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Introduction and background

Climate change is already affecting people, the economy and the environment in Europe. Temperatures have repeatedly broken long-term records in recent years and are projected to further increase. The economic costs of not adapting to climate change could amount to at least 175 €billion in annual welfare loss in the EU under a 3°C global warming scenario.[1]

Climate change impacts primarily manifest in changes to the water cycle, including extreme events such as droughts and floods, but also gradual, yet significant effects on water availability, quality, and water-related ecosystems. This makes adaptation to water-related climate impacts a core challenge for immediate water-sector activities as well as for all sectors that depend on water resources. The failure to adopt climate-resilient water management will result in billions of euros in damages – as witnessed by the agricultural sector and inland waterways transport in the wake of the drought in 2018 and 2019.

Sustainable and climate-resilient water management is a critical building block for the overall climate-resilience of economic sectors, ecosystems and society at large. It is thus crucial for achieving the Sustainable Development Goals (SDGs) of the 2030 Agenda – SDGs 2, 6, 13, 15 in particular. Efforts to enhance climate-resilient water management, therefore, need to be further strengthened through policy, research and innovation, knowledge generation and capacity development. Successful implementation requires coordinated action on all political-administrative levels, from local, sub-national, and national to transboundary. The resilience of water systems, however, also strongly depends on sustainable practices in, and coordination among, related sectors – especially the agricultural and energy industries, as well as urban development.

In the face of increasing pressure on water resources, however, the incremental adaptation of water management to changing climate conditions will, in many places, not ensure resilience in the future. More systemic and transformational change will be required in the way water is managed, used by various sectors, and valued by society. This need for systemic change, however, can also prompt innovative solutions that bring along multiple benefits.

European institutions play a key role in establishing the framework conditions that enable all relevant actors in the Member States to accelerate efforts to enhance water and climate resilience. Germany's EU Council Presidency in the second half of 2020 provides a special opportunity to have an impact on relevant policy processes. To this end, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, in cooperation with the Portuguese Ministry of Environment and Climate Action and the Slovenian Ministry of the Environment and Spatial Planning, hosted the **online conference 'Climate change and the European water dimension – Enhancing resilience' on November 4-5, 2020.**

This policy paper results from the deliberations at the conference and provides recommendations for the European Commission and EU Member States on how to increase water-related climate resilience and initiate the transformational change required to ensure resilience in the future. The paper provides input for the current political debate and, in particular, the new EU Adaptation Strategy expected for early 2021. It also aims to influence targeted EU initiatives to enhance adaptation efforts at EU, Member State and transboundary levels. The paper is intended to be comprehensive in scope rather than propose detailed measures for implementing the policy recommendations. A draft of this paper served as a basis for discussion among conference participants and was finalised in the follow-up by drawing on the outcomes. It builds on a background paper available on the conference website, which analyses in more detail the observed and expected climate change impacts, adaptation measures adopted to date, required action and possible entry points for EU activities.

[1] Feyen et al. (editors) 2020: Climate change impacts and adaptation in Europe. JRC PESETA IV final report.

Challenges and opportunities for water and climate resilience

Climate change significantly affects the water cycle, but the effects are diverse across different regions in Europe and manifest with seasonal variability. Uncertainties remain in projections of future impacts. An increase in temperature and changes in rainfall patterns will affect all types of water bodies, such as rivers, lakes and wetlands, but also groundwater, coastal waters and oceans. Models predict more frequent and severe hydrological extremes, but also significant, slow-onset changes to water availability, quality and seasonality as well as sea-level rise. While there is a clear north-south gradient, with southern regions of Europe much more impacted through the effects of extreme heat, water scarcity, and drought, other parts of Europe will increasingly have to face seasonal water stress and drought as well. Moreover, climate change is projected to progressively increase the frequency and severity of river and flash floods in most of Europe and damage from coastal flooding is projected to rise sharply along all European coastlines.

Indirect climate change effects on water systems can further result from adaptation measures in other sectors, often referred to as maladaptation. Better cross-sectoral coordination is required to prevent trade-offs. This applies especially to the agricultural and energy industries, where adaptation to changes in temperature and rainfall may result in higher water withdrawals for irrigation and cooling, but also urban development. In a similar vein, grey infrastructure, such as dams and dykes – built to increase water supply for irrigation, to attenuate floods, or maintain water levels for shipping – compromise the health of water-related ecosystems and the critical services they provide for resilient water systems. As a result, they should only be applied in exceptional cases, where necessary for sustainable human development.

Moreover, the EU and its Member States will be affected by climate change impacts outside Europe through international trade, supply chains, migration, and more. Increasing and abrupt occurrences of e.g. water stress and hydrological extremes are likely to disrupt water, food and production systems in the future all over the world. This may destabilise societies, threaten peace and security, and force people to migrate – especially in fragile countries. This makes climate resilience outside Europe a concern for all Member States and the EU, including in security policy and external relations.

In recent decades, there has been considerable research and debate on climate adaptation; various measures, strategies and policies have been adopted at the EU and Member State levels, as well as in cross-border regions and transboundary river basins. The 2013 EU Adaptation Strategy has prompted mainstreaming of adaptation into various policy areas, knowledge generation and exchange, and supported national adaptation strategies. Moreover, several water-related policies at the EU level directly or indirectly address adaptation to water-related climate impacts. These include the Water Framework Directive (WFD) and the Floods Directive (FD). The recently proposed EU Climate Law requires Member States to develop and implement adaptation strategies to strengthen climate resilience, thereby providing a legal basis for further action.

Climate-resilient water management needs to be further strengthened as a cornerstone of climate change adaptation and overall climate resilience. In the face of uncertainties in climate and socioeconomic projections, **challenges remain in regard to the availability of data and knowledge** to carry out comprehensive risk assessments, **the research and development of flexible and robust adaptation approaches** that provide benefits regardless of future climate conditions, and **financial and regulatory instruments that favour resilient solutions.**

Climate-resilient water management also provides opportunities to create co-benefits for the economy, ecosystems and society at large, including through climate mitigation effects. Nature-based solutions[2] have proven to be especially effective in providing robust and flexible water management while creating multiple benefits, including for biodiversity conservation, recreation and climate mitigation. The restoration of wetlands for flood protection and water storage, for example, can also support biodiversity and human livelihoods and increase quality of life. Moreover, restoring and conserving wetlands, especially peatlands and bogs, preserves their function as carbon sinks. Climate mitigation effects can also be yielded from reducing consumption and increasing the reuse of water to adapt to limited availability, as this will reduce the energy needed for water supply and treatment (e.g. in energy-intensive desalination plants) and thus reduce related greenhouse gas emissions.

While sustainable water management is crucial for overall climate resilience, there is a risk that the combined pressures from climate change and unsustainable water and land use will push water systems beyond their coping capacity, especially if the international community does not effectively pursue efforts to limit global warming to 1.5°C or even misses the goal of limiting it to well below 2°C. For example, over-abstraction of water combined with continuing pollution and rising temperatures has already caused the collapse of some freshwater ecosystems in the EU and many groundwater sources have already become depleted or unusable due to high nutrient or salt loads. Degraded ecosystems may stop providing their water-storing and flood-retention services, for example, and deteriorating water sources can compromise water supply systems with potential impacts for hygiene and health.

Ensuring water-related climate resilience in the future will require some fundamental changes in water management but also in other water-using sectors, society and the economy. Incremental adaptation to climate change through sustainable water management may not be enough to prevent irreversible effects on water systems or protect the economy and society from water-related climate risks. Instead, more transformational adaptation[3] will be required to maintain resilient water systems, including systemic changes in land and water use, consumption patterns, agricultural production, and spatial and urban planning. **This will require increased awareness of the value of water and resilient water systems for the economy, society and the environment, better cross-sectoral coordination, as well as strong political will and appropriate governance approaches to manage conflicting interests and implement the necessary changes.** Adaptive governance systems and adequate policies at EU, transboundary, Member State and local levels need to provide the enabling environment for enhancing resilience.

[2] The European Commission defines nature-based solutions as 'solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.'

[3] The IPCC defines transformational adaptation as 'adaptation that changes the fundamental attributes of a social-ecological system' and as 'characterised by system-wide change or changes across more than one system, by a focus on the future and long-term change, or by a direct questioning of the effectiveness of existing systems, social injustices and power imbalances.' (IPCC, 2019: Annex I: Glossary [Weyer, N.M. (ed.)]. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate)

Policy recommendations for EU initiatives to enhance water-related resilience to climate change

Mainstreaming water-related climate resilience into EU policy and international frameworks

More attention needs to be paid to water-related issues in relevant international and EU policy frameworks. Stronger efforts by the EU to mainstream water-related climate resilience are crucial in order to reduce negative impacts from conflicting sectoral policies, make best use of EU funds by leveraging synergies, and support the systemic changes required to ensure resilient water systems. This refers not only to policies and strategies that deal directly with climate change adaptation, but also the various sectoral policies that impact the sustainability of water resources, including those related to agriculture, energy, transport networks, and urban and spatial planning, or those aiming to promote more sustainable economies and societies in general.

- **Increase coherence and ambition across relevant EU policies, strategies, and initiatives that affect climate-resilient water management and offer opportunities for synergies, including the Common Agricultural Policy (CAP), National Energy and Climate Plans (NECPs), the Urban Agenda for the EU, the Forest Strategy or initiatives announced in the European Green Deal, such as e.g. the Biodiversity Strategy and the Circular Economy Action Plan.** With regard to the CAP, the EC and Member States should make enhanced efforts to achieve water sustainability, as described in the CAP proposal. Member States' CAP strategic plans need to give priority to moving the sector towards sustainable use of water resources (e.g. by switching to less water-demanding crops, promoting water reuse, water retention through wet agriculture or paludiculture, and agroforestry) – while exploiting synergies with the Farm to Fork Strategy (F2F) for a fair, healthy and environmentally-friendly food system. Mainstreaming water into implementation of the Circular Economy Action Plan provides synergies for climate mitigation and resilience, as a circular economy perspective can help reduce water-dependency of consumption and production. The EU and Member States should exploit these synergies by stepping up efforts to promote water sustainability in industrial processes – for example through requirements for related monitoring and reporting, Eco-design and product labels. Similarly, NECPs need to comprehensively integrate water sustainability issues. Synergies between the EU Biodiversity Strategy and/or the EU Nature Restoration Plan on the one hand and, and climate resilience and mitigation, on the other, should be exploited by giving priority to nature-based solutions, e.g. restoring rivers, catchment forests and other water-related ecosystems, or creating blue and/or green ecological corridors. Synergies with the Urban Agenda can be leveraged by fostering transformational adaptation in cities and towns that centres nature-based solutions and blue-green infrastructure and serves multiple goals, including provision of sustainable urban drainage. This could be promoted, for example, within the adaptation pillar of the EU Covenant of Mayors initiative bringing together more than 9,600 cities in the EU. Moreover, the EC and Member States should duly consider water-resilience issues in plans responding to the Recovery and Resilience Facility. The EC should support coherence and synergies by providing relevant guidance and good practice examples (e.g. in online tool boxes) for policy mainstreaming and implementation in the Member States and by defining indicators that allow the measurement of policy impacts towards multiple goals, including water-related climate resilience.

- **The EU should promote mainstreaming water resilience into the implementation of relevant international policy frameworks related to climate change, disaster risk reduction (DRR) and sustainable development.** Some of the EU policies relevant to climate resilience are guided by international agreements and development goals, especially the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Framework for Disaster Risk Reduction (Sendai Framework), and the 2030 Agenda for Sustainable Development with its Sustainable Development Goals (SDGs). Mainstreaming water resilience into the implementation process of these policy frameworks is crucial to minimising trade-offs and negative impacts due to conflicting objectives (e.g. between renewable energy targets and resilient water systems; or between energy-efficiency and water treatment quality targets). Furthermore, climate-resilient water management can provide synergetic effects, as e.g. water-related ecosystems provide benefits in terms of climate mitigation, reducing disaster risk from flooding and various SDGs (especially SDGs 2, 6, 13, 15). The EU should promote efforts to capitalise on resilient water management as a win-win solution across the above mentioned policy fields in its external action. Alongside promoting an integrated approach in EU und Member States' bilateral cooperation, the EU should make use of its complementary foreign policy instruments, including policy dialogue, international negotiations and financial instruments to advance sustainable development, climate change, and disaster risk reduction policy agendas in an integrated manner. Policy integration should be promoted through EU Climate Diplomacy activities and the EU Green Diplomacy Network, as well as within the framework of the EU External Investment Plan and the EU Neighbourhood Policy. In addition, the EU should strengthen exchange and collaboration among the different international stakeholder communities that shape and implement relevant policies in key diplomatic and multilateral processes (e.g. through cross-cutting thematic initiatives and working groups).

Highlighting water-relevant issues in the new EU Adaptation Strategy

The new EU Adaptation Strategy needs to recognise more explicitly the fundamental role that sustainable water management and healthy water-related ecosystems play in overall climate resilience. It should require the mainstreaming of water resilience in sectoral strategies and transformational change where necessary. For sectors that disproportionately affect water sustainability or face water-related climate risks (e.g. urban water management, agriculture, forestry, energy and inland waterway transportation), the EU Adaptation Strategy has to promote more transformational approaches in order to safeguard resilient water systems. The required transformations encompass, for example: fundamental change towards sustainable agricultural systems and cropping patterns instead of mainly focussing on increasing water productivity and water supply e. g. by extending infrastructures; innovations in logistical concepts and naval architecture with the potential for reducing the need for infrastructural measures to maintain water levels in waterways; more integrated land and urban planning to maintain the connections between land cover, soils and water cycles instead of technical measures to prevent floods and sewer overflow during heavy rains.

Moreover, the new adaptation strategy needs to address existing challenges in water-related climate resilience by promoting appropriate **adaptation financing, effective climate services and increased cross-border and international cooperation.**

Adaptation financing

Provide appropriate adaptation financing for water-related climate resilience: The EU supports adaptation measures through a range of financial instruments, including the European Regional Development Fund (ERDF) and Cohesion Fund (CF), and financing by the European Investment Bank (EIB). While climate mainstreaming via climate spending quotas (earmarking) for these and other financial instruments help to channel funding for climate action, including for adaptation, assessment mechanisms should be put in place to ensure the climate resilience of the funded investments and projects. Another key policy framework to support channelling financing for adaptation is the Sustainable Finance Action Plan and the newly developed EU Taxonomy, including criteria to determine if an economic activity contributes to climate change adaptation. In order to strengthen the availability of financing for increased water-related climate resilience, the EU should:

- **Promote the allocation of funds for climate adaptation,** as up to now the majority of financial resources from large European Structural and Investment Funds such as the ERDF or CF earmarked for climate action have been flowing into mitigation.
- **Develop and agree on a uniform definition of what constitutes adaptation finance at the EU level and include it in the new EU Adaptation Strategy.** As any single definition of adaptation finance will inevitably be broad, it should be substantiated through criteria to be useful. Such an EU-wide definition could then be applied by national and sub-national authorities in all Member States to allocate and track adaptation finance towards meeting funding objectives. Determining whether an investment falls under the category of adaptation should be based on the outcome of a climate risk assessment. Moreover, in order to ensure their future effectiveness, climate proofing projects and investments should be required to take account of potential trade-offs and prevent maladaptation, especially with regard to resilient water systems.
- **Scale up the amount of climate adaptation funding available to sub-national authorities** and provide technical assistance to local authorities to get access to funding and foster local adaptation actions, including in the water sector.
- **Establish standardised funding procedures and provide all actors with the necessary guidance.** Standardised, yet simple procedures for funding from EU institutions and from the Member States will benefit both public and private actors across Member States by unifying and simplifying reporting requirements.
- **Establish standardised screening criteria and provide guidance for a standardised approach to climate risk assessments at EU level.** This could be based on the requirement for conducting life-cycle climate risk assessments following the steps outlined in the international standard EN ISO 14091 'Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment', to be published in 2021.
- **Enable water actors, including public authorities, infrastructure and utility operators, to access climate financing and conduct climate risk assessments.** Detailed and understandable guidance should be provided for the water sector, including definitions of what constitutes adaptation in water management and exemplary climate risk assessments to determine the adaptation benefits of sustainable water management.
- **Encourage relevant stakeholders, including infrastructure operators and utility companies, to take part in the ongoing specification of the sustainable finance taxonomy criteria** by responding to consultations/calls for feedback on the recommendations of the Platform on Sustainable Finance. Indeed, some of these parties will have to report on their adaptation activities.

Climate services

Improve availability of water-relevant data and climate services (CS) appropriate to inform policy and planning for climate resilience: There is a need for more systematic hydrological and other water-related data and better integration with other data to understand how climate change is interacting with the water cycle. At the same time, data describing important climate change effects is still insufficient and uncertain, despite an increasing overall availability (e.g. through the EU's Earth Observation Programme Copernicus). These data issues, together with a lack of open-access and fit-for-purpose products, still limit the use of CS in decision-making about climate resilience. The new EU Adaptation Strategy should promote further efforts to improve CS in supporting initiatives that:

- **Help close data gaps that impede the improvement of water-relevant CS by promoting an EU-wide data assessment framework for key water-related parameters.** This would establish a solid scientific basis for, in particular, downscaling impact modelling and developing CS, and be useful for other sectors or for nascent issues (e.g. the nexus of climate change and water, energy, and food security).
- **Support the development of co-designed, user-friendly CS** by providing sectorial guidance, best practices, success and business cases, user-friendly tools, and by creating communities of practice. This does not always imply producing new knowledge, but making existing data more fit for purpose – for example by increasing limited water-relevant CS at spatial and temporal scales more applicable for water management.
- **Improve the navigability of the CS market for researchers, providers, and end users** by enhancing platforms that provide (as of yet) insufficient information on the availability of CS, where to find them, and their suitability to users' individual expectations. This should include centralising existing sources (including those provided by the European Drought Observatory or the European Flood Awareness System which is part of the Copernicus programme) to increase visibility, coverage and comparability.
- **Facilitate the transition of CS innovations from the development to the demonstration stage** to create more market-ready examples (by setting clear and reliable regulatory conditions or by fostering the process of standardisation, among other things) and **enhance capacities of public authorities and institutions for providing essential state of the art CS** in a reliable, transparent and publically accessible manner.

Cross-border cooperation

Promote cross-border cooperation in climate adaptation. In Europe's transboundary river basins, alpine and marine areas, tackling water-related climate change impacts requires cross-border cooperation by definition. Member States can gain decisive advantages through cooperation, as a cross-border approach is more effective than solo action and provides considerable synergies. Moreover, the new EU adaptation strategy should promote cross-border climate adaptation efforts among Member States as well as with Non-EU countries (as initiated by the 2013 EU Adaptation Strategy):

- **Promote increased cooperation among Member States as well as between Members States and Non-EU neighbouring countries in cross-border adaptation efforts, especially in addressing transboundary hazards in transnational regions, and transboundary river and marine basins.** Climate change adaptation activities should, therefore, be systematically integrated in implementing planning instruments, such as river basin management plans, flood risk management plans, and promoted through the EU neighbourhood policy. Cooperation should include monitoring and forecasting, exchange of best practices and the development of transboundary risk assessments. Transboundary institutions such as bilateral or international river basin commissions are increasingly vital to designing robust adaptation measures, for tackling issues ranging from conflicting sectoral water use to coastal flooding, and to implementing them effectively in a joint effort involving all Member States and sectors.

- **Provide guidance on transboundary and cross-border adaptation planning and support the formulation of joint adaptation strategies.** These should integrate the views of different sectors and be based on existing good-practice examples such those resulting from the work under the UNECE Water Convention on climate adaptation and nexus assessments in transboundary river basins or the joint adaptation efforts ongoing for example in the Danube, Sava, Rhine, and Iberian river basins, and the Alpine and Pyrenees regions.
- **Integrate transboundary aspects into national adaptation plans** and ensure the consistency of adaptation strategies and measures adopted on various levels (from local, regional, national to transboundary).
- **Support the joint investment in and on-the-ground implementation of adaptation measures,** e.g. in EU-supported transnational projects, and increase the number of those that foster cross-sectoral and integrated adaptation.
- **Strengthen capacities in undertaking risk assessments and adaptation planning** in the Member States and neighbouring countries, e.g. through programmes under the EU Interreg initiative and the UNECE Water Convention.

International cooperation

Continue and strengthen international cooperation to increase climate resilience in vulnerable countries and with major trade partners. Increasing resilience to climate change in those countries that are most vulnerable is a global responsibility and often a prerequisite to achieving internationally agreed targets like the SDGs. It contributes to peace and security. In a globalised world, a changing climate in other parts of the world can have significant repercussions on the EU via international trade, supply chains, and migration. The ongoing EU Trade Policy review provides an opportunity to highlight water-related climate risks in EU international trade and advocate for inclusion of sustainable and climate-resilient water use in the sustainability chapters of trade agreements and within the World Trade Organisation. In addition, the new EU Adaptation Strategy should promote efforts to:

- **Continue international development cooperation and strengthen knowledge transfer on climate resilience.** Besides existing financial assistance for climate adaptation, the sharing of knowledge and expertise between the EU and third countries should be further promoted, specifically in regard to integrated solutions and approaches to foster the transition to inclusive green and circular economies, nature-based solutions and ecosystem-based approaches to adaptation and mitigation. The sharing of knowledge should be promoted in both directions, from the EU to third countries and vice versa. Moreover, knowledge transfer should not only be limited to the (technical) solutions, but also encompass knowledge on how to adapt these to different socio-economic conditions, how to implement them in an inclusive and conflict-sensitive manner, and how to strengthen an enabling environment for long-term effectiveness.
- **Increase awareness and understanding of Europe's vulnerability to water-related climate change impacts outside Europe,** including, for example, impacts on global markets, e.g. food prices, and impacts on migration, peace and security, and respective repercussions for the EU. In addition to awareness and understanding, guidance is needed on how to address climate change impacts outside Europe in national adaptation strategies.
- **Encourage and support European businesses that are reliant on international supply chains to map their dependencies on water and better understand their water-related vulnerabilities.** This will require access to relevant data and information on climate impacts affecting water resources for regions where they are most severe as well as further research and guidance on how to make best use of existing tools and concepts, such as 'water risks' and 'water footprint' for identifying climate risks in supply chains.

Supporting sustainable water management as a key building block for climate resilience in EU Member States

Ensuring sustainable water systems in the future will require a fundamental change in how water is used by various sectors and valued by society. More transformational change needs to be promoted through evidence-based decision making, cross-sectoral coordination, stakeholder participation and awareness-raising. Local and sub-national institutions play a crucial, indispensable role in implementing water resources management and climate adaptation, but depend on an enabling environment and support provided by agencies, strategies and legislation at the national level. Human resources need to be enhanced at all levels e. g. through education and training in order to cope with the increasing demands on the personnel with regard to the complexity of the required transition.

Financial and regulatory instruments should be applied to incentivise and steer change towards more resilience. The existing EU policy framework, the Water Framework Directive (WFD) and other water-related directives, in particular, provide a good starting point but require better and more ambitious implementation by Member States in some regards. More effective implementation of the policy framework and climate-resilient water management, in general, needs to be further strengthened through: research and innovation; data and knowledge generation; guidance and capacity development. Exchange of experiences and mutual learning among Member states should be encouraged, e.g. within the framework of the Common Implementation Strategy (CIS).

Dialogue and coordination

- **Promote increased mainstreaming of water-related climate adaptation measures into national and, especially, sectoral adaptation plans, where this is not yet the case.** For example, flood risk and river basin management plans, coastal protection measures, drought management plans, and urban strategies for dealing with heavy rain events all need to be aligned with national adaptation strategies and sectorial adaptation plans to prevent maladaptation across sectors and trade-offs for water systems.
- **Facilitate and strengthen local climate action** through coordination and support of local activities through national and/or sub-national level mechanisms.
- **Support cross-sectoral dialogue** at all relevant levels to increase the coordination of strategies and prevent maladaptation.
- **Encourage involvement of business stakeholders, local authorities, and citizens** in climate adaptation planning in order to increase their risk awareness and readiness to accept and act on climate resilience measures.
- **Raise awareness through dialogue and education.** Stakeholders from water-dependent and polluting sectors, but also the general public (including youth), need to be aware of the intrinsic value of water and water-related ecosystems and their role in maintaining resilient water systems. Awareness-raising should highlight the co-benefits of sustainable climate-resilient water management and the innovation opportunities that can come along with change towards more resilient systems.

Financial and regulatory instruments

- **Make climate-resilient water management measures an eligibility criterion for accessing funding.** For example, metering and reporting of water abstractions – which is already compulsory in some cases but not broadly implemented – or adopting water-efficient and sustainable cropping patterns can be included as a prerequisite for subsidies and certification labels, especially in the agricultural sector.
- **Foster the development of preventive, up-to-date drought management provisions and plans,** through regulatory instruments or, for example by only granting access to EU emergency funds if these are in place.
- **Promote adaptive solutions with multiple benefits, especially nature-based solutions, through attractive funding opportunities,** including grants, tailored loans and investments. These should be backed by an EU guarantee such as the Natural Capital Financing Facility (NCFF), governed by the European Investment Bank and EC, as well as a future investment initiative on natural capital and circular economy over the next years, in line with the 2030 Biodiversity Strategy.
- **Establish a methodology to implement cost recovery** – including the polluter pays principle – consistently across the EU for **all** water-use activities that have a significant impact on water bodies, including impoundments, abstractions, storage, treatment and distribution of surface waters, and collection, treatment and discharge of wastewater.
- **Address regulatory options for reducing freshwater use in the context of upcoming revisions of pieces of EU legislation** (e. g. eco-design, Industrial Emissions Directive, energy sector regulation) as well as in implementation.
- **Utilise the European Green Deal Renovation Wave** as an opportunity for financing water retention, efficiency and reuse in buildings and drive innovation in the sector.

Research and innovation

- Expand research on approaches to **deal with uncertainties and responses to high-end scenarios of climate change,** including flexible but structured **adaptation pathways and transformational adaptation** that addresses existing path dependencies as well as social and societal implications and creates opportunities for innovative solutions to cope with severe climate impacts.
- **Continue funding of research and innovation activities,** e.g. within the Horizon Europe mission on Adaptation (including societal transformation) **to develop innovative ways of sharing water resources, water saving technologies and management options,** capitalising on the need to enhance resilience as a driver for technological and societal innovation.
- Continue research and demonstration activities on multi-functional solutions, especially **nature-based solutions and infrastructures that integrate 'grey' and 'green' elements.** This should include assessing their effectiveness and opportunities to reduce the social and economic costs as well as developing viable financing and governance models.

Data and knowledge

- **Steer the development of a Europe-wide register** for damages caused by hydrological extreme events, including heavy rain events. This facilitates the assessment of climate change impacts over time and aids decision-makers in the evaluation of appropriate actions. The German Federal Environment Agency is planning to establish a registry of climate change-induced damage costs in Germany, which could serve as a starting point.

- **Establish a common set of indicators, based on existing indicator systems as appropriate, for assessing climate risks as well as benefits and co-benefits of adaptation** that allows monitoring and communication of the effectiveness of adaptation measures.
- **Provide information on the (incremental) costs of adaptation and the cost of inaction** for all sectors, including through improved modelling of future flood and drought impacts and damages.
- **Further develop and upgrade availability of water-relevant data (real-time and long-term projections) from existing early warning and monitoring systems and climate services of the EU's Earth Observation Programme Copernicus,** potentially engaging further institutions to assure proper information is being developed at relevant management scales.
- **Promote monitoring and reporting on water footprints** of products and organisations as well as on **water use efficiency or water productivity,** disaggregated by sector

Guidance and capacity development

- **Heavy rain events: Support the development of a unified definition and thresholds for heavy rain events and provide guidance and defined minimum standards for rain hazard maps.** This would improve the foundation of all monitoring and planning activities across Europe.
- **Dealing with uncertainties: Support capacity development and the sharing of knowledge and experiences** in dealing with uncertainties to prevent damages, such as in making appropriate use of probabilistic forecasts in decision-making.
- **Water abstraction control: To improve implementation of WFD provisions, compile, assess and recommend good practices,** in terms of metering, data assessment, the evaluation of effects and assessment of resilience and adaptivity of permitting systems. Similarly, good practices are needed for better detection and control of illegal water abstractions.
- **Water allocation:** Provide additional guidance and good-practice examples of innovative water allocation mechanisms, to support Member States in their efforts to **change or develop rules for water allocation** and implement ecological flows. In order to prevent conflicting water uses in the future, in particular in prolonged periods of drought or water scarcity, a transparent water allocation mechanism should be put in place for prioritizing water uses based on proper water accounting[4] **(e.g. by establishing water use hierarchies for different framework conditions). Water pricing** should be adopted as a tool to promote water use efficiency, not only in water-scarce regions and during periods of drought.
- **Achieving good status:** Within the implementation framework of the WFD, explore how climate change will affect the achievement of environmental objectives, and the potential for reattribution of water body types due to significant climate change impacts. Promote exchange of knowledge and experience on how this has to be taken into account in river basin management plans and WFD programmes of measures. Address potential synergies and conflicts with the Natura2000 directives in enhancing water resilience.

[4] Following the CIS Guidance document on the application of water balances for supporting the implementation of the WFD