

WATER JPI VISION 2030

Together for a Water-secure World

April 2020



www.waterjpi.eu



List of Abbreviations

Term	Meaning
AMR	Antimicrobial resistance
BONUS	Joint Baltic Sea Research and Development Programme
CAP	Common Agricultural Policy
CEC	Contaminants of Emerging Concern
DG	Directorate General (of the EC)
EC	European Commission
EIP	European Innovation Partnership
EPA	Environmental Protection Agency
ERA	European Research Area
ERC	European Research Council
EU	European Union
EurAqua	European Network of Freshwater Research Organisations
FACCE	Joint Programming Initiative for Agriculture, Food Security & Climate Change
GB	Governing Board
IoT	Internet of things
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
JPI	Joint Programming Initiative
NBS	Nature-Based Solutions
PRIMA	Partnership for Research and Innovation in the Mediterranean Area
RDI	Research, Development and Innovation
RI	Research infrastructure
SDG	Sustainable Development Goal
SMART	Specific, measurable, achievable, relevant and Timely (indicators)
SRIA	Strategic Research and Innovation Agenda
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UWWTD	Urban Waste Water Treatment Directive
WEFE	Water–Energy–Food–Ecosystems (Nexus)
WFD	Water Framework Directive
WHO	World Health Organization

Foreword

The Water JPI's Vision 2030 is the overarching forward-looking document that illustrates what the Water JPI aims to achieve within the next 10 years, taking into account the main trends, the key drivers and challenges in relation to our water resources. It is guiding the Strategic Research and Innovation Agenda, the roadmap for the 5-year cycle and the 3-year implementation plans.

In the past decade, the vision was “Achieving Sustainable Water Systems for a Sustainable Economy in Europe and Abroad”, which required a multi-disciplinary approach, since economic, ecological, technological and societal challenges are to be addressed jointly. The targets were on sustaining human and economic development as well as on maintaining the essential functions of our water ecosystems, through an integrated holistic approach to water resource management.

Over the years, trends and challenges have changed, highlighted by the stakeholders' consultation outputs proposing “Together for a Water-secure World” with a shared mission “Jointly Enabling ‘Smart’ Water Solutions for a Changing World” as the new ethos for the Water JPI. Research and Innovation in water needs are facing new challenges in relation to, for example, changes in agriculture practices (70% of freshwater consumption), adaptation to climate change with increased extreme events (droughts and floods), new contaminants of emerging concern with a focus on antimicrobial resistance and the need to recycle and reuse water to meet the increasing demands.

Therefore, sharing a resource that is becoming rarer while ensuring water security (both in quantity and quality) in a changing world (growing population, migration, urbanisation expansion, climate change) will be the key water challenge.

These challenges are global ones, as illustrated by the United Nations Sustainable Development Goals, in particular SDGs 6 with its objective to “ensure availability and sustainable management of water and sanitation for all by 2030.”

The challenges that are faced in the world relating to water cannot be fully addressed by any individual country working alone. The Water JPI, as facilitator of cooperation between countries on water research, will produce scientific results to support European and international policies in the water domain by coordinating national efforts by joining forces and funds on the emerging problems to come up with feasible solutions.

I would like to thank all our Water JPI partners and in particular the Irish Environmental Protection Agency, which coordinated this important work across different consultations.



Maurice Heral

Chair of the Water JPI
Governing Board

Acknowledgements

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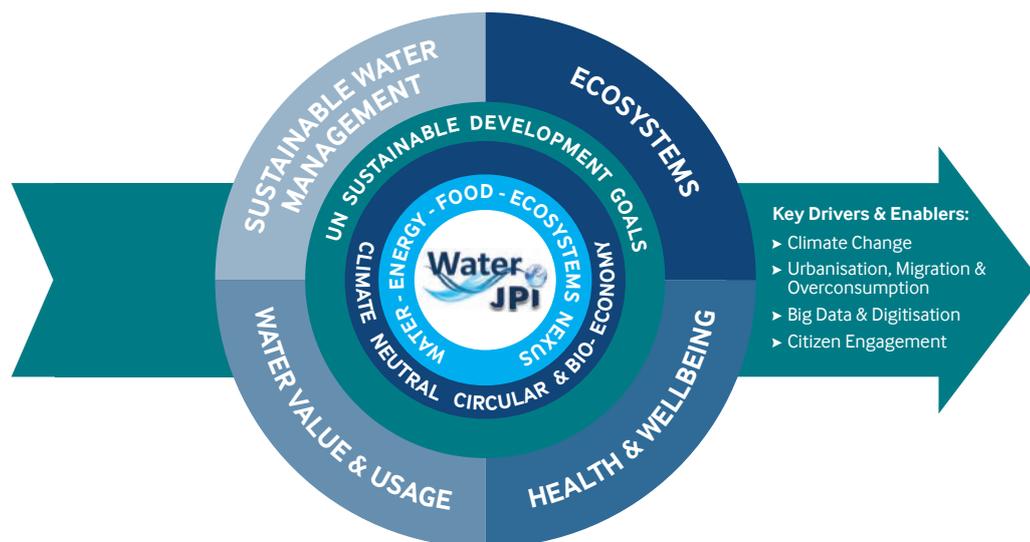


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Executive Summary

European water policy deals with complex systemic issues and has ambitious goals. This is increasingly set against the backdrop of global trends and issues, such as the quality and quantity of water, the sustainable use and management of water resources, integrated flood risk management and the climate crisis. Research, development and innovation (RDI) in the water area therefore aims to develop knowledge and reinforce mechanisms for knowledge and technology transfer on an international scale. Joint Programming Initiatives (JPIs) focus on strengthening and harmonising public research and innovation activities and align national research agendas.



This document presents the Water JPI Vision 2030, **Together for a Water-secure World**, which aims to tackle water challenges through its shared mission of **Jointly enabling “smart” water solutions for a changing world**. The Vision 2030 will reinforce global leadership in water research and foster collaboration to achieve safe, clean and sustainably managed water resources for all. This will be achieved using a multi-faceted and cross-sectoral approach that encompasses policy, environmental, economic, technological and societal considerations. It is an overarching and forward-looking document that spans 10 years, after which it will be revised and updated again. It outlines what the Water JPI aims to achieve during the period up to 2030 and sets out the roadmap for all Water JPI activities. It is first in the hierarchy of the Water JPI’s activities and provides the context for those activities (i.e. trends, drivers and challenges) in responding to the issues faced by Europe and increasingly at a global level. This reflects the move towards sustainable development and international cooperation across all countries, in line with agendas such as the United Nations’ Sustainable Development Goals

and the European Green Deal, which sets out the European Union’s aiming to be the first continent to achieve climate-neutrality by 2050. This Vision 2030 document includes:

- an overview of the key water challenges;
- an overview of water-related policy and recent developments;
- an overview of key cross-cutting issues, drivers and enablers that drive change and apply across all areas of research;
- the four key research themes being addressed by the Water JPI; and
- objectives and indicators to measure the effectiveness of the Water JPI and its activities.

The Water JPI also develops Strategic Research and Innovation Agendas (SRIAs) and is updated in 5-year cycles. A SRIA sets out specific RDI research themes, sub-themes and priorities. It also identifies areas where RDI actions are required. The identified research priorities are then opened for consideration to various stakeholders, such as researchers, regulatory agencies, policymakers, industry and the public.

Chapter 1

The Water Joint Programming Initiative



1 The Water Joint Programming Initiative

1.1 What Are Joint Programming Initiatives?

The Joint Programming Initiatives (JPIs) are intergovernmental collaborations created to tackle major societal challenges that cannot be addressed by individual European and international countries alone, and in doing so contribute to the development of the European Research Area (ERA). Member States and associated countries participate in joint initiatives on a voluntary basis to increase the value of relevant national and European research, development and innovation (RDI) funding through joint planning, implementation and evaluation of national research programmes. This is achieved through common visions and Strategic Research and Innovation Agendas (SRIAs). The key objectives of the JPIs are to:

- align national policy priorities, strategies, competencies and programmes;
- drive scientific excellence through mission-oriented joint actions;
- build trust and encourage new forms of collaboration and partnership between local, regional, national, European and international policymakers, research-funding agencies, research-performing organisations, international initiatives and other stakeholders;
- benefit from institutional alignment and partnering;
- provide effective links between research and knowledge on the one hand and global policy on the other, such as the United Nations (UN) Sustainable Development Goals (SDGs) and the European Green Deal, which is committed to making Europe climate neutral by 2050; and
- extend links to various challenge-related international initiatives for learning from other countries' experiences.

This document presents the Vision 2030, **“Together for a Water-secure World”**, and looks forward to the next 10 years. It is aimed primarily at policymakers and funding organisations. Since its approval at the Council of the European Union (EU) in 2011, the Water JPI Vision has, among other accomplishments, created a common Vision and a robust SRIA that is updated in 5-year cycles and aligned national water research and innovation agendas. JPI activities are implemented through a variety of joint actions, such as joint calls, knowledge hubs and task forces. The fostering of better coordination and cross-border collaboration is at the very core of the Water JPI.

1.2 Water JPI Membership

The Water JPI membership (**Figure 1.1**) has grown since its inception. With 23 member countries and 3 observers, membership of the Water JPI accounts for 88% of all European public RDI annual expenditure on water issues¹. One of the main achievements of the Water JPI is the high degree of partner involvement in implementing joint transnational calls.

Water JPI Membership

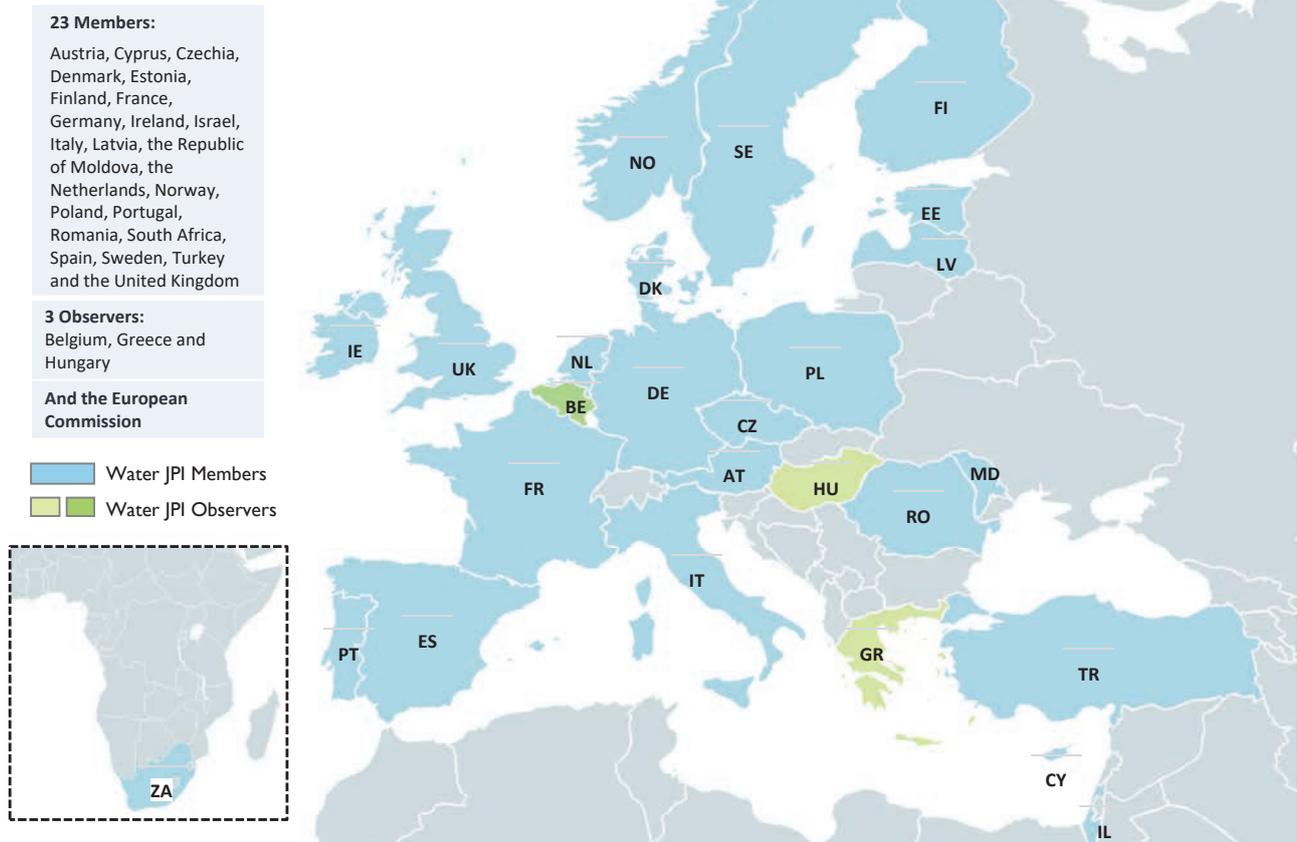


Figure 1.1. Water JPI membership

¹Water JPI. Water RDI mapping. Available online: <http://www.waterjpi.eu/mapping-agenda/water-rdi-mapping>

1.3 Synergies with Other Initiatives

The Water JPI seeks to enhance synergies with other JPIs and European and international initiatives to establish common activities. **Table 1.1** identifies other initiatives that have synergies with the Water JPI SRIA that could contribute to tackling the societal challenges also being addressed by these other initiatives.

Table 1.1. Synergies between the Water JPI and other JPIs and international initiatives

 BiodivERsA	 JPI Oceans	 EIP Water European Innovation Partnership (EIP) Water	 BONUS Joint Baltic Sea Research and Development Programme (BONUS)	 PRIMA Partnership for Research and Innovation in the Mediterranean Area (PRIMA)
 JPI for A healthy diet for a healthy life (HDHL)	 JPI for Agriculture, Food Security and Climate Change (FACCE)	 JPI for Antimicrobial Resistance (AMR)	 JPI Climate	 JPI for Urban Europe (UE)
 European Network of Freshwater Research Organisations	 Water Europe	 UN Water	 Future Earth	 Belmont Forum
 JPI for More Years, Better Lives (MYBL)	 JPI Culture Heritage	 Global Water Research Coalition (GWRC)	 China Europe Water Platform Partnership (CEWP)	 WASAG The Global Framework on Water Scarcity in Agriculture The Global Framework on Water Scarcity in Agriculture (WASAG)

Chapter 2

The Need for a New Water JPI Vision

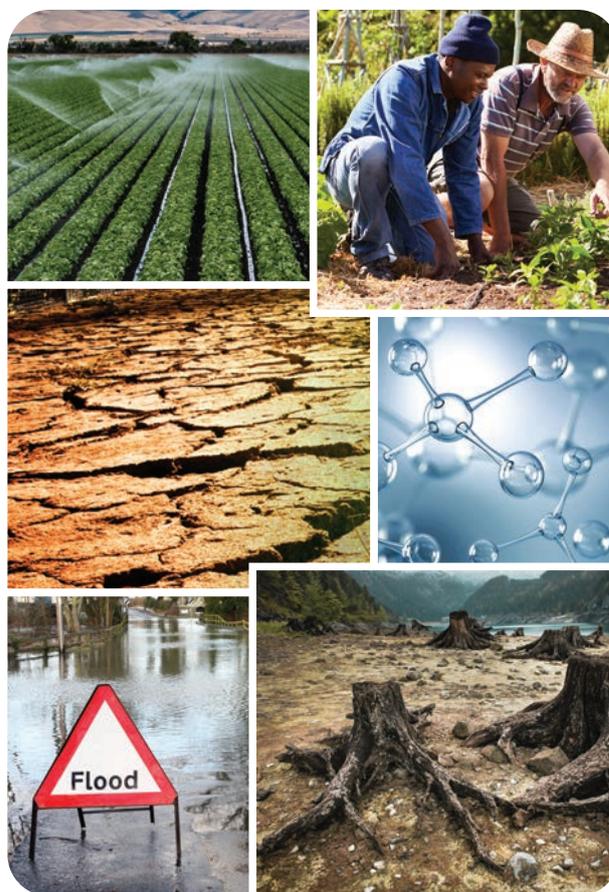


2 The Need for a New Water JPI Vision

The Water JPI Vision is updated every 10 years. The Vision 2020 document was published in 2011 and has been revised in the context of new developments in Europe, as well as globally, in terms of water policy, the water-related challenges of climate change, urbanisation and population expansion. Pressures such as biodiversity loss, pollution, degradation of freshwater ecosystems, floodplain disconnection and climate change effects are impacting on Europe's water resource and this needs to be addressed urgently. The update of the Vision document has taken into consideration the UN SDGs, the European Green Deal and the development of the future Research and Innovation Framework Programme and Horizon Europe (2021–2027). The Vision's horizon year of 2030 also aligns with the target year for achieving many of the SDGs.

2.1 Global and Water Challenges

In 2010, the UN acknowledged the right of all human beings to have access to safe, affordable and accessible water and sanitation (UN SDG6). Transboundary cooperation is essential when there are shared water basins and catchments, and more effort is required in this area.² On a global scale, water crises were identified in 2020 by the World Economic Forum as one of the most important risks to the economy and society in the coming years.³ Water crises, which are associated with the failure of climate change adaptation/mitigation, water as a factor in major conflicts and natural disasters are perceived to be more likely to occur in the future and have greater global impacts. Global water requirements are projected to be pushed beyond sustainable water supplies by 40% by 2030, with global use doubling by 2060.⁴ Furthermore, water quality is expected to deteriorate substantially over the next decade, leading to impacts on human health, the environment and sustainable development.⁵ Key drivers of these issues are an increasing population, migration and climate change, which all lead to greater water demands.



²United Nations. Sustainable Development Goal 6: progress of goal 6 in 2019. Available online: <https://sustainabledevelopment.un.org/sdg6>

³World Economic Forum. The Global Risks Report 2020. Insight report. 15th Edition. In partnership with Marsh & McLennan and Zurich Insurance Group. Available online: http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

⁴EEA (European Environment Agency), 2019. The European Environment – State and Outlook 2020. Knowledge for Transition to a Sustainable Europe. Available online: <https://www.eea.europa.eu/publications/soer-2020>

⁵UN (United Nations) Water, 2018. The United Nations World Water Development Report 2018: Nature-based Solutions for Water. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000261424>

The European Environment Agency’s (EEA) The European Environment – State and Outlook 2020 report states that the key pressures on freshwater resources are pollution from diffuse sources, hydromorphological changes and abstraction (Figure 2.1).

Thematic summary assessment				Source: © European Environment Agency, 2019	
Theme	Past trends and outlook		Prospects of meeting policy objectives/targets		
	Past trends (10-15 years)	Outlook to 2030	2020		
Water ecosystems and wetlands	Trends show a mixed picture	Developments show a mixed picture	☒	Not on track	
Hydromorphological pressures	Deteriorating trends dominate	Developments show a mixed picture	☒	Not on track	
Pollution pressures on water and links to human health	Trends show a mixed picture	Developments show a mixed picture	☒	Not on track	
Water abstraction and its pressures on surface and groundwater	Improving trends dominate	Developments show a mixed picture	☒	Not on track	

Figure 2.1. The European Environment – State and Outlook 2020 – Summary of the freshwater thematic assessment (source: EEA, 2019)⁶.

Biodiversity has a functional role in the nature-based solutions that underpin the ecosystem processes and functions that deliver services. There is a direct link between these services and human health and wellbeing (e.g. availability of freshwater, food and fuel). Over 60% of ecosystem services are being degraded or used unsustainably and this affects water supply, and quality, recreational use and flood protection. Habitat degradation, climate change, pollution and invasive or alien species threaten an average of 25% of animals and plants worldwide and up to 1 million species face extinction as a result according to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)⁷.

The main challenges up to 2030 are protecting and restoring water as a valuable resource, protecting ecosystems and halting biodiversity loss. This can be achieved through the implementation and integration of water measures, such as aligning with the international UN SDGs, the 2015 Paris Agreement and the Convention on Biological Diversity as well as through EU policies.

The UN SDGs have set many targets to be met by 2030. Water is relevant and critical to most of the

SDGs. SDG 6, “Ensure availability and sustainable management of water and sanitation for all”, is particularly relevant to the Water JPI (see Figure 2.2).



Figure 2.2. UN SDG6 and interlinkages (source: UN 2019).

Source: Integrated Approaches for Sustainable Development Goals Planning: The case of Goal 6 on Water and Sanitation. United Nations publication. Copyright © United Nations 2017. May 2017, Bangkok, Thailand.

⁶EEA 2019 Thematic Assessment Summary

<https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/assessments>

⁷IPBES (Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services), 2019. Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio, E.S., Settele, J., Díaz, S., and Ngo, H.T. (eds). IPBES Secretariat, Bonn, Germany.

Progress towards and current challenges in meeting the SDG6 indicators are outlined in **Table 2.1**. The UN report on the progress towards meeting the SDGs⁸ states that a key challenge globally is **access to a basic drinking water service**, as 785 million people still lacked this in 2017. As the **demand for water** continues to increase, and as **population** and **industrial production increase**, research, innovation and technology need to be developed to deal with this demand. This must be considered in the context of energy sources and efficiencies in line with climate change adaptation policies and include societal transformational change.

Table 2.1. Progress towards meeting the UN SDG6 targets

SDG 6 Target	SDG 6 Indicator	Improvements Seen or Critical Challenge/Needs
Target 6.1 <i>Drinking Water</i>	6.1.1 Proportion of population using safely managed drinking water services	Cost recovery; solutions for off-grid water collection, household water purification
Target 6.2 <i>Sanitation and hygiene</i>	6.2.1 Proportion of population using safely managed sanitation services	Behavioural changes, overcoming taboos Dry sanitation; separation of faeces and urine; reuse of nutrients; understand interlinkages between water, sanitation and hygiene (WASH) and water quality
Target 6.3 <i>Water quality and wastewater</i>	6.3.1 Proportion of wastewater safely treated	Understand new pollutants, impacts, fate in the environment; integrate water quality in hydrological models; nature based solutions; product replacement; incentives, cost recovery, feedback from down- to up-stream
	6.3.2 Proportion of bodies of water with good ambient water quality	
Target 6.4 <i>Water use and scarcity</i>	6.4.1 Change in water use efficiency over time	Implementation: water pricing/ valuation
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	Technologies for irrigation, industry and households; water footprinting and virtual water; scarcity in relation to the hydrological cycle and climate change/ variability
Target 6.5 <i>Water resources management</i>	6.5.1 Degree of integrated water resources management implementation	Integrated Water Resource Management (IWRM): understand "integrated"; solutions: e-governance, water information systems; implementation: basin versus admin boundaries
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	
Target 6.6 <i>Water related ecosystems</i>	6.6.1 Change in the extent of water related ecosystems over time	Understand multiple stresses, tolerance limits, tipping points and fragmentation; valuation of ecosystem services
		Nature-based solutions; ecosystem restoration; payment for ecosystem services

Key: Adequate Improvement Critical **Source:** UNEP Presentation at the Water JPI Experts Workshop, 22 October 2019, Dublin, Ireland.

⁸United Nations Economic and Social Council, 2019. *Special Edition: Progress Towards the Sustainable Development Goals. Report of the Secretary-General*. Available online: <https://undocs.org/E/2019/68>

⁹European Commission, *EU water legislation – fitness check*. Available online: https://ec.europa.eu/environment/water/fitness_check_of_the_eu_water_legislation/

¹⁰European Commission, 2017. *Fitness check of the WFD and the Floods Directive*. Available online: https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5128184_en

2.2 Key Policy Developments

Key policy developments (see **Appendix A**) have occurred since the Water JPI Vision 2020 was published in 2011. The 17 UN SDGs are intended to frame countries' national agendas and policies until 2030. The EU's report on SDG implementation notes that progress needs to accelerate, and, while the EU has demonstrated leadership, achieving the goals remains a challenging ambition. Member States' development cooperation needs to align more fully with the SDGs. Better engagement throughout society and support are needed, such as joint programmes and results frameworks. Better use of limited resources is needed to tackle related SDG issues, such as mainstreaming environment and climate action into trade policies.

Key **water policies within the EU** have changed in recent years and continue to evolve (see **Figure 2.3 overleaf**). The Water Framework Directive (WFD) (2000/60/EC) has underpinned the EU's water policy since 2000. A fitness check of the WFD was completed in December 2019,⁹ along with its associated directives (Groundwater Directive and Environmental Quality Standards Directive) and the Floods Directive (2007/60/EC).¹⁰ Key findings of the fitness check show that the directives are still as relevant as when they were adopted and have led to a high level of protection for water bodies and flood management. However, a delay in the implementation of the directives by Member States has resulted in less than half of the EU's water bodies receiving good status. Pressures such as biodiversity loss, pollution, degradation of freshwater ecosystems, floodplain disconnection and climate change are having a major impact on our water resource. Tackling these issues through the WFD and related directives remain relevant going forward.

The European Commission (EC) adopted a proposal for a revised Drinking Water Directive (98/83/EC) in 2017, updating the quality standards and approach to water quality monitoring.¹¹ Between 2017 and 2018, an evaluation of the Bathing Water Directive (2006/7/EC) was conducted and recommendations were made by the World Health Organization (WHO) to include additional parameters in the directive.¹² In 2018, the EC proposed new rules to encourage and facilitate water reuse in the EU¹³; however, enacting such policy on waste water reuse in the EU is proving to be challenging.

In response to the challenges facing Europe, the European Green Deal¹⁴ was adopted for the EU in December 2019. Termed a new growth strategy based on clean products and technologies, the European Green Deal is committed to working towards a climate-neutral society by 2050. The 8th Environment Action Plan Framework is also being delivered by the end of 2020.

It is crucial that RDI programmes prioritise synergistic actions that can address and meet multiple targets being set out by current and new policies and frameworks. This, of course, has to be in the context of the Water–Energy–Food–Ecosystems (WEFE) Nexus paradigm, which has been described by UN Water as central to sustainable development.¹⁵ The Nexus encompasses several of the SDGs that will be essential in managing water demand, usage and scarcity, all of which are more challenging in the face of climate change. The 2015 Paris Agreement marked the date that a legally binding global agreement on climate change was made. After 2020, countries must show how targets are being met, with stricter targets to be set thereafter. At the EU level, the 2021–2030 Climate and Energy Policy Framework sets the context for Europe's continued progress towards a carbon-neutral circular economy, complimenting the European Green Deal.

¹¹European Commission, 2017. *Proposal for a Directive of the European Parliament and of the Council on the quality of water intended for human consumption (recast)*. COM(2017) 0753 final, 2017/0332(COD), 1.2.2018, Brussels. Available online: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1519210589057&uri=CELEX:52017PC0753>

¹²European Environment Agency, 2019. *European Bathing Water Quality in 2018*. Available online: <https://www.eea.europa.eu/publications/european-bathing-water-quality-in-2018>

¹³European Commission. *Proposal for a regulation on minimum requirements for water reuse*. Available online: <https://ec.europa.eu/environment/water/reuse.htm>

¹⁴European Commission. *A European Green Deal: striving to be the first climate-neutral continent*. Available online: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

¹⁵UN (United Nations) Water. *Water, food and energy*. Available online: <https://www.unwater.org/water-facts/water-food-and-energy/>



Figure 2.3. Key Relevant Policy Developments to 2030.

Chapter 3

Water JPI Vision 2030



3 Water JPI Vision 2030

The Water JPI Vision document is an overarching, forward-looking document that spans 10 years. It outlines what the Water JPI aims to achieve over that period, sets out the roadmap for all Water JPI activities and provides the context for the Water JPI activities (i.e. trends, drivers and challenges) in responding to the issues and challenges faced by society.



As such, the Vision is a high-level roadmap. It is not intended to be a detailed work plan nor a detailed list of research activities or projects.

It sits at the top of the hierarchy of the Water JPI’s activities (see Figure 3.1)

Figure 3.1.
Activities of the Water JPI.

3.1 Vision and Mission Statement

The Water JPI will produce science and evidence-based knowledge to support European and international policies, identify problems and knowledge gaps and develop feasible technical and managerial solutions. It aims to align water-related RDI in participating countries and provide a powerful tool for international cooperation in the water area. Water is at the heart of all sustainable development (agriculture, food production and security, ecosystem sustainability and biodiversity, and urban development) and is central to several thematic areas (e.g. climate change adaptation and mitigation measures). **Figure 3.2** illustrates the vision and shared mission identified by the Water JPI up to 2030.



Figure 3.2. Water JPI Vision 2030 and mission statement.

There is a major challenge in developing a “smart” water society. “Smart” in this context means utilising technologies and methods to manage water sustainably while responding to demands. The aim is to avoid scarcity and pollution and to mitigate extreme events. Water challenges can be addressed more efficiently using digital services. It is critical that issues and solutions are communicated at all levels, not just to policymakers or between researchers. The public and society at large should be central in understanding issues and contributing to solutions to our water challenges. Changing human behaviour and thinking in how we value and use our water resources sustainably is key and needs to lead society to a sustainable transformation.

3.2 Drivers and Enablers

Our society and our world are subject to global changes. Drivers are those overarching aspects that push change forward, both positively and negatively. They are global trends that affect us all. Enablers act as complements to drivers. They are specific elements that foster change or act to facilitate change. The main drivers and enablers include:

■ Climate change

Climate change is a clear driver of global trends. Mitigating climate change places an onus on society to act on shifting behaviours in response. Adaptation measures requires society to identify risks and develop strategies to manage them.



■ Urbanisation, migration and overconsumption



Water management and the sustainable use of resources are critical for adapting to and mitigating climate change. As with climate change, many of the challenges and issues related to water quality/

quantity and water stress are driven by human factors, namely urbanisation and migration. The rate of consumption is increasing because of population growth and increasing globalisation. This puts pressure on both natural and anthropogenic-made systems.

■ Big data and digitisation.

These are fast becoming important tools for evaluating and contributing to studies in water-related topics. A large number of data is being generated from a vast array of sources. Water utilities are starting to utilise big data and the “internet of things” (IoT). These can be utilised to generate baseline information and risk mapping. Digitisation enables the generation and storage of information that can be leveraged by researchers and other stakeholders. It can also reduce barriers to accessing water data.



■ Citizen engagement.



This is being driven and enabled by social media. Digital access to information also enables research and allows for knowledge transfer across all levels of society, from the public to policymakers; everyone can have

a part to play in contributing to the research knowledge base and knowledge transfer. Social media can act as a catalyst for policy, social and behavioural changes (such as societal sustainable transformation).

3.3 Research Infrastructures

Research infrastructures (RIs) are an essential part of any scientific ecosystem at national, European and international levels. They support and facilitate the advancement of fundamental and complex research, provide access to new research consortia, promote the transfer of knowledge and support capacity building. National and European RIs play an important role in addressing the complexity of water research under global changes.

3.4 How Was the Vision 2030 Prepared?

The key stages and consultation steps in the update process for Vision 2030 and SRIA 2025 were discussed and agreed with the Water JPI Governing Board and Advisory Boards in 2018 and 2019. **Figure 3.3** illustrates the key stages throughout the complex, comprehensive and inclusive process.

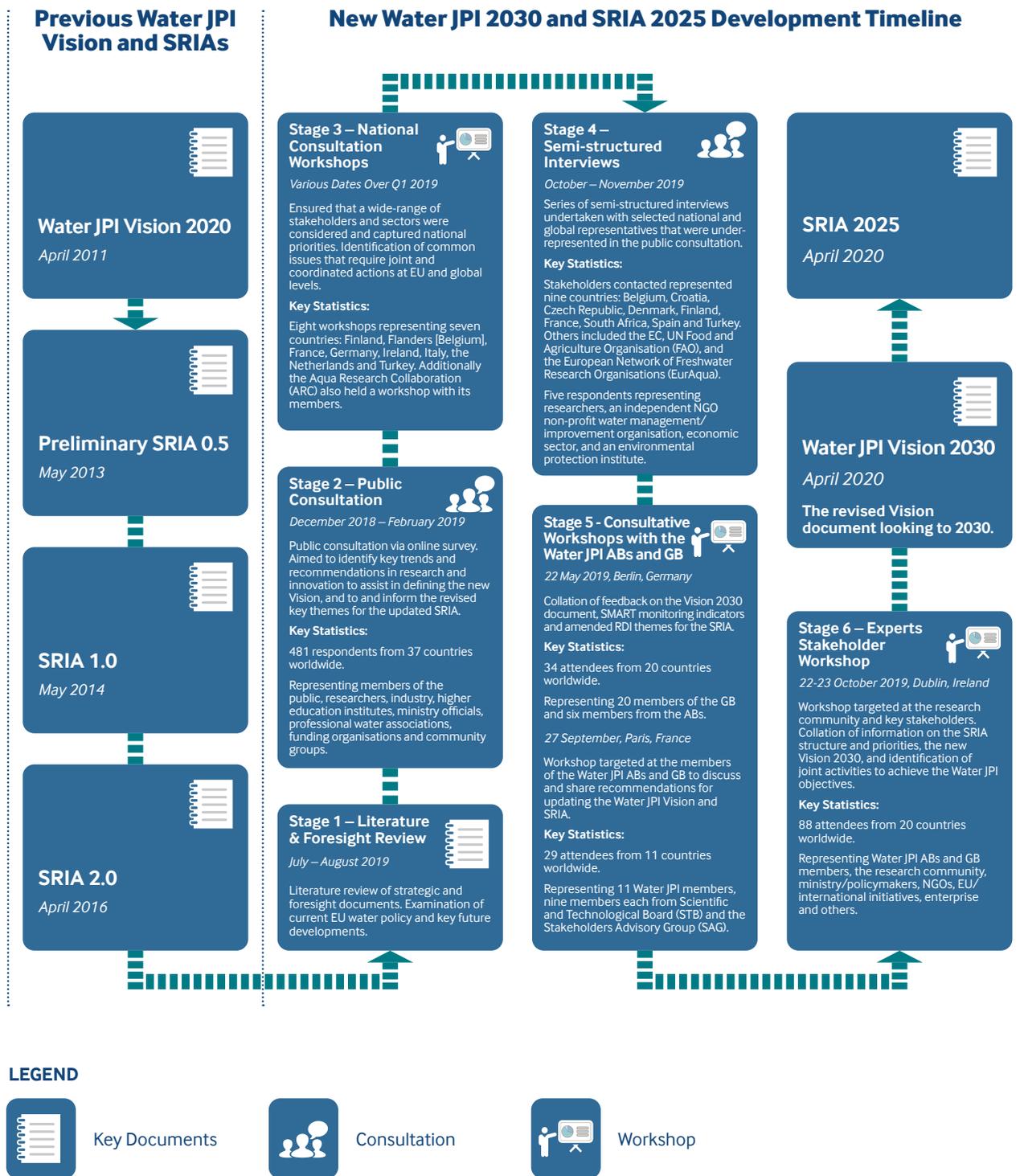


Figure 3.3. Water JPI Vision 2030 and SRIA 2025 preparation timeline.

Chapter 4

Vision 2030 Objectives and Indicators



4 Vision 2030 Objectives and Indicators

Monitoring the impacts of the Water JPI can show how its activities have contributed to the development of the design, transfer and implementation of innovative solutions. Monitoring is also useful for identifying and covering the gaps in the implementation, highlighting efforts and successes, identifying good practice and supporting mutual learning among the JPIs. The Water JPI applies SMART¹⁶ indicators to measure the achievement of its mission and Vision up to 2030, under seven defined objectives. As part of its impact assessment, it will be critical that information is collated to create a baseline to assist in defining possible targets when selecting joint actions for implementation.

4.1 Objective 1: Engaging Stakeholders

The first objective of the Water JPI Vision 2030 is real engagement with stakeholders.

This includes engaging with end users to co-design and co-develop to facilitate the effective uptake of the results of RDI. To ensure that the Water JPI addresses the needs of society, it is essential to ensure that RDI investments are correctly prioritised to meet key challenges. To do this, the inputs of a broad range of stakeholders and relevant

people working across all aspects of the water sector are needed to arrive at a fit-for-purpose SRIA. In turn, multi-stakeholder, multi-disciplinary teams are needed to work together to develop practical solutions to the challenges that exist and ensure that new knowledge is effectively transferred to end users (policymakers, water resources managers, the public, water and sanitation utilities/enterprises, etc.) and the resulting solutions are adopted.



- **Indicator 1.1:** Number of stakeholders involved in planning (scoping, calls design, funded projects, other joint actions such as knowledge hubs and exploratory workshops).
- **Indicator 1.2:** Types of stakeholders involved in planning (end users, regulatory agencies, water economic sector, research institutes/universities, etc.).
- **Indicator 1.3:** Level of engagement (questionnaires, workshops, commenting on draft documents, time, etc.), commitments and contribution of stakeholders.
- **Indicator 1.4:** Public outreach and public engagement.

4.2 Objective 2: Broadening the Partnership

The second objective of the Water JPI Vision 2030 relates to broadening the Water JPI partnership within and with other relevant initiatives.

The Water JPI provides an opportunity for enhanced cross-border programme collaboration, resulting in a larger critical mass of resources and increased impact of research. The success of the Water JPI depends on a willingness to share and proactively encourage the alignment

of existing and future national research agendas for contributing to joint actions. International cooperation is a key priority activity, given that water is a global resource. In this respect, the Water JPI aims to strengthen the international aspect of European water RDI, developing durable partnerships for water RDI across the world and broadening the impacts of the Water JPI common activities.

¹⁶SMART: specific, measurable, achievable, relevant and time bound.



- **Indicator 2.1:** Number of international partners (i.e. not only partners) involved in Water JPI activities.
- **Indicator 2.2:** Number of countries involved from the EU and beyond.
- **Indicator 2.3:** Budget committed to joint actions with the Water JPI.
- **Indicator 2.4:** Joint publications from Water JPI-funded projects or by members of the Water JPI highlighting EU, international and mutual benefits (e.g. synergies with other initiatives).
- **Indicator 2.5:** Relevant international documents addressing Water JPI activities.

4.3 Objective 3: Contributing to Policy Development/Implementation

The third objective of the Water JPI Vision 2030 is ensuring policy development and implementation at both EU and international levels are informed and influenced by sound evidence-based knowledge.

Significant impacts can be envisaged in the scientific and water policy communities as well as in developing countries, supporting the implementation of the UN SDGs at the global level as well as of the European Green Deal and Climate Change.

Alignment can be implemented through (joint) actions that aim to foster greater coordination among national research priorities, programmes and activities around jointly identified strategic priorities. For example, funded projects are expected to support the development of innovative technological solutions and services for the implementation of water policy in the EU, such as the WFD and the Floods Directive. Alignment also aims to maximise research impact on policymaking and innovation to more effectively tackle global societal challenges.



- **Indicator 3.1:** Number of conferences and seminars attended by Water JPI members to promote Water JPI outputs.
- **Indicator 3.2:** Number and scope of policy briefs published resulting from the Water JPI activities.
- **Indicator 3.3:** Number of publications published by Water JPI-funded projects or by members of the Water JPI.
- **Indicator 3.4:** Number of guidelines published by Water JPI-funded projects or by members of the Water JPI.
- **Indicator 3.5:** Number of best practice documents published by Water JPI-funded projects or by members of the Water JPI.
- **Indicator 3.6:** Number of “understanding to act” documents (methodologies to address issues and how they can be used by various stakeholders) published by Water JPI-funded projects or by members of the Water JPI.
- **Indicator 3.7:** “Direct” engagement (participation in committee hearings, etc.).

4.4 Objective 4: Supporting and Enhancing the Research and Innovation Community

The fourth objective of the Water JPI Vision 2030 looks to build and develop capacity and knowledge within the research community, for example assisting in mobility actions and sharing RI. A more coordinated and consistent approach to international water RDI cooperation not only helps to build a greater critical mass and build the momentum needed to provide an effective response to major

societal challenges, but also enables Europe and its associated partners to participate more effectively in agenda setting in international water fora and to convey consistent messages.

Joint activities are crucial to making the Water JPI instrumental to the RDI community and augmenting the effectiveness of tackling water-related challenges. Funded projects are expected

to enable multi-national, collaborative RDI projects addressing questions relating to the water challenges faced by society, promote multi-disciplinary work and encourage proposals with fundamental and/or applied approaches

connecting Water JPI consortia to projects funded by RDI funding programmes, enhance the sharing and use of RI, and stimulate the mobility of researchers within the consortia during a project's life and beyond.



- **Indicator 4.1:** Number of funded projects, actions involving mobility/research and innovation sharing.
- **Indicator 4.2:** Number of new partnerships formed in Water JPI-funded project consortia.
- **Indicator 4.3:** Number of citations of activities developed as part of Water JPI.
- **Indicator 4.4:** Number of postgraduate programmes financed as part of Water JPI-funded projects and number of citations linked to related publications.
- **Indicator 4.5:** Number of RI platforms used throughout Water JPI projects.

4.5 Objective 5: Stimulating Innovation and Value of Research Outputs

Knowledge transfer and take-up of the research and innovation outputs is the fifth objective of the Water JPI Vision 2030.

The Water JPI promotes multi-stakeholder and multi-disciplinary teams working together to develop practical solutions to the challenges we face. New knowledge needs to be effectively transferred to and adopted by end users (policymakers, water resources managers, society, water and sanitation utilities/enterprises, etc.). Effective outreach enables efficient knowledge transfer by encouraging the cooperation of public and private stakeholders through regular information exchange and supporting the transfer

of knowledge and solutions developed during the research of the innovation stage.

One of the key instruments for implementing the Water JPI SRIA is launching joint calls for proposals to stimulate and facilitate multi-national, collaborative RDI projects and increase synergies in cross-cutting issues. Another instrument relates to networking activities, such as the development of knowledge hubs or thematic annual programming, whereby participation and links with the main stakeholders and end users are key to successfully transferring knowledge and utilisation of research outputs.



- **Indicator 5.1:** Number of patents and licences arising from joint transnational projects funded by the Water JPI.
- **Indicator 5.2:** Number of start-ups arising from joint transnational projects funded by the Water JPI, once the project has finished.

4.6 Objective 6: Contributing to Achieving the UN SDGs

The sixth objective of the Water JPI Vision 2030 relates to producing knowledge, evidence and solutions that will contribute to the implementation of the UN SDGs.

The UN SDG “Clean Water and Sanitation” (UN SDG6) focuses on the water cycle in its eight targets. Issues such as water quantity and quality,

efficient waste water treatments, better water management and governance, international cooperation and capacity-building support for developing countries are key. Water also supports the achievement of numerous other UN SDGs (e.g. SDG2: zero hunger, SDG3: good health and wellbeing, SDG11: sustainable cities and communities and SDG13: climate action).

These require a more integrated approach in terms of synergies and trade-offs. Achieving these targets by the deadlines set in the UN SDGs will require (1) a new scientific approach that links disciplines, knowledge systems and

societal partners to support these necessary developments, and (2) large funding partnerships to achieve the volume of research and cross-sectoral approach required in the light of the global challenges we are facing.



- **Indicator 6.1:** Number of funded projects that specifically address SDG6 targets (and other SDGs, when relevant).
- **Indicator 6.2:** Number of projects involved in intersectoral dialogues as a measurement of JPI effectiveness.
- **Indicator 6.3:** Number of workshops and outputs addressing UN SDG challenges and water-related SDG targets.
- **Indicator 6.4:** Number of verified contributions to SDG achievement (stakeholder engagement metrics).

4.7 Objective 7: Adopting the Water JPI Vision and SRIA at the National Level

Finally, the seventh objective of the Water JPI Vision 2030 is the alignment of research agendas at the national level.

Alignment can be implemented by undertaking (joint) actions that aim to foster greater coordination and complementarities among national research priorities, programmes and activities around jointly identified strategic priorities (e.g. a strategic research agenda).

Alignment aims to increase synergies among (existing) national research programmes and activities, trigger cost-efficiencies in research financing (e.g. via leverage effects), enhance the level of scientific performance, help identify research gaps and maximise the research impact on policymaking and innovation to have an effective impact on tackling global societal challenges. This is a crucial priority of the Water JPI, as it will enable the optimal use of national research funds, both on national and multilateral calls.



- **Indicator 7.1:** Number of countries with national research strategies aligned with the Water JPI SRIA.
- **Indicator 7.2:** Level of recognition of the Water JPI Vision over time at the funding agency/country level.

Chapter 5

Water JPI Vision 2030: Research Themes



5 Water JPI Vision 2030: Research Themes

5.1 Cross-cutting Issues

To achieve its Vision 2030 and address its grand challenge, the Water JPI has identified the following four core research themes and these are explained in detail in the Water JPI SRIA 2025.

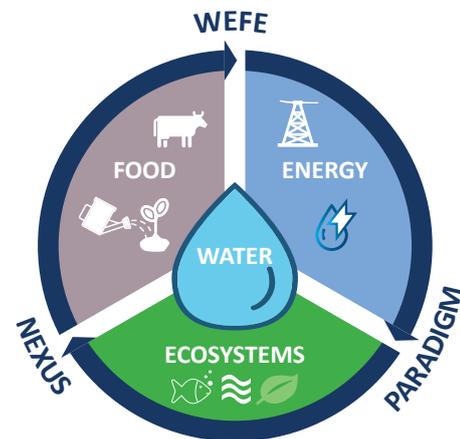
-  **A. Ecosystems**
-  **B. Health and Wellbeing**
-  **C. Water Value and Usage**
-  **D. Sustainable Water Management**

Considering the scope and complexities of the four core research themes of the Water JPI, three key cross-cutting issues have been identified in **Figure 5.1** (overleaf); these illustrate the need to ensure that a more integrated and holistic approach is taken.

1. UN SDGs. Sustainability is at the heart of long-term planning, and the 2030 Agenda for Sustainable Development encourages countries to develop national responses to the SDGs and incorporate them into policy.



2. WEF Nexus paradigm (encompassing water, energy, food and ecosystems). This is central to enabling sustainable development. The Nexus covers several of the SDGs, demand for food, energy and water is rapidly increasing across sectors so the scope of water challenges must widen to include food security, water management and efficiency, sanitation, ecosystem services and resource depletion.



3. Climate-neutral circular economy and bio-economy. This aims to eliminate waste and promote the reuse products without compromising the environment. Establishing a climate-neutral economy is challenging, as it requires major changes and transitions, such as the EU’s commitment to transition to carbon neutrality by 2050.



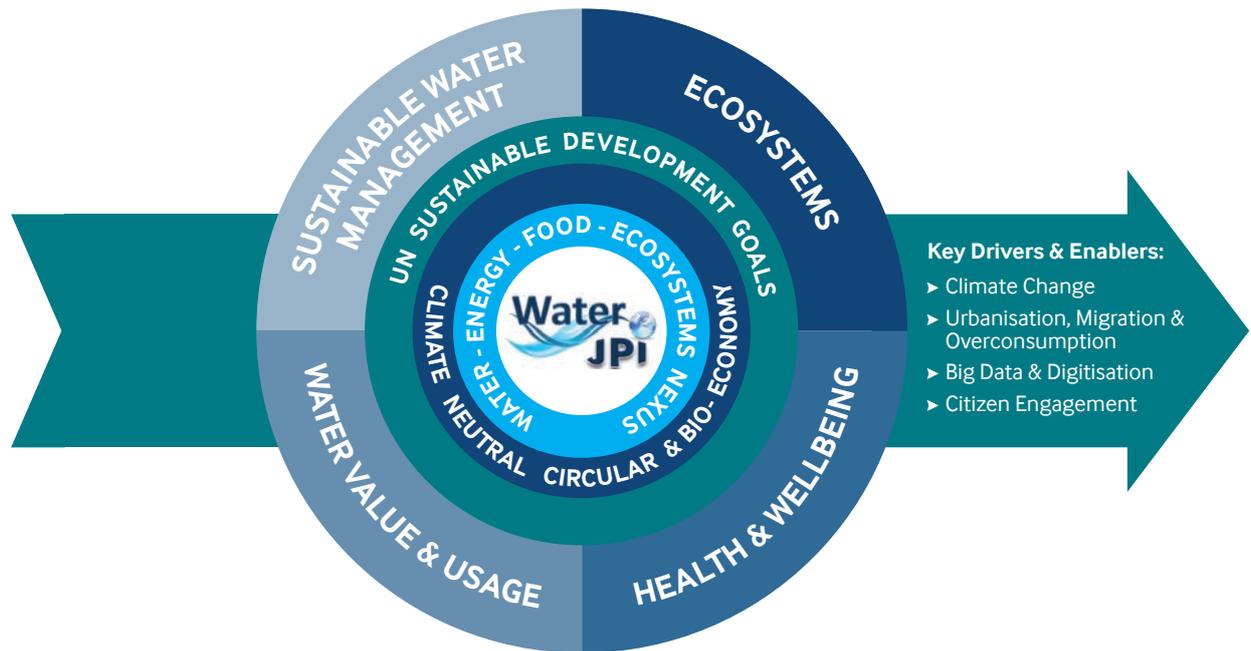


Figure 5.1. The Water JPI core research themes, cross-cutting issues and drivers/enablers.



5.2 Theme A: Ecosystems

Ecosystems and ecosystem services play an important role in terms of their biodiversity, mitigating the effects of flood and drought and absorbing and detoxifying pollutants. Ecosystems, which encompass the marine, freshwater and terrestrial environments, provide vital services to humankind, for instance food, timber, flood control, water regulation and purification, pollination, recreation and cultural benefits, and habitats for plants and animals. All ecosystems are linked and maintained by water, providing plants and habitats and breeding grounds for the various species that depend on them. Furthermore, ecosystems serve humans in terms of purification and filtration of water, recreationally and economically. They are a finely tuned process and are susceptible to pressures such as climate change, pollution, water abstraction and the spread of alien species.

A related aspect of ecosystems is the concept of ecosystem “disservices.” These arise in cases in which the interaction between natural systems and humans is negative or has adverse effects; this can negatively affect economic production and human life. Examples include excessive primary productivity (supporting disservice), the proliferation of non-native species (provisioning disservice), offensive-smelling decomposing organic matter (cultural disservice), carbon sinks turning to carbon sources (regulating disservice) and water quality deterioration following landslides or bog bursts.

Rapid population growth and urbanisation have significantly affected ecosystem services in terms of land use change (i.e. agriculture and urbanisation). Intensive farming practices have contributed to excess nutrients, sediment and chemicals (agri-chemicals) in the environment. Following extreme weather events, excesses of these substances can be washed from farmland into waterways and cause major environmental damage. These factors have contributed to

biodiversity loss. Research has also shown that there is a direct correlation between biodiversity and ecosystem services. The IPBES Regional Assessment Report for Europe and Central Asia states that there is a trend towards a decline in biodiversity. This will have consequences for resilient ecosystem services, impacting on, for example, the formation of habitats, the regulation of freshwater quality and quantity, soil formation and flood regulation. According to the report, land use change, climate change and economic growth are considered the key drivers for the loss of both biodiversity and ecosystem services, not only in Europe and Central Asia, but also on a global level. Nonetheless, initiatives such as the SDGs and IPBES highlight not only the deficits regarding biodiversity and ecosystem services but also the achievements in knowledge transfer and policy regulation associated with environmental stewardship. Greater engagement of people with water issues would also lead to an increased awareness of the need to protect water resources and of the value of ecosystem services, as well as including them in national environmental policies and land use planning.

There are significant knowledge gaps regarding the value of ecosystem services, such as understanding the intrinsic value of ecosystems and their functioning, and approaches to accounting for this value. Further research is required to assess and evaluate the links between biodiversity and ecosystem change, and a deeper understanding of ecological tipping points, which is becoming more critical in the face of global changes. Ways of embedding ecosystem services in policymaking, (spatial or land use) planning and river basin management processes is another key linking area. Research outcomes under this theme will contribute to the evidence base, which is critical for informing robust policy actions. It will also support the implementation of European directives and international policy. The key SDGs related to this theme and to which research can contribute are outlined in **Figure 5.2**.



Figure 5.2. Key UN SDGs relevant to Theme A.

5.3 Theme B: Health and Wellbeing

The current global population is 7.7 billion and it is set to rise to 8.6 billion by 2030. Coupled with climate change, urbanisation and migration, water demand pressures will significantly increase. Intensive agriculture, over-abstraction of ground and surface waters, the persistence of contaminants of emerging concern in water bodies and the subsequent adverse health effects on humans, animals and the environment continues to rise. The global health crisis in the form of antimicrobial resistance (AMR) is estimated to contribute to 10 million deaths by 2050.

The main challenges under this theme are ensuring safe and clean water, for both people and the natural environment. Further research is required not only on the underlying issues but also on human, animal and environmental impacts – the “one health approach”. This approach seeks to implement programmes, research and policies to understand and evaluate the links between global human practices (including waste water treatments), ecosystems and human health. There is a requirement to develop methodologies on how to prevent adverse health effects of substances both known and not yet known, to have a direct or cumulative impact on public health and ecosystems. There are direct relationships or correlations between environmental aspects (such as agriculture, forestry, water, soil and climate change) and social science and epidemiological aspects (such as opportunistic pathogens in water due to more favourable climate conditions). Higher temperatures, especially in more temperate regions, will see greater transmission rates of waterborne pathogens, such as species of *Legionella*, *Cryptosporidium* and *Giardia*,

leading to increased transmission rates of such pathogens. There are knowledge gaps regarding the evaluation of potential risks of transmission on account of extreme climatic events and mitigation measures, such as improvements in sanitation. Furthermore, evidence-based research can serve to inform policy. Research outcomes in this theme can help to inform policy by providing epidemiology in addition to environmental evidence.

Research under this theme also aims to contribute to key policies, such as the EU Strategy on Adaption to Climate Change and the WFD and related directives, which directly contribute to safeguarding and slowing down the deterioration of water resources. The Waste Framework Directive and the Common Agricultural Policy are relevant to this theme and research should highlight the need for the implementation of stricter controls on the use of antibiotics (relevant to farming and aquaculture). Improving the health and wellbeing of all EU citizens is one of the main objectives of the European Green Deal. Furthermore, one of the objectives of the EU One Health Action Plan on Antimicrobial Resistance, adopted in 2017, is to boost research, development and innovation in AMR. The WHO works closely with similar organisations (such as the Food and Agricultural Organisation of the United Nations and the World Organisation for Animal Health) to promote and foster cross-sectoral cooperation to respond to associated hazards (food safety and zoonoses) at the human–animal interface and offer guidance on how to reduce risks. Research outcomes within this theme can support and contribute to achieving this aim. The key SDGs related to this theme and to which research can contribute are outlined in **Figure 5.3**.



Figure 5.3. Key UN SDGs relevant to Theme B.

5.4 Theme C: Water Value and Usage

The sustainable use and preservation of natural water resources is becoming more and more relevant in the face of population growth, climate change and urbanisation. As the population expands, demands on water, energy, food and ecosystems and geosystems are all set to significantly increase. Agricultural irrigation accounts for 70% of water use worldwide. Over-abstraction of groundwaters has led to deficits in freshwater, the dropping of water tables and, in coastal areas, the introduction of saltwater intrusion, which degrades groundwater. This is exacerbated by climate change effects (drought and floods) and urbanisation. Ecosystems are also under threat, as many wetlands are in decline in terms of the services they provide. The reuse of water, particularly waste water, has been cited as an option to close the loop in terms of the circular economy. Putting a price on water increases its value. However, it can also exclude marginalised or vulnerable groups in terms of access to water. Research outcomes in this theme can lead to new ways of thinking and technological developments that contribute to improving water and waste water quality and mitigating negative impacts through better processes and better data. This is required to generate a real circular economy market. New concepts to balance conflicting goals are beneficial, for example water as a resource for human needs/infrastructure versus biodiversity and ecosystem functions. This would help create a more water-wise and water-smart society.

There are considerable knowledge gaps in the reuse of treated water and the impact on water quality. Both the Urban Waste Water

Treatment Directive and the WFD promote the reuse of treated water whenever appropriate. There is, however, no EU legislation to specify the conditions for water reuse. In 2018, the EC proposed new legislative measures to incentivise the reuse of treated water while maintaining a high level of health (for both humans and the environment). This proposal builds on the 2015 Circular Economy Action Plan. To achieve this vision, improvements in technologies and materials as well as the development of new inclusive governance models and “living laboratory” pilots need to be advanced. Additional research is required to identify conditions under which reuse is not generating new environmental and health risks (greater dispersion in ecosystems of medical contaminants for instance). Governance issues need to be analysed in terms of critical analyses of the potential negative impacts of such technologies.

Research in this theme can contribute to policy development, particularly for the implementation of the Drinking Water Directive, the WFD, the Urban Waste Water Treatment Directive, the EU Scarcity and Droughts Strategy and the EU proposal for regulations on water reuse. Research outcomes should serve to influence and adapt policies, and develop and enforce regulations and directives to enable water reuse technologies and improved associated governance structures. There is also a need to seek better alignment between public preferences and necessary changes (though this does not only imply increased public acceptance). The key SDGs related to this theme and to which research can contribute are outlined in **Figure 5.4**.



Figure 5.4. Key UN SDGs relevant to Theme C.



5.5 Theme D: Sustainable Water Management

Climate change has led to an unpredictability in the water cycle in recent years. Unprecedented levels of flooding and drought in recent times have added to a water infrastructure that is already challenged. Globally, drivers such as climate change, population growth and economic development have placed significant pressure on water resources. Agriculture accounts for 44% of all total water abstracted in the EU and reaches even higher proportions in southern regions. Crop adaptation to water shortages, as well as in aquifers in coastal areas on account of groundwater abstraction and in groundwaters as a result of tidal fluctuations, require further monitoring and research. Adapting water resources management to deal with increased uncertainty (in terms of drivers such as climate change, demands/supply) will therefore require developing innovative and robust decision-making approaches. Sustainable water resources management considers all components of the water cycle, particularly with respect to climate and global change and devising appropriate solutions. There is a requirement to develop knowledge of sustainable water resource management, such as management at a catchment scale for different users.

Ensuring the sustainability of water supplies for increasing water demand requires holistic optimisation of the WEFE Nexus approach and it has been suggested that the definition should be broadened to include resource use and health. Food security will be more challenging as resources (water, nutrients, land, energy) become limited, urbanisation/migration/consumption increases and water quality is compromised. The Nexus approach also considers the synergies and trade-offs associated with the management of all resources. Understanding those can help to mitigate and prioritise interventions. In terms of governance, a global management system for water is needed, specifically a negotiation mechanism, as well as a global water strategy.

Research outcomes in this theme can lead to new innovative solutions, a better understanding of the interlinkages and interdependencies of the Nexus approach and a better integration of EU and international policies, as well as across sectors, such as agriculture, water, waste, energy and climate. Research should also contribute to the lessening of political conflicts in relation to water policies, which in turn have an impact on migrant and seasonal workers. The key SDGs related to this theme and to which research can contribute are outlined in **Figure 5.5**.



Figure 5.5. Key UN SDGs relevant to Theme D.



5.6 Research Themes Contributing to the Water JPI's Objectives

The joint actions under the four core research themes will contribute to achieving the objectives of the Water JPI's Vision 2030. **Table 5.1** below summarises how this may be achieved.

Table 5.1. Research themes and achieving the Water JPI's objectives

Theme	Objective 1 Engaging stakeholders	Objective 2 Broadening the partnerships	Objective 3 Contributing to policy development/ implementation	Objective 4 Supporting and enhancing the research and innovation community	Objective 5 Stimulating innovation and value of research outputs	Objective 6 Contributing to achieving the UN SDGs	Objective 7 Adopting the Water JPI Vision and SRIA at the national level
Ecosystems	✓✓✓	✓	✓✓	✓✓✓	✓	✓✓✓	✓
Health and Wellbeing	✓✓✓	✓	✓✓	✓✓✓	✓✓	✓✓✓	✓
Water Value and Usage	✓✓✓	✓✓✓	✓	✓✓	✓✓✓	✓✓✓	✓✓
Sustainable Water Management	✓✓✓	✓✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓

Key: Contributes to objectives: ✓ | Contributes more to objectives: ✓✓ | Contributes strongly to objectives: ✓✓✓



Chapter 6

From Vision to SRIA to Implementation



6 From Vision to SRIA to Implementation

The challenges facing Europe and the world in terms of water issues cannot be addressed by one entity alone. The Water JPI and its Vision 2030 will strengthen evidence-based water research and foster collaboration to achieve safe, clean and sustainably managed water resources for all. The Vision 2030 is a high-level strategic document looking to 2030 that sets the context for identifying and prioritising RDI investments and joint activities of the Water JPI. The SRIA 2025 elaborates on and identifies key research areas where joint actions are required, under the four core themes. These will be reviewed and updated in 2025 (i.e. SRIA 2025) to ensure that the Water JPI achieves its objectives and to address its grand challenge. The Water JPI will define how it will address the priorities and knowledge gaps identified in SRIA 2025 by preparing a work programme and prioritising actions. This will be done via the preparation of three early implementation plans (see Figure 6.1).



Figure 6.1. Relationships between the Water JPI Vision, SRIA and the implementation plan.



