

# Cooperation in research and innovation programming with Brazil: topics, success stories and future opportunities

Dominique Darmendrail<sup>1</sup>, Elisa Natola<sup>2</sup>,

## Resumo

Alcançar os objetivos da política internacional relacionados ao acesso à água limpa e ao saneamento exigirá contribuições: (1) da ciência multidisciplinar, dos sistemas de conhecimento e de parcerias sociais, de modo a apoiar a implementação dos processos envolvidos; e também 2) de amplas parcerias de financiamento para alcançar a massa crítica e implementar uma abordagem intersetorial de enfrentamento aos desafios globais identificados. Para superar as barreiras enfrentadas por programas de pesquisa e inovação – fragmentação, massa crítica insuficiente, reduzido nível de absorção dos resultados por políticas e mercados -, um inovador modelo de programa de pesquisa

## Abstract

*Achieving International policy targets on clean water and sanitation by 2030 will require contributions: (1) from science that links disciplines, knowledge systems, and societal partners, to support and implement the necessary developments; and (2) large funding partnerships to reach the necessary critical mass and implement the cross-sectoral approach required to address the ascertained global challenges. To overcome the barriers faced by research and innovation programmes (fragmentation, insufficient critical mass, low level of results uptake by policies and markets), an innovative research programming model entitled Joint Programming Initiative (JPI) is developed since 2008, which targets major global societal challenges*

- 1 Currently works at the Environment and Biological Resources Department of the French Research Funding Agency (ANR). Coordinates the Water Joint Programming Initiative, a network of 30 research and innovation funding agencies dealing with water security challenges and coordinates an International Cooperation Support action in this area. Ms. Darmendrail has a 30 years' experience in Environmental and Water Sciences.
- 2 Political scientist and Senior Advisor for International Cooperation and European Policies and Programmes. Within Confap, is advisor for International Cooperation between European Union & Brazil, is the Brazilian National Contact Point for Horizon 2020 Marie Skłodowska-Curie Actions-MSCA; coordinates cooperation activities, programmes and projects between Confap and the EU and with the Water Joint Programming Initiative.

intitulado de Joint Programming Initiative (JPI) vem sendo desenvolvido desde 2008. Seus alvos são os principais desafios sociais globais que não podem ser combatidos pelos países de maneira individual. O artigo apresenta um amplo leque de ações realizadas pela Water JPI para enfrentar tais desafios globais, destacando a importância de esforços em pesquisa e inovação, mas também em ampliar o nível internacional de implementação das soluções mais sustentáveis, justas e aceitáveis, nas quais Soluções baseadas na Natureza (SbN) são mais relevantes. O artigo também ressalta a cooperação com o Brasil, lançada em 2017, em conjunto com o Conselho Nacional das Fundações Estaduais de Amparo à Pesquisa (Confap).

**Palavras-chave:** Pesquisa e Inovação. Iniciativas de programação conjunta. Cooperação Brasil – Europa. Desafios relacionados à água.

*that cannot be addressed individually by countries. The paper presented the broad range of actions taken by the Water JPI to tackle water challenges in the global context, highlighting the importance of the efforts to research and innovate, but also scale up at international level for implementing the most sustainable, fair and acceptable solutions, in which Nature-Based Solutions are of most relevance. It highlights the cooperation with Brazil launched in 2017, together with the Brazilian National Council of State Funding Agencies [in Portuguese, Conselho Nacional das Fundações Estaduais de Amparo à Pesquisa, acronym Confap].*

**Keywords:** Research and Innovation. Joint Programming Initiative. Brazil – Europe Cooperation. Water – related challenges.

## 1. What are the Joint Programming Initiatives?

Joint Programming Initiatives (JPI) are intergovernmental collaborations to tackle major societal challenges unable to be addressed by individual countries and, in doing so, to 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 (SRIA). Launched in 2010, the JPI “Water challenges for a changing world”, the Water JPI Vision 2020, aimed to tackle the ambitious challenge of achieving sustainable water systems for a sustainable economy both in Europe and beyond. The objectives of the JPI are:

- Aligning national policy priorities, strategies, competencies and programmes;

- Driving scientific excellence through mission-oriented joint actions;
- Building trust and encouraging 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;
- Benefiting from institutional alignment and partnering;
- Providing effective links between research and knowledge on one hand, and global policy on the other, such as the United Nations (UN) Sustainable Development Goals (SDG) and the European Green Deal that is committed to making Europe climate-neutral by 2050; and
- Extending links to various challenge-related international initiatives for learning from other countries' experiences.

## 2. The Water JPI

The Water JPI, entitled “Water Challenges for a Changing World”, was launched and later formally approved by the European Council in December 2011. The Water JPI membership (Figure 1) consists of 23 Member States and the European Commission (EC) as a non-voting member with three observing countries. It accounts for 88% of all European public RDI annual expenditure on water issues (WATER JPI, 2020a).

The international cooperation dimension of the first implementation actions of the Water JPI includes Israel, Norway, the Republic of Moldova, South Africa and Turkey (full Water JPI members), as well as two additional Horizon 2020 associated countries (Egypt and Tunisia) and three international partners (Brazil, Canada and Taiwan) involved in specific joint transnational activities (Figure 2).

The Water JPI is dedicated to achieving its 2030 vision “Together for a water-secure world” with a share vision “Jointly enabling smart water solutions for a changing world”.

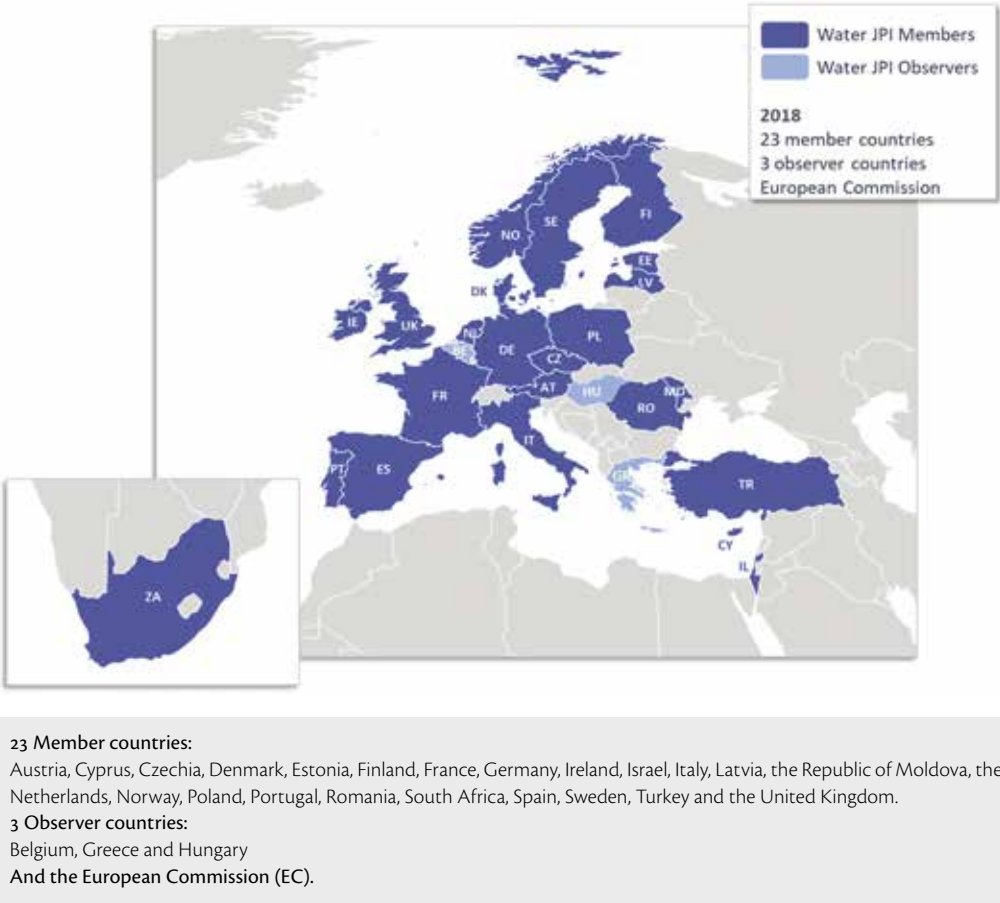
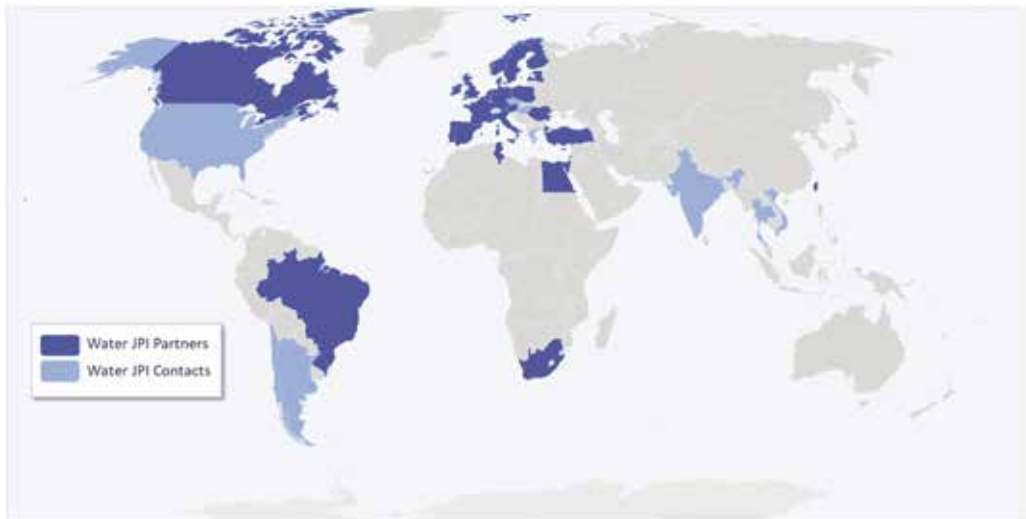


Figure 1. Water JPI Membership

Source: *Water JPI*, 2019a.

This will be realised through a multi-disciplinary approach, which includes economic, ecological, societal and technological considerations. This JPI mobilises existing national and regional RDI programmes and aims to harmonise their research agendas and infrastructures. It will define common research needs and develop joint activities in the ERA context that will increase efficiency by avoiding duplications across Europe and beyond. The Water JPI provides an opportunity for broader cross-border cooperation, greater collaboration and a more unified focus on water RDI across Europe and beyond. It must be remembered that the European water sector has a wide diversity of stakeholders and is highly fragmented: water resources, water supply and wastewater have often been locally managed.



**Figure 2.** JPI Partnership Map

Source: *Water JPI*, 2019a.

The Water JPI produces science-based knowledge leading to the support of European and International policies, comprising the identification of problems, their quantification, and the development of feasible technical and managerial solutions. It will coordinate water RDI in the participating countries, contribute to the Smart Specialisation Agenda, and provide a powerful tool for international cooperation in the water area.

The JP<sup>3</sup> concept is therefore based on the following key principles, as illustrated in **Figure 3**:

- Joint actions are launched based on a shared Strategic Research and Innovation Agenda (SRIA) agreed by all actors.
- Variable geometry: countries participate only in activities related to their specific interests.
- Flexibility: activities are developed in response to partners' needs and opportunities using a large range of implementation tools.
- Everything in common except funding: each JPI partner funds its activities and its communities' participation (so-called virtual common pot).

---

<sup>3</sup> JP – this is the concept transformed in initiatives / actions with JPI.

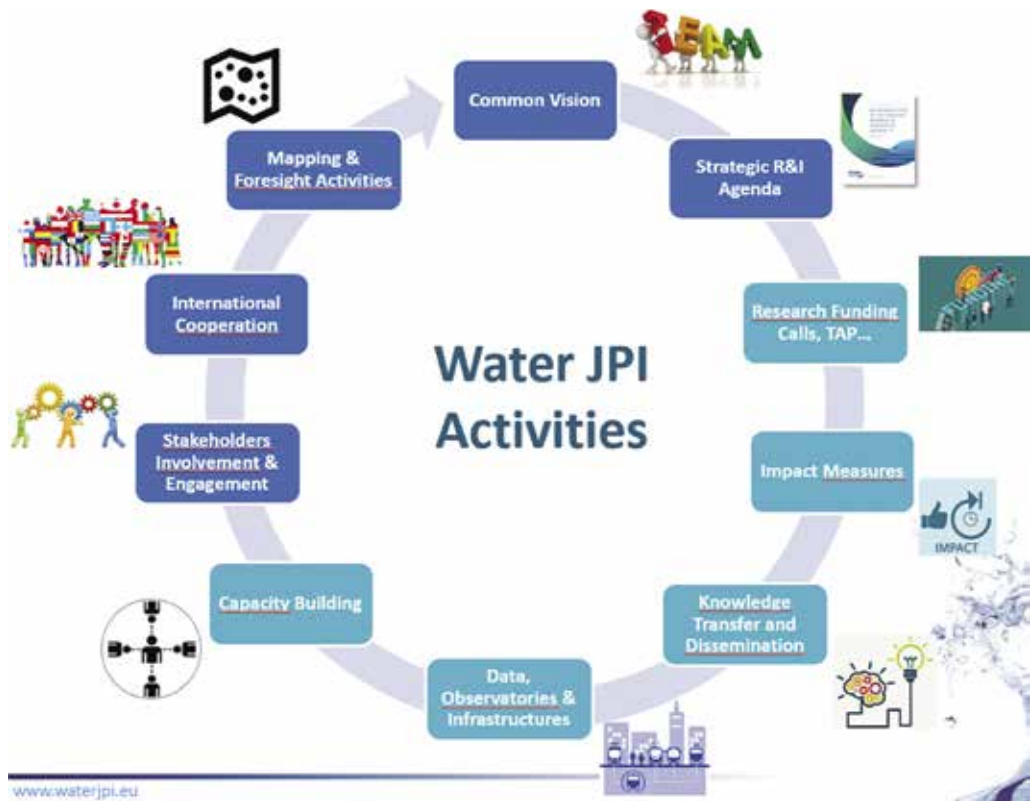


Figure 3. Water JPI activities

Source: Water Europe, 2020.

*To date*, the Water JPI has been successful in mobilising important national water research and innovation funding. It has encouraged and stimulated the broadening of the JPI to several international cooperation partner countries and has focused on new knowledge and knowledge transfer. The JPI engages in mapping exercises to explore gaps, undertakes joint transnational calls and Thematic Annual Programming (TAP) to generate knowledge, and takes part in two knowledge hubs. Between 2013 and 2018, the Water JPI engaged in five joint calls encompassing 336 research organisations and 70 research and innovation projects (Table 1).

**Table 1.** Water JPI Joint Calls (2013–2018)

Water JPI Joint Calls, 2013–2018				
Year	Joint Call	Participation	Value	Funded Projects
2013	Emerging water contaminants	10 countries	€9 million	7
2015	Waste water treatment and water reuse	15 countries + European Commission	€14 million	16
2016	Water challenges in agriculture, forestry and freshwater aquaculture	22 countries + European Commission	€18 million	21
2017	Water-related UN Sustainable Development Goals	12 countries	€6.8 million	8
2018	Closing the Water Cycle Gap: Sustainable Management of Water Resources	18 countries + European Commission	€15.2 million	18

**Source:** Prepared by the authors.

Currently, two calls are launched in 2020 in relation with *Risks posed to human health and the environment by pollutants and pathogens present in water resource*, one for traditional Research and Innovation proposals and one for accelerating the transfer of funded projects results, a new type of call to support a more efficient exploitation of project outputs.

New opportunities will be offered in 2021 via an ERA-NET Cofund dedicated to “conservation and restoration of degraded ecosystems, including a focus on aquatic ecosystems”, for 2020-2021 Joint Calls (submitted to the European Commission for extra funding in February 2020 – if approved, the call should be launched end of 2020).

**For developing knowledge transfer and dissemination**, the first Water JPI Knowledge Hub on Contaminants of Emerging Concern (CEC) started in March 2018, with 25 experts (WATER JPI, 2019b). In this area, several documents were produced:

- **Water JPI Policy Brief** on “*What is contaminating our waters next? Contaminants of Emerging Concern (CEC) – novel ways to reduce their human and environmental risks*” - October 2018 (WATER JPI, 2018a).
- **Water JPI Knowledge Hub on CEC Policy Brief** “*Contaminants of Emerging Concern - an emerging risk in our waters*” - June 2019 (WATER JPI Knowledge Hub, 2019).

- **Water JPI Knowledge Hub on CEC Stakeholder Brief** “*Continuous increase of CECs in the anthroposphere as a stressor for water resources*” – January 2020 (WATER JPI Knowledge Hub, 2020).

The second Knowledge Hub on the UN SDG started in December 2019. Their main topic for future joint actions will be the Water – Energy – Food - Ecosystems Nexus, as Water resources are embedded in all forms of development (e.g. food security, health promotion and poverty reduction), in sustaining economic growth in agriculture, industry and energy generation, and in maintaining healthy ecosystems (UN Water, 2018).

**For aligning national programmes and related funded projects**, the Water JPI launched a TAP Action on Ecosystem Services (WATER JPI, 2020b) which kicked-off in June 2019 in Dublin, covering six projects from four countries. After exchanging on possible impact indicators for such activity, the project teams discussed the title and scope of their first joint output, a policy brief in relation with the overall importance of communicating the variety of services (cultural services, water supply, etc.) that contribute to overall human and environmental health and therefore the quality of life. The common ground included shared challenges (reluctance to change, lack of awareness) as well as possible communication tools (social media for younger generations, integration into governmental policies and strategies).

### 3. Nature-Based Solutions in Water JPI Programme

Nature-Based Solutions (NBS) are considered in the Water JPI SRIA Theme 1: Improving Ecosystem Sustainability and Human Well-being, in particular in Theme 1.2 - Integrated approaches: developing and applying ecological engineering and ecohydrology. The aim of the RDI actions under this theme is to maintain the essential functions, processes and services of water bodies and associated ecosystems over the long-term through integrated and interdisciplinary RDI actions. The key to sustainable development is to achieve a balance between the exploitation of natural resources for socio-economic development and conserving ecosystem services (benefits people obtain from ecosystems).

Further water management efforts and RDI actions are currently needed to ensure the protection and/or restoration of water bodies and ecosystems whilst meeting the socio-economic, political and cultural needs of current and future generations. Research on ecosystem sustainability will also support a relatively wide range of national, European and international policy initiatives including: the 7th Environment Action Programme (EAP); the EU Biodiversity Strategy; the



Water Framework Directive (WFD); the Habitats and Flood Directives; and the United Nations Sustainable Development Goals (UN SDG).

The 2017 Water JPI Exploratory Workshop (WATER JPI, 2016) was organised in close cooperation with BiodivERsA (BiodivERsA, 2020) and achieved its intended objectives: network and share knowledge, discuss views on the knowledge gaps and RDI needs in Theme 1, come to a consensus and elaborate on how these RDI needs could be addressed to link to the UN SDGs, water policy and predict impact. The results of these exchanges were considered for updating the Water JPI SRIA and for developing content for call for RDI proposals.

The Water JPI 2018 Joint Call addressed R&I to support the implementation of EU water policy, in particular on the thematic area “Closing the Water Cycle Gap – Sustainable Management of Water Resources” of the Water JPI SRIA.

The following themes are targeted in the call:

1. Enabling Sustainable Management of Water Resources;
2. Strengthening Socio-economic Approaches to Water Management; and
3. Supporting Tools for Sustainable Integrated Management of Water Resources.

The Sub-theme 1.2 of this focused on “Integrative management by implementing Natural Water Retention Measures (NWRM) such as Managed Aquifer Recharge (MAR)”. The aim is to increase the knowledge and develop NWRMs such as MAR in a multidisciplinary way, to protect, prolong, sustain and augment freshwater supplies. Evidence of their effectiveness and on the multiple benefits they deliver should be demonstrated.

The water JPI decided to focus on MWRM as the European Commission had a call launched end of 2017 targeting topics such as:

- Valuing nature: mainstreaming natural capital in policies and in business decision-making
- Strengthening international cooperation on sustainable urbanisation: nature-based solutions for restoration and rehabilitation of urban ecosystems
- Innovative nature-based solutions for carbon neutral cities and improved air quality

- Visionary and integrated solutions to improve well-being and health in cities (e.g. capture the multiple co-benefits created by nature-based solutions in terms of health and well-being).

Five out of the 18 projects of the 2018 call are related to NBS (WATER JPI, 2017).

**Table 2.** List of the RDI projects funded under the 2018 Call

Projects	Research teams from following countries
ATeNaS - To Ally Technology, Nature and Society for integrated urban water management	Poland, Finland, France
EviBan - Evidence Based Assessment of Nature based solutions	Norway, Finland, France, South Africa
MARadentro - Managed Aquifer Recharge: Addressing the Risks of Recharging Regenerated Water	Spain, France, Italy, Sweden
NATWIP - Nature-Based Solutions for Water Management in the Peri-Urban	Sweden, Norway, Poland, South Africa, Spain
RAINSOLUTIONS - Research-based Assessment of Integrated approaches to Nature-based SOLUTIONS	Sweden, Brazil, Estonia, Ireland, Netherlands, Norway, Romania

Source: Prepared by the authors.

To illustrate the Water JPI, two funded projects – See Table 3 (below) and 4 in following chapter “Brazil in the Water JPI”.

**Table 3.** Illustration of a Water JPI funded project addressing NBS

Call 2018 – MARadentro - Managed Aquifer Recharge: Addressing the Risks of Recharging Regenerated Water
<p>The aim of MARadentro is to lower the pressure on water resources through (i) the evaluation of the risks associated to the use of regenerated water in Managed Aquifer Recharge (MAR) and (ii) the identification of proper requirements to ensure human health and environment protection, feasibility and public confidence in the use of reclaimed water in MAR. The specific goals are:</p> <p>a) enhance water quality improvement during MAR through advanced tools to stimulate pollutants degradation and pathogens inactivation. These tools include reactive layers based on biotic and abiotic systems,</p> <p>b) resort to reactive transport modelling tools to predict the behavior of pollutants and pathogens,</p> <p>c) perform an environmental risk assessment by advanced modeling tools to test whether the use of reclaimed water for the proposed MAR system has no adverse effects on the ecosystem,</p> <p>d) address the challenges in upscaling MAR operations from lab tests to a pilot MAR and a real field MAR site,</p> <p>e) evaluate the economic feasibility of the proposed system in a real field MAR,</p> <p>f) promote the general public acceptance on water reuse and MAR, and</p> <p>g) transfer knowledge gained and provide recommendations to stakeholders for efficient implementation and operation of MAR, and to authorities and policy makers on water to help for an EU regulation on MAR.</p>
▼.....▼

---

Call 2018 – MARadentro - Managed Aquifer Recharge: Addressing the Risks of Recharging Regenerated Water

---

**Scientific outputs:** **MarAdentro** aims to increase the benefits of MAR regarding water quality and quantity, and to minimize the associated risks of using reclaimed wastewater as recharge water source by developing affordable and effective technologies through reactive layers' implementation. Based on the knowledge gained, **MarAdentro** will provide recommendations/guidelines for a future regulative scenario regarding the reuse of reclaimed water for MAR. The technological readiness level from several multidisciplinary approaches and applications will be improved, reaching a MAR prototype close to market.

**Innovation outputs:** **MARadentro** addresses MAR challenges through the following novel approaches:

a) Development of bioaugmented/biologically active reactive layers to enhance the pollutant and pathogen removal capacity; b) developed layers will be adapted to three environments, laboratory, pilot and field MAR, to identify and overcome issues related to aquifer characteristics, climate, etc.; c) determination of the key-points governing the risk of MAR to human health and ecological status through the incorporation of the risk assessment concept in modelling tools; d) use of the rapid early warning monitoring of flow-cytometry and toxicity assays to assess MAR depuration efficiency; e) application of the most powerful analytical techniques based on high resolution mass spectrometry for the identification and structural elucidation of the transformation products of the chemical contaminants formed.

**Societal outputs:** **MARadentro** will fill knowledge and regulatory gaps for MAR technology to contribute to closing the water cycle gap. **MARadentro** will develop a knowledge base for understanding, preventing and mitigating the risks associated to MAR implementation, to make MAR a reliable technology for water management adapted to the emerging water challenges. The incorporation of novel reactive layers will ensure MAR as a sound and safe technology, capable to increase fresh water resources as well as to improve ecological status and chemical quality of groundwater, while ensuring no negative impacts over human health. The economic analysis will facilitate the market replication of MAR into the water sector. Key scientific recommendations, validated by the demonstrable data produced, will be formulated and legislative refinement suggested over the basis of scientists and stakeholder's guidance to help develop water policies closer to end-users needs. General public acceptance about MAR is expected providing a firm scientific basis and an open access to the outcomes.

---

**Partners:** Consejo Superior de Investigaciones Científicas (CSIC-IDAEA, Spain), Universidad Politécnica de Cataluña (UPC, Spain), Aqualia Gestión Integral del Agua SA (AQUALIA, Spain), HydroSciences Montpellier (CNRS, France), Centre Nationale Recherche (CNR-IRSA, Italy), and Swedish University of Agricultural Sciences (SLU, Sweden)

**Contact:** Dr Silvia Diaz (MAR, 2018).

---

**Source:** Project coordinator / [www.maradentro-jpi.eu](http://www.maradentro-jpi.eu).

On these same challenges, BiodivERsA and the Water JPI decided to jointly submit a proposal for getting EC cofunding on "Conservation and Restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems" which should lead to a call end 2020.

## 4. Brazil in the Water JPI

Brazil was one of the seven countries targeted by the Water JPI since its launch in 2011 for:

- Strengthening the international dimension of European Water RDI.
- Developing durable partnerships for Water RDI in the world.

A first mapping detailed i) major water challenges; ii) major funding organizations in Brazil; iii) existing RDI programming initiatives with EU funders (European Commission and Member States); iv) scientific publications between EU and Brazil; and v) a market analysis (WATER JPI, 2012).

The main water challenges faced by Brazil were identified:

- Brazil holds 12% of the World's fresh water. Water is very unevenly distributed across the country. Around 50% of the water is found in the Amazon, where only 4% of the Brazilian population lives, whilst 80% live less than 100 km from the Atlantic Ocean. These large disparities in terms of the availability of the resource and the distribution of the population pose real challenges, such as the issue of producing and transporting drinking water to the coast, wastewater treatment, etc. In the urban areas, access to drinking water resources is very uneven. Water scarcity is common in the Northeast of Brazil; water pollution can be frequently found in the South-East of the country.
- About 37.5% of the collected wastewater is currently treated. More than 60% of impatient care at hospitals is due to water borne diseases.
- Large climatic variability can be found in Brazil, where equatorial, tropical, semi-arid and sub-tropical climates can be found. Climatic diversity presents an additional challenge, with large areas subjected to floods and droughts.
- The geopolitics of water is also an integral part of the major challenges facing this country. Brazil shares river basins with ten countries. This makes hydrological monitoring and pollution control more challenging, and requires international cooperation in the region.
- In relation to water quantity, Brazil is a key global player in hydroelectricity, with more than 85% of the country electricity consumption produced by hydroelectric plants.

Brazil had existing cooperation with several EU countries [i.e. France, on funding side, between ANR – Fapesp – Facepe (in Portuguese, Fundação de Amparo à Pesquisa do Estado de São Paulo, acronym Fapesp; Fundação de Amparo a Ciência e Tecnologia do Estado de Pernambuco, acronym Facepe), on research performing organisations side, between IRD and the Brazilian National Council for Scientific and Technological Development, in Portuguese, Conselho Nacional de Desenvolvimento Científico e Tecnológico, acronym CNPq] and with the European Commission, which could help for launching a multilateral cooperation scheme. In 2014, 87% of the publications from Brazil were with European Partners.

Brazil, through the Brazilian National Council of State Funding Agencies (Confap) and its State Funding Agencies (FAP), joined the Water JPI activities in 2017 and participated in 3 Joint Transnational calls.

- **Call 2017** – Topic on developing accessible solutions for clean water management (Water JPI, 2017).
- **Call 2018** – Topic on strengthening socio-economic approaches to water management (WATER JPI, 2018b).
- **Call 2020** – Topics on risks posed to human health and the environment by pollutants and pathogens present in the water resources (WATER JPI, 2020c).

The Table 4 summarises the outcomes of this cooperation.

**Table 4.** Brazil in Water JPI Joint Calls (2017–2018)

Call	No of Applications Step 1	No of Applications Step 1 from Brazil	No of funded projects	No of funded projects with Brazilian partners
2017	67 57 Eligible	37 (9 as coordinators) 27 Eligible	8	6 projects with 8 Brazilian partners None as coordinators
2018	105 74 Eligible	24 (5 as coordinators) 13 Eligible	18	2, None as coordinators

**Source:** Prepared by the authors.

**Table 5.** Illustration of funded projects with Brazilian partner – 2017 Call

Call 2017 – IDOUM - Innovative Decentralized and low-cost treatment systems for Optimal Urban wastewater Management
<p>Reuse of treated wastewater is increasingly seen as one of the solutions to tackle the water scarcity problem and to limit the pollution load to surface water. Yet, using reclaimed water for non-potable purposes and particularly to irrigate food crops presents an exposure pathway for antibiotics and antibiotic resistant bacteria and genes (ARB&amp;G) to enter the human food chain.</p> <p>The objectives of IDOUM are: i) establishing monitoring strategies based on the data-derived prioritization of a set of indicator contaminants and pathogens for domestic wastewater, and ii) developing energy-efficient, cost-effective, and robust treatment systems for the decentralized production of treated wastewater mainly from domestic wastewater. Diagnostic indicators are selected based on their regular occurrence, potential for leaching/mobility and toxicological relevance. The second major objective of this project is to design wastewater treatment technologies based on the combination of biological-based treatment systems using selected plants and microorganisms (e.g., fungi, endophytic bacteria and microalgae) and the use of low-cost engineered nanostructured materials for catalytically activation of oxidants (persulfate and hydrogen peroxide). These decentralized treatment systems using smart technologies will be tailored to remove key antibiotics and antibiotic resistance bacteria and genes.</p>

▲.....▲
Call 2017 – IDOUM - Innovative Decentralized and low-cost treatment systems for Optimal Urban wastewater Management
<p><b>Scientific outputs:</b> IDOUM delivers new knowledge in the identification of endophytic microorganisms of <i>Phragmites australis</i>, which will be used for bio-inoculation of constructed wetlands. IDOUM also develops and evaluates modified iron mining residues and CuO-based nanoparticles as catalysts for heterogeneous Fenton processes with hydrogen peroxide and persulfate.</p> <p><b>Innovation outputs:</b> IDOUM aims to show decentralized wastewater treatment systems avoiding large capital costs and reduced operation and maintenance costs. Pilot-scale demonstrators are implemented in Mossay Bay (SA), University of Campinas (Br) and in Montpellier (Fr).</p> <p><b>Societal outputs:</b> IDOUM is expected to have an impact on environmental and public health by defining lists of priority contaminants in each participating country to be removed from domestic wastewaters and to contribute to UN Goal 6.</p> <p><b>Partners:</b> HydroSciences Montpellier (France), Council for Scientific and Industrial Research (South Africa), Helmholtz Center for Environmental Health (Germany), São Paulo State University Institute of Chemistry (Brazil)</p> <p><b>Contact:</b> Prof. Serge Chiron (IDOUM, 2020).</p>

Source: Project coordinator - <https://idoum.msem.univ-montp2.fr>.

Table 6. Illustration of funded projects with Brazilian partner – 2018 Call

Integrated approaches to Nature-based SOLUTIONS
<p>The objectives of RAINSOLUTIONS are (a) to identify stakeholder and urban ecosystem needs to inform planning/design; (b) to review and capitalize upon existing experiences of good practices; (c) to simulate the impact of climate variability and existing urban infrastructure on NBS within scaled pilot laboratory and field installations; (d) to develop an integrated indicator system for the evaluation of key NBS in terms of closing the water quantity and quality gap addressing also socio-economic aspects; (e) to map ecosystem services delivered by NBS for an evaluation of the best technology to implement in different urban contexts to support sustainable water management; (f) to create a NBS planning and design framework supported by machine learning to generate recommendations; and (g) to disseminate the self-sustainable web-based framework in collaboration with national stakeholders and communicate the project impact.</p> <p><b>Scientific outputs:</b> RAINSOLUTIONS delivers new knowledge and related tools and guidelines for innovative planning and assessment of NBS as part of sustainable water systems. Targeted knowledge products will be developed for the different audiences informing them about the benefits of NBS and the proposed evidence-based framework. The platform will also facilitate expert knowledge exchange.</p> <p><b>Innovation outputs:</b> A reference framework for future solution is being deployed. This will facilitate the growth of small businesses providing NBS and services, and creating new local green jobs in the process.</p> <p><b>Societal outputs:</b> Benefit are via substantially improved quality of life and well-being due to innovative NBS used which, in turn, will help reduce the risk of flooding and droughts whilst restoring urban ecosystems and adding to the amenity value of the urban environment.</p> <p><b>Partners:</b> Lund University (Sweden), University of Johannesburg (South Africa), University of Pretoria (South Africa), VESI Environmental Ltd. (Ireland), Federal University of Technology of Paraná – UTFPR (Brazil), Técnica y Proyectos S.A. (Spain), Oslo Metropolitan University (Norway), Wageningen University and Research (The Netherlands), University of Tartu (Estonia) and Danube Delta National Institute for R&amp;D (Romania)</p> <p><b>Contact:</b> Prof. Miklas Scholz (RAINSOLUTIONS, 2019).</p>

Source: Project coordinator - [www.rainsolutions.info](http://www.rainsolutions.info).

Following the 2014 mapping and subsequent contacts with first successful cooperation, it was decided to strengthen the cooperation activities between Brazil and EU.

In the framework of the EU-Brazil Sector Dialogues on Science and Technology, the Brazilian Ministry of Science, Technology, Innovation and Communications (MCTIC)<sup>4</sup>, and the European Commission, Directorate General for Research and Innovation (DG RTD) jointly implemented a dialogue focussed on water challenges, initiated after the World Water Forum 2018, held in Brasília.

The Sector Dialogues are an instrument aimed at reinforcing the strategic partnership between the EU and Brazil, based on the principles of reciprocity, complementarity and mutual interest, around key priorities for Brazil and for the EU.

The Objectives of this EU-Brazil Sector Dialogue Project were:

- To support policy dialogue on water challenges to tackle this grand challenge recognized by the United Nations considering its interlinkages to other challenges (health and well-being, sustainable cities, clean and sufficient water & sanitation, preservation of biodiversity, climate change, socio-economic development, etc.), while seeking more efficient outreach to civil society;
- To identify common research and innovation agendas and mutual learning opportunities with a potential for Brazil-EU cooperation in the field of water related UN SDGs;
- To link Brazilian and European R&I actors within each region for maximizing collaborations and partnerships; and
- To strengthen the integrated approach to action learning from the experiences of European and Brazilian networks and R&I programmes for providing solutions which could be implemented on both sides.

During the Brasília 2018 World Water Forum, several events were organised:

- a High Level Session “Science-Policy dialogue for identify key issues to solve global water challenges and support decision making”, where high-level political participation from the EC, MCTIC, the Brazilian Ministry for Foreign Affairs [in Portuguese, Ministério das Relações Exteriores, acronym (MRE)] and other partner institutions contributed.

---

<sup>4</sup> At the time of the Sector Dialogues, the denomination of the ministry was Ministry of Science, Technology, Innovation and Communications (MCTIC). In 2020, the ministry was dismembered, changing its name to Ministry of Science, Technology and Innovations (MCTI).

- A special session on financing research and innovation on water challenges with representatives of Brazilian Federal and States level [CNPq; Confap; Brazilian Federal Agency for Support and Evaluation of Graduate Education; and Brazilian National Water Agency, in Portuguese respectively, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, acronym Capes; and Agência Nacional de Águas, acronym ANA] and European funders (European Commission, Water Joint Programming Initiative).
- A side event organised at the Ministry of Science, Technology, Innovation and Communications of Brazil (MCTIC), with scientists from Brazil and European Union (EU), for discussing three top scientific challenges: sanitation, water crisis, water resources management.

After the side event, experts from Brazil and European Union further discussed key scientific topics for water challenges. They also identified opportunities for mutual learning and connecting Brazilian and European R&I actors with the objective of: i) leveraging nationally funded research in Brazil and within the EU; ii) connecting R&I centres and their communities; iii) empowering the young generations of researchers and innovators; iv) maximizing/sharing resources and infrastructures; and v) actively involving governing bodies and encouraging citizen participation.

Under the umbrella of the Urban Water Management theme, a series of research and innovation areas of action have been identified such as Urban regeneration and water management (for closing the water cycle gap); The food-energy-water nexus for increasing water productivity and urban environmental services; urban wastewater treatment; or recovery of degraded urban ecosystems, urban rivers and wetlands (soon available on BR – EU Sectoral Dialogues website).

Always under the umbrella of the EU-Brazil Sector Dialogues, another project has tackled water resources as a common priority, but within the Environmental Policy Dialogue. The project “EU - Brazil exchange and cooperation on sustainable integrated water resources management” is led by the European Commission – Directorate General for Environment (DG ENV) and the Brazilian National Water Agency (ANA), and should be concluded in 2020, with the elaboration of a roadmap which may design future actions to take jointly.

Moreover, always in the cooperation framework of the Sector Dialogues, another project supported within the Science & Technology Dialogue, involving the EC – DG RTD, MCTIC and Brazilian Center for Strategic Studies and Management [in Portuguese, Centro de Gestão e Estudos Estratégicos, acronym CGEE]: “Nature-Based Solutions for Transition to Sustainable Communities”, has also addressed water issues in the urban dimension, following NBS principles.



As a result of these respective projects, “Dialogues among the Dialogues” dealing with cities and water have been carried out along the respective implementation of the projects and most intensively during the a cycle of inter-connected events held in March 2020 in Brasília, promoting a greater approximation and interaction among the involved institutions and stakeholders, including the JPI Water.

## 5. Future opportunities

The cooperation themes addressed by the projects mentioned above have also been endorsed in 2019 within the ninth meeting of the Joint Steering Committee of the “EU-Brazil Cooperation Agreement on Science and Technology”, where cooperation on global water challenges has been formalized as a mutual priority to be furthermore deepened in the future.

In fact, the Joint Communiqué issued after the high policy level meeting, referring to water resources as a common priority, states that “both sides agreed to keep supporting the current cooperation under the JPI Water, EraNets, Belmont Forum and funded Sector Dialogue Support Facility to underpin cooperation on urban water management and looked forward to future possibilities under Horizon Europe” (EU, 2019). In such context, also the NBS and sustainable cities priority has been reaffirmed.

Sharing water challenges is the key driver for joining RDI programming, co-designing work programmes and engaging between Brazilian and European funding programmes and institutions. No single State or stakeholder can fix global challenges alone, considering the R&I resources and capacities required to address challenges such as the water related ones. In the upcoming years, there will be several opportunities for building on the existing cooperation and progressing in equal footing cooperation.

The Joint actions planned in 2020 (on Risks posed to human health and the environment by pollutants and pathogens present in water resources) and 2021 (Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems) constitute new opportunities for joint contribution between Brazilian funding institutions and the countries involved in the Water JPI. The Knowledge Hub on Water Scarcity and Water reuse launched in December 2019 is now also open to experts from International countries and organisations.

The European Union is currently developing Horizon Europe, an ambitious € 94.4 billion research and innovation programme to succeed Horizon 2020 (budget proposed by the European

Commission on 27 May 2020). The process started with the elaboration of a multiannual Strategic Plan to prepare the content in the work programmes and calls for proposal for the first 4 years of Horizon Europe. The main novelties are related to the rationalisation of the funding landscape and the mechanisms to strengthen International Cooperation.

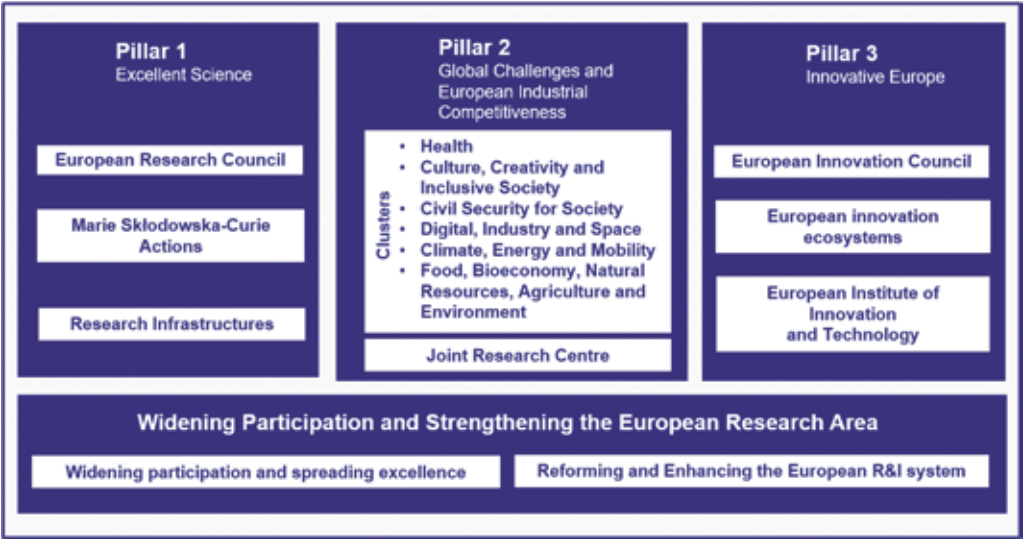


Figure 4. Preliminary Structure of Horizon Europe

Source: ECS, 2020.

In the second pillar, the Framework Programme plans to support European partnerships with EU countries, the private sector, foundations and other stakeholders. The aim is to deliver on global challenges and industrial modernisation through concerted research and innovation efforts. One proposal, so called Water4All – Water Security for the Planet, aims at securing all water demands in terms of quality and quantity, that both economic and natural systems, as well as people are protected from water-related hazards and risks. It proposes a portfolio of aligned multi-disciplinary actions (beyond calls) relevant for different stakeholders in order to create a critical mass and enhance impact by replicating implementation of innovative transformative solutions and building capacities in actor groups. It will strengthen water diplomacy and EU’s role as global actor by supporting international cooperation.

In this future cooperation scenario, it is most likely that the terms for EU-Brazil cooperation in R&I shall maintain elements of continuity, for instance the coopetition modalities identified

within the Administrative Arrangement signed between the European Commission – DG RTD and Confap, CNPq and the Brazilian Innovation Agency [in Portuguese, Financiadora de Estudos e Projetos, acronym Finep]: collaborative projects (co-financed by the Brazilian funding agencies), coordinated calls on key mutual priorities, and twinning of projects funded by both sides.

Such mechanisms should be maintained for the future, therefore policy dialogues which reinforce the identification and detail of common priorities can greatly contribute to future common actions, also in the field of water resources and cities, which are now clearly endorsed as target EU-Brazil cooperation topics.

Moreover, considering that Brazilian State Funding Agencies have supported several calls in the past years, allocating a considerable budget for enhancing cooperation on water with the JPI Water and with the EU (within EraNets), there is clearly a will to advance in such support, also in the context of the future Framework Programme.

Finally, the Brazil – EU Sectoral Dialogue projects are also proposing follow-up actions. Some are particularly of interest for increasing the Brazilian participation in the EU R&I programmes and developing co-designed programmes. They range from:

- Elaboration of a study aimed at identifying twinning research projects already funded at EU and Brazil level and develop communities;
- Widening the cooperation supported by the Sector Dialogues on Environmental Policies and Water Management, involving the European Commission, Directorate General for Environment (DG ENV): possible follow-up actions may be the creation of a EU-Brazil Water Platform, gathering a wider range of European and Brazilian stakeholders and partner institutions, also from the Research & Innovation sphere.
- Connecting Research Infrastructures: sharing resources and common objectives in Urban Water Management;
- Proposing Brazil as a testbed for the implementation of new infrastructures for urban water management.

All these actions will develop leveraging nationally funded research by enlarging Brazilian participation in multilateral projects.

## 6. Acknowledgements

We thank the Water JPI funded Project coordinators (Silvia Diaz Cruz – Spain, Serge Chiron – France and Miklas Scholz – Sweden) for their inputs.

### References

BiodivERsA. **Welcome to BiodivERsA**. Available at: <https://www.biodiversa.org/>

EUROPEAN COMMUNICATION STRATEGIES - ECS. **Implementing Horizon Europe: a next step towards achieving Horizon 2020**. Available at: [https://www.europeancommunicationstrategies.com/Implementing-Horizon-Europe-a-next-step-towards-achieving-Horizon-2020\\_a114.html](https://www.europeancommunicationstrategies.com/Implementing-Horizon-Europe-a-next-step-towards-achieving-Horizon-2020_a114.html)

EUROPEAN UNION. 9<sup>th</sup> Joint Steering Committee Meeting of the bilateral cooperation agreement on science and technology between Brazil and the Europe Union. **Joint Communiqué**. 2019. Available at: [https://ec.europa.eu/research/iscp/pdf/policy/ec\\_rtd\\_eu-brazil-joint-communique\\_2019.pdf](https://ec.europa.eu/research/iscp/pdf/policy/ec_rtd_eu-brazil-joint-communique_2019.pdf)

IDOUM. **IDOUM Project**. Innovative decentralized and low-cost treatment systems for Optimal Urban wastewater Management Project. 2020. Available at: <https://idoum.msem.univ-montp2.fr>

MAR. Managed Aquifer Recharge. **Addressing the risks of recharging regenerated water call 2018**. Available at: <http://www.maradentro-jpi.eu>

RAINSOLUTIONS. **Welcome to RainSolutions, a water JPI project**. 2019. Available at: <http://www.rainsolutions.info>

UNITED NATIONS WATER – UN Water. **Sustainable Development Goal 6**. Synthesis Report on Water and Sanitation. Geneve: 2018. 199 p. Available at: [https://www.unwater.org/publication\\_categories/sdg-6-synthesis-report-2018-on-water-and-sanitation/](https://www.unwater.org/publication_categories/sdg-6-synthesis-report-2018-on-water-and-sanitation/)

WATER EUROPE. **Interview with Dominique Darmendrail, Water JPI Coordinator**; What is the Water JPI about? What is it working on? 2020. Available at: <https://watereurope.eu/interview-with-dominique-darmendrail-water-jpi-coordinator/>

WATER INTERNATIONAL COOPERATION – Water IC. **Joint Call 2017 - IC4WATER**. Supporting international cooperation activities water. Available at: <http://www.waterjpi.eu/joint-calls/joint-call-2017-ic4water>

WATER JPI. 2016 **Water JPI Exploratory Workshop Report**. Dublin: 2016. 65 p. Available at: [http://www.waterjpi.eu/images/documents/2016/Exploratory\\_Workshop\\_14112016/Documents/Exploratory\\_Workshop\\_1\\_Report%20\(2\).pdf](http://www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Exploratory_Workshop_1_Report%20(2).pdf)

WATER JPI KNOWLEDGE HUB. **Contaminants of emerging concern** - continuous increase of CECs in the anthroposphere as a stressor for water resources. Stakeholder brief. jan. 2020. 21 p. Available at: [http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-knowledge-hub-1/jpi-khcec\\_january\\_2020\\_stakeholderbrief.pdf](http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-knowledge-hub-1/jpi-khcec_january_2020_stakeholderbrief.pdf)

WATER JPI KNOWLEDGE HUB. **Contaminants of emerging concern** – an emerging risk in our waters. 2019. 2 p. Available at: <http://www.waterjpi.eu/images/documents/policy-brief-khcec-an-emerging-risk-in-our-waters.pdf>

WATER JPI. **Tackling European water challenges coordination and support action**. 2012. Available at: <http://www.waterjpi.eu/images/documents/2016/WP%205%201%20Final%20Report%20-%2030-04-2014%20without%20SWOT.pdf>

WATER JPI. **Water challenges for a changing world. Joint Call 2018 - WaterWorks 2017**. 2018b. Available at: <http://www.waterjpi.eu/joint-calls/joint-call-2018-waterworks-2017>

WATER JPI. **Water challenges for a changing world. Joint Call 2020**. Aquatic pollutants joint transnational call 2020. 2020c. Available at: <http://www.waterjpi.eu/joint-calls/joint-call-2020-aquaticpollutants>

WATER JPI. **Water challenges for a changing world. Members**. 2019a. Available at: <http://www.waterjpi.eu/about-us/members>

WATER JPI. **Water challenges for a changing world. Water JPI knowledge hub on contaminants of emerging concern**. 2019b. Available at: <http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-knowledge-hub-1/water-jpi-knowledge-hub-on-contaminants-of-emerging-concern>

WATER JPI. **Water challenges for a changing world. Water JPI TAP on ecosystem services**. 2020b. Available at: <http://www.waterjpi.eu/implementation/thematic-activities/water-jpi-tap-action/first-water-jpi-tap>

WATER JPI. **Water challenges for a changing world. Water RDI Mapping.** 2020a. Available at: <http://www.waterjpi.eu/mapping-agenda/water-rdi-mapping>

WATER JPI. **Water challenges for a changing world. WaterWorks2017 RDI funded projects booklet.** Available at: <http://www.waterjpi.eu/joint-calls/joint-call-2018-waterworks-2017/booklet>

WATER JPI. **Water challenges for a changing world. What is contaminating our waters next?** contaminants of emerging concern (cecs) – novel ways to reduce their human and environmental risks. Policy Brief, 22 oct. 2018a. Available at: [http://www.waterjpi.eu/images/documents/waterjpi\\_policy\\_brief\\_final.pdf](http://www.waterjpi.eu/images/documents/waterjpi_policy_brief_final.pdf)

WATER JPI. **Water JPI vision 2030.** Together for a water-secure world. Apr. 2020d. 37 p. Available at: [http://www.waterjpi.eu/water-jpi-vision/waterjpi\\_vision2030\\_web.pdf](http://www.waterjpi.eu/water-jpi-vision/waterjpi_vision2030_web.pdf)