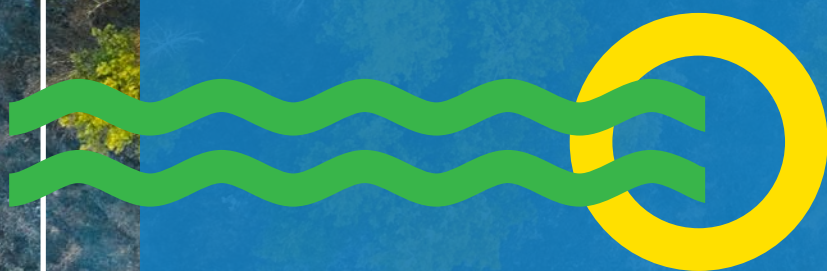


# Innovative Solutions to Cope with Water Scarcity

## White Paper



December 2021



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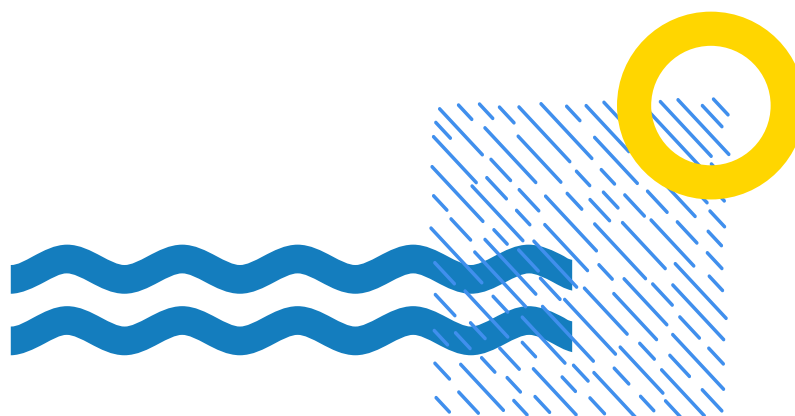
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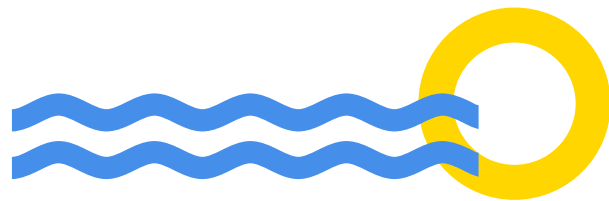
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## FOREWORD

Dear Reader,

Thinking over the past years: would you say your region is suffering from water scarcity? As a citizen, have you ever experienced limitations over water use for irrigating your garden? As a farmer, are you struggling to maintain production and income due to water shortages? Or maybe you are part of the water authority in the region, and you are in a delicate balance to allocate the available resources in the region for the different economic activities?

Water availability is a key challenge in Europe, especially in the Southern region although not limited to it. Millions of people are already affected, and much more will be in the following years as water scarcity is forecasted to increase, posing a risk to the socioeconomic development of the region.

It is time to act. The reallocation of water resources and limitation in its use for certain activities have not always been well received by different stakeholders. A holistic and dynamic approach to water resources' management must take into consideration all the stakeholders involved, from policy makers to farmers. And what is more, it must consider the full water cycle, from water extraction and allocation to its use, reclamation, reuse and discharge. This systemic change is needed to respond to the ever-evolving challenges posed not only by climate change, but also by the growing population and changes on socioeconomic dynamics.

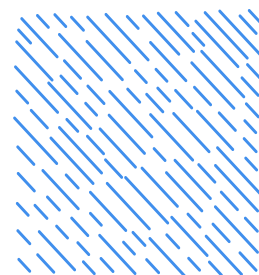
**Therefore, this paper is for you and for me: whatever we do and wherever we are. It is for water managers, water users, legislators, the scientific community, and our society in general. All stakeholders.**

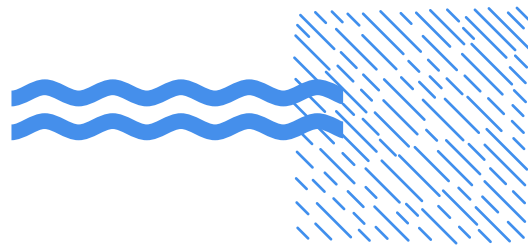
This paper aims at unlocking water governance in Europe. Innovative and effective water-related solutions are available to foster climate change readiness, including relevant services that can enable a more integrated water management planning across Europe. But their adoption must be on many occasions coupled with new and disruptive water governance schemes.

Here you will find a compilation of potential solutions to tackle the most acute challenges for Europe's stakeholders to create a water-saving and long-lasting sustainable economy. Of course, in an ever-evolving environment, solutions shall be adapted over time as new needs and new solutions arise. And that is why a systemic cross-cutting approach towards water scarcity is a must.

As a society, we do have the responsibility to share solutions and best practices for a more sustainable use of water-resources. Are you willing to contribute to the transformation?

**Carmen Galindo,**  
Project Manager, EIT Food





## EXECUTIVE SUMMARY

Water management solutions and technologies from the past no longer offer adequate solutions. Water scarcity has been exacerbated in the last decades because of increasing pressures such as unsustainable water abstraction, pollution of water bodies, the effects of climate change and inadequate water planning. Water crises are becoming more frequent and acute, and the risk is increasing affecting not only to traditional dry regions such as the Mediterranean but also to more water abundant regions. This new context requires an innovative approach built on existing knowledge and experiences.

**The purpose of this White Paper is to propose innovative solutions to cope with water scarcity in southern Europe as a response to 5 main challenges, described in Chapter 2 as:**

- 1. Water pollution**
- 2. Limited spread of circular economy options and practices**
- 3. Restrained optimisation of water management through water-smart tools and solutions**
- 4. Mismatch between water demand and supply**
- 5. Suboptimal governance and financial schemes to tackle water scarcity**

In **Chapter 3** we present different solutions and technologies which have been applied in different contexts. These experiences are a collection of good practices to guide further implementation and include economic instruments, natural water retention and recharge measures, water reuse, water conservation measures in irrigation, use of alternative water sources, nature-based solutions, control of water abstraction, cap water rights and reduction of food waste.

All of the solutions proposed emphasise the role of good governance as an essential building block to ensure their success. Sound governance is crucial to adequately plan, efficiently implement, evaluate and monitor policy strategies and sustainable operations. Innovation oriented policies may provide incentives for companies, foster cooperation and knowledge sharing among innovators and help reduce market barriers.

**Chapter 4** includes a set of recommendations with practical proposals oriented to facilitate the implementation of the different solutions described in the previous chapter. These recommendations intend to also serve to support the implementation of European Union Directives and Regulations which require further policy development by Member States.

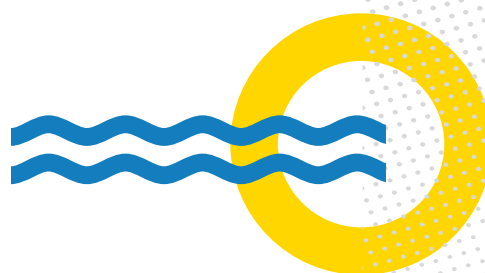
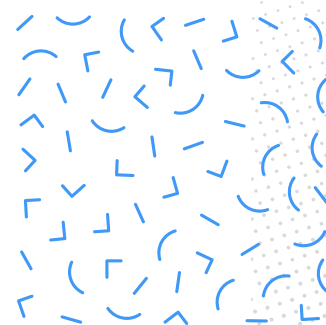
**Chapter 5** returns back to the Challenges and analyses potential long-term impacts of solving these challenges with their environmental and socio-economic implications.



Water scarcity can be alleviated by the reduction of water pollution, the reuse of water in irrigation advancing towards a more circular economy, the improvement of the profitability of investments in water technology, or by the reduction of food waste, allowing to reach the targets of EU policies.

Water resource management can benefit from the use of new monitoring technologies to reduce waste and to mitigate the gap between water demand and availability allowing the re-design of farm processes with greater involvement of interested parties. This would allow the combination of water supply and demand to adapt to seasonal and structural imbalances, implementing innovative protocols and using international regulatory tools for the integrated planning of water resources. Governance and financial schemes can effectively address water scarcity by implementing control over water abstraction, increasing lawful uses of water, and investing in metering, monitoring and control devices.

Our White Paper confirms that water scarcity is a complex challenge with no silver bullet solutions. However, we aim to contribute with our selection of solutions to the design of complex and systemic solutions are needed with multistakeholder collaborations and the integration of adequate governance and financial schemes that complement EU policy framework.



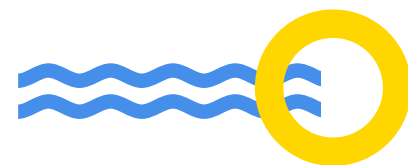


The background of the page is a photograph of parched, cracked soil in shades of brown and tan. A large, semi-transparent blue rectangle with rounded corners is positioned on the left side, containing the page number and title. A thin green horizontal line is located just below the page number. The right edge of the blue rectangle features a white dotted pattern that fades into the background. A solid green horizontal bar runs across the bottom of the page.

# 01

## Introduction





## PURPOSE OF THE WHITE PAPER

The White Paper aims to share today's understanding, innovations, experiences and knowledge in addressing water scarcity in southern Europe with water managers, water users, stakeholders and legislators.

**Water scarcity is dynamic: it has been exacerbated in southern Europe and is extending towards a broader area and for a longer duration, due to ever-increasing water consumption, changing societal values and climate change.**

Consequently, the solutions must be different. 50 years ago, water scarcity was addressed by building new dams or an inter-basin water transfer, increasing water supply. Today, solutions to increase the water supply – such as the reuse of treated wastewater, managed aquifer recharge and desalinisation – are more costly and complex. In addition, actions to increase the control of water use, improve efficiency and cost recovery and others have emerged over the past years.

The work reported therein is the result of the [Finding innovative solutions for water scarcity in Southern Europe programme](#) led by EIT Food, with the collaboration of EIT Climate-KIC, EIT Manufacturing, EIT Digital, Bioazul and Athena Research Centre. The objective of this programme is to enhance knowledge and overcome current barriers to tackle water scarcity in Southern Europe through innovation, entrepreneurship, education, and communication. In 2020 the programme established the Body of Knowledge (BoK) expert group comprising of renowned experts across Europe specialising in water scarcity from governance, technology, and financial perspectives. In 2021 the BoK was tasked with delivering a White Paper and a Mapping of Financial Tools to tackle water scarcity. This White Paper describes the main challenges ([2- Challenges](#)) in tackling

water scarcity identified by the BoK, describing the main causes, data, impacts, focus areas, knowledge gaps and priorities. It also presents innovative solutions, assessing their strengths, weaknesses, lessons learned from case studies and the need to rely on a robust policy framework, including governance.

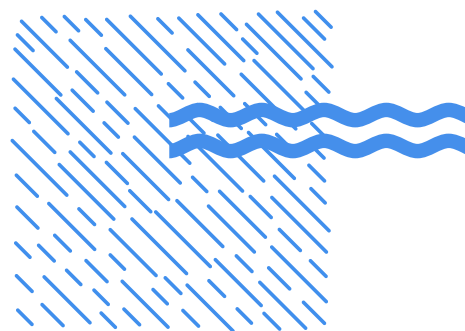
## PROBLEM DEFINITION

Water scarcity is the scenario where the water demand is higher than available supply. This scenario may cause overexploitation meaning more water is used than what is available. Many regions in Southern European countries are already suffering from it, and the risk of occurrence is increasing and extending to more water abundant regions. Scarcity is defined by long term planning (multiyear) and is different from drought which is a seasonal or multiyear underaverage precipitation. However, during drought periods, water availability is reduced, and often the water scarcity increases, when water uses remain stable or even increase.

Scarcity is therefore driven by the existing and unsatisfied freshwater extraction for economic uses such as agriculture (by far the main user of freshwater resources), industry and urban supply, as well as by increasing societal environmental concerns, given there are higher amounts of water being allocated to preserve ecosystems. The pressure on water resources is further exacerbated by climate change and urbanisation.

While there are solutions to reduce pressure on water resources, current fragmented water governance is a major barrier for wide application of available solutions. Water scarcity is a result of poor governance.

This report has been prepared with reference to relevant EU regulation and policies, including the European Green Deal and the EU Biodiversity Strategy for 2030, the Zero Pollution Action Plan and the Climate Adaptation Strategy, as well as the Water Framework Directive (WFD) and its conceptual DPSIR approach (Drivers-Pressures-Status-Impact-Response). Furthermore, it considers the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 and its Sustainable Development Goals (SDGs; [sdgs.un.org/goals](https://sdgs.un.org/goals)) whenever relevant.



## OUR APPROACH

This report is divided into four main chapters.

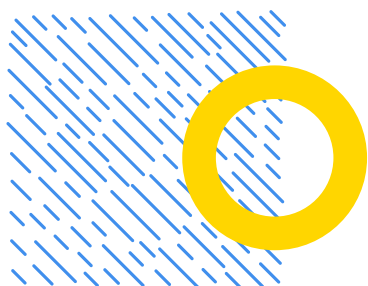
**2- Challenges** chapter provides an overview of the water scarcity challenges Southern European face, looking into the reasons why water scarcity has not been tackled yet. In this report we will refer to water pollution; limited spread of circular economy options and practices; restrained optimisation of water management through smart tools; mismatch between water demand and supply and suboptimal governance and financial schemes.

**3. Solutions** chapter presents a selection of innovative solutions to tackle water scarcity that are particularly well fitted for Southern Europe. In this report we consider full cost recovery implementation; nature-based solutions and Hybrid Grey-Green infrastructure; water reuse implementation; water conservation measures in irrigation; innovative alternative

water sources; control and enforcement of water abstraction; cap water rights in overexploited basins and aquifers; global view - Reduce food waste. For each of these solutions you will find a concise definition and an analysis of strengths, weaknesses, lessons learned and policy frame.

**4- Policy recommendations** chapter presents short policy briefs for each of the solutions described in the previous section, offering concrete policy recommendations to enable the successful implementation of the solutions proposed in this White Paper.

**5. Potential impact** chapter highlights the positive outcomes we envisage the solutions can have in terms of alleviating the challenges identified in this paper.





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