

The background of the entire page is a close-up, high-angle shot of water ripples. The ripples are concentric and spread out from a central point, creating a sense of movement and flow. The color palette is a range of blues, from light sky blue to deep, dark navy blue.

Water security research: understanding the flow

Uncharted waters, uncertain future

Water sustainability and water management have emerged as increasingly important research areas in recent years. Extreme weather events such as droughts and floods have brought growing concerns about water supply and water management to many parts of the world that previously had seemingly little to worry about. Yet water research is not just about headline-grabbing catastrophes.

Water security research addresses all aspects of water's impact on the wellbeing and flourishing of human and non-human populations. As such, it touches on a wide range of topics including safe drinking water provision, climate change, food security, energy generation and environmental protection. Research in this field is frequently interdisciplinary, building on a deep understanding of the status quo as well as on the analysis of the physical and social drivers and dynamics that contribute to contemporary global water challenges.

The field of water security research has steadily grown in size over recent decades. Particularly in the last 15 years, the number of journal articles published in areas such as water footprint, water sustainability and water productivity jumped significantly with new research centres being established around the world.

Naturally, a key focus of research in the field has and continues to be the protection of agricultural production. According to UN predictions, the world's population is expected to reach more than 9 billion people by 2050. Such a rise will require a significant increase in global food production – and with it, more arable land for crop production. To help improve the efficient use of water supplies across expanding farmland, further research is needed to support sustainable, efficient irrigation management, erosion risk management, flood warning systems and the development of precision farming systems.

Yet questions surrounding agricultural water management are not the sole concern. Attention is also increasingly being directed to urban water demand, service provisions and consumption practices. Water is a highly energy-intensive sector and contributes significantly to residential energy demand. As a result, policy and industry attention has commonly become fixated on water efficiency labelling and the technical aspects of micro-components such as taps, showers, washing machines and toilets. However, to support innovation, further research is needed to understand the wider social and infrastructural developments that frame everyday demand.

Another hot topic in the field relates to the mounting effects of extreme weather events. With large proportions of the world's population living in close proximity to rivers and oceans, sea level rise and extreme storm surges are likely to affect many communities around the globe. To support hard engineering structures such as sea walls, dikes and levees, the development of sophisticated water modelling technologies will be essential to determine current vulnerabilities and suggest effective solutions to better address these challenges.

In the context of the circular economy, water security research will also need to address the challenges posed by the reuse of wastewater. Most traditional design and operations in the water sector are linear in nature. After use, water is generally treated and discharged into a receiving water body with no attention being paid to valuable resources such as nitrogen, phosphorus and energy that are contained in the discharged sludge. Further research is required to investigate ways to recover and reuse these elements to help preserve scarce resources and facilitate the transition to a truly circular economy.

A bridge over troubled waters: Research funding and prize opportunities

Funding and monetary prizes for water sustainability and security projects are wide-ranging and interdisciplinary in nature, being very much interlinked with aspects such as agriculture/land use, nutrition, climate change, biodiversity and pollution.

Grant funding

The European Commission LIFE programme's Nature and Biodiversity sub-programme aims to protect and restore Europe's nature, including marine ecosystems, and to halt and reverse biodiversity loss. Over the course of the programme, calls will contribute to European Union (EU) objectives for the protection, maintenance and restoration of the EU's natural capital in its marine, freshwater and terrestrial ecosystems.

Pillar II of Horizon Europe (2021 – 2027) (Global Challenges and European Industrial Competitiveness) contains the **sixth cluster** of **Food, Bioeconomy, Natural Resources, Agriculture and Environment**.

Topics under this cluster with a focus on water use and management include:

- Developing EU Advisory Networks on Water Use (HORIZON-CL6-2022-GOVERNANCE-01-15)
- Climate Sensitive Water Allocation Systems and Economic Instruments (HORIZON-CL6-2022-CLIMATE-01-01)
- Innovative Food From Marine and Freshwater Ecosystems (HORIZON-CL6-2022-FARM-2FORK-02-05)

Cluster 6 also includes a call for proposals for the creation of a new co-funded European partnership, **Water4All**. Horizon Europe introduces a more strategic, coherent and impact-driven approach to European Partnerships. They represent a significant investment (approximately 25% of the Horizon Europe budget and up to half of the budget of Pillar II). Co-funded Partnerships (ERA-NETs, EJP, FETFlagships model in Horizon 2020) involve EU countries, with research funders and other public authorities at the core of the consortium.

Water4All is one of eight new partnerships with centre of gravity within Cluster 6. Building on the work of the Water JPI, the EIP Water and the Water Europe Technology Platform, Water4All includes the following themes:

- Water for circular economy: smart water value
- Water for ecosystems and biodiversity
- Water for the future: sustainable water management
- Water and health
- Infrastructures for water
- International cooperation (cross-cutting issue)
- Governance (cross-cutting issue)

The partnership is open to all EU Member States, as well as to countries associated to Horizon Europe and will remain open to such countries wanting to join. The total indicative budget for the duration of the partnership is €126 million. Financial resources from participating countries/funding organisations will be pooled, with a view to implementing joint calls for transnational proposals.

Funded through Horizon 2020, the five-year **BlueHealth project** formed a multidisciplinary research team spanning all EU countries. Led by the UK's University of Exeter, investigators studied 'blue infrastructure' as a means of supporting the planning process, particularly in terms of health, wellbeing and disease prevention. 'Blue infrastructure' refers to the network of aquatic environments (natural and artificial) that provide a variety of services (eg transportation and freshwater provision). BlueHealth produced several innovative tools to help stakeholders understand the importance of 'blue spaces' in urban planning. For example, the 'decision support tool' was designed to help planners assess the prospective benefits and inherent risks of blue infrastructure construction and regeneration projects. This project is just one of the hundreds of **water-related projects** supported across Horizon 2020 and provides an insight into the types of research projects funded by the Commission.

Innovation in environmental fields is promoted and encouraged by **FAMAE**, an independent foundation based in France. Every year FAMAE organises an international challenge to encourage the creation of simple and innovative solutions that can substantially improve people's daily lives while alleviating environmental impact. The theme of the 2021 edition 'Sustainable Innovations' challenges individuals and organisations, based anywhere in the world, to develop solutions in the areas of waste, water, food, habitat, energy and mobility. A previous challenge entitled 'Precious Water' funded projects in the areas of water purification, desalination, agroforestry, water consumption, filtering water in humanitarian emergencies and promoting access to drinking water in urban areas.

Similarly operating at a global level, two opportunities offer funding in the areas of hydrology and environmental achievement. The International Association of Hydrological Sciences (IAHS) presents the **Tison Award** each year to promote excellence in research by young hydrologists based in any country. The **Tyler Prize for Environmental Achievement**, worth \$200,000 to the winner, was created in 1972 and is administered by the University of Southern California. The prize is awarded globally to individuals at any career level and organisations that are working to preserve and enhance the environment. Recipients encompass the spectrum of environmental concerns, including environmental policy, health, air and water pollution, ecosystem disruption and loss of biodiversity, and energy resources.



Prizes and competitions

In addition to grant funding, our ResearchConnect service reports on prizes and competitions, whereby research and innovation projects are rewarded, very often with monetary prizes to bring the idea to market, continue the project or carry out other kinds of research. Prizes also very often bring greater visibility, global recognition and networking opportunities.

The Stockholm International Water Institute (SIWI) is a Stockholm-based policy institute that generates knowledge and informs decision-making towards 'water wise' policy. It runs the annual **Stockholm Water Prize (SWP)**, which honours outstanding contributions to the sustainable use and protection of the world's water resources. There is a prize of SEK 1 million (approximately €97,922) and eligible nominees are individuals or organisations from any country.

With the support of corporate sponsors, the **Mülheim Water Award** rewards innovative, practice-relevant concepts and solutions to meet future challenges in water systems and water analysis. The theme for the 2022 award is 'Innovations for a sustainable, safe and secure water supply'. The competition is open to organisations within Europe (including Turkey, Azerbaijan, Armenia, Georgia and the western part of Russia), however, the project does not have to be in Europe. There is a total prize fund of €10,000.

Awarded every two years, the **Prince Sultan Bin Abdulaziz International Prize for Water** is an international prize focusing on water-related scientific innovation. It consists of a creativity prize worth \$266,000 and four specialised prizes worth \$133,000 each. Alongside this, each prize is accompanied by a trophy and certificate.

Case Study: The Explore2 project in France

It is clear that water security and sustainability are global issues that require action at local, regional, national and international levels. This case study from France focuses on a specific project run by the nation's two main environmental organisations: the Institut National de Recherche en Agriculture, Alimentation et Environnement (INRAE – National Research Institute for Agriculture, Food and the Environment) and the Office International de l'Eau (OiEau – International Office for Water).

The situation in France is typical of elsewhere. As a result of climate change, rising temperatures (which could exceed +4°C) and less rainfall in the summer, it is likely that the frequency and severity of drought will significantly increase in some French territories during the twenty-first century. The development of water management strategies and the investigation of potential solutions are required to address the significant societal issues that could result from the potential scarcity of this essential resource.

With this in mind, the **Explore2 project** was launched in July 2021 by INRAE and OiEau. The project follows the Explore 2070 study (2010–2012), which had established the first possible scenarios of water availability in France. Co-funded by the Ministry of Ecological Transition and the French Office for Biodiversity (OFB), the **Explore2 project** aims to update knowledge on the impact of climate change on hydrology, based on the latest publications of the Intergovernmental Panel on Climate Change (IPCC). In addition, the project aims to support local stakeholders in understanding and using these results to adapt their water management strategies by 2024.

The scientific consortium led by INRAE will bring together several research organisations such as Météo-France, ENS-PSL, Sorbonne University and CNRS. The first part of the project will focus on assessing the impact of climate change on water resources throughout the twenty-first century in Metropolitan France. The second part of the Explore2 project, coordinated by OiEau, will aim to strengthen consultation with stakeholders who will use the project's results. This will enable French regions and local stakeholders to implement new approaches on water usage and the necessary requirements for its sustainable management, thereby introducing new adequate policies.

In addition to the Explore2 project, funding calls for sustainable water and water security projects continue to be available through other funders. For instance, Office Français pour la Biodiversité (OFB – French Office for Biodiversity) launched a call for projects that aim to support research projects focusing on the design and management of agroforestry systems in the context of climate change. The call's objective is to develop knowledge or methodology for rural territory stakeholders with the aim of improving the regulation of water flows, nutrients and climate through the establishment, management and evaluation of agroforestry systems.

Funded by France's Agence Nationale de la Recherche (ANR – National Research Agency), the **An Ocean of Solutions** call is a major call focusing on ocean sciences and marine conservation. The aim is to support interdisciplinary, ambitious and structured research projects that focus on assessing global changes of anthropogenic origin that have an impact on the oceans. Projects funded will focus on identifying solutions for the protection of the ocean, the preservation of ecosystem services and the sustainable usage of the oceans. Due to the wide variety of challenges presented in the call, its budget is between €1.5 and €2.5 million.



A joint response to a global change

The vital role water plays for peace and prosperity for people and the planet is acknowledged by the United Nations whose **17 Sustainable Development Goals (SDG)** include clean water and sanitation, resilient infrastructures and the conservation of life below water. Achieving the UN's ambitious goals will require concerted efforts, not just across state borders but also between researchers, economists, stakeholders and policy makers. Opportunities for knowledge exchange between research and practice, such as the **Third Water JPI Annual International Conference**, will be imperative to inform future research. It is collective action and collaboration that will shape this complex research field for years to come.

Our ResearchConnect service provides ongoing support via coverage of research funding and policy, helping the research community navigate global challenges such as water security. Our team will continue to report on emerging policy and funding opportunities within this topical and increasingly important field of research.



Call us now on **0333 011 1200** or e-mail marketing@idoxgroup.com for more information on Idox's funding services.

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