belgium and ~15% in Portugal).

In order to identify the set of planned measures, MS are using **economic appraisal methods**. The WFD stipulates that PoMs need to include a cost-effective set of measures. While most countries employ Cost-Effectiveness Analysis (CEA) of the planned measures, in many instances, the analysis is applied only to a sub-set of measures and in combination with qualitative appraisals. Furthermore, an integrated assessment of the different types of measures is rarely applied with CEA largely focusing on pollution mitigation measures and fully fledged Cost-Benefit Analysis rarely used by countries.

7.2. Main results: Assessing the costs of the Floods Directive

In the context of flooding, MS have identified in total 7,906 areas of potential significant flood risk (APSFRs) during the development of preliminary flood risk assessments (PFRA) and flood risk management plans (FRMPs). Contrary to the Water Framework Directive, the Floods Directive does not define country specific measurable targets that should be fulfilled within a certain period. Instead, countries have defined their own **objectives** in the FRMPs.

The formulation of flood risk management objectives is heterogeneous across countries and concerns the quantification of flood risk levels, areas, impacts targeted, measure types, and coordination. Generally, the objectives are not **quantified and measurable**, hindering the estimation of the level of effort, the linking to measures, and the estimation of costs and of the cost-effectiveness of measures (including the importance given to nature-based solutions in addressing flood risk while delivering additional benefits).

[139] When excluding the countries that only provide cost estimates for basic (Luxembourg) or supplementary measures (Belgium, Netherlands, Lithuania); note that Czechia reported EUR 0 cost for the supplementary measures.

Measures aiming to reduce floods' adverse consequences for human health, the environment, cultural heritage and economic activity have been put in place in the national FRMPs necessitating substantial capital investment and maintenance costs. The **total flood risk mitigation costs** planned in the 1st FRMPs reach at least **EUR 14 billion**, but these figures should be interpreted with caution as the knowledge base on costs is heterogeneous and incomplete. Not all countries report costs in their 1st FRMPs and the available cost estimations are often partial covering specific types of measures, areas or cost categories. The costs of some types of measures are location specific (spatial planning measures and nature-based solutions that depend on land prices) and therefore the estimates of such costs are difficult to transfer to other countries.

Detailed information on the **costs per flood risk component** (prevention, protection, preparedness, and recovery) or per type of measure (structural/non-structural) is lacking. Few countries report on future **investment needs** and this information is heterogeneous as concerns the use of time horizons and scenarios.

Countries apply a wide range of flood risk reducing measures targeting specifically prevention, protection, preparedness, and recovery. There seems to be a specific emphasis on structural measures. The **costs and effectiveness of non-structural measures** are often difficult to quantify and, therefore, these types of measures are often discarded in economic ranking procedures. Few countries provide detailed information about the application of **natural flood management measures,** even though they are an interesting option worth to be considered in analyses because of the multiple benefits they provide.

Most countries apply some form of **economic appraisal approaches** to evaluate measures. However, in many cases it is unclear if and how the results have been used for **the selection and prioritization of measures**.

The completeness of **cost-benefit analysis** differs across countries that apply this method. **Environmental benefits** are rarely considered, even though they can be especially important for the evaluation of non-structural measures and natural flood management options. In these cases, the **combination of cost-benefit analysis with multi-criteria analysis** seems to be promising as it allows to capture environmental benefits that can be decisive.

Few countries account for the synergies of so-called **"win-win measures"** (the measures that simultaneously serve WFD and FD objectives) in economic evaluation procedures and in the prioritisation of measures. A method allowing the **prioritisation of synergistic measures** is currently lacking.

7.3. Main results: Financing of Measures

When it comes to the **financing the management of water ecosystems/resources and floods**, data and information are scattered and heterogeneous across MS – and thus the analysis of the fiches has been mostly qualitative. Nevertheless, some important key messages emerge from the wealth of information included in MS fiches:

- The most important funding sources for water management in Europe are **water and sanitation tariffs, EU funds and national public funds** – they are in place in a vast majority of MS[140], and the financial volumes deployed are larger than other sources;

[140] These funding sources are likely to be in place in all MS – however, some MS fiches do not provide any information on their use.

- **Abstraction and pollution charges** are in place in several MS, and generate significant revenues. However, while in some MS their revenues are earmarked and directed to water management, in a few other MS, these revenues go into the Central Government budget or are allocated to regional, local or municipal budgets for several uses. In these countries, earmarking revenues may be a way to unlock additional revenues for water management;
- **Private investments** receive limited application in EU MS. Further investigations to assess the potential for additional private financing, and its potential impacts (in particular in the economic and social domain) would help identifying untapped potential for funding, and thus would deserve further attention in the debate on financing water resource management at the EU and national level;
- **Innovative funding arrangements** would deserve further attention in the future, so as to assess their potential for funding water management measures. It concerns for example PES schemes; financial assistance schemes combining public funding and financial participation by recipients (e.g. farmers); and an environmental fund financed by hydropower companies;
- At present, a variety of **charges on other significant water uses** (e.g. taxes on pesticides, charges on alluvial sediment extraction) are in place in some MS, targeting different types of water users. These charges improve the implementation of the polluter-pays and user-pays principle, and hence their implementation in MS should be promoted. For example, while nitrates and pesticides are one of the main water management issues in the EU, only three MS currently have specific charges in place (and a fourth one is planning to have one), revealing weaknesses in the implementation of the polluter-pays principle in the EU.

Surely, all untapped or emerging sources of funding should be carefully explored at EU and MS level before commencing design and implementation, in order to ensure that they fit into the specific architecture of the national economic, social and environmental settings[141].

Overall, the implementation of full-financial cost-recovery for the WSS sector (excluding irrigation) still presents some weaknesses in the EU, although improvements have taken place since 2006 – following WFD implementation. In one third of the MS (9 out of 27), financial cost recovery is 100% or higher; in 5 countries, the cost-recovery rate is between 90 and 100% and 6 countries between 80 and 90%; in 4 MS, cost recovery levels are below 80%; and in 3 MS this information was not available. In 10 MS out of 27, water and sanitation tariffs are set between 1 and 2 EUR/m^3; in 6 MS between 2 and 3 EUR/m^3; and in 5 MS, tariffs are above 5 EUR/m^3. Further investigation is required to better identify the factors that constrain the application of the cost-recovery principle, and the possible solutions for addressing those.

A comparison between cost recovery levels and the affordability of water and sanitation expenditures in the EU suggested that, in general, **full cost recovery levels** – and also cost-recovery levels between 90 and 100% - **do not seem to compromise the affordability of water services.** In all these MSs, water and sanitation services appear affordable for all, including on average, the households in the lowest income decile, i.e. when considered at the aggregated level.[142] However, in the countries not yet reaching full cost-recovery and planning to achieve it by raising current water and sanitation tariffs, it is recommended to carry out an ex-ante assessment of the affordability of higher water tariffs, in particular concerning the vulnerable households, and to implement accompanying measures (e.g. social tariffs) to mitigate any affordability-related issues.

[141] A MS representative suggested that this might be a good starting point to think about the future work programme of the CIS Strategic Coordination Group.

[142] Still, water consumers in the majority of countries might still face challenges in paying their water bills, with mechanisms put in place for supporting them to ensure they benefit from the essential water services.

7.4. Putting the assessment results into perspective: discussion

The analysis of the available MS data has led to the following findings on the need to progress towards a more strategic approach to financing water-related investments (in line with what was discussed in Chapter 4):

- **Integrating or mainstreaming water financing considerations** across all water-related sectors should be a priority in order to leverage additional funds for sustainable water resources management. Currently, a sector-biased approach is predominant, which is actually hindering the possibility to leverage funds from other sectors but also to adopt a more holistic approach to financing, one that actually matches the nature of some of the policy challenges: i.e. a nexus approach[143], the conservation of biodiversity, macroeconomic performance, resource efficiency, circularity, et cetera. To put it in a different way, there seems to be scope to unlock some institutional lock-ins in the current financing approaches: a bias in public investment systems towards conventional infrastructures, and weak institutional innovation to address wider challenges (such as adaptation or long-term security from a nexus approach). International finance for climate-related purposes has grown significantly, but over 80% of disbursements are geared to mitigation programmes in the energy and transport sectors (UNEP, 2016)[144], with an untapped potential from adaptation funds.
- In terms of assessment, additional lock-ins can be found, such as comparing grey and green infrastructures at the hand of cost-effectiveness analysis, which does not factor in the multiple benefits from the latter infrastructure type. Hence, there is significant potential to **move away from 'least-cost' to 'best-value' approaches**: using existing financial resources to fund water-related activities that provide the highest social, environmental and economic benefits. As regards the practical steps in policy preparation, this does not only entail a wider use of cost-benefit analysis, beyond cost-effectiveness analysis, but also the use of these analytical frameworks to inform decisions *ex ante* rather than to justify them *ex post*. There is evidence (Urrea et al, 2020[145]) that infrastructure maintenance and conservation policies have been developed mainly from a corrective point of view, i.e. once the asset has failed.
- Looking at the multi-level governance schemes in place, it seems that what should be improved is not just the **coordination of sectoral policies but also of water-related investments**, as shown in the definition of match-funding schemes and the discussion on public interest investments, pervasive in the new Plan DSEAR in Spain.
- Part of the **potential to minimize the need of financial resources remains untapped**. Although there have been major efforts to increase water use efficiency (for instance in the modernisation of irrigation systems in Mediterranean countries) and to ensure adequate asset management, none of those efforts has delivered in general terms as required, especially when it comes to achieving the overall

[143] See for an introduction to the "nexus approach," this internet page of the Global Water Partnership (Mediterranean).

[144] United Nations Environment Programme. The Adaptation Finance Gap Report 2016; Nairobi, Kenya

[145] Urrea-Mallebrera, M. A., Altarejos-García, L., & García-Bermejo, J. T. (2020). Management of River Basin Physical Assets. In *River Basin Management*. IntechOpen.

objectives, i.e. the wider long-term water security at a basin level). There are very significant savings in a number of irrigation districts in Southern European countries, but those savings are not always transferred to the river basins (as evident in countries like Spain or Italy).

- There seem to be ways of i**ncreasing revenues internally generated** in the water sector, an approach that may complement the use of funds generated elsewhere (i.e. climate financing, integrated projects in LIFE, et cetera). This should also be compatible with the **increase of public budgetary resources to water-related activities**, although trade-offs will need to be considered in view of, on the one hand, the joint effect of increased indebtedness and fiscal consolidation efforts and, on the other hand, the significant stimulus from recovery and resilience packages. Overall, a public debate on how to share costs and benefits as to water policy seems a pending issue.
- The strategic use of **resources from the Recovery and Resilience Facility under Next Generation EU** (as 'intelligent money') may contribute to leverage other sources of finance.

Opportunities to improve financial appraisals and economic assessments informing financing decisions

As discussed above in Section 5.2, there is evidence that the improvement of financial appraisals and wider economic assessments is of chief importance to improve the decisions about the prioritisation of investments and the strategic financing of measures overall. The most critical findings are:

- Overall, **difficulties are observed to make a clear difference between ensuring upfront capital investment and project finance (to deal with opex and financial sustainability),** and how to connect these to water pricing (tariffs, charges/fees, taxes, subsidies, et cetera), in line with the discussion under Section 4. This shows the lack of an integrated, strategic approach. However, some progress can be observed in a number of MS.
  - ✓ In **Belgium**, comprehensive scenarios have been developed (September 2020) to estimate the investment necessary to achieve full compliance with the WFD objectives (GES). Whether or not these scenarios suffice to reach the objectives remains, however, uncertain.
  - ✓ In **the Netherlands,** the future investment needs in flood protection have been assessed through a comprehensive cost-benefit analysis (CBA). Before the Delta Plan (2011), the country already spent about EUR 1billion annually on flood risk management. Responding to the 1990s intense flooding of the Meuse riverbanks in Limburg, the Delta Plan established new safety targets for maximum flood risk ranging from a risk level of death of 1/1250 to 1/100,000 a year. Climate change and land subsidence are amplifying risks.
  - ✓ As discussed in Section 5.2, **the use of sound financial appraisals could be improved; wider economic assessments (dealing with multiplier effects on macroeconomic performance and externalities) are even weaker.** The European Commission's (2019) evaluation[146] recognised that a number of MS had upgraded their water pricing policies by fulfilling the *ex-ante* conditionality for water under the Common Provisions Regulation for the

[146] European Commission, 2019, 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); Second River Basin Management Plans and First Flood Risk Management Plans," 2019 COM(2019) 95.

European Structural and Investment Funds for the period 2014-2020. Progress was acknowledged in terms of the definition of water services, the calculation of financial costs, the performance of economic analyses and the assessment of both environmental and resource costs for compliance with the cost recovery principle.

- **CEA is becoming more widely used as compared to the first cycle of river basin management planning, and as required for decisions on PoMs, but cost curves stemming from those CEA tend to be used *ex post* to justify previously made decisions.**
  - ✓ In October 2020, **Spain** released the so-called DSEAR plan for public consultation. The plan concerns wastewater treatment, sanitation, efficiency, savings and reuse. Part of that effort is on improving the use of CEA to prioritise investments.
  - ✓ In **Cyprus**, both RBMPs and FRMPs are ranked based on a multivariate, qualitative CEA. This assessment was performed for all measures in the RBMP. Measures were ranked in terms of effectiveness based on multiple criteria such as the relevance of measures, the time required for implementation and for delivering outcomes, the number of water bodies affected, the relevance to climate change, and costs. However, it remains unclear how the results of the CEA feed into the prioritisation of measures, as there is no specific mention of the methodology or the results from such a prioritisation.
  - ✓ In **Belgium (Flanders)**, CEA was only used for the prioritisation of sewage infrastructure and wastewater treatment projects; Multi-Criteria Analysis (MCA) was used for all other actions.
  - ✓ In **Finland**, CBA was used in the prioritisation and the planning of measures in all five of the FRMPs assessed. CBA did not consider multiple benefits, but only those based on avoided damage from conventional flood defences. Not all measures could thus be assessed.
  - ✓ In **Greece**, the magnitude of flood damages was estimated during the preparation stage of the flood risk maps. In addition to the identification of potentially affected uses, an evaluation of flood impacts was carried out via a vulnerability assessment of affected areas, uniformly applied across all FRMPs and based on a common CBA framework.
  - ✓ In **Lithuania**, measures for FRMPs were selected at the hand of a CBA and multi-criteria analysis. Costs and benefits were assessed for all measures. As in other cases, a more detailed CBA for structural, grey infrastructural measures was developed.

- **Full-fledged CBAs are very scarce. There is hardly any discussion on discounting even when decisions on climate change adaptation and long-term water security are to be made.**
  - ✓ Although there is evidence that many MS delivered some analysis of costs and benefits of measures and also that the majority of them did so through a national approach, most of these analyses are partial and some of them remain mostly largely qualitative. The lack of basic information on costs and benefits is evident as well for the assessment underlying "disproportionate cost"

decisions, which are at the core of many exemptions (see for instance Machác et al., 2020)[147].

- ✓ The lack of an adequate use of discount rates is somewhat problematic, particularly with measures addressing water quality and with investments addressing climate change adaptation, whose benefits may need decades to be evident (IEEP et al, 2018). Discounting is a technical procedure to put costs and benefits occurring now and in different periods in the future on a common denominator. It shows the weight we give today to impacts happening in the future (the "present value" of these impacts). The choices underlying the discounting method (such as the choice of discount rate) matter for a proper and meaningful assessment of the expected benefits and costs of policy measures, especially in cases where the most relevant outcomes are expected to materialise many years or decades from now.

- **Some MS have identified the need to apply new decision-making methods (such as those that have been developed to deal with risk and uncertainty), but in most RBDs, these methods have not yet been implemented. Innovative financing mechanisms and innovation in decision-making theories (including robust decision-making, stochastic modelling, real option methods, et cetera) are not pervasive.**
  - ✓ In **Sweden**, new tools (such as robust decision-making and resilience thinking principles) are being developed to support decision-making. Studies have been carried out to measure the cost of flood prevention measures for the municipalities, and the effects of floods on economic output, which does not seem a very innovative metric anyway.
  - ✓ In **Austria**, the concept of "step-wise reaching of objectives" by designating areas/regions as "priority areas" (*Sanierungsraum*) is not a straightforward prioritisation of measures. However, this framework works with different time-limited objectives, focusing on main pressures (hydro-morphological alterations in that case, mostly referred to hydropower and flow regulation actions).

- **Circular economy approaches offer a significant potential for innovation in pricing schemes (and public procurement, i.e. circular procurement)**. The Commission's proposal for a "Renewed Sustainable Finance Strategy," under development in 2020[148], contains the goal of mainstreaming finance for a circular economy. It is developing policies and regulations to influence businesses to measure and report on circular economy activities
  - ✓ **Cyprus** offers an example where water reclamation, tertiary treatments and water reuse projects are based on public-private partnership (PPP) schemes (such as BOT (Build, Operate and Transfer), as part of a policy to outsource projects[149]), partially funded from public funds, based whereas. The costs of producing desalinated water are to a large part charged to end users, reportedly unlike in other countries (e.g. Spain), where desalinated water is sometimes subsidised.

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[147] Macháč, J.; Brabec, J. and Vojáček, O. 2020. Development and implementation of the concept of disproportionate costs in water management in central Europe in the light of the EU WFD. Water Alternatives 13(3): 618-633

[148] The Commission is expected to adopt this Strategy soon after the conclusion of this report. In 2020, the Commission carried out extensive public and expert consultations.

[149] BOT, a model used in Public-Private-Partnerships, is a project delivery method used for large-scale (water and other) infrastructure projects: a private entity receives a concession from the public sector to finance, design, construct, own, and operate a facility stated in the concession contract.

- ✓ **Malta** provides incentives to farmers to use reclaimed water (at 0.20 €/m^3, for consumption levels below 2,500 m^3 and 0.5 ha of cropland), in order to replace groundwater sources (abstracted on average at 0.56 €/m^3). In addition, the public utility Water Services Corporation (WSC) is undertaking the project 'Towards Net Zero Impact Utility', which aims to move towards the full recovery of costs of the urban water cycle in the longer term, through a combination of charges.

8. CONCLUSIONS - STRENGTHENING STRATEGIC FINANCING IN MS: AREAS FOR FURTHER WORK

This study's assessment illustrates the current application of economic assessment methods in the frame of the implementation of the WFD and FD. It stresses, in particular, the following:

- Some economic knowledge receives **very limited attention** in the WFD and FD planning process as well as in water policy making in general, including because of the limited knowledge base that is currently available at the MS and EU scale. These include *inter alia* information on:
  - ✓ The **operational and maintenance costs** of the majority of measures (apart for measures related to water services);
  - ✓ The assessment of the **costs of the FD measures** when they are carried out mostly at the local levels, and mechanisms that would facilitate the aggregation of (locally defined) costs to the river basin and national scales.
  - ✓ The **non-financial economic impacts** of measures, including the macro-economic impacts of proposed PoM;
  - ✓ The costs of **measures proposed for addressing hydro-morphological** pressures (these costs been very dependent on local conditions including access to land), and the costs (and benefits) of **multifunctional measures** (nature-based solutions) that can benefit both the WFD and the FD;
  - ✓ The **total costs required to achieve policy goals** for both the WFD and the FD (with the additional challenge to Member States to define their goals for the latter), while accounting for ongoing climate change (an area not well covered in the WFD implementation) and socio-economic trends. As regards the FD implementation, studies at national level using the Aqueduct Floods framework, could deliver more detailed and context-specific results than what the Aqueduct Floods tool delivers, supporting FD planning and strategic financing. The assessments supporting FD decisions would also benefit from a better understanding of the additional (marginal) costs that would be required to achieve stricter levels of security (in terms of flood standards) in different MSs;

- There is very limited evidence on **how the results of economic assessments are inform the selection and prioritisation of measures**. In some cases, it is clear that the choice of measures is made independently of the outcome of economic assessments, in particular when some measures (e.g. basic measures) have to be implemented anyway and take up the bulk of (readily) available (public) financial resources. In other cases, economic assessments are carried out *ex-post* without informing the selection of measures, thus mainly to respond to reporting requirements. In the majority of cases, the selection of measures under the WFD and FD PoMs carried out at the level of a river basin accounts for the readily available financial resources (with a few iterations between cost assessment and the search for financial resources), as set in public institution budgets or resulting from negotiated revenues from water-related charges. Thus, the priorities in investments rarely affect financing sources and instruments directly – as changes in financing instruments mostly originate from nationally driven policy changes and / or political processes. With investment and finance decisions remaining mostly sector-specific and then in parallel siloes, and in the absence of a systematic prioritisation of cost-effective measures (e.g. treating problems at source, soft measures supporting changes of practices instead of high-cost infrastructure, nature-based solutions…), more attention needs to be given to estimating the cost-

saving potential MS could seize to reduce implementation costs. The estimation of such cost-saving potential would lead to a more systematic consideration and subsequent implementation of more cost-effective measures (e.g. pollution prevention, nature-based solutions, PES). This could be promoted through a better availability and diffusion of easy-to-apply methodologies, helping to compare options quickly and effectively. In this domain, sharing of best practices and more exchanges of information on how to implement these approaches could be useful for MS.

- An increasing number of Member States appear open to consider or already apply a range of (**new) innovative instruments** including mechanisms that involve the private sector. They require more attention and knowledge on the following factors: their design and implementation; their performance in terms of the additional financial resources provided; the conditions under which they perform (including the synergies with other regulatory, voluntary and economic instruments); the types of measures and improvements they can support; their contribution to the overall policy goals, hence in terms of enhanced water status and reduced in flood risk. Of particular interest are:
  - ✓ A wider application of **environmental charges and taxes**, along with mechanisms that enhance the earmarking of their revenues to effective water management improvements;
  - ✓ The establishment of a **Payments for Ecosystem Services** (PES) system connecting the farming community supplying these services and the (private and public) beneficiaries of these services, an instrument that is available in the new Common Agricultural Policy;
  - ✓ Voluntary agreements with / instruments targeting the **(energy) hydropower operators** who can deliver additional financial resources to support river and hydro-morphological restoration;
  - ✓ The establishment of mechanisms that facilitate the streamlining of financial resources from different sectors/funds in order to support the effective implementation of (multi-functional) **nature-based solutions**;
  - ✓ Existing evidence on financing instruments (in terms of their operational application, revenues generated and use of these revenues) is rarely presented and put into the context of the wider water financing framework. Indeed, financing solutions are mainly developed and set on a sector-by-sector basis, with limited interactions between sectors or integration of sectors. More attention could be given to the **appropriate combination of sources of finance**, acknowledging that different public and private sources have different roles to play, driven by different considerations.

Experiences reported by MS as well as the European stakeholder workshop organised in the context of this study suggest a range of actions for filling the economic and financial knowledge gap and supporting the development of sound financial strategies in line with the ambitions of the two Directives. They include (not presented in any order of priority):

- **Update MS reporting** in order to gather more robust and coherent information. In relation to the FD, MS could provide a set of quantifiable objectives in the various FRMPs, in terms of targeted flood risk reduction against which impacts of measures can be measured. This information would ensure that the various measures' contributions to and the overall progress towards the objectives can be monitored and that the cost-effectiveness of measures can be used as criterion in the prioritisation process. In relation to the WFD, a more coherent cost reporting would clearly help improving the understanding of the magnitude of the efforts required

for achieving policy goals and the distribution of costs among water users and sectors. The cost reporting should cover the investment costs and the operational and maintenance costs, and it should not be limited to the measures that benefit from public (financial) support. The reporting should also cover the current financing and cost-recovery levels. However, such efforts to upgrade the reporting standards require a shared understanding of its purpose and benefits among all actors involved in the Common Implementation Strategy (CIS) process. Rather than a mere compliance checking exercise, it should be a collective effort to set a shared knowledge base on costs (and financing) so that the challenges of the WFD and FD implementation are made visible, shared and known by policy makers at different levels. At the same time, the reporting could then help water managers in charge of the WFD and FD implementation to give attention to costs and financing challenges in the various MS, including in relation to the adequate mobilisation of EU funds.

- **Strengthen the knowledge base** that can support the implementation of the WFD and FD with studies and additional research:
  - ✓ This relates to the knowledge gaps already identified above, in relation to specific **cost and benefit categories** and to **pre-conditions to and the performance of (innovative) economic instruments and financing schemes** that may represent alternative sources of financing some MSs could adapt to their own water management, socio-economic and institutional context;
  - ✓ This relates also to **nature-based solutions** that can contribute to the objectives of both Directives. One should give attention to the costs and the direct and indirect benefits of multi-functional measures, accounting for the contributions to the different services ; as well as the mechanisms that can help reducing the bottlenecks to an effective implementation, in terms of governance, social acceptability, and as regards the streamlining of funding from different (sectoral) sources (WFD, FD, agriculture, climate, urban development, et cetera). Different efforts are made in MS for developing such knowledge. A coordinated evaluation framework and tools would then help establish a wider knowledge base that would support the comparison of grey and green solutions (paying specifically attention to the environmental impacts).

- Support the **allocation of financial resources** coming from the different financial instruments, e.g.:
  - ✓ Increase the **earmarking of revenues** (such as from the existing water charge schemes) to water-related financial investments, also going beyond the traditional water services (for example hydro-morphological restoration projects that can contribute to both the WFD and the FD objectives), and / or put political processes in place that explicitly consider how the revenues of new market-based instruments regulating water use can be used to contribute to WFD and FG goals;
  - ✓ Establish the conditions for seizing the **opportunities offered by the new Common Agriculture Policy in the implementation of Payments for Ecosystem/environmental Services.** This would help to ensure that these instruments connect the valuation of aquatic ecosystem services to the design and implementation of financial instruments that address various water management challenges (water quality, water quantity, hydro-morphology and ecology, flood risk, erosion, et cetera). The available information suggests that so far, mainly theoretical work has been carried out on this topic. Hence,

additional information on practical studies and examples would be welcome, because at present the main challenge is to gain expertise on how to turn this potential into practice. In addition, sharing and comparing the experience with actual applications would also be useful to shed light on the effectiveness of these measures. To help in this direction, the European Commission has published a non-exhaustive list of measures that can get financial support under Eco-schemes - although MS can be creative and propose additional innovative measures. Eco-schemes could be used to promote nature-based solutions.

  - ✓ Making the best out of **new revenue streams** in circular economy approaches, within the context of industrial symbiosis (i.e. clustering relevant economic activities); or make optimal use of (combining and blending) different EU financing instruments for investments in enhancing the knowledge base, experimenting novel approaches and supporting investments.

- Build (and strengthen) the connection between the water community and the financial sector (both public and private financers) at different levels (national & European) in order to bolster the actual "strategic financing" and risk-management approaches. This will promote outcome-oriented investment schemes and deliver long-term financing contributing to the achievements of the WFD and FD objectives. It can also provide a better understanding of the interaction of different instruments and of the "incentive compatibility" of various instruments within complex policy mixes (i.e. economic incentives, information mechanisms, command-and-control instruments, et cetera).
- Enhance the **sharing and benchmarking of practices between EU MS** – mobilising representatives of the water and financing communities e.g. on economic and financing assessments, strategic financing, innovative instruments, et cetera.


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