Interreg Sudoe AQUIFER

European Regional Development Fund

SUDOE-AQUIFER Project - Identification of Potential Innovative Groundwater Management Practices

Final Report

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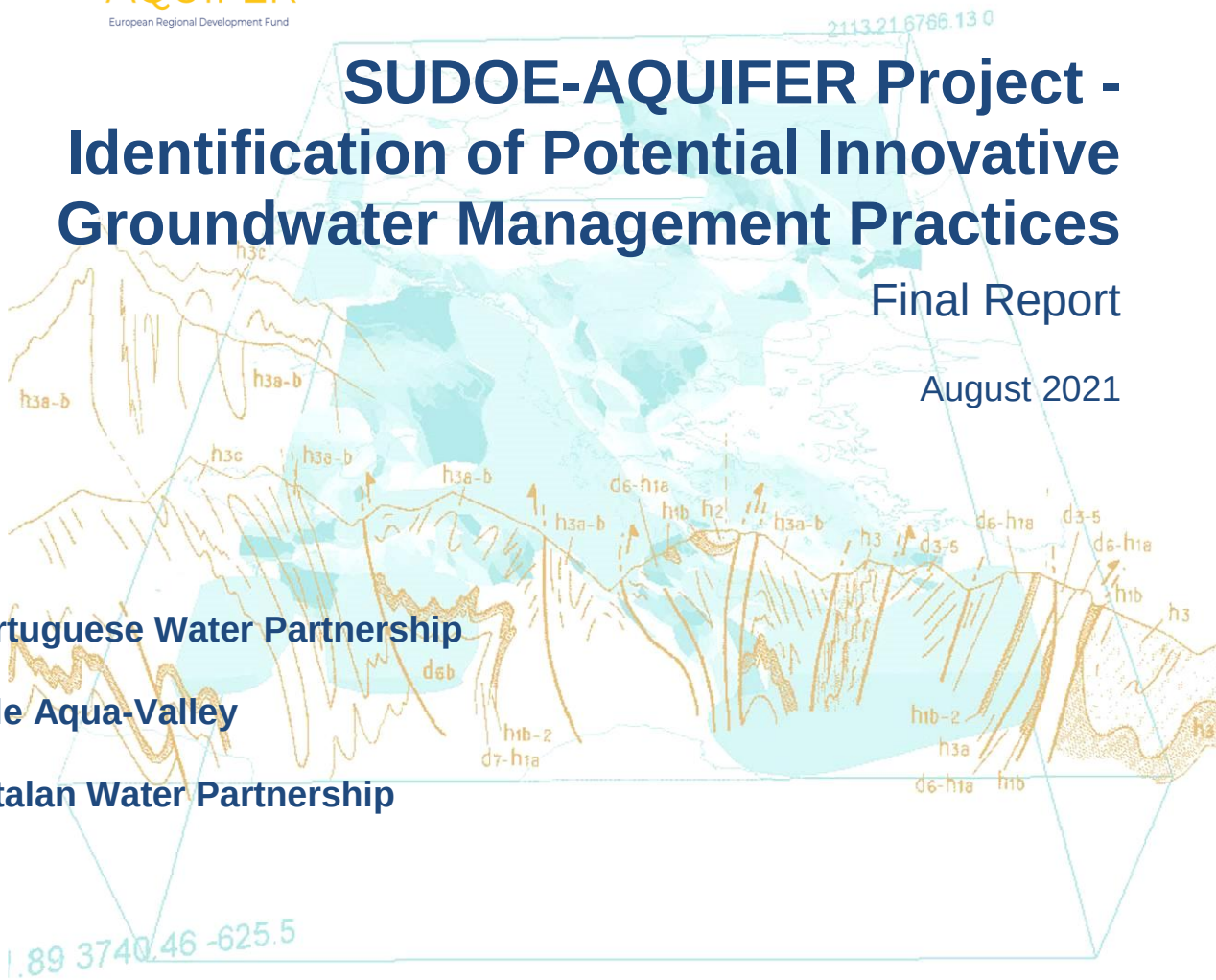

Portuguese Water Partnership

Pôle Aqua-Valley

Catalan Water Partnership

AQUA VALLEY MEMBRE

CATALANWATERPARTNERSHIP

Parceria Portuguesa para a Água

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Summary

This study was done in the context of the research project SUDOE AQUIFER in which PWP (the Portuguese Water Partnership) is a partner. The consortium also comprises the following partners: the IGME (Instituto Geológico y Minero de España), as leader, ISA-UL (Instituto Superior de Agronomía da Universidade de Lisboa), Pôle Aqua-Valley, CWP (Catalan Water Partnership - Asociación Catalana para la Innovación y la Internacionalización del Sector del Agua), BRGM (Géosciences pour une Terre Durable), CUADLL (Comunitat d'Usuaris d'Aigua de la Vall Baixa i Delta del Llobregat), CRCC (Comunidad de Regantes del Campo de Cartagena) and AR (Águas do Ribatejo).

To objective of this first study has been to identify and characterize, on a very preliminary basis, potential Innovative Practices in Groundwater Management that may offer an interesting possibility of replication in the context of the SUDOE territory (Portugal, Spain and France).

This was achieved through the combination of phone contacts followed by an on-line survey with experts in these three countries. The work was coordinated by PWP with the active help of PAV and CWP, and the overall support of AdRibatejo and IGME.

Although special emphasis was placed on identifying candidates in the Sudoe Region, the geographical scope of research was global. This first activity, now concluded, constitutes a basis for a second phase that will entail a detailed analysis and characterization of approximately 30 selected innovative groundwater management practises in a context of increased resource scarcity.

1. Context and objectives

Context

Groundwater is a very important natural resource and an essential element of the hydrological cycle, that makes up to 30% of the world's freshwater and has a significant role in the countries' economy.

It includes aquifers that are located below the soil surface, supporting rivers, lakes and wetlands, especially through drier months when there is little direct input from rainfall. Due to the importance of the aquifers, its water quality and quantity must be preserved.

The scientific community is aware that an improvement in the knowledge of aquifers is necessary. It is necessary the implementation of networks to proceed with a reliable monitoring and the involvement of administration and water users in a sustainable management and use of aquifers under the context of water scarcity and environmental threats.

AQUIFER's main objective is to capitalize, test, disseminate and transfer innovative practices to the preservation, monitoring and integrated management of aquifers that help in decision making about the management of groundwater resources, improving technology transfer to agents and create new synergies and develop common tools in a water resources context.

The objective of this task was to gather as much information as possible about innovative groundwater management practices worldwide and in the Southwest region of Europe, namely the countries of Portugal, Spain, and France.

The specific goal was to list a certain number of these practices by means of expert consultation.

2. Methodology

A common Excel "master" database was created by PWP to support and coordinate the work and data gathering efforts of the three active partners in France, Spain and Portugal, i.e., PAV, CWP and PWP, respectively.

This "master database" is structured in the following sections:

- A list of potential experts that were contacted in each of the three countries;
- A blank questionnaire template that was individually sent to each participating expert;
- A compilation of all the individual answers received to the survey;
- A database with the key data on each potential innovative practice that has been identified;
- A standardized table of contents for a second phase of this research that will entail a detailed analysis and characterization of approximately 30 selected innovative groundwater management practises.

2.1. POTENTIAL EXPERTS

The first document prepared comprised a list of experts in the field who could potentially provide information on one or more innovative practices, or in alternative/addition provide contact informations from another experts who could contribute with innovative practices information themselves.

This part of the survey questionnaire had information about some potential experts with the following information for each expert:

- *Entity/Institution*
- *Type of entity*
- *Name of potential expert*
- *Role in entity*
- *Entity website*
- *E-mail contact*

- *Work phone*
- *Cell phone*
- *Has been contacted?*
- *Has already filled in the exploratory questionnaire?*
- *Comments and observations*

Each potential expert was individually contacted with the requests of filling the blank questionnaire mentioned in the next section and providing, if possible, contacts of other potential experts. Preference was given, by our part, to personal phone numbers, as they proved to be more effective.

Annex I shows the three sections of this document, one for each country, with contact information left off for privacy's sake.

All the experts contacted were informed about the confidentiality of their answers, and that the information given was for research purposes only, without reference to their names and private information. All agreed to the terms and proceeded with the contribution to the questionnaire.

2.2. BLANK QUESTIONNAIRE

This spreadsheet was the file sent to potential experts who agreed to and were able to participate in the survey. As mentioned before, the survey followed confidentiality assumptions accepted by each respondent.

The sheets contained, at the top, a brief explanation of what was required of the participants:

- *This survey takes place in the context of the AQUIFER Project which is funded by the 4th Interreg SUDOE Program.*
- *We are seeking to identify and characterize Innovative Practices in Groundwater Management that may have an interesting potencial for replication in the context of the SUDOE territory (Portugal, Spain and France).*
- *The concept of "Practices" is fairly broad and may comprise governance and regulatory systems (licensing and allocation, monitoring and enforcement regimes), physical installations (e.g. for Managed Aquifer Recharge), IT based platforms and systems (including remote sensoring and telecontrol), use of market based mechanisms for*

groundwater use allocation, stakeholder engagement and transparency mechanisms, etc.

- *We would deem a given Practice as "Innovative" if its adoption is not a widespead standard in the SUDOE territory, there is some evidence of its potencial merits and benefits and if its possible replication within the SUDOE territory should be given consideration.*
- *All individual answers will be treated under strict confidentiality and selected Innovative Practices, in the second-phase of this study, will be the object of in-depth literature analysis and expert interviews with their responsible entity.*

Experts were then asked to fill in the following information, for organization purposes:

- *Name*
- *Entity of affiliation*
- *Position*
- *E-mail*
- *Phone contact*
- *Entity website*

The information above was not disclosed to others beyond the respective working group assigned with this task in particular.

The questions posed were the following:

- Question #1
  - Can you think of a Practice that:
  - Is employed by your entity of affiliation?
  - Is employed by an entity in your country?
  - Is employed by an entity overseas?
- Question #2
  - Could you please attempt to summarise the Practice in a one-sentence title?
- Question #3
  - Could you please provide some further description of this practice?
- Question #4

  - How would you classify this type of practice? (is it a regulatory regime, an IT based system, a physical system, etc.)
- Question #5
  - In which country/ region/ place is it currently being enacted?
- Question #6
  - Which entity is responsible for the implementation of this Practice? What type of entity is it?
- Question #7
  - How would you describe the key benefits derived from the implementation of this Practice?
- Question #8
  - Any Website references you could indicate? (attached documents are equally welcome)
- Question #9
  - To what extent can this Groundwater Management Practice be considered innovative?
- Question #10
  - Do you think there is an interesting potential for further adoption of this practice within the SUDOE territory? (Portugal, Spain, and France)

2.3. EXPLORATORY SURVEY

This document with the result of the survey had the purpose of storing all the collected answers as they were given to us, for further analysis. Each column had room for one submission, and submissions were stored next to one another.

2.4. POTENTIAL PRACTICES SURVEY

The final document containing the results of the survey was formatted for delivery to the destined reader and contained fields slightly different from those which were filled in by the experts. They were the following:

- *Brief description of the practice*
- *Type of Practice*
- *Geography (Country)*
- *Geography (Region/place)*
- *Responsible entity*
- *Type of entity*
- *Entity Website*
- *Literature references*
- *Recommended by*
- *Has been selected?*
- *Cluster in charge? (PWP, CWP, PAV)*
- *Comments and observations*

These were filled manually from the information inserted into the **Potential Practices** sheet.

3. Activity Report

Of the Potential Experts most were contacted by personal mobile phone, and the rest by e-mail. Given that this survey occurred during the end of July and August, e-mail contact proved to be less efficient, as most people didn't reply or replied saying they were on vacation and could not participate or said they would and never answered again. Phone contact was more successful, and some people even answered right away. All experts contacted by phone were sent the blank survey by e-mail, nonetheless.

Some contacts declined to answer stating lack of knowledge and expertise about the subject, even though it was later considered they may have had a significant contribution, had they been more incentivised to do so.

Below is a table of some of the major institutions who were approached and responded:

Entity	Number of experts contacted	Number of experts who responded	Number of responses (total)
BRGM	3	3	3
CUADLL	1	1	1
AR - Águas do Ribatejo, E.I.M., S.A.	1	1	1
Instituto Superior de Agronomia da Universidade de Lisboa	3	2	3
Instututo Superior Técnico da Universidade de Lisboa	6	2	2
SMAS Almada	1	1	1
APA - Agência Portuguesa do Ambiente	3	1	1
LNEC - Laboratório Nacional de Engenharia Civil	2	1	1
Centro Nacional IGME-CSIC	1	1	5
University of Lisbon - CERIS	2	2	1
Veolia	1	1	1
Fenareg	1	1	1
TOTAL			**21**

4. Annex I a – Potential Experts in Portugal

Entity/ Institution	Type of Entity	Name of Potential Expert	Role in Entity
LNEC - Laboratório Nacional de Engenharia Civil	Research Center	João Paulo Lobo Ferreira	Senior Research Officer (Investigador-Coordenador)
LNEC - Laboratório Nacional de Engenharia Civil	Research Center	Teresa Eira Leitão	Senior Research Officer (Investigadora Principal)
APA - Agência Portuguesa do Ambiente	Water Resource Administration Agency	Felisbina Quadrado	Directora Departamento Recursos Hídricos
APA - Agência Portuguesa do Ambiente	Water Resource Administration Agency	Fernanda Gomes	Chefe de Divisão de Planeamento e Gestão da Água
APA - Agência Portuguesa do Ambiente	Water Resource Administration Agency	André Matoso	Director ARH Alentejo
IST - Instituto Superior Técnico	University	José Saldanha Matos	Professor Catedrático
IST - Instituto Superior Técnico	University	Susana Neto	Professora (ex-Presidente da APRH)
IST - Instituto Superior Técnico	University	Francisco Nunes Correia	Professor Catedrático
IST - Instituto Superior Técnico	University	Prof. António Gonçalves Henriques	Professor
IST - Instituto Superior Técnico	University	Rodrigo Proença de Oliveira	Professor
AdP - Águas de Portugal	Water Utility	Nuno Brocco	Administrador AdP Valor
AdP - Águas de Portugal	Water Utility	Alexandra Cunha Serra	Presidente AdP Valor
SMAS de Almada	Water Utility	Paulo Nico	Director
ISA - Instituto Superior de Agronomia	University	Cláudia Cordovil	Professor
ISA - Instituto Superior de Agronomia	University	António Guerreiro de Brito	Professor

ISA - Instituto Superior de Agronomia	University	Teresa Ferreira	Professor
Fenareg - Federação Nacional de Regantes	Water user association (irrigation)	José Núncio	Presidente
Fenareg - Federação Nacional de Regantes	Water user association (irrigation)	Carina Aranja	Secretária Geral
Comissão Especializada de Águas Subterrâneas (CEAS) da APRH		Maria Paula Mendes (Presidente)	
Comissão Especializada de Águas Subterrâneas (CEAS) da APRH		José Paulo Monteiro	
Comissão Especializada de Águas Subterrâneas (CEAS) da APRH		Maria Manuela Simões	
Comissão Especializada de Águas Subterrâneas (CEAS) da APRH		Manuel Abrunhosa	
Comissão Especializada de Águas Subterrâneas (CEAS) da APRH		Jorge Duque	
Universidade de Coimbra	University	Manuel Abrunhosa	Professor
IAH	University	António Chambel	Professor
IST - Instituto Superior Técnico	University	Teresa Melo	Professor

5. Annex I b – Potential Experts in Spain

Entity/ Institution	Type of Entity	Name of Potencial Expert	Role in Entity
IGME - Instituto Geológico y Minero de España	Public Authority	José Luis García Arostegui	Científico Titular
IGME - Instituto Geológico y Minero de España	Public Authority	Sergio Martos Rosillo	
ADASA		Jordi Cros	Head of innovation
Catalan Water Agency	Public Authority	Juan José Villegas	Engineer
Amphos21		Ester Vilanova	Project Manager
HACH		Luís Navarro	Business development manager
Geoservei		Joan Solà	Manager
SCAN		Jordi Raich	Managing Director
FCC Aqualia	Water utility group	Robert Rosell	Head of contracts
Consorci Besós Tordera		Begoña Martínez	R+D Manager
CETAQUA		Cláudia Puigdomènech	Resercher
Catalana de Perforacions		Roser Grau	Project Manager
ICRA		Pep Mas	Researcher
Cubeta d'Abrera		Joan Arevalo	Director
IDRA		Albert Santasusagna	Professor/researcher
UAB		Juan Antonio Baeza	Professor
ENGISIC		Albert Herrero	Engineer
IDAEA-CSIC		Josep Maria Bayona	Researcher

6. Annex I c – Potential Experts in France

Entity/ Institution	Type of Entity	Name of Potencial Expert	Role in Entity
Agence de l'eau Adour-Garonne	Water Administration Agency	Isabelle Fournier	Groundwater Expert
Agence de l'eau Adour-Garonne	Water Administration Agency	Pierre Marchet	Groundwater Expert
Agence de l'eau Adour-Garonne	Water Administration Agency	Jessica PARTAUD	
Agence de l'eau Rhone Méditerranée Corse	Water Administration Agency	Laurent Cadilhac	Groundwater Expert
BRGM	Research Center	Jean-Pierre VERGNES	DEPA/GDR - Research engineer
BRGM	Research Center	Marie PETTENATI	PhD Project Manager, Scientific Correspondent
BRGM	Research Center	Anne TOGOLA	
BRGM	Research Center	Dominique DARMENDRAIL	
BRGM	Research Center	Grégory DELOBELLE	
BRGM	Research Center	Julie LIONS	
BRGM	Research Center	Olivier DOUEZ	
BRGM	Research Center	Pierre LE COINTE	
CEA	Research Center	Sébastien MORILHAT	
CEA	Research Center	Emilie GIBERT	
DREAL Adour-Garonne	Public administration	Margaux SAÜT	
DREAL OCCITANIE	Public administration	Horace CODJO	
DREAL AURA	Public administration	michel GMYR	

Organisme Unique du Sous Bassin Tarn	Public administration	Anne-Charlotte POMMIER-PETIT	
DDT 65	Public administration	Bruno BACHTANIK	
Conseil départemental de l'Hérault	Public administration	Nicolas LIENARD	
Conseil Départemental de la Haute-Garonne	Public administration	Vincent RIBOT	
Commune de Lussan	Public administration	Jean-Marc FRANCOIS	
VEOLIA Water	Private company	Boris David	Hydrogeologist
BRL	Private company	François GONTARD	
BERGA-Sud	Private company	Guillaume LATGE	
HYDRO SIAL	Private company	Pascal SUZZONI	
Saint-Gobain Research Provence	Private company	Laurent GOMES DA CUNHA	
IMAGEAU	Private company	Marjorie CLERGUE	
XYLEM ANALYTICS FRANCE	Private company	Mehalia MEDJAHED	
HYDROFIS	Private company	Pascal FENART	
Envilys	Private company	XAVIER LOUCHART	
Tetraedre France	Private company	Fabien LEVARD	

7. Annex II – Blank Survey

AQUIFER - GT 4.1 - Identification and characterization of Innovative Groundwater Management Practices under water scarcity scenarios

Exploratory Survey designed at identifying potencial Innovative Practices in Groundwater Management (in a context of increased water scarcity)

#	Question	Answer
Context	*This survey takes place in the context of the AQUIFER Project which is funded by the 4th Interreg SUDOE Program.*	
	We are seeking to identify and characterize Innovative Practices in Groundwater Management that may have an interesting potencial for replication in the context of the SUDOE territory (Portugal, Spain and France).	
	The concept of "Practices" is fairly broad and may comprise governance and regulatory systems (licensing and allocation, monitoring and enforcement regimes), physical installations (e.g. for Managed Aquifer Recharge), IT based platforms and systems (including remote sensoring and telecontrol), use of market based mechanisms for groundwater use allocation, stakeholder engagement and transparency mechanisms, etc.	
	We would deem a given Practice as "Innovative" if its adoption is not a widespead standard in the SUDOE territory, there is some evidence of its potencial merits and benefits and if its possible replication within the SUDOE territory should be given consideration.	

	All individual answers will be treated under strict confidentiality and selected Innovative Practices, in the second-phase of this study, will be the object of in-depth literature analysis and expert interviews with their responsible entity.	
Identification of respondent		
	Name	
	Entity of affiliation	
	Position	
	E-mail	
	Phone contact	
	Entity website	
Identification of Innovative Groundwater Management Practices		
# 1	*Can you think of a Practice that:*	
	Is employed by your entity of affiliation?	Yes/ no
	Is employed by an entity in your country?	Yes/ no
	Is employed by an entity overseas?	Yes/ no
Summary of Potencial Innovative Groundwater Management Practice		
# 2	*Could you please attempt to sumarize the Practice in a one-sentence title?*	

# 3	*Could you please provide some further description of this practice?*	
# 4	*How would you classify this type of practice? (is it a regulatory regime, an IT based system, a physical system, etc.)*	
# 5	*In which country/ region/ place is it currently being enacted?*	
# 6	*Which entity is responsible for the implementation of this Practice? What type of entity is it?*	
# 7	*How would you describe the key benefits derived from the implementation of this Practice?*	
# 8	*Any Website references you could indicate? (attached documents are equally welcome)*	
# 9	*To what extent can this Groundwater Management Practice be considered innovative?*	
# 10	*Do you think there is an interesting potential for further adoption of this practice within the SUDOE territory? (Portugal, Spain and France)*	

8. Annex III – Filled Survey Example

#	Question	Answer
Identification of respondent		
	Name	
	Entity of affiliation	AR - Águas do Ribatejo, E.I.M., S.A.
	Position	
	E-mail	
	Phone contact	
	Entity website	www.agausdoribatejo.com
Identification of Innovative Groundwater Management Practices		
# 1	*Can you think of a Practice that:*	
	Is employed by your entity of affiliation?	no
	Is employed by an entity in your country?	Yes
	Is employed by an entity overseas?	Don.t know
Summary of Potencial Innovative Groundwater Management Practice		

# 2	*Could you please attempt to summarise the Practice in a one-sentence title?*	Portuguese National Information System on Water
# 3	*Could you please provide some further description of this practice?*	This is an initiative, with more than 20 years, of the Portuguese Environment Agency, that has deployed on the Web Portal making available to the public all the information on Water Resources that is available
# 4	*How would you classify this type of practice? (is it a regulatory regime, an IT based system, a physical system, etc.)*	IT system / governance and transparency initiative
# 5	*In which country/ region/ place is it currently being enacted?*	Portugal
# 6	*Which entity is responsible for the implementation of this Practice? What type of entity is it?*	Portuguese Environmental Agency (Public Body)
# 7	*How would you describe the key benefits derived from the implementation of this Practice?*	This practice has contributed in a significant way to improve the water management, by making

		available to all (academic, suppliers, farmers, etc.) a set of relevant information about the quantity and quality of the water resources
# 8	*Any Website references you could indicate? (attached documents are equally welcome)*	https://snirh.apambiente.pt/
# 9	*To what extent can this Groundwater Management Practice be considered innovative?*	I consider it innovative especially because it makes available, in a transparent way, all the information on this subject
# 10	*Do you think there is an interesting potential for further adoption of this practice within the SUDOE territory? (Portugal, Spain and France)*	Yes