

AQUIFER PROJECT: “Innovative instruments for an integrated management of groundwater in a context of an increasing scarcity of hydrological resources”

Project product :

P4.2. “Transnational strategy for innovative groundwater resource management solutions”

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1. Introduction

The Interreg Sudoe AQUIFER project entitled "Innovative tools for groundwater integration in a context of increasing scarcity of water resources", is funded by the European Regional Development Fund (ERDF) under the Interreg SUDOE V program (2014-2020). Its main objective is to capitalize, test, disseminate and transfer innovative practices for the preservation, monitoring and integrated management of aquifers that are useful when making decisions on groundwater resources management.

To achieve this goal, the project is divided into 4 groups of specific tasks that group 15 specific tasks with 25 deliverables and 10 products. On the other hand, the project includes three groups of transversal tasks that group 17 specific tasks.

This document explains the product P4.2. "Transnational strategy for innovative solutions in groundwater resources management." and it has been developed under the direction of Aqua-Valley, partner of the project.

In the frame of the activity 4.2, a web platform was developed to capitalize, test, disseminate and transfer innovative practices for the preservation, monitoring and integrated management of aquifers. The platform was developed as an innovative practice showcasing to help the replicability of good underground water management practices between territories, especially in the SUDOE area.

► platform.aquifer-sudoe.eu

The platform has been launched in November 2022 and is presenting the 30 practices identified during the AQUIFER project regarding preservation, monitoring and management of groundwater. For water sector players (users or managers), the AQUIFER platform is an opportunity to discover and integrate innovative solutions into their daily practices. For administrations, this project is an opportunity to draw inspiration from existing practices and better integrate groundwater resources in the development of management plans.

The 30 practices currently described in the platform are not geographically specific. Some innovative solutions have been implemented not only in the SUDOE region, but also on the African continent and in Australia.

Through this work of listing innovative practices, the aim here is to see how a transnational strategy for the SUDOE territory could be implemented concerning innovative groundwater resources management practices.

Each practice includes a description about the replication potential in SUDOE region. The purpose of this document is to summarize these sections in order to highlight both the opportunities and obstacles to replicability, and to identify the needs to make these solutions replicable.

Regarding the classification of the practical sheets, the summary will be divided into 3 parts corresponding to the different themes of the practices:

- MAR (Management of Aquifer Recharge) and in situ treatment
- ICT and modelling
- Governance

2. MAR and in situ treatment

The SUDOE region, faces both levers and obstacles when it comes to replicating innovations in various fields. Several factors contribute to the facilitation or hindrance of replication efforts.

Geographical and Environmental Factors

The region's diverse geography and environmental conditions offer opportunities for replication. Innovations that are tailored to specific geographic characteristics, such as aquifer systems, river networks, and climatic patterns, can be replicated more easily. Similar hydrogeological settings, climate change challenges, and water scarcity issues present

replication potential for water management technologies like Managed Aquifer Recharge (MAR) and stormwater harvesting.

Demonstrated Success and Best Practices

The existence of successful case studies and best practices within the SUDOE region and beyond serves as a lever for replication. When innovations have proven their efficiency and viability in similar contexts, they become valuable references for other regions. Examples like the Salisbury Water project and Riverbank Filtration in Berlin demonstrate how successful implementations can inspire replication efforts.

Economic Considerations

The economic aspects associated with replicating innovations pose a significant obstacle. Some innovative solutions require substantial investments, making it challenging for regions with limited financial resources to adopt them. Considerations of cost-effectiveness, return on investment, and long-term sustainability often influence replication decisions.

Technical and Infrastructure Requirements

Certain innovations may have specific technical and infrastructure requirements that hinder replication. Factors like water quality standards, hydrogeological conditions, and existing regulatory frameworks need to align with the replicating region's circumstances. Adequate infrastructure, such as storage facilities or treatment plants, may need to be established or upgraded, adding complexity and cost to the replication process.

Social Acceptance and Stakeholder Engagement

The acceptance of innovations by local communities and stakeholders is crucial for successful replication. Public perception, cultural factors, and engagement processes play a significant role in determining the feasibility and acceptance of innovations. Building awareness, trust, and involvement among relevant stakeholders is essential to overcome resistance or skepticism towards new approaches.

Policy Support and Collaboration

Supportive policies and collaborative frameworks at various levels-local, regional, and national-act as levers for replication. Governments, institutions, and organizations can encourage replication efforts through funding, incentives, capacity-building programs, and knowledge-sharing platforms. Collaboration between researchers, practitioners, and policymakers facilitates the transfer of knowledge and expertise, enhancing the replication potential.

In conclusion, the replication of innovations about MAR and in situ treatment in the SUDOE region is influenced by a combination of levers and obstacles. Geographical and environmental factors, demonstrated success, and supportive policies serve as levers, while economic considerations, technical requirements, and social acceptance pose obstacles. Overcoming these challenges requires strategic planning, stakeholder engagement, resource mobilization, and a comprehensive understanding of the local context to ensure successful replication of innovations in the SUDOE region.

3. ICT and modelling

The SUDOE region has witnessed a multitude of innovative practices aimed at addressing water management challenges. These practices have the potential to revolutionize the way water resources are utilized, conserved, and governed. However, replicating these innovations is not without its challenges. In this part, we delve into the key levers and obstacles that need to be considered when replicating ICT and modelling practices across the region.

Financial Support and Resources

One of the primary levers for successful replication lies in securing adequate financial support and resources. Innovative practices often require significant investments in equipment, technology, and expertise. Without the necessary funding, their replication

becomes a formidable task. Securing financial resources, either through public funding, grants, or collaborations with relevant stakeholders, is crucial for the success of these endeavors.

The initial implementation of innovative practices can be resource-intensive, posing a challenge for replication. Acquiring specialized equipment, expertise, and technology can be costly, and sustaining the practice in the long term may require continuous financial support. Overcoming this obstacle requires strategic planning, partnerships with funding agencies, and exploring alternative financing models.

Technological Solutions and Expertise

Technological advancements play a vital role in the success of innovative water management practices. Leveraging existing technological solutions or developing customized ones specific to the local context is key to replication. Access to relevant expertise and knowledge is equally crucial for adopting and adapting these technologies effectively.

Replicating technological solutions may present obstacles such as limited access to proprietary software or the need for customized adaptations. Additionally, implementing these solutions often requires specialized expertise, which may not be readily available in all regions. Overcoming this obstacle necessitates collaboration with technology providers, fostering knowledge exchange networks, and investing in capacity building.

Collaborative Partnerships and Stakeholder Engagement

Collaboration among multiple stakeholders is essential for successful replication. Innovative practices thrive when they are supported by a network of actors, including governmental bodies, research institutions, local communities, and industry players. Engaging stakeholders and fostering collaborative partnerships facilitate knowledge sharing, resource pooling, and a shared sense of ownership.

Creating and maintaining collaborative partnerships can be challenging. Overcoming bureaucratic barriers, aligning divergent interests, and ensuring active participation from stakeholders require dedicated efforts. Establishing mechanisms for ongoing communication, coordination, and shared decision-making are crucial steps in surmounting this obstacle.

Existing Infrastructure and Networks

Leveraging existing infrastructure and networks can significantly enhance the replication potential of innovative practices. Building upon established systems, such as water distribution networks or data collection mechanisms, can expedite the implementation process and reduce costs. Identifying synergies and aligning with existing initiatives can maximize the impact of replication efforts.

Data and Analytics

Data-driven decision-making is a cornerstone of effective water management. Innovative practices often rely on data collection, analysis, and modeling to optimize resource allocation and mitigate risks. Replication of these practices requires access to quality data and expertise in data analytics. Embracing emerging technologies like artificial intelligence and machine learning can unlock hidden insights and enhance the effectiveness of replication efforts.

Overcoming data-related obstacles is crucial for successful replication. Challenges may include data availability, compatibility, and data governance. Implementing appropriate data management systems, addressing privacy concerns, and fostering a culture of data sharing and collaboration are necessary to overcome this obstacle.

International Collaboration and Support

Water management challenges often transcend regional boundaries. Replicating innovative practices can benefit from international collaboration and support. Sharing experiences, best

practices, and lessons learned across different regions fosters a global community of practice, enabling accelerated replication and fostering mutual learning.

Engaging in international collaboration may encounter obstacles such as limited coordination, divergent policies, and varying regulatory frameworks. Establishing platforms for international knowledge exchange, harmonizing standards, and facilitating policy alignment can help overcome these obstacles.

Replicating innovative water management practices in the SUDOE region requires leveraging key levers while navigating the associated obstacles. Securing financial support, harnessing technology and expertise, fostering collaborative partnerships, leveraging existing infrastructure and networks, embracing data-driven approaches, and engaging in international collaboration are all critical components of successful replication. By addressing these levers and overcoming the obstacles, the SUDOE region can unlock its full potential in sustainable water management, ensuring a resilient future for its communities and ecosystems.

4. Governance

In the SUDOE region, several obstacles need to be overcome to ensure the successful implementation of innovative solutions about governance. This part explores the key obstacles and levers associated with replicating innovative practices in the region, focusing on the availability of sufficient data, transboundary governance and resource sharing, financial support, well-defined rights and monitoring, collaboration and knowledge exchange, as well as consensus and stakeholder involvement. By understanding and addressing these obstacles, the SUDOE region can unlock the potential for sustainable water resource management and benefit from the replication of innovative approaches.

Availability of Sufficient Data

The replication of innovative practices often requires access to specific data such as piezometric and rainfall data. The availability of such data may be a challenge in some regions. The success of projects like GICRESAIT, which focuses on integrated water resource management, depends on the availability of data to feed mathematical models.

Transboundary Governance and Resource Sharing

Innovative practices like GICRESAIT, which are designed for transboundary aquifers, face challenges related to governance and resource sharing. Establishing a consultation framework and reaching consensus among different stakeholders across multiple countries can be complex and require significant coordination and cooperation.

Financial Support

Many innovative practices require substantial financial support for their implementation. Projects like GICRESAIT have received financial support from organizations such as the African Water Facility and the French Global Environment Facility. Replication of such practices in the SUDOE region would require adequate financial resources to ensure their successful implementation.

Well-Defined Rights and Monitoring

Groundwater licensing and trading, as seen in the case of the State of Victoria in Australia, requires well-defined rights with limited groundwater use allocations and monitoring of extraction by all users. This necessitates a good understanding of hydrogeology, groundwater mobility, and sustainable yield. Implementing similar practices in the SUDOE region would require a comprehensive understanding of local hydrogeology and the establishment of effective monitoring systems.

Collaboration and Knowledge Exchange

Initiatives like the Portuguese Corporate Manifest for Water Stewardship and the European Water Association Water Manifesto 2020 rely on collaboration and knowledge exchange among different stakeholders. Replicating such practices in the SUDOE region would require

a supportive business environment, transnational collaboration, and platforms for sharing knowledge and experiences.

Consensus and Involvement of Stakeholders

Projects such as the Northern Sahara Aquifer System and the Baix Ter Basin Case highlight the importance of reaching consensus and involving stakeholders in water resource management. Overcoming resistance to change and ensuring the active participation of stakeholders can be a challenge in implementing similar practices in the SUDOE region.

Overall, the replication of innovative practices in the SUDOE region requires addressing specific obstacles related to data availability, transboundary governance, financial support, well-defined rights and monitoring, collaboration and knowledge exchange, as well as stakeholder involvement. By leveraging these factors and overcoming the associated obstacles, the SUDOE region can benefit from the successful replication of innovative water resource management practices.

5. Conclusion

The transnational strategy for innovative solutions in groundwater resource management in the SUDOE region should consider various levers and obstacles to ensure successful replication. The analysis of three types of innovative practices, namely MAR and in situ treatment, ICT and modeling, and governance, provides valuable insights into the factors that influence replication efforts.

Geographical and environmental factors, demonstrated success and best practices, and supportive policies act as levers for replication. The diverse geography and environmental conditions of the SUDOE region offer opportunities for replicating innovations that are tailored to specific hydrogeological settings, climate change challenges, and water scarcity issues. Successful case studies within the region and beyond serve as references and sources of inspiration for replication. Supportive policies and collaborative frameworks at

different levels facilitate replication through funding, incentives, capacity-building programs, and knowledge-sharing platforms.

On the other hand, economic considerations, technical and infrastructure requirements, social acceptance and stakeholder engagement are all obstacles to replication. Limited financial resources can make it challenging for regions to adopt innovative solutions that require substantial investments. Technical requirements and infrastructure needs may hinder replication efforts if they do not align with the replicating region's circumstances. Social acceptance and stakeholder engagement play a crucial role in determining the feasibility and acceptance of innovations, requiring efforts to build awareness, trust, and involvement.

To successfully replicate innovative solutions in groundwater resource management, strategic planning, stakeholder engagement, resource mobilization, and a comprehensive understanding of the local context are necessary. Overcoming the obstacles requires addressing economic considerations, aligning technical requirements, fostering social acceptance, and leveraging policy support and collaboration.

By leveraging the identified levers and effectively addressing the obstacles, the SUDOE region can unlock its potential in sustainable groundwater resource management. The replication of innovative practices can contribute to improved water management, resilience to climate change, and the protection of communities and ecosystems in the region.