Water4All
Water security for the planet

European Partnership

Identification of Needs Report

Setting up Water Oriented Living Labs
Lessons learned and outlook

Co-funded by
the European Union

OUTPUT SUMMARY PROJECT INFORMATION	
Project Title	European Partnership Water4All – Water security for the planet
Project Acronym	Water4All
Call Identifier	Horizon-CL6-2021-Climate-01-02
Contract Number	101060874
Starting Date	1 June 2022
End Date	31 May 2029
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Deliverable Title	Identification Needs Report
Deliverable Number	D4.6
Work Package	WP4 - Pillar D: Demonstration activities
WP leader	Andrea RUBINI (WE)
Nature	Report
Dissemination	Public
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Date of Delivery	08/05/2024

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Date	30/05/2024

Acknowledgements

Water4All has received funding from the European Union's Horizon Europe Programme under Grant Agreement 101060874.

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LIST OF ACRONYMS

ACRONYM	FULL TITLE
ENoLL	European Network of Living Labs
LL	Living Lab
SRIA	Strategic Research and Innovation Agenda
TRL	Technological Readiness Level
WOLL	Water Oriented Living Lab
Water4All	European Partnership on Water Security for the Planet

PREFACE

This report is a living document first published in June 2024 following the first phase of the Water4All partnership. It is the deliverable D4.6 from the Water4All Pillar D task D2 - Support to the development of new Water Oriented Living Labs and Demos, subtask D2.1 - Identification of needs.

The document presents findings and current conclusions from the ongoing analysis of the needs and relevant contexts for developing Water Oriented Living Labs.

The analysis is based on the extensive mapping of best practice and numerous stakeholder consultations and workshops.

Water Oriented Living Labs (WOLLs) are emerging as important vehicles for the strengthening of the European innovation ecosystem fit to deliver and implement the solutions for a water-smart society.

The Water4All partnership supports the development of WOLLs by cultivating a methodological framework fit for water related challenges; identifying best practice; building a network; and helping new and existing living labs to develop and mature.

In this document we set the scene of “the what” and “the how” of these WOLLs by defining some basic principles and outlining how they strengthen the water innovation ecosystem. In doing so, we also pinpoint some key focal points where achieving a higher maturity level for WOLLs is less straightforward.

The aim of the document is to inform stakeholders interested or actively engaged in cross-cutting water collaboration initiatives and the prospects of developing these into Water Oriented Living Labs. Furthermore, it aims at informing policymakers at the regional, national and EU levels about the values of WOLLs and inspire their integration into innovation policies.

ABSTRACT

This document presents an overview of the state of play of the development of Water Oriented Living Labs (WOLLs) and offers recommendations for going forward. WOLLs are characterized by the following main properties:

- Through applying a clear thematic and problem-oriented approach, WOLLs organize their innovation ecosystem more effectively and reach a faster market uptake.
- Water related challenges are always context specific and thus require a context specific territorial approach.
- The quadruple helix model forms the core of WOLLs, emphasizing co-creative innovation involving stakeholders like end users and policymakers. Trust building among stakeholders is an essential part.
- Having a long-term strategy including a clear governance structure ensures the long-term success of a WOLL and overcomes the project life cycle duration and connects the quadruple helix. Having a strong involvement from governments in this governance is a key to success.
- To boost innovation not only technological aspects but also aspects of the surrounding innovation ecosystem like regulatory, social, governance and environmental aspects are important.

For each of these main properties critical observations and focus points are presented. In conclusion, three cross-cutting parameters and three key steps for the development of new WOLLs are put forward.

IDENTIFICATION OF NEEDS REPORT

SETTING UP WATER ORIENTED LIVING LABS. LESSONS LEARNED AND OUTLOOK

INTRODUCTION

During the initial two years of the Water4All partnership, an Atlas of Water Oriented Living Labs (WOLLs)[1] is compiled. This involved a thorough review of submitted candidates, analyzing their innovation ecosystems and processes. The best examples complying with the Water4All WOLL criteria are acknowledged and presented in the Atlas, while others were identified as needing further development in certain areas.

Selected and future WOLLs will play a crucial role in advancing the Water4All Strategic Research and Innovation Agenda (SRIA), expediting the innovation journey to strengthening the European water innovation ecosystem and maximize impact.

Through the engagement with the mature WOLLs as well as less mature WOLL candidates, we gained valuable insights into the diverse innovation processes within the water sector and optimal setups for maximizing impact.

This report synthesizes our collective experiences and offers input for WOLL development roadmaps. Drawing from numerous workshops and dialogues conducted among Water4All partners, wherein we actively engaged with numerous living labs, the report encapsulates our findings and recommendations.

The focus of this first version of the report is on the key properties of WOLLs themselves. Future revisions of the report will take stock of new lessons learned going forward in the second phase of Water4All, particularly from establishing an operational network of WOLLs (subtask D1.2); developing a demonstration implementation roadmap (D1.3); and supporting local stakeholder engagement in the development of new WOLLs (subtask D2.2). From developing and defining the key properties of WOLLs themselves in the first phase, the second phase will bring valuable input to the further development of the wider framework conditions for WOLLs.

[1] Water4All Atlas of Water Oriented Living Labs, 2024 - https://www.water4all-partnership.eu/sites/www.water4all-partnership.eu/files/2024-05/Water4All_Atlas%20of%20WOLLs_2024%20.pdf.

WHAT ARE WOLLS?

A WOLL can be defined as a "Water-Oriented, real-life demonstration and implementation instrument that brings together public and private institutions, government, civil society, and academia to jointly build structured grounds to develop, validate, and scale-up innovations that embrace new technologies, governance, business models, and advancing innovative policies to achieve a Water-Smart Society"[2]. As such WOLLs fit within the idea that Living Labs are means to improve innovation processes. But there is not a fixed definition of living labs, and different concepts are developing in different contexts.

The WOLL definition provides a means to contextualize the role of living labs for water. In a European context the European Network of Living Labs (ENoLL) define living labs as "open innovation ecosystems in real-life environments based on a systematic user co-creation approach that integrates research and innovation activities in communities, placing citizens at the center of innovation. Living Labs are real-life test and experimentation environments that foster co-creation and open innovation among the main actors of the Quadruple Helix Model". The Rathenau institute differs LLs from other innovative research based on their high level of co-creation and that experiments take place in real-life conditions[3].

A Water-Oriented Living Lab is more than a network of infrastructures and services: it is a collaborative ecosystem that supports community innovations in a multi-participatory context. It provides a practical environment and methodology to identify, validate, and refine innovative solutions in real-world settings. This approach is crucial for the innovation process toward a Water-Smart Society, as it not only identifies effective innovations in various environmental, social, economic, and cultural contexts but also promotes the market uptake of these innovations. Moreover, Water-Oriented Living Labs play a fundamental role in mobilizing human and financial resources to support the implementation and diffusion of innovative solutions.

Figure 1 provides an overview of the distribution of WOLLs and new WOLL candidates after the first mapping phase of Water4All.

[2] Water-Oriented Living Labs: Water-Oriented Living Lab Notebook Series #2. How to assess and evolve towards a network of Water-Oriented Living Labs.
[3] Innoveren voor maatschappelijke doelen | Rathenau Instituut

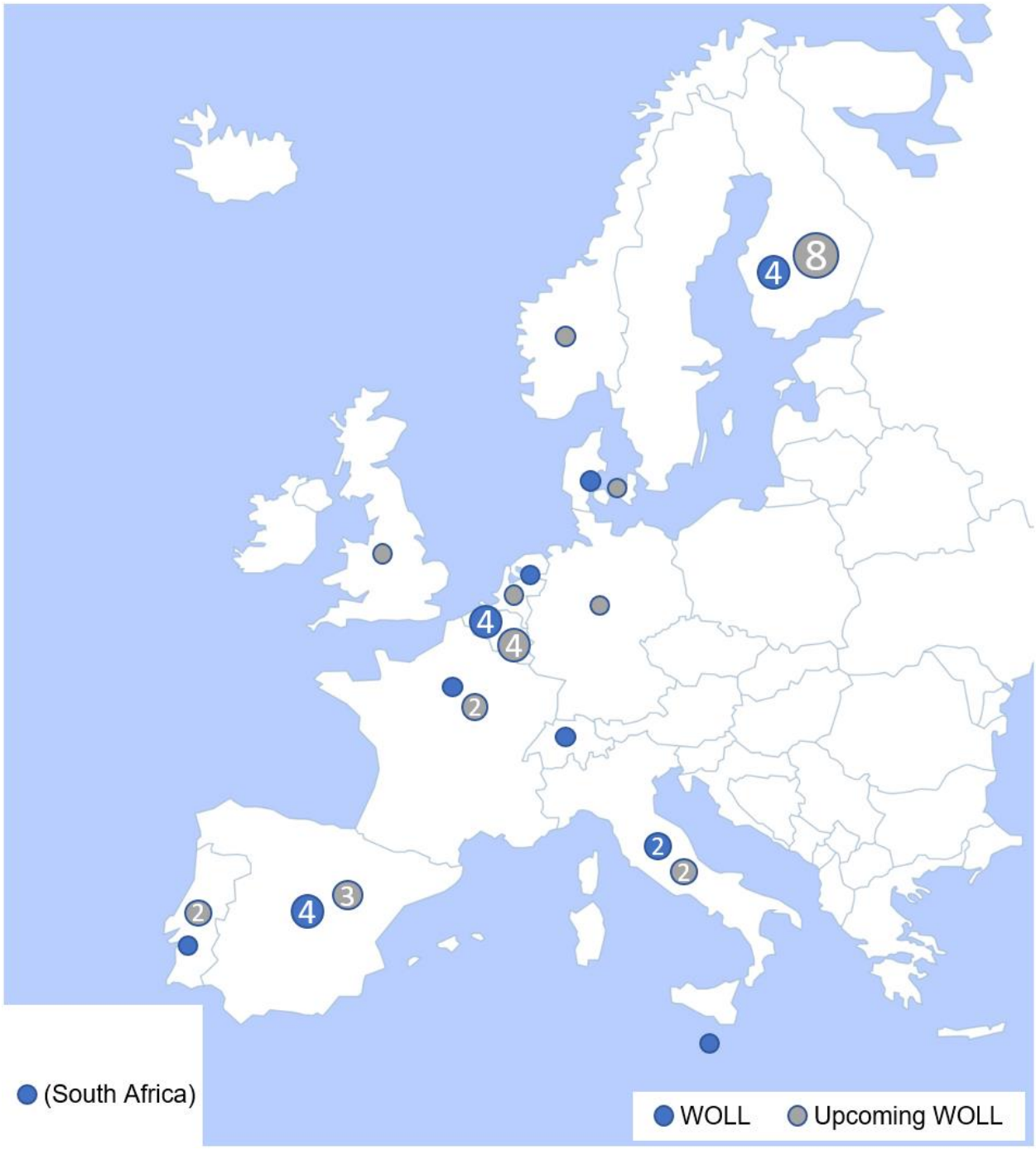

Figure 1 The geographical distribution of the WOLL network as of June 2024

THE STATE OF PLAY

From the Water4All framework development and best practice mapping process the following five key properties have emerged as particularly important for Water Oriented Living Labs.

1. **Thematic and problem-oriented approach**
   A WOLL has a clear focus on water as a theme, in line with the Water4All SRIA, and is essentially driven by the need to tackle specific, well-defined but complex problems at the societal level.
2. **Territorial link**
   Complex water challenges are inherently territorial and the establishment, organizational structure and development of a WOLL should always reflect the need to respond to specific territorial challenges and opportunities.
3. **Quadruple helix**
   WOLLs involve stakeholders across the government-research-industry-citizens-nexus in a co-creation innovation process. However, the WOLL differentiates somewhat from other types of living labs regarding the role of citizens which are often more indirectly represented through local and regional government stakeholders.
4. **Long-term strategy and robust governance and management structures**.
   A long-term financial strategy and foundation differentiates the WOLL from any project-based initiative. The WOLL governance and management structures underpins long-term support from the key stakeholders, efficient collaboration processes, and transparency.
5. **Demonstration of innovation in a real-life environment**
   A WOLL foster innovation by open demonstration, which includes access to test and demonstration facilities in a real-life or operational environment.

Thematic and problem-oriented approach

Through applying a clear thematic and problem-oriented approach, WOLLs organize their innovation ecosystem more effectively and reach a faster market uptake. The Water4All SRIA can help WOLLs in defining their themes.

Mature WOLLs focus on addressing context-bound and complex problems, aligning with a vision that encompasses clear goals and ambitions.

By concentrating efforts on well-defined complex problems, WOLLs can precisely define the innovation ecosystem, identify relevant stakeholders and partners, and facilitate the development of a joint research and innovation agenda.

This focused approach not only enhances the effectiveness of innovation activities but also plays a crucial role in promoting the market uptake of innovative solutions. This clarity in addressing specific challenges and goals is essential for attracting and communicating effectively with investors who are not only interested in supporting research and innovation but also in realizing the practical implementation and commercial success of these innovative solutions.

The Water4All SRIA can support non-mature WOLLs to guide their focus, while efforts to align with national agendas, priorities and initiatives relevant to water innovation action are also important to strengthen the support base for a WOLL.

Territorial link

Water related challenges are always context specific and require a context specific approach to problem-solving at the territorial level. As such, WOLLs are anchored in this specific context that has a territorial extent and tailor its innovations to address these specific needs. This results in faster innovation and uptake, and in increased replication.

The geographical location is crucial for the effectiveness of a WOLL, particularly because water presents a challenge that, despite its global nature, is always related to the specificities of the local context. Open innovation is inherently context-specific, and a WOLL can precisely tailor solutions to address the unique territorial challenges and opportunities. This targeted approach allows for a more accurate adaptation to the water-related context's specific needs and enhances engagement with local stakeholders, fostering collaboration with businesses, public institutions, and communities.

Furthermore, the geographical context plays a key role in the scaling-up of tested and validated water-related solutions. Validating solutions within a specific water-centric territory provides practical evidence of their effectiveness in real-world situations, simplifying the process of convincing other regions or communities to adopt similar water-related innovations. Additionally, it contributes to social acceptance, increasing the likelihood of widespread adoption. The knowledge gained from the territorial focus facilitates the adaptability and customization of water-related solutions, enabling their integration into new contexts without "reinventing the wheel". In essence, territoriality is not only fundamental for the success and sustainability of WOLLs but also serves as a solid foundation for the subsequent scaling-up of water-related innovations and governance models.

Quadruple helix collaboration ecosystem

The quadruple helix model forms the core of WOLLs, emphasizing co-creative innovation involving stakeholders like end-users and policymakers. Trust building among stakeholders is an essential part of becoming a WOLL. The quadruple helix approach supports end-user and user-centred innovation and regulatory compliance to accelerate societal uptake. Looking at best practice, the inclusion of citizens and government stakeholders in WOLLs calls for special attention.

The quadruple helix model is at the core of a living lab by ENoLL as well as Water4All's definition. A main differentiating factor between living labs and other innovation systems (like cluster organizations, research infrastructures, knowledge sharing network etc.) is in the co-creative innovation process between these quadruple helix stakeholders, that is based on iterative stakeholder feedback. An essential factor in this co-creation process is building trust between the stakeholders. Only when there is trust and stakeholders are part of the innovation process on equal footing, the true value of living labs as innovation ecosystems emerges.

The way stakeholders are included in the WOLL processes depends on the local context. Often this is formalized in some way in the governance structure. In practice this means at a metalevel that stakeholders are consulted when setting up innovation agendas and that in some way regular stakeholder feedback is requested to inform the practical functional and strategical direction of the WOLL. This can for instance be organized by offering seats in boards or organizing formal sound boards.

When considering the development of a successful WOLL, the inclusion of government stakeholders in particular should not be underestimated. These are the key end-users, public authorities, political bodies and a necessary interface between citizens and the strategic planning and policy-making processes that frames the development of solutions for a water-smart society, which inherently is a challenge at the system level.

Furthermore, a strong government buy-in in the innovation process means that WOLLs can focus on long-term innovation with maximal impact. WOLLs could ideally also function as regulatory sandboxes, offering a

controlled environment for testing and refining water management regulations, thus providing a practical setting to experiment with regulatory frameworks, policies, and governance models.

Long-term strategy and governance

Having a long-term strategy including a clear governance structure ensures the long-term success of a WOLL. This governance structure should overcome the project life cycle duration and connect the quadruple helix. A strong regional or local government commitment is an important key to success.

A WOLL goes beyond the project life cycle and is based on a long-term funding strategy and appropriate governance and management structures. It cannot be based on a specific project. A long-term strategy and permanent organization are necessary as complex water related challenges are not solved during one project cycle.

Permanent organization and robust governance are key to the long-term, continuous development of trust and understanding between the stakeholders. Furthermore, it counters the transactional costs and lack of societal impact that often comes with project-based initiatives.

It is important to carefully consider the WOLL governance structure as it sets the scene for the collaboration between the partners and the engagement of the wider stakeholder community. It should go further than bilateral agreements and the inclusion of local and regional governments in this structure is essential. Local and regional governments are the main problem owners at the territorial level, and they are key to ensuring robust support across the quadruple helix and establishing functional end-user-policy interfaces that also ensure the alignment with the surrounding societal and political priorities. While the core mission of a WOLL is to leverage the solving of complex water related problems of a specific territory, it is naturally linked to the wider innovation ecosystem at national, European and international level as well. Complex water problems are intrinsically territorial, but the solutions are not.

A sustainable financial plan is another essential element of a WOLL. For most successful WOLLs this entails some degree of public funding for core activities, typically for the WOLL backbone organization to be able to support the collaboration between the WOLL partners, facilitate wider stakeholder engagement activities, and handle other day-to-day functions. Such a facilitating mechanism doesn't qualify as a WOLL on its own but is rather an integral part of the WOLL governance and management structure and should be budgeted as such.

Demonstration of innovation in a real-life environment

The main WOLL objective is to make the innovation cycle faster, more goal-oriented and more impactful. This implies a necessary inclusion of not only technological aspects, but also wider societal and market-related aspects that requires demonstration of innovation in a real-life environment to enable faster uptake, acceptance, and replication of the innovations.

WOLLs should provide access to physical test and demonstration facilities and infrastructures that can support the validation and implementation of new solutions.

The WOLL can own and operate such facilities and infrastructures, or structure and provide access indirectly through the WOLL partners, typically public utilities and research-performing organizations. It is often a combination given the multi-faceted role of the WOLL backbone organization, which is first and foremost a platform for collaboration and aligned action between all the key stakeholders, addressing the technological as well as non-technological aspects of the entire innovation value chain.

As such, the WOLL also entails real-life innovation which is not purely focused on the advancement of TRL (Technological Readiness Levels). The valorization of social, regulatory or business model innovation is also considered.

RECOMMENDATIONS GOING FORWARD

Maturity takes time

Reviewing mature WOLLs, it is evident that establishing a WOLL with a large impact on innovation takes time, often a considerable number of years. It requires close and well consolidated cooperation between all quadruple helix stakeholders.

It is a process that requires a solid outset, but further entails many incremental steps. These build on each other and cannot be achieved at once due to the basic WOLL challenge of bringing together and aligning a number of stakeholders, strategies, policies etc. across a typically fragmented innovation ecosystem.

This continuous journey towards maturity is in principle without a finite end and therefore an important basic condition to consider when discussing the maturity of a WOLL. Also considering another basic condition, namely the context bound nature of any WOLL's specific challenges, it makes little sense to assess the maturity of WOLLs up against fully objective norms or targets. Rather, in addition to the five key properties three important and cross-cutting qualitative aspects should be considered when discussing the maturity of WOLL initiatives and how they meet the WOLL criteria: a solid outset, a problem-driven vision, and a well-defined pathway.

Solid outset

The outset, or starting point, of a WOLL should always build on a well-informed analysis of the stakeholders whose ownership to the establishing of a WOLL is critical because sustainable solutions are too difficult to develop or implement through "business as usual".

Hence, the key stakeholders must be properly identified and engaged from the start. This does not imply that every important stakeholder must be onboard from the beginning, but certain stakeholders in any given context will be gatekeepers that can either ensure or stand in the way of a WOLL's successful development, and they must be on board from the beginning.

If a new WOLL builds on an existing organization or initiative, it is particularly important to revisit the fundamental stakeholder analysis and carefully consider if the foundation is – or can be – fit for purpose.

Problem-driven vision

A WOLL is inherently driven by the shared understanding of systemic problems in a territorial context, which distinguishes it from other types of platforms for water-oriented collaboration. Hence, a WOLL should present a vision based on the territorial context and defined core problems and challenges.

Given the level of complexity a WOLL is addressing, including the dynamics of the territorial challenges at hand, a vision is not necessarily a stand-alone statement, but can be unfolded in, and supported by, different key documents such as policy statements, sector reports, white papers, Memorandum of Understandings, a research and innovation agenda etc.

Well-defined development pathway

Future ambitions should be backed by specified development pathways reflected in strategic decisions, documents, or plans.

When other types of innovation organizations, such as clusters, network organizations or research infrastructure, are the starting point of a WOLL, drafting such a clear pathway is particularly important. This leverages the process of alignment with the surrounding water innovation ecosystem and necessary widening of the stakeholder base.

DEVELOPING A WOLL

From the analysis of the state of play and the recommendations going forward, key elements in the process of developing WOLL emerge. This process should be context specific, adapted to the local needs and enablers. However, following generic steps can be identified as crucial for developing a WOLL.

1. Identifying the local and contextual water related challenges. The systemic dimensions of the challenges are analyzed to focus on the core of those challenges. Well-defined water challenges are put forward as the main focus of the WOLL. The contextual water challenges include technological challenges, but also governance and regulation, social aspects, environmental aspects etc.
2. Identifying the main stakeholders and engaging them in the WOLL. Certain stakeholders will be gatekeepers that can either ensure or stand in the way of a WOLL's successful development, and they must be on board from the beginning. Successful WOLLs often set up a formal process of engaging stakeholders through the WOLL's governance structure. Engagement of regional or local government stakeholders from the start of the WOLL on is essential to long term success.
3. Setting out a clear pathway by defining a research and innovation agenda, based on the identified challenges and in co-creation between all key stakeholders. This pathway includes defining clear objectives, scope, targets, activities, and a financial plan. The plan can include performance indicators and ways to monitor them.

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Grant Agreement n° 101060874

Co-funded by
the European Union