Water4All
Water security for the planet

European Partnership

GUIDELINES FOR MAINTENANCE OF WATER-ORIENTED LIVING LABS

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LIST OF ACRONYMS

BWS AF	Water-Smartness Assessment framework
PESTLE	Political, Economic, Social, Technological, Legal, and Environmental
SME	Small-Medium Enterprise
SWOT	Strengths, Weaknesses, Opportunities and Threats
WOLL	Water-Oriented Living lab
Water4All	European Partnership on Water Security for the Planet

ABSTRACT

This document is a strategic manual produced within the Water4All Partnership, specifically for Pillar D Demonstration activities, task D2.6 – Replication of Methodologies. The core purpose of this task is to create guidelines that will (i) ensure the successful replication of methodologies for Water-Oriented Living Labs (WOLLs) and (ii) support their lasting upkeep and performance beyond Water4All (Annex 1). WOLLs are realistic, user-focused environments where stakeholders collaborate to co-create, test, and validate innovative water solutions in real-world conditions.

The Water4All activities for the replication of methodologies provide directives for maintaining and strategically evolving WOLLs, with a focus on Demonstration efforts. This report builds on the groundwork laid by earlier activities implemented in the framework of Water4All Pillar D, including the startup guide for setting up a WOLL and the strategic roadmap for creating and maintaining a successful WOLL. Its principal objective is to ensure the long-term viability, development, and effectiveness of WOLLs through the duplication of proven methods and effective approaches.

This deliverable presents a comprehensive collection of over 100 solutions and exemplary practices, sourced from a network of 24 WOLLs across Europe and beyond. These resources are classified by category (such as technology, product, or established practice), assessed using the PESTLE analytical framework, and aligned with key strategic goals aimed at enhancing WOLL maturity and overall impact. The gathered information stems from SWOT analyses, stakeholder conversations, and engagement with the Water Europe Marketplace platform.

Included with this report is a practical, Excel-based tool (Annex 2). This instrument enables users to filter, compare, and scrutinize the selected solutions. It facilitates decision-makers, WOLL managers, and professionals in identifying scalable strategies, fostering knowledge sharing, and aligning efforts with EU water policy priorities. In essence, this report functions as a practical handbook designed for both established and future WOLLs, helping them evolve into valuable entities that contribute to a Water-Smart Society.

This document also outlines a comparative evaluation instrument (Excel format in Annex 2), developed to facilitate methodical and standardized evaluations of societal, ecological, and financial consequences across different regions. The instrument merges elements of PESTLE analysis with maturity modelling, to pinpoint essential factors contributing to success and to illuminate areas needing more attention and advancement. Through allowing for structured comparisons, it supports well-informed decision processes and strategic organization in varied locales and environments.

The portfolio is intended to serve as dynamic, iterative rather than static, and must evolve alongside their utilization by WOLLs. The next phases of the Water4All partnership should include a task that defines a shared approach to support WOLLs in the roadmap, frameworks implementation and strategies selection, building knowledge and skills among WOLLs and their stakeholders. This common path/program will not only facilitate the transfer of knowledge but also foster collaboration and networking among participants, encouraging the sharing of experiences and best practices.

GUIDELINES FOR MAINTENANCE OF WATER-ORIENTED LIVING LABS

1. INTRODUCTION

1.1 WATER4ALL PARTNERSHIP AND PILLAR D

Water4All is a co-funded European Partnership set up in Horizon Europe and addressing the Research and Innovation (R&I) challenges related to freshwater. It aims at enabling water security for all on the long-term by boosting systemic transformations and changes across the water R&I pipeline, fostering the matchmaking between problem owners and solution providers. Water4All offers a portfolio of additional activities including the alignment of water programmes, demonstration projects, international cooperation, the wide transfer and dissemination of activities and results, networking, and capacity building. Organized in five Pillars, each addressing different aspects of water challenges, the partnership seeks to address climate change effects, support the United Nations' Sustainable Development Goals, and boost the European Union's competitive edge and economic progress (Water4All, 2022). A description of Water4All is available on www.water4all-partnership.eu.

The Water4All Partnership duration is from 2022 to 2031, and the five operational Pillars are described below:

1. **Pillar A**: is responsible for the development of the thematic strategy of the Water4ll Partnership and the implementation of communication and dissemination tools.
2. **Pillar B**: aims at developing knowledge and innovation capacity to address the water challenges identified in the Water4All strategic research and innovation agenda (SRIA) through the pooling of financial resources from participating national and regional funding programmes.
3. **Pillar C**: foresees the implementation of specific instruments for knowledge transfer, improved communication with key policy actors for the implementation of water related strategies and regulations, and a better understanding of the innovation landscape in the water sector.
4. **Pillar D**: supports Water4All in enabling water security for all in the long term and in promoting systemic transformations and changes by supporting and promoting the demonstration and access to the market of innovative solutions across the entire water research and innovation pipeline. The strategy to reach this goal is based on the WOLL concept.
5. **Pillar E**: aims to strengthen international cooperation in all the different strategic themes of Water4All fully taking into consideration the main scientific needs of partners, their political and socioeconomic context, and best available instruments (Water4All, n.d.).

This report is produced in the context of Demonstration activities implemented in the framework of the Water4All Partnership (Pillar D). The task on the **Replication of methodologies** (Task D2.6) aims at the development of guidelines for setting up and maintaining WOLLs. The various tasks of Water4All Pillar D and their interconnectedness is shown in Figure 1.

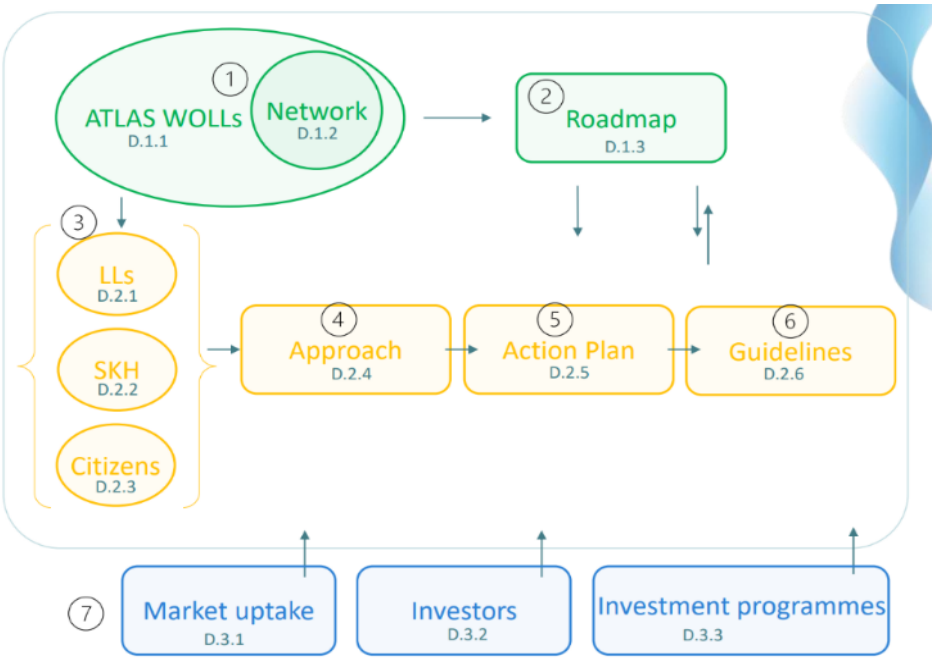

Figure 1. Water4All Pillar D intervention logic (Water Europe, 2022a). Task D1 is marked in green, Task D2 in yellow and Task D3 in blue.

1.2 THE WATER4ALL ATLAS OF WATER-ORIENTED LIVING LABS

Water-Oriented Living Labs (WOLLs) are multi-stakeholder collaboration environments created to systematically address a clearly defined water-related challenge that is territorial and context-dependent. Water Europe defines WOLLs as "real-life, water-oriented and demo-type and platform-type environments with a cross-sector nexus approach, which involve and commit multiple stakeholders (including water authorities) and provide a 'field lab' to develop, test, and validate a combination of solutions as defined in the Water Europe Vision, which include technologies, their integration as well as combination with new business models and innovative policies based on the value of water".

The Water4All Atlas is a database of European initiatives of water-related innovations and represents a significant milestone in the collaborative efforts towards sustainable water management.

It results from a mapping exercise by Water4All partners, and a selection process based on a maturity assessment tool. This initiative lays the groundwork for establishing a network of test facilities fostering synergies and enhancing collaboration among WOLLs operating in the water sector. It involves making smart decisions about water use, investing in innovative solutions, and fostering partnerships to ensure long-term water security for all. In the context of the Water4All partnership, an Atlas of Water-Oriented Living Labs was issued in 2024 with the 21 WOLLs identified in the first year of assessment activities carried out in D1.1. At the time of drafting this report, 24 WOLLs are hosted in the online catalogue of WOLLs, Water-Oriented Living Labs - Water Europe. The Atlas's purpose is to map, describe, and assist WOLLs throughout Europe and further afield. It features a diverse collection of Living Labs across Europe and beyond, each focusing on innovative water management solutions. These WOLLs are collaborative, practical environments where stakeholders – including researchers, water companies, businesses, citizens, and public agencies – team up to co-create, test, and implement innovative solutions for tackling water-related challenges. The Atlas offers a complete summary of these WOLLs and their role in achieving sustainable water management (Water4All, 2024).

TheWater4All Atlas of WOLLs is displayed as an online catalogue of WOLLs[1], a living web-platform regularly updated with new mature WOLLs.

The WOLL Atlas serves multiple purposes. It seeks to provide:

- a clear definition of WOLLs,
- an outline of their strategic significance in boosting innovation and sustainability in water management,
- a methodological structure for evaluating the maturity and effectiveness of different Living Labs,
- detailed profiles of current WOLLs, demonstrating how they operate, the challenges they address, their geographical scope, governance approaches, accomplishments, and goals.

The core of the WOLL Atlas is made up of the individual WOLLs that act as collaborative hubs where innovation is not just evaluated but also openly distributed. Despite operating in various settings, these WOLLs share a central goal: to act as practical settings. Here, stakeholders, from public bodies and academics to residents and private firms can collaborate to devise, test, and refine water-related solutions.

A key value of each WOLL is its function in collecting and disseminating practical information. By tackling local problems head-on, WOLLs produce specific insights that are easily applied elsewhere. They become key parts of a larger learning network where proven methods, valuable experiences, and successful approaches are freely shared and adjusted across areas and industries.

WOLLs actively promote transparency and shared learning. This cooperative approach promotes constant improvement, not only within single labs but across the entire WOLL network. The Atlas enhances this by making their work visible, allowing other efforts to gain ideas, copy successful strategies, and sidestep typical issues.

Through this continuous knowledge exchange, WOLLs are not just trying out water solutions, but actively building a better, more robust strategy for managing water. Their information-sharing role is crucial for broadening innovation and ensuring that progress in one place helps communities elsewhere (Water4All, 2024).

1.3 LIAISON WITH STARTUP GUIDE AND STRATEGIC ROADMAP

The Water4All Partnership fosters the development and longevity of WOLLs through a cohesive structure designed to nurture these innovation hubs from inception to realization. This structure hinges on three interrelated outputs — produced in Water4All Pillar D Tasks D1.3, D2.5, and D2.6—each crucial in driving the ongoing evolution and impact of WOLLs throughout Europe.

The Task D2.5 offers an **introductory guide designed for new WOLLs**, helping them establish their foundation by focusing on initial steps such as stakeholder engagement, forming governance structures, and defining innovation objectives. It provides a practical, easy-to-understand starting point for labs just beginning their journey. Employing practical tools and templates, the guide assists new WOLLs in assessing their developmental stage and identifying necessary steps for expansion. The guide presents a flexible, three-phase approach—planning, establishment, and sustainability—helping local entities like municipalities and community groups assess their readiness, build partnerships, and develop their WOLL.

[1] https://watereurope.eu/wateroriented-living-labs/

The Task D1.3 on *Demonstration Implementation Roadmap* presents a **strategic roadmap for more advanced WOLLs** that are ready to implement, test, and expand water-related innovations. It outlines key strategic goals, development stages, maturity indicators, and impact indicators to help WOLLs grow into effective innovation ecosystems. While the start-up guide simplifies and introduces key concepts, the migration roadmap presents a more strategic, long-range perspective. This alignment prevents fragmentation and supports a seamless progression from emerging labs to established WOLLs.

Both tasks use a common framework, ensuring a smooth transition from the initial setup (Task D2.5) to strategic implementation (Task D1.3). The start-up guide aligns with roadmap structured approach, guiding new WOLLs through early development, while migration roadmap provides the detailed plan for scaling and long-term impact.

Furthermore, the Task D2.6 for the **replication of methodologies** builds upon both by translating the strategic insights from the WOLL implementation roadmap into practical tools, evaluation frameworks, and standards. It supports WOLLs in scaling their activities, ensuring sustainability, and expanding their influence within the broader water innovation community.

In summary, as part of Water4All Pillar D on demonstration activities, Task D2.5 helps new WOLLs get started, Task D1.3 offers a comprehensive strategic plan for growth, and Task D2.6 provides a portfolio of tools and solutions needed for expansion and long-term success. Together, these tasks create a coherent pathway from initial establishment to mature, impactful water innovation ecosystems. The collaboration between these three tasks guarantees that WOLLs are not left to navigate their evolution in isolation. Instead, they receive support at every step—from formation to impact—through a coherent, organized structure. By interlinking practical startup guidance, strategic leadership, and advanced implementation tools and solutions, the Water4All Partnership offers a comprehensive support system, converting promising water initiatives into sustainable, scalable WOLLs that yield tangible results.

1.4 OBJECTIVES

This document serves as a complete, user-friendly guide designed to help WOLLs achieve greater maturity and make a bigger impact. **The primary goal of this document is to support the long-term sustainability, resilience, and scalability of WOLLs by offering an adaptable set of strategies, tools, and replicable best practices.** Recognizing the diverse operational environments in which WOLLs function, these guidelines do not propose a one-size-fits-all model. Instead, they provide a flexible yet structured portfolio of interventions to guide WOLLs in aligning with European or regional water policy goals, strengthening stakeholder collaboration, and advancing toward a Water-Smart Society.

This deliverable builds upon the insights and outcomes of other tasks, namely WOLLs mapping (Task D1.1, Atlas of Water-Oriented Living Labs 2024) and WOLLs Network engagement (Task D1.2), the Migration roadmap for demonstration of innovation (Task D1.3; Rosa et al., 2025), the Start-up Guide for new WOLLs (Task D2.5; Winderickx, 2025), New value approach propositions (Task D2.4), Market uptake (Task D3.1), Investors (Task D3.2), and Investment programs (Task D3.3), as illustrated in Figure 1. Using prior deliverables and actual data (collected and processed within Task D2.6), Task D2.6 provides actionable guidance and optimal methods to help WOLLs address technical and non-technical hurdles in future developments. Namely, it provides a **portfolio of solutions and best practices the WOLLs may replicate** (as so or adapted) as strategies for increasing their maturity or impact, as foreseen in step 5 of the Task D1.3 roadmap and illustrated in Figure 2 (Rosa et al., 2025).

Essentially, step 5 acts as a resource for WOLLs aiming to boost their performance, strengthen connections with stakeholders, support European water targets, and achieve significant, lasting results in their areas and beyond.

Figure 2. Roadmap steps for creating and maintaining a successful WOLL (Rosa et al., 2025)

1.5 DOCUMENT STRUCTURE

Section 1 starts with an introduction of the Water4All partnership and Pillar D, explaining how it supports the development and sustainability of WOLLs. It also introduces the WOLL Atlas and describes how this guide expands upon earlier work developed within Tasks D1.3 for the Roadmap implementation and Task D2.5 for the Startup Guide for new WOLLs.

In Section 2, the guide clarifies the data sources used to build the portfolio. These sources include the SWOT-based WOLL template, survey information, interviews with WOLL stakeholders, and data from the Water Europe Marketplace. These various sources guarantee that the identified solutions are based on practical experience and encompass different regional perspectives.

Section 3 offers a description of chosen WOLLs. This includes information like WOLL location, stage of development, maturity scores, and core thematic areas. This information is presented as a small table within the document, with the complete dataset added as an annex (Annex 1).

Section 4 showcases the main Portfolio of Best Solutions and Practices (Annex 2). This section contains images or excerpts demonstrating user interactions, specifically how solutions may be filtered by WOLL maturity levels, impact domains, or intervention categories (product, technology, or best practices).

2. METHODS: APPROACH ADOPTED TO DEVELOP THE PORTFOLIO

This chapter details the approach taken to examine the top solutions and practices currently implemented within WOLLs. It explains the specific structures and informational bases utilized to assess both the developmental stage and effect of WOLL. This is particularly achieved via PESTLE analysis and strategic objectives established during preliminary project phases. Important components of this investigation include SWOT analyses, organized interviews, and the Water Europe Marketplace.

2.1 FACTORS USED TO CATEGORIZE THE TOP SOLUTIONS AND PRACTICES

The chosen solutions and strategies in WOLLs are analysed with **PESTLE** dimensions — Political, Economic, Social, Technological, Legal, and Environmental — for a broad, multi-faceted evaluation, and towards the strategic objectives defined in Task D1.3 for WOLL maturity and for WOLL impact (Rosa et al., 2025).

Regarding **WOLL maturity**, the strategic objectives translate the six aspects of the **Harmonization Cube** (Water Europe, 2022b) namely:

- **USER INVOLVEMENT:** which aims at involving water users (e.g., cities/citizens, industry and/or agriculture) as well as the users of innovations that will enable a Water-Smart Society. This gives stakeholders such as water users, utilities, and related service providers like wastewater management companies the opportunity to have an influence on solutions that will affect their future.
- **SERVICE CREATION**: has the objective of facilitating and supporting the development of new ideas, services and solutions that contribute to a sustainable and Water-Smart Society and offering representative (semi) real-life environments of water production, distribution and (re)use, for co-design and validation.
- **INFRASTRUCTURE**: aims at providing the physical or virtual environment to integrate, test, validate and measure the performance of water innovations. This may involve an experimental set-up (e.g., in labs, or demo sites) or, real-life test environments for water production, distribution and (re)use (e.g., at utilities, river basin settings, urban areas, [agro] industrial sites).
- **GOVERNANCE:** has the objective of engaging the quadruple helix from the water sector in an innovation-eco-system, for instance, by involving public (water management) authorities (including utilities), water users, water research organizations and technology developers, with a view to having them work jointly on the management and continuity of the WOLL.
- **INNOVATION OUTCOME:** aims at facilitating innovations that contribute to a sustainable and Water-Smart Society ('mission focus'). These outcomes can consist of knowledge, new products and services and/or IPR. Outcomes can take the form of finished end-user applications, but also of prototypes or simply of knowledge about usage patterns.
- **METHODS AND TOOLS**: supports providing and continuously updating specific (interoperable) methods and tools to acquire relevant large-scale user data related to the targeted innovation outcomes within the water sector (Water Europe, 2022c).

For **assessing and improving the WOLL's impact**, the Water-Smartness Assessment framework (BWS AF) (Silva et al., 2023) was proposed in Rosa et al. (2025). This framework provides a structured way to assess progress towards five strategic water-smart objectives through a detailed set of criteria and metrics:

- **Ensuring water for all relevant uses** – This objective aims to guarantee secure and affordable access to water for all sectors, including domestic, industrial, agricultural, and environmental uses.
- **Safeguarding ecosystems and their services** to society – This objective focuses on protecting water-related ecosystems, enhancing ecosystem services in both urban and rural areas, pursuing carbon neutrality, and promoting resource efficiency for environmental protection.
- **Boosting value creation around water** – This objective seeks to create value by leveraging synergies within the water-energy-resources-waste nexus through the implementation of circular economy policies and business models.
- **Promoting adaptive change** towards resilient infrastructure – This objective aims to ensure that governance, financial, and decision-making conditions foster adaptive change towards resilient infrastructure, enabling robust planning and effective implementation, with a focus on resilience.
- **Engaging citizens** and actors across sectors in continuous co-learning and innovation – This objective emphasizes the deliberate engagement of citizens in planning, decision-making, and implementation processes.

Although the framework delivers a complete set of targets, it is acknowledged that not all WOLLs seek to tackle all five goals equitably. Depending on their context, priorities, and abilities, certain WOLLs might focus on one or two main objectives rather than all of the strategic objectives. Nevertheless, the framework offers a valuable guide for directing and comparing WOLL development.

2.2 DATA SOURCES

To better understand WOLLs, their operation, development, and how they support the Water-Smart Society objectives, a structured and cooperative research approach was employed. The goal was not only to record current WOLL practices but also to gain insights for new or developing WOLLs within the Water4All partnership. Given the complexity of WOLLs, which involve governments, researchers, businesses, and citizens in actual settings, capturing their dynamics required several data sources, namely:

- The SWOT analyses conducted by the WOLLs that applied to integrate the Atlas, within task D1.1,
- An interview framework including three moments,
- The Water Europe Marketplace.

A key part of this process was the use of SWOT analysis, which allowed WOLL stakeholders to critically evaluate their internal strengths and weaknesses, external opportunities and risks. Since WOLLs function across different sectors and levels, the SWOT provided a straightforward yet effective way to arrange that complexity and support future planning.

Along with the SWOT, a series of interviews took place with experienced WOLL leaders, using a carefully designed interview framework. These semi-structured discussions aimed to explore the origins, governance, resource requirements, stakeholder involvement, and impact of each WOLL. Each question in the interview served a specific role—for instance, revealing the motivations behind a WOLL's establishment, understanding its success measurements, or identifying lessons learned over time. These interviews were conducted in three moments and ensured the insights gathered were based on real-world experience and helped align local actions with wider European water innovation goals.

2.2.1 SWOT analyses conducted by the WOLLs in the Atlas

The SWOT methodology involves a structured, collaborative approach designed to encourage balanced reflection and is especially helpful for WOLLs because it:

- simplifies complexity: WOLLs function across many sectors and systems. SWOT helps structure both internal and external factors, providing a clearer overall view.
- informs strategic choices: By outlining strengths, weaknesses, opportunities, and threats, WOLLs can better plan priorities, alliances, and initiatives.
- reveals capacity shortcomings: SWOT highlights where a WOLL has resource gaps, visibility issues, or misalignment with local or European goals.
- improves communication: A SWOT's outcome is easy to share, which helps build alignment and transparency with partners, funders, and policymakers.
- guides development: WOLLs frequently evolve. SWOT can assess their current stage of maturity.

In a WOLL, a SWOT analysis usually starts by involving various stakeholders from the "quadruple helix" (public, private, academic, and civil society). This guarantees that the collected insights reflect the opinions of all parties within the WOLL ecosystem regarding:

- **Strengths:** What internal assets exist? Examples include institutional support, technical know-how, unique collaborations, or facility access.
- **Weaknesses:** What internal problems exist? Lack of funds, poor governance, limited communication, or inadequate stakeholder participation may be considered here.
- **Opportunities:** Which external trends or developments could help the WOLL? This might include EU funding calls, policy changes, or increasing public awareness of water matters.
- **Threats**: Which external risks or uncertainties could hinder the WOLL's progress? Political developments, competition, or legal hurdles may fit here.

Once all elements are identified, they are often displayed in a matrix and discussed as a group. The main goal is to select the most important strengths to build upon, the most crucial weaknesses to address, and the key external factors to respond to—either by seizing opportunities or decreasing threats.

The information used to develop the portfolio (Section 4) was extracted from the WOLL template tool.docx (SWOT) filled in by the WOLL candidates within Task D1.1 for the development of the Atlas of WOLLs.

2.2.2 Interview framework

To grasp, foster, and expand WOLLs, a clear and organized method for investigating their functionality is crucial and was implemented. A series of interviews was conducted with experienced WOLL leaders, using a carefully designed interview framework. The **first survey** took place in 2023 and included the 13 questions listed in Table 1 (Interview Jasper Pranger, 2023), with feedback from 15 WOLLs. In 2024, a **second survey** with 5 questions (Table 2) was carried out, receiving feedback from 13 WOLLs (Interview Linna Sakina, 2024). In the second survey, 7 WOLLs were new and had not participated in the first survey. Each question serves a specific purpose. When combined, they help reveal the motivations, structures, challenges, and potential of each WOLL. By collecting insights through these focused questions, the interview approach ensures a comprehensive and comparable overview of how WOLLs operate, their needs, and their development. This method facilitates comparison and learning across diverse WOLLs and regions, aligning with the broader European vision for a Water-Smart Society.

Based on close proximity to the interviewers and being a driving force behind a unique, regionally rooted approach to water technology development in the Netherlands, an interview was conducted with the Water Campus Leeuwarden to gain a clearer picture on how WOLLs operate. The intention was to collect insights from people heavily involved in the creation of the Water Campus and its living lab framework, identify crucial success factors, hurdles encountered, and the decision-making process related to building and maintaining a WOLL. It is particularly valuable for supporting the strategic design of fresh WOLLs within the Water4All partnership and to make sure guidance provided in documents like the Water4All Startup Guide for new WOLLs (Winderickx, 2025) is based on practical knowledge. The interview used a semi-structured qualitative methodology, i.e.:

- Important stakeholders were chosen based on their roles in the Water Campus's initial and continuing development.
- The questions addressed key topics, such as defining a WOLL, initial setup, regional partnerships, long-term viability, management, and funding.
- The format permitted open conversation, inviting the interviewee to offer in-depth thoughts and share personal and organizational experiences.
- The findings were utilized to identify top practices and to formulate widely applicable suggestions for other areas seeking to implement similar projects.

Table 1. Interview Framework – questions in the first survey conducted in 2023 (Pranger, 2023)

No.	Question	Purpose / Explanation
1	**What prompted the creation or what is the origin of your WOLL?**	This question aims to uncover the initial motivation and background behind the establishment of the WOLL. Understanding whether the lab was created in response to a specific crisis (e.g., drought, pollution), driven by a government program, a research initiative, or grassroots community effort provides essential context. It reveals the founding objective, initial challenges, and drivers, which help define the WOLL's identity and long-term relevance. Labs founded out of urgency may focus on immediate problem-solving, while those born from strategic planning may aim at long-term transformation.
2	**What are the main elements that drive your organization to encourage innovations towards a Water-Smart Society?**	This question seeks to explore the current motivations and strategic drivers behind your innovation activities. Are you reacting to urgent environmental or societal needs? Are you driven by policy goals, business opportunities, or international frameworks? It helps identify the values and incentives—economic, environmental, political, or social—that motivate the lab to pursue innovation. It also reveals whether the lab is primarily reactive or proactive in shaping water-smart futures.
3	**How does your WOLL help in achieving the objectives and innovation concepts of the Water-Smart Society?**	This question links the WOLL's work to broader societal and environmental objectives. It encourages reflection on how your activities—whether in technology, governance, stakeholder engagement, or public awareness—contribute to achieving water-smart goals. The answer helps assess your WOLL's strategic alignment, external relevance, and whether it's contributing meaningfully to European and global sustainability targets.
4	**What components make up your WOLL? (people, infrastructure, tools, governance)**	This question maps the internal structure of the WOLL. Who is involved, what kind of infrastructure or digital platforms are used, how governance is organized, and what tools are applied for innovation. It helps understand the operational setup and identify key building blocks. This is crucial for evaluating the lab's maturity, scalability, and whether the model could be adapted or replicated elsewhere.
5	**What are the main governance mechanisms of the WOLL?**	Governance is central to the functioning and legitimacy of any WOLL. This question seeks insight into how decisions are made, who holds authority, and how inclusive and transparent the processes are. Understanding governance mechanisms allows us to evaluate trust, flexibility, stakeholder engagement, and the ability of the WOLL to evolve with shifting needs or contexts. Strong governance structures are often key to long-term resilience and success.

No.	Question	Purpose / Explanation
6	**What resources are required for a successful WOLL operation? (human, financial, technological)**	Every WOLL depends on a mix of people, funding, and technology. This question identifies the essential resources needed to sustain and grow the lab. It helps to highlight where there might be resource bottlenecks or dependency on external support. Clear understanding of these resource needs is important for designing funding strategies and engaging partners.
7	**Can you offer specific examples of human, technological, and financial resources that are essential for your WOLL to function?**	Building on the previous question, this one asks for concrete, real-world examples of what enables the WOLL to function day-to-day. This could include types of staff roles, funding sources, digital tools, or physical infrastructure. The goal is to move from abstract needs to tangible cases, providing practical insight for others trying to build or improve their own WOLL.
8	**What methods or criteria do you utilize to assess the effectiveness and impact of your WOLL's initiatives?**	Measuring success is key to improvement. This question explores how the WOLL evaluates the outcomes of its work—through key performance indicators (KPIs), user feedback, environmental metrics, policy uptake, or other impact assessments. It helps determine how reflective, adaptive, and results-oriented the WOLL is. It also supports knowledge sharing by showing what works in terms of monitoring and evaluation.
9	**What challenges or lessons learned have come up during your WOLL journey?**	Innovation is rarely smooth. This question invites honest reflection on barriers encountered—political resistance, funding instability, low user engagement, coordination difficulties, etc. Sharing these experiences fosters a culture of transparency and mutual learning. It helps other WOLLs anticipate obstacles and adopt strategies that have proven successful or avoid known pitfalls.
10	**How do you include stakeholders from the quadruple helix?**	A key feature of WOLLs is the involvement of multiple stakeholder groups—government, industry, academia, and civil society. This question explores how these groups are engaged: Are they involved in co-design, testing, decision-making? Is their involvement continuous or occasional? Understanding this helps assess the WOLL's openness, diversity of perspectives, and strength as a participatory innovation ecosystem.
11	**What impact has your WOLL had on the local territory or economy?**	WOLLs should not only innovate but also generate tangible value for their surrounding regions. This question explores economic, social, and environmental benefits—job creation, public awareness, improved water use, policy influence, etc. It helps demonstrate the WOLL's territorial embeddedness and its contribution to sustainable regional development.
12	**What role does politics or policy play in the development of your WOLL?**	No WOLL operates in a vacuum. This question addresses how political support, regulatory frameworks, and public funding have influenced the WOLL's development. It helps assess how dependent the WOLL is on political context, how adaptable it might be to political change, and whether it has institutional support to ensure long-term sustainability.
13	**What advice or tips would you provide to other (emerging) WOLLs?**	This final question promotes peer-to-peer learning. By sharing practical advice—what worked, what didn't, and key takeaways—your WOLL contributes to the broader Living Lab community. It fosters collective growth and supports emerging WOLLs in building stronger, more effective ecosystems from the start.

Table 2. Interview Framework – questions in the second survey conducted in 2024 (Sakina, 2024)

No.	Question	Purpose / Explanation
1	**What are the main factors that drive your organization's efforts to advance innovations towards a Water-Smart Society?**	To explore the fundamental motivations and context-specific pressures that propel an organization toward innovation. These can include environmental challenges, regulatory demands, historical backgrounds, or socio-economic dynamics. Understanding these drivers helps determine whether innovation is motivated by necessity, strategic opportunity, or a broader, long-term vision aligned with sustainability goals.
2	**How does your WOLL contribute to reaching the aims and innovation concepts of the Water-Smart Society?**	To assess how well the WOLL aligns with and contributes to the broader goals of a Water-Smart Society. This includes evaluating the WOLL's role in promoting innovation, fostering stakeholder collaboration, sharing knowledge, and enabling systemic changes in water governance. The question also helps determine the strategic value and real-world impact of the WOLL within this wider vision.

No.	Question	Purpose / Explanation
3	**What resources are essential for the successful operation of your WOLL?**	To understand the core operational needs—human, technical, organizational, and financial—that ensure the WOLL functions efficiently. Identifying these elements allows for better evaluation of the WOLL's sustainability, resilience, and potential to scale or be replicated in different contexts. It also supports more targeted support from funders and partners.
4	**Could you offer concrete examples of human, technological, and financial resources that are vital for the performance of your WOLL?**	This question encourages the WOLL to go beyond generalities and provide specific, real-life examples—such as staffing roles, types of technology used, sources of funding, and infrastructure. It supports the development of a more practical and actionable understanding of what enables WOLLs to operate effectively, helping others to benchmark or build similar initiatives.
5	**What methods or criteria do you utilize to evaluate the effectiveness and impacts of WOLL's initiatives?**	To examine how the WOLL measures its performance and outcomes—using tools such as KPIs, stakeholder feedback, impact assessments, or reporting frameworks. This helps ensure accountability, continuous learning, and adaptive management. It also allows comparisons across different WOLLs and supports the identification of successful practices and strategies.

2.2.3 Water Europe Marketplace

The Water Europe Marketplace is a novel digital platform designed to boost cooperation, innovation, and information exchange inside Europe's water industry. It serves as a central point where diverse participants—including researchers, businesses, decision-makers, tech developers, and public bodies—can meet to share ideas, showcase technologies, and jointly develop solutions to urgent water issues.

This online space supports Water Europe's goal of establishing a Water-Smart Society, where water is handled in a sustainable, circular, and resilient manner. The marketplace is especially useful for speeding up water solution adoption by connecting solution providers directly with those needing new methods and raising their profile (Water Europe Marketplace, n.d.).

To develop the portfolio of solutions and best practices (Section 4), the Water Europe Marketplace was comprehensively evaluated. It was studied as a key resource for digital collaboration platforms, with a focus on how they contribute to WOLLs success in areas such as increased awareness, fostering partner involvement, and scaling up solutions. The marketplace was used in this context to define the characteristics of various WOLLs and also to compile a collection of the most effective solutions. The analysis involved examining the functionalities offered and the way in which the marketplace was utilized, aiming to understand its role in promoting knowledge sharing, connecting relevant parties, and spreading awareness of leading practices (Water Europe Marketplace, n.d.).

3. WOLLS CHARACTERIZATION

Annex 1 presents a structured comparison of the 24 WOLLs from Europe and elsewhere currently (May 2025) listed in the online repository. Each WOLL in this review has been assessed based on several key aspects to understand its role in fostering sustainable and innovative water management. This overview aims to capture the variety and impact of these Living Labs, as well as identify similarities, effective practices, and possibilities for wider application in different settings. Annex 1 is important, as it would significantly strengthen the contribution (social, environmental and economic) of the various categories of WOLL characterization. While the comparative analysis offers valuable insights, its full potential lies in connecting those findings to practical implications.

The analysis concentrated on six main elements:

1. **WOLL Name:** Identifying each individual Living Lab project.
2. **Country and Region/City:** Specifying the geographical location of the WOLL to highlight its regional or national significance.
3. **Year of Establishment:** Indicating the founding date of the WOLL.
4. **Social Impact:** This includes activities related to community involvement, cooperation between various stakeholders, collaborative design processes, and educational programs. It reflects how WOLLs interact with and involve society in water-related innovation.
5. **Environmental Impact:** This considers measures such as sustainable water use, climate change adaptation, groundwater protection, and nature-based solutions. The focus is on how WOLLs contribute to improving environmental resilience and ecosystem health.
6. **Economic Impact:** This part examines the ability of each WOLL to create lasting economic value, for example, through job creation, circular economy strategies, commercialization of water technologies, backing for small to medium-sized enterprises (SMEs), and boosting regional progress.

The data was gathered from formal strategy reports, the Water Europe WOLL Atlas (2024), and freely accessible documents and publications from each WOLL's website or associated institutions. This ensures that the information is based on verified sources and reflects the practical outcomes and strategic aims of the WOLLs. These sources are included in Annex 1.

4. PORTFOLIO OF SOLUTIONS AND BEST PRACTICES

This section and Annex 2 (excel file) present a portfolio of solutions and best practices identified within each WOLL, classified according to (Figure 3):

- Type of solution: Product, Technology, or Best Practice,
- PESTLE dimension(s) each product/technology/best practice address,
- WOLL Maturity strategic objectives each product/technology/best practice address,
- WOLL Impact strategic objectives each product/technology/best practice address.

PESTLE dimensions and strategic objectives for WOLL maturity and for WOLL impact defined in section 2.1. One should note that, while the excel data set offers a valuable overview, the allocation of "X" marks in certain categories may need improvement. These marks represent preliminary evaluations and could be enhanced through more uniform scoring or expert verification in future studies.

Best practice Technology/produc	Description	WOLLs	PESTLE						WOLL Maturity						WOLL impact					Sources
			Political	Economic	Social	Technological	Legal	Environmental	User Engagement	Service Creation	Infrastructure	Governance	Methods and tools	Innovation Outcomes	A. Ensuring water for all r	B. Safeguarding ecosyste	C.Boosting value creatior	D. Promoting adaptive ch	E. Engaging citizens and	
Best practice	Replace DW in non-potable uses by RW.	***Lisbon Water Smart Living Lab***	x		x			x			x						x			https://watereurope.eu/woll/water-smart-lisbon-woll/
Product	Use a digital tool for water smart allocation.			x		x		x					x	x	x				x	
Best practice	Create a dedicated bulk RW service.		x				x			x							x			
Best practice	Create a community of practice with stakeholders across the 4-helix.				x				x										x	

Figure 3. Print screen of the portfolio of best solutions and practices for WOLL maturity and impact (excel file, Annex 2)

The portfolio highlights practical approaches, tested technologies, and successful methods and best practices applied in real-life settings. The aim is to share replicable insights that can inspire or guide other regions and stakeholders. This organized structure simplifies the process of assessing how each WOLL contributes to a water-smart society and reveals potential areas for collaboration or scaling up.

Detailed examples per WOLL exploring the topics below are available in the accompanying **Excel file (Annex 2)**. This excel empowers users to:

1. Filter by objective: e.g., Need to concentrate solely on water-circularity solutions? Use the filter for Impact E (Transition to a circular economy).
2. Sort by maturity: e.g., Interested in technologies that are ready to scale? Sort by high maturity scores.
3. Explore by type: e.g., view only best practices to find community-focused examples or focus on tools for digital innovation.
4. Identify overlaps: e.g., see which WOLLs integrate environmental, social, and governance considerations.

These filters support:

- Policy development,
- Funding decisions,
- Research collaborations,
- Benchmarking between regions.

Regarding the rationale for measuring these categories, each category reflects a critical domain that influences the success and replicability of water innovation:

1. **Political** Is the innovation supported by the government or facilitated by enabling policies?
2. **Economic** Does the solution create jobs, reduce expenses, or support small and medium-sized enterprises (SMEs)?
3. **Social** How are citizens or users involved? Is co-creation present?
4. **Technological** What is the level of innovation? Are digital tools, AI, or sensors employed?
5. **Legal** Does the project comply with laws and regulations related to water usage?
6. **Environmental** What is the ecological value – reduction in pollution, improved ecosystems, climate adaptation?

Examining over 22 WOLLs in Europe and elsewhere (Figure 4) reveals key insights:

- Environmental and technological aspects are the most frequently highlighted, indicating a major emphasis on eco-friendly innovation and smart-water systems.
- Social and governance components are often present in WOLLs that prioritize public participation, local government involvement, and cooperation among various sectors.
- Numerous WOLLs display strong economic possibilities, especially where circular economy concepts and digital water technologies are used to improve efficiency and robustness.
- There's significant progress concerning established, adaptable solutions, especially those that merge nature-based strategies with real-time monitoring methods.

Figure 5 illustrates how the currently listed best practices and solutions for addressing the strategic objectives for WOLL maturity are distributed across the six PESTLE dimensions, highlighting that:

- “Methods and Tools” dominates Technological, Economic, and Social dimensions.
- “Innovation Outcomes” is most significant in Legal and Economic dimensions.
- “Governance” is most important in Political and Legal dimensions.
- “Infrastructure” plays a major role in Political and Environmental dimensions.
- “Service creation” spreads across all dimensions, with modest scores.
- “User Engagement” (strategic objective for WOLL maturity) is highest in Social dimension.

Regarding the strategic objectives proposed for WOLL impact, Figure 6 shows that:

- “Ensuring water for all relevant uses (A)” is more related with Economic and Technological dimensions.
- “Safeguarding ecosystems and their services to society (B)” dominates the Technological dimension and is also much related with the Legal dimension.
- “Boosting value creation around water (C)” is stronger in Legal and Environmental dimensions.
- “Promoting adaptive change (D)” is the strongest objective in Political, Economic, and Social dimensions.
- “Engaging citizens and actors (E)” is more important in Environmental and Social dimensions.

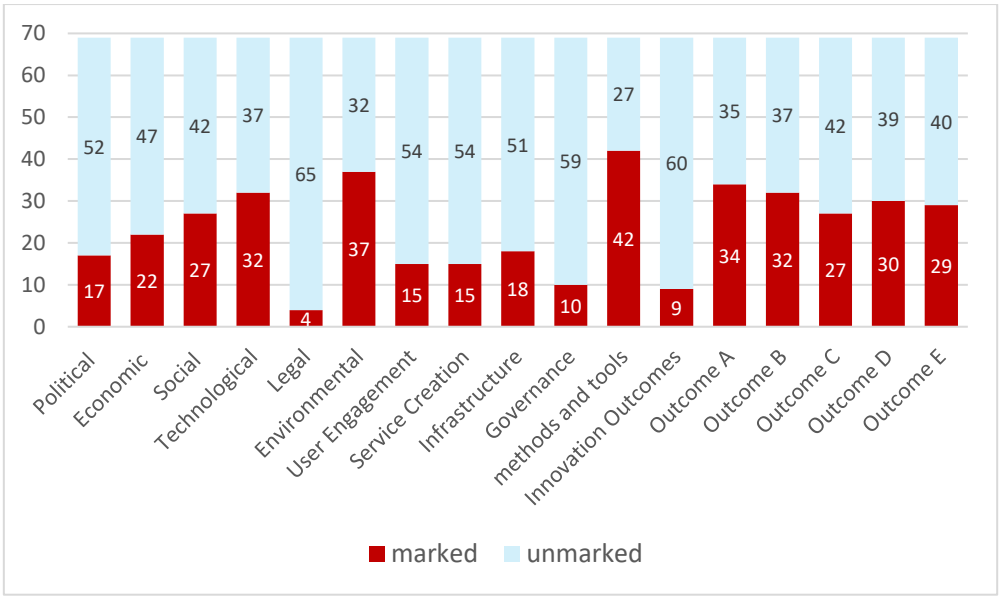

Figure 4. Solutions and best practices for all categories measured

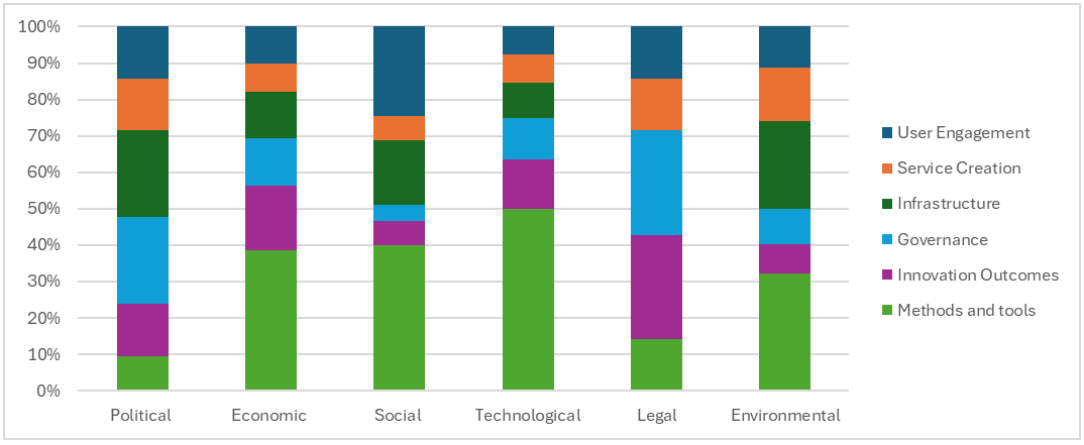

Figure 5. Solutions and best practices currently listed by key objective of WOLL maturity and PESTLE dimension

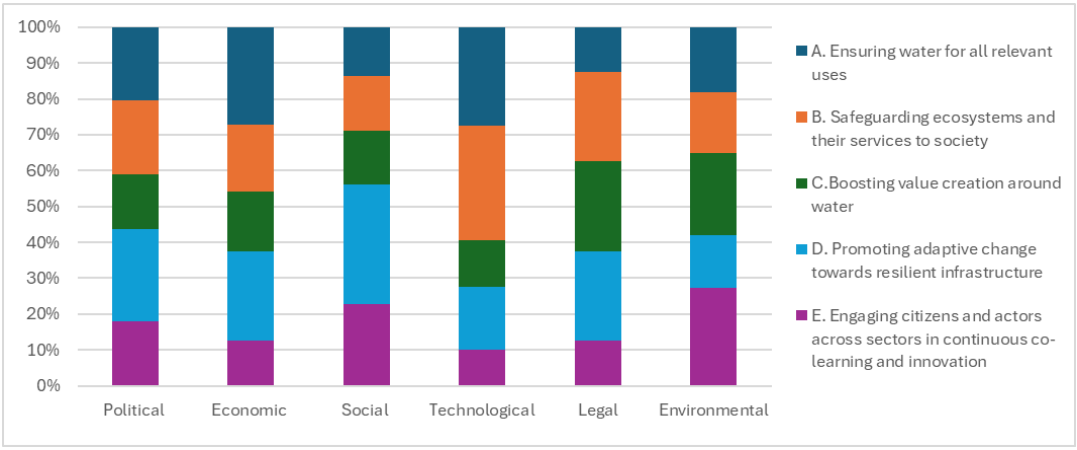

Figure 6. Solutions and best practices currently listed by key objective of WOLL impact and PESTLE dimension

5. CONCLUSION

This deliverable of Water4All Task D2.6 for the "*Replication of methodologies*" represents a pivotal output of the Water4All Partnership, providing a practical, structured approach aimed at bolstering the sustained growth, adaptability, and extensibility of WOLLs. Complementing previous deliverables, which concentrated on providing assistance for new ventures or establishing a strategic roadmap, this report incorporates practical application, expert insights, and insights gathered from 22 operational WOLLs distributed throughout Europe, resulting in a unified, actionable toolkit.

The underlying approach of this deliverable was carefully crafted to be pragmatic. It leveraged the WOLL mapping data from Task D1.1 and the stakeholder networks established in Task D1.2. This methodology guaranteed that the tools and tactics incorporated in Task D2.6 directly addressed the specific difficulties and prospects observed in practical scenarios. This approach enabled to deal with not only the technical dimensions of WOLLs, but also the non-technical factors, like governance models, funding structures, and stakeholder collaboration, which often present their own challenges.

A significant component is the comparative tool, accessible in Excel as Annex 2. This allows for systematic and consistent cross-regional assessment of societal, environmental, and economic effects. Through the use of PESTLE analysis and of WOLL maturity and impact assessments, the tool highlights the key elements for success and pinpoints areas needing additional development.

Fundamentally, these guidelines act as a strategic connection between conceptual planning and actual execution. By translating the intricacies of real-world experience into practical instructions, it supports stakeholders to make well-informed choices, ensuring that WOLLs continue to encourage innovation and promote sustainable water management even after the Water4All initiative has concluded.

The portfolio is intended to serve as dynamic, iterative rather than static, and must evolve alongside their utilization by WOLLs. The document will be circulated among the WOLLs in the network for them to propose and characterise other solutions/best practices they are successfully using for improving their maturity or impact. Furthermore, the next phases of the Water4All partnership should include a task providing a common path for supporting the voluntary WOLLs in the roadmap and frameworks implementation and in strategies selection, building knowledge and skills among WOLLs and their stakeholders. This common program will facilitate the transfer of knowledge and foster collaboration and networking among participants, encouraging the sharing of experiences and best practices.

REFERENCES

Pranger, J. (2023). WOLLs' first interviews. Water4All task D2.6.

Rosa, M.J.; Silva C.; Cardoso M.A.; Uche, U. (2025). Migration roadmap for demonstration of innovation. Water4All EU Partnership. Water4All Deliverable D4.10. 43 pp.

Sakina, L. (2024). WOLLs' Second interviews. Water4All task D2.6.

Silva, C.; Cardoso, M. A.; Rosa, M. J.; Alegre, H.; Ugarelli, R.; Bosco, C.; Raspati, G.; Azrague, K.; Bruaset, S.; Damman, S.; Koop, S.; Munaretto, S.; Melo, M.; Gomes, C.; Rosell, L. F.; Schmuck, A.; Strehl, C.; Doss, P. M. (2023) Final version of the water-smartness assessment framework. B-WaterSmart D6.3. February, 276 pp.

Water4All (2024). ATLAS of Water-Oriented Living Labs 2024. Water4All EU Partnership. ISBN: 9789464003185, 40 pp.

Water4All. (n.d.). Six-action pillars. Retrieved 15 May 2025, from https://www.water4all-partnership.eu/five-operational-pillars

Water Europe (2022a). Minutes of Pillar D plenary meeting.

Water Europe (2022b). Water-Oriented Living labs: Notebook Series #1. Definitions, practices and assessment methods. Editors: Rubini A., Krol D., Kemp E., Gervasio I., van Vierssen W., Marco C. E., Weerdmeester R., & Tsegay, S.. Water Europe, Brussels. ISBN: 9789464003093, 24 pp.

Water Europe (2022c). Water-Oriented Living labs: Notebook Series #2. How to assess and evolve WOLLs. A manual with a vision. Editors: Rubini A., Krol D., Kemp E., Gervasio I., van Vierssen W., & Tsegay, S.. Water Europe, Brussels. ISBN: 9789464003109, 29 pp.

Water Europe Marketplace. (n.d.). Retrieved 3 April 2025, from https://mp.watereurope.eu/

Winderickx, A. (2025). Start-up Guide for new Water-Oriented Living Labs. Water4All EU Partnership. Water4All Deliverable D4.9 22 pp.

ANNEX 1 WOLLS' CHARACTERISATION

WOLLs name reference	Country	region/city	Year of foundation	Social impact	Environmental impact	Economic impacts
VesperX (reference)	Greece	East Peloponnese, Nafplio	2021	promotes the transition of water-intensive industries towards circular production models, fostering new value chains and symbiotic systems between industries, water providers, and communities.	By developing technologies and methodologies for purifying and reusing industrial water, VesperX contributes to reducing water scarcity and supports sustainable agricultural practices.	Extracting, purifying, and commercially utilizing valuable compounds from wastewater creates new revenue streams for industries and enhances their resilience.
AG-WaMED Val d'Orcia Living Lab	Italy	Val d'Orcia, Tuscany	2023	Enhances collaboration between local stakeholders, including farmers, water management experts, environmental organizations, and researchers. It fosters public awareness and participation in sustainable water management.	Promotes the reuse of wastewater and optimizes rainwater storage, reducing water scarcity issues. Enhances sustainable agricultural practices and conserves local water resources.	Improves agricultural water efficiency, which helps sustain local farming businesses. Encourages investment in innovative water management technologies, boosting economic resilience in the region.
Tagliamento Living Lab	Italy	North-eastern Italy	2024	The initiative is citizen-driven, engaging local communities as both co-creators and users of innovations. It fosters collaboration between various stakeholders including municipalities, agricultural actors, NGOs, and local citizens.	Focuses on integrated river management actions, addressing ecosystem and water use challenges while preserving the river's environmental values.	Plans for economic sustainability by securing long-term revenue streams and utilizing the river's value as a foundation for sustainable management.
City of Mechelen	Belgium	Mechelen	2023	The initiative emphasizes public participation, engaging citizens in transforming urban infrastructure and adopting sustainable practices. It involves activities such as depaving, rainwater separation, and greening projects, fostering community-wide climate resilience.	The project addresses climate challenges through nature-based solutions, such as greening gardens, rainwater management, and the reopening of water channels. These efforts aim to enhance urban adaptability to climate change.	The project focuses on long-term sustainability and collaboration between the city and its citizens, contributing to a more climate-resilient economy through collective action and infrastructure transformation.
Herk and Mombeek Living Lab	Belgium	Limburg	2023	This Living Lab brings together a variety of stakeholders, including farmers, citizens, NGOs, and researchers, to collaborate on landscape transformation. The process aims to improve water management through a co-design process, which promotes active public participation in addressing flooding and drought issues.	The focus is on restoring the natural water system and converting the landscape into a "sponge" to better manage drought and flooding. Nature-based solutions aim to improve water quality, biodiversity, and ecosystem health within the river basin.	It aims to enhance agricultural productivity and biodiversity while addressing water security. By focusing on nature-based solutions, the Living Lab seeks to ensure a more sustainable agricultural future.
Port of Antwerp – Bruges	Belgium	Antwerp and Zeebrugge	1997	The port is a significant global trade hub, providing 164,000 jobs and contributing €21 billion in added value. It prioritizes sustainable growth, focusing on water management, circular economy, and maintaining climate resilience, benefiting local communities through job creation and environmental initiatives.	The port promotes sustainable water management, focusing on water conservation, the shift from drinking water to recycled wastewater in industrial processes, and improving water quality in docks. It aims to maintain water levels during dry periods to ensure smooth operations.	With over 1,400 companies operating within the port, it is Europe's largest integrated chemical cluster. The port supports sustainable economic development and transitions to a circular economy, focusing on creating long-term value for industries and the region.
Water Climate Hub	Belgium	Flanders	2021	The Water Climate Hub emphasizes collaboration between diverse stakeholders, including academic institutions, leading organizations, and solution providers. It fosters innovation, knowledge exchange, and the development of new initiatives to address global water challenges.	The Hub integrates cleantech and innovation in the water sector, employing nature-based solutions and mobile technologies for wastewater treatment to manage water availability and improve ecosystem resilience.	The Hub drives economic returns through investments in water management and treatment infrastructure, digital solutions, and partnerships that promote smarter, more flexible water control systems, supporting sustainable economic growth.
Water Valley Denmark	Denmark	Aarhus	2021	The initiative promotes collaboration between various stakeholders such as science institutes, startups, and global companies to co-create sustainable water solutions. It encourages open innovation and fosters a collective approach to improving water quality of urban and industrial systems.	Water Valley Denmark focuses on the water-energy nexus, promoting circular reuse of water, and integrating nature-based solutions to enhance sustainability in water management.	The initiative supports the development of innovative water solutions, driving economic growth through smart resource management and industry partnerships, contributing to both the national and global water sectors.
Freshwater Competence Centre (FWCC)	Finland	Turku	2022	The FWCC is dedicated to fostering innovation and collaboration between stakeholders, including researchers, industries, and government bodies. It enhances the understanding of freshwater ecosystems, focusing on educational initiatives and knowledge exchange.	FWCC works on advancing green and digital transitions in water management, focusing on sustainable water use, environmental conservation, and enhancing the ecological health of freshwater systems.	The center supports the development of water-related technologies and solutions, promoting economic growth through innovation in water management and attracting investment in sustainable water practices.

HYGLO	Finland	Multiple locations across Finland, focusing on subarctic and arctic regions	2023	HYGLO fosters collaboration between various local and international partners, including water companies, universities, and citizen groups, enhancing water resource governance and public involvement in managing groundwater.	It explores the effects of global changes on groundwater, especially in subarctic and arctic areas, using advanced monitoring tools to study groundwater-surface water interactions, flooding, droughts, and groundwater recharge.	By advancing hydrogeological models and providing actionable insights, HYGLO supports sustainable groundwater management, which is essential for long-term water security and economic development.
Water Management Innovation	Finland	Ruukki	2017	The WMI Living Lab engages with various stakeholders, including farmers, policymakers, and industry professionals. It emphasizes education, with tours and workshops that promote shared understanding and the adoption of best practices in sustainable water management.	The lab integrates advanced sensors and data analytics for real-time monitoring of water quality, quantity, and availability, focusing on environmentally friendly solutions for agricultural water management in northern climates.	WMI empowers farmers and businesses by providing data-driven insights to optimize water use. This approach promotes sustainable agricultural practices while improving economic efficiency in water management.
PIREN-Seine	France	Paris	1989	PIREN-Seine is a collaborative research project that connects academic institutions like Sorbonne Université and CNRS with industry partners. It enhances the understanding of the Seine River's ecosystem and its interaction with human activities, fostering transdisciplinary collaboration.	Focuses on the Seine River's ecological and biochemical dynamics. It uses advanced models to predict changes and informs water management strategies for the Seine-Normandy basin, with a particular focus on sustainability and ecosystem health.	The project helps shape local water management policies, contributing to the economic sustainability of water systems and guiding resource management decisions within the region.
Canale Reale River Contract (CRRC)	Italy	Brindisi Province, Torre Guaceto Natural Reserve	2021	The CRRC engages a wide range of stakeholders in a collaborative, voluntary planning process. This initiative encourages public participation and aims to improve local development while preserving natural ecosystems. It promotes the adoption of integrated governance models for land and water management.	The focus is on addressing the threats of groundwater overexploitation and salinization, aiming to protect the fragile wetland ecosystem of the region. It works on ensuring the sustainability of water resources and ecosystem health through collaborative water management.	CRRC creates a framework for fostering regional development through sustainable agricultural and land-use practices. It advocates for policies that balance ecological preservation with economic growth, contributing to sustainable local economies.
WIrri – Wise Irrigation	Italy	North-eastern Italy, including Veneto, Friuli Venezia Giulia, and Emilia Romagna	2023	The WIrri initiative promotes collaboration among farmers, universities, and stakeholders in the water and agrochemical sectors. It supports climate-smart agriculture by co-developing innovative water use practices and solutions. The initiative encourages inclusive participation and knowledge exchange.	WIrri aims to enhance water use efficiency in agriculture, addressing water scarcity through on-farm demonstrations and experimentation. It supports sustainable water management practices, optimizing irrigation and improving water conservation.	The project focuses on improving the productivity and sustainability of agriculture, boosting economic resilience in the farming sector by enhancing water management, and ensuring long-term water-wise farming practices that benefit regional economies.
National Water Table EWA	Malta	National	2018	The initiative provides a critical platform for stakeholders such as government bodies, NGOs, and the private sector to collaborate on water management issues. It helps raise awareness and fosters active participation in addressing national water challenges.	The National Water Table works to implement the goals of the River Basin Management Plan (RBMP) within the Water Framework Directive (WFD), aiming for better water quality and management in Malta.	By promoting collaborative actions, this platform supports sustainable water use and management, enhancing Malta's ability to address water scarcity while fostering economic activities dependent on water resources.
Lisbon Water Smart Living Lab	Portugal	Lisbon	2020	The Lisbon Water Smart Living Lab involves various stakeholders, including the local municipality, research institutions, and businesses, to improve water management, climate resilience, and water-energy-phosphorus efficiency. It promotes collaboration and enhances the quality of life for citizens through innovative solutions.	The lab focuses on green-blue infrastructure and water circularity. It aims to enhance climate resilience, optimize water demand and supply management for non-potable uses, and improve urban water cycles for a more sustainable future.	By advancing water-smart technologies and solutions, the initiative aims to drive economic growth through water-efficient infrastructure, support the transition to sustainable urban water management, and improve resource efficiency in the region.
South African Sanitation Technology Enterprise Programme (SASTEP)	South Africa	National (focused on South Africa)	2018	SASTEP works to revolutionize sanitation in South Africa by advancing alternative sanitation technologies. It fosters public-private partnerships, aiming to improve public health through access to safe and dignified sanitation. The initiative also creates new economic opportunities within the sanitation sector.	The program supports environmentally friendly sanitation technologies, aiming to reduce pollution and improve waste management. It focuses on promoting sustainable solutions for water and sanitation challenges in South Africa.	SASTEP aims to integrate the emerging sanitation sector into the national economy, fostering the growth of industries around innovative sanitation solutions. This supports job creation and enhances the national GDP through sanitation technology commercialization.
Catalan Water Partnership (CWP)	Spain	Girona, Catalonia	2008	CWP unites a wide range of stakeholders from consultancies, knowledge centers, utilities, and public entities to enhance the sustainability of water management practices. It focuses on building partnerships that foster innovation, cross-sectoral collaboration, and knowledge sharing.	The CWP advocates for water sustainability and circular economy practices in water management. It works on innovative technologies and solutions for water quality, quantity, and efficient use, aiming to mitigate environmental challenges such as water scarcity.	By promoting research, development, and the competitiveness of the Catalan water industry, CWP contributes to economic growth. It facilitates international collaborations, supports SMEs, and drives the adoption of cutting-edge technologies that can enhance water-related business opportunities.

DESAL+ Living Lab	Spain	Las Palmas, Canary Islands	2017	DESAL+ Living Lab facilitates collaboration between public and private research institutions, industries, and technological innovators to advance sustainable desalination solutions. It supports job creation and enhances the quality of life by providing access to innovative water technologies.	The lab focuses on sustainable desalination technologies that aim to optimize the water-energy nexus, reduce the environmental footprint of desalination processes, and enhance the use of circular economy principles.	By driving technological innovation in desalination, DESAL+ supports economic growth, particularly in regions facing water scarcity. It also provides consultancy, training, and testbed facilities that help develop scalable solutions for desalination across Europe and beyond, fostering the growth of related industries.
Sustainable Desalination Living Lab	Spain	Almería, Eastern Andalucía	2022	This initiative brings together diverse stakeholders such as CIEMAT, CIESOL, the Provincial Council of Almería, and local farmers and municipalities. It focuses on improving the water-energy-food nexus by using solar desalination and material recovery from seawater, benefiting local communities and fostering innovation in water resource management.	The lab is dedicated to decarbonizing desalination processes and applying circular economy practices, including brine valorisation. It aims to reduce the environmental footprint of desalination while addressing water scarcity.	By improving the efficiency and sustainability of desalination, the lab helps boost the agriculture and tourism sectors in Almería. It also creates a model that can be shared with other regions globally, promoting sustainable water resource management and providing added value certifications to local sectors.
ZINNAE – Cluster for the Efficient Use of Water	Spain	Aragón, Zaragoza	2010	ZINNAE connects various stakeholders such as academia, industry, businesses, public administrations, and citizens to collaborate on water innovation. It supports SMEs and promotes the development of water-related technologies and solutions, improving water efficiency across various sectors.	The cluster focuses on water conservation, the circular economy, and implementing smart water management technologies. It works to reduce water wastage, improve water quality, and foster sustainable water practices across rural, urban, and industrial landscapes.	ZINNAE fosters economic growth by promoting R&D projects, facilitating cross-regional collaborations, and supporting the commercialization of water innovations. It also helps identify funding opportunities, contributing to the expansion of the water sector in Spain and Europe.
BlueArk	Switzerland	Le Châble, Verbier, Valais	2018	BlueArk serves as an open-air laboratory designed to foster innovation in the water sector, specifically targeting climate change and water challenges. It collaborates with startups, municipalities, and local industries to encourage solutions that improve water management and environmental awareness.	The initiative focuses on developing cost-effective and innovative solutions to address water scarcity and the impacts of climate change in the Alps. It also raises awareness about environmental issues and seeks to create sustainable solutions for the region.	By supporting the development of water-related technologies and pilot projects, BlueArk contributes to economic growth in the region. It also aims to expand its model to other Alpine countries, providing opportunities for new industries and collaborations.
Water Campus Leeuwarden	The Netherlands	Leeuwarden, Friesland	2003	Water Campus Leeuwarden creates a collaborative ecosystem for water research and innovation, uniting companies, universities, research organizations, and public stakeholders. It provides opportunities for SMEs and startups in the water sector to develop and scale solutions that improve water management and sustainability.	The campus supports research and development of sustainable water technologies, including water-energy-food nexus solutions, circular water use, and smart water resource management, aimed at mitigating environmental challenges related to water scarcity and pollution.	By fostering collaboration and supporting innovation, Water Campus Leeuwarden drives the growth of the water technology industry. It helps local businesses and startups gain access to testing facilities and research, contributing to the economic development of the region and beyond.
Blue Economy Mikkeli Centre of Excellence (BEM)	Finland	Mikkeli, South Savo	2022	The centre supports the development of sustainable water solutions through collaboration with universities, municipalities, and industry partners. It aims to transform Mikkeli into the "capital of clean water," driving innovation in the water sector and fostering a circular economy for water management.	BEM focuses on advancing wastewater treatment and reuse technologies. It applies a circular economy approach to water management, promoting sustainable practices that contribute to reducing water pollution and improving resource efficiency.	BEM enhances regional economic development by attracting global expertise and facilitating the commercialization of water technologies. It promotes local innovation, contributes to job creation, and strengthens Finland's role as a leader in sustainable water management.

ANNEX 2 PORTFOLIO OF SOLUTIONS AND BEST PRACTICES

Portfolio of Solutions and best practices.xlsx

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