



MARCLAIMED

Terms of reference for stakeholder engagement

Deliverable 3.1

WP3

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**Funded by
the European Union**

GRANT AGREEMENT NUMBER	101136799		
ACRONYM / FULL TITLE	MARCLAIMED: integrated Decision Support Tool for Reliable and Affordable Application of Managed Aquifer Recharge with Alternative Water Resources in River Basin and Drought Management Plans		
START DATE	01/02/2024	DURATION	36 months
END DATE	31/01/2027		
PROJECT URL	https://marclaimed.eu/		
DELIVERABLE	D3.1		
WORK PACKAGE	WP3		
CONTRACTUAL DATE OF DELIVERY	31/10/2024		
ACTUAL DATE OF DELIVERY	29/10/2024		
NATURE	R	DISSEMINATION LEVEL	PU
LEAD BENEFICIARY	USAL		
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ABSTRACT	The deliverable 3.1, Terms of reference for stakeholder engagement, aims to methodologically guide and oversee processes in which stakeholders actively contribute to the generation of knowledge on Alternative Water Resources (T3.2-5). To this end, this deliverable design Terms of Reference for stakeholder engagement processes that stimulate exchange of knowledge between stakeholders and scientists, enhance capability and adaptive efficiency, and organise safe collaboration and experimentation spaces.		

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EXECUTIVE SUMMARY

Rationale for D3.1

T3.1 aims to methodologically guide and oversee co-creation processes in which stakeholders actively contribute to the generation of knowledge on AWR strategies (T3.2-5). Guiding co-creation requires collaboration between experts and local stakeholders, including partners, to ground complex concepts into the local realities of the demo sites, which are often unique. To this end, a key objective of T3.1 is to foster an open and inclusive environment, devoid of blame, where stakeholders and MARCLAIMED partners share stories and exchange points of view, so as to underpin consensus-building that leads to co-creation. This requires partners to collectively develop protocols to identify relevant stakeholders, assess engagement methods and rules, and explore barriers and enablers; and incorporate all the key findings into a guidance document that underpins co-creation by the CoP—the D3.1.

Workflow: links to T3.2-5 and WP2

Co-creation is at the core of WP3, being developed itself in T3.2 on the basis of the rules and guidance provided in T3.1. Co-creation will be complemented with profiling (T3.3), social acceptance actions (T3.4) and actions towards improving the current policy and regulatory framework (T3.5).

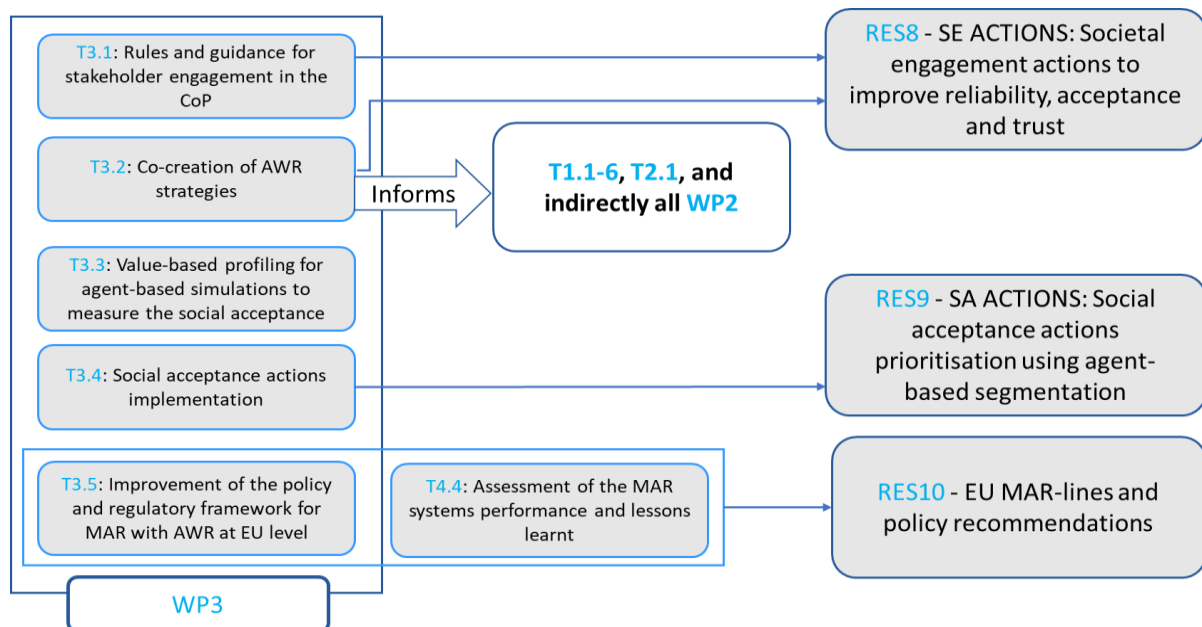


Figure 1: WP3 workflow and linkages with other WPs.

The co-creation process described above is complex and full of nuances. Tradeoffs will emerge, with nontrivial conflicting interests that will need to be addressed so as to achieve MARCLAIMED objective of building resilience, but also the equally relevant objectives of social justice and sustainable growth. Disagreements will emerge and instruments for mitigating and managing conflict among stakeholders will be necessary. Moreover, the changing environment in which MAR with AWR emerged will likely necessitate adjustments in AWR strategies during and after the lifetime of MARCLAIMED, which calls for flexibility. Institutional change/paralysis and resultant transaction costs will need to be dealt with, and their future relevance limited as much as possible by nurturing adaptive efficiency. To deal with these issues and ensure successful co-creation, T3.1 aims to design Terms of Reference (ToR) for stakeholder engagement processes that stimulate fluid and continued exchange of knowledge between stakeholders and scientists, enhance capability and adaptive efficiency, and organise safe collaboration and experimentation spaces.

The ToR described in the present deliverable D3.1 aims to provide clear guidance that addresses all relevant steps in initiating and managing stakeholder co-creation processes, in three phases: initiation, management and co-creation.

The **initiation phase** includes:

- 1) defining demo site context,
- 2) defining demo site objectives, and
- 3) building contextual understanding and relational competence (stakeholder mapping).

The **management phase** includes:

- 4) developing knowledge sharing spaces,
- 5) defining rules of engagement and governance, and
- 6) ensuring adaptive efficiency.

The **co-creation phase**, to be implemented empirically in T3.2, includes:

- 7) co-design scenarios,
- 8) co-design AWR strategies,
- 9) co-develop models,

- 10) co-evaluate AWR strategies, and
- 11) co-identify resilient AWR strategies.

The present guidance provides, in the following sections, a detailed description and guidance for implementing each of these steps in the demo sites. The approach is flexible and can be adopted, after some additional work, to other sites interested in developing MAR with AWR.

1. Initiation and management steps

○ 1.1. Defining demo sites context

The goal of this section is to define the demo site context by addressing the following questions. This involves focusing not only on the demo site itself but also considering the relevant basin where the solution could potentially be scaled up. This approach aims to explore the scalability potential of the proposed solutions for Managed Aquifer Recharge (MAR) with Alternative Water Resources (AWR), specifically for policymakers, water managers, and stakeholders involved in regional water planning and management. The demo site leaders have provided their answers using data from river basin plans, particularly from the 3rd cycle River Basin Management Plans (RBMP) in the EU context. They utilized the Reno River Basin in Italy, as featured in the TRANSCEND project (<https://transcend.usal.es/>), to address the questions related to water availability, quality, demand, current challenges, and potential solutions. They also specified how projections vary across different future emissions scenarios and time periods, following the example of the Reno River Basin.

1.1.1. River basin status

1.1.1.1. Drivers, pressures, status, and outlook

1.1.1.1.1. Which is the quantitative status of water bodies in the area?

➤ Comporta (Portugal)

Groundwater bodies (only aquifer systems were considered, undifferentiated systems excluded; only the groundwater bodies within the hydrographic region where Comporta is located was considered - Sado-Mira river basins)

- Bacia do Tejo-Sado / Margem Esquerda (PTT3) - Good status

- Viana do Alentejo - Alvito (PTA6) - Good status
- Sines - Zona Norte - Good status
- Sines - Zona Sul - Good status
- Bacia de Alvalade - Good status

➤ **Waddenregio (Netherlands)**

The MAR application, as piloted in the Wadden region, focuses on freshwater storage in saline aquifers. These aquifers inherently lack freshwater availability, requiring the quantitative status of the groundwater body to be considered relatively. In the Rhine catchment in the coastal region of the Netherlands, there is sufficient groundwater, but its quality is inadequate for agricultural use.

The quantitative status of

- Salt Rhine North *good*.
- Salt Rhine west *good*
- Salt Meuse *good*

➤ **Llobregat (Spain)**

The Llobregat DemoSite is located in the lower part of the Llobregat River basin. According to the "Water Management Plan for the Internal Basins of Catalonia 2022-2027", the quantitative status of the main water bodies are in this area are:

- 1) "Llobregat River from SJD" (surface water 1000950): poor condition
- 2) "Vall Baixa i Delta del Llobregat" (groundwater body MAS39): poor condition due to saline intrusion with an increasing trend detected. ([See page 40](#))

Documentation:

[3rd planning cycle \(2022-2027\). Catalan Water Agency \(gencat.cat\)](#)

[Annex 8 del Pla de gestió del districte de conca fluvial de Catalunya. 2022-2027 \(gencat.cat\)](#)

[Synthesis document \(gencat.cat\)](#)

1.1.1.1.2. Which is the qualitative (biological and chemical) status of water bodies?

➤ Comporta (Portugal)

Groundwater bodies (only aquifer systems were considered, undifferentiated systems excluded; only the groundwater bodies within the hydrographic region where Comporta is located was considered - Sado-Mira river basins)

- Bacia do Tejo-Sado / Margem Esquerda (PTT3) - Mediocre status due to phosphates
- Viana do Alentejo - Alvito (PTA6) - Good status
- Sines - Zona Norte - No data
- Sines - Zona Sul - Mediocre status due to Polycyclic Aromatic Hydrocarbons (PAHs)
- Bacia de Alvalade - Good status

➤ Waddenregio (Netherlands)

- Salt Rhine North *Failing to achieve good*
- Salt Rhine West *Failing to achieve good*
- Salt Meuse *Failing to achieve good*

The question on the biological status of the water bodies only makes sense in relation to surface water bodies, not groundwater bodies. The KRW-factsheets give info on the qualitative status of the groundwater bodies, and on the biological and chemical status of the surface water bodies. I've only included the information on the groundwater bodies below (I think that's what you're after). The only biological parameter that is considered for groundwater bodies is the "groundwater dependent terrestrial ecosystems", so I've included that one as well. If the judgement is "insufficient", it means that regionally the relationship between the groundwater body and the terrestrial ecosystem is insufficient. Conversely, the parameter "general quality" relates to the groundwater body as a whole.

Salt Rhine North:

General quality: good

Groundwater dependent terrestrial ecosystems: good

Salt Rhine West:

General quality: good

Groundwater dependent terrestrial ecosystems: insufficient (This relates to N2000 area Botshol)

Salt

General

quality:

Meuse:

good

Groundwater dependent terrestrial ecosystems: good

➤ [Llobregat \(Spain\)](#)

The Llobregat DemoSite is located in the lower part of the Llobregat River basin. According to the "Water Management Plan for the Internal Basins of Catalonia 2022-2027", the qualitative status of the main water bodies are in this area are:

- 1) "Llobregat River from SJD" (surface water 1000950): poor condition due Phosphates, TOC, Ammonia, Chlorides, Conductivity, Nitrates and Sulfates. (See page 11)
- 2) "Vall Baixa i Delta del Llobregat" (groundwater body MAS39): bad status due to Ammonia, Chlorides, Conductivity, Nitrates and Sulfates. (See page 29)

1.1.1.1.3. Which are the main water user sectors?

➤ [Comporta \(Portugal\)](#)

In the Sado-Mira river basin district, having 2018 as reference year (APA, 2023), by sector:

- Energy 65.03% (100% SW)
- Agriculture 25.71% (64% SW, 36% GW)
- Industry 6.02% (98% SW, 2% GW)
- Other sectors 1.95% (97% SW, 3% GW)
- Urban 0.88% (56% SW, 44% GW)
- Tourism (including Golf) 0.01% (100% SW, 0% GW)
- Livestock 0.39% (29% SW, 71% GW)

➤ [Waddenregio \(Netherlands\)](#)

Generally, the main sector performing groundwater extractions in this region is industry for cooling and process purposes. Other users are irrigation in agriculture and modified/artificial groundwater level management.

➤ [Llobregat \(Spain\)](#)

The estimated distribution of water uses in the Llobregat basin is as follows:

- Urban supply: 66%

- Agricultural irrigation: 27%
- Industrial use: 5%
- Other uses (hydroelectric generation, aquaculture, etc.): 2%

1.1.1.1.4. How is climate change projected to affect water quantity, quality and water use?

➤ Comporta (Portugal)

In Sado-Mira river basin district, under the RCP4.5 scenario (BAU), rainfall is expected to decrease 2.9% in the 2011-2040 period, 8.5% in the 2041-2070 period and 9.9% in the 2071-2100 period. For the most extreme emission's scenario (RCP8.5), the rainfall is expected to decrease 5.1% in the 2011-2040 period, 12.7% in the 2041-2070 period and 24.8% in the 2071-2100 period. (APA, 2023).

➤ Waddenregio (Netherlands)

It's expected that climate change will cause an increase of precipitation in the winter period and a decrease in the summer period. Besides that, an increase of 'high water events' is expected.

Besides that, climate change will mean an energy transition has to take place. Water plays a role in this. Thermic energy from groundwater could supply the energy demand for example.

Dry summers can lead to lower groundwater levels. However, in areas affected by seepage (*kwelgebiden*), there's less of a chance that groundwater levels will decrease, because of the continuous upward flow of water from lower aquifers.

The effects of larger precipitation in winters on groundwater levels depend partly on the drainage density in the affected areas and therefore will differ between areas.

Unfortunately, not a lot of information is available on the effects of climate change on groundwater. The effects of prolonging droughts on the groundwater reserves will be monitored.

➤ Llobregat (Spain)

The projected demand growth in this system on the 2027 horizon is estimated approximately by +1.1% of current consumption. In the longer term (2039), a growth of around 8% compared to current references could be reached. In the case of precipitation, the marked variability makes it difficult to observe clear trends, although there could be agreement on more significant reductions in summer, up to 40% in coastal areas and around 15% in the Pyrenees, with values that on average would exceed 10% throughout the territory, but only in the case of the most critical scenario RCP 8.5.

Based on that, the first scenario implies a reduction of 52 Hm³/year of groundwater resources, increasing 10 water bodies that go from having a positive balance to a negative one, from 4 to 14. The second scenario, where in addition to the effect of climate change according to RCP 8.5, an increase of 27 Hm³/year of extractions is added, in terms of balance it means a reduction that would reach 80 Hm³/year. In this case, the negative balance would affect 17 water bodies. However, it should be noted that this scenario is based on an increase in extractions calculated according to estimates of increased demand, it would be interpreted as an extreme scenario.

1.1.2. Water allocation and economic instruments

This section presents the water allocation system - the set of laws, rules or common practices that determine who is able to use water resources, including how much they can abstract, for what purpose, and when and where withdrawals are permitted.

1.1.2.1. Water Legal water management framework

1.1.2.1.1. How are water rights defined and regulated?

How are water rights quantified: by a specific volume (total volume of m³) or as a proportion (%) of available resources? Are water rights considered a public or private resource (focus on groundwater, but also discuss surface water and other potential sources)? Which laws govern the allocation of water resources? Is water bundled to land (i.e., when you buy an irrigated land, you also buy the right to use water)? What are the various recognized uses of water (as per the basin plan), and how is priority determined among these uses? Can rights be carried over in time (i.e., if you store water in say an aquifer, can you use that water the following year or it reverts automatically to the public domain)? What institution allocates and manages water rights? Is there a requirement for metering? Identify key barriers and challenges hampering water rights performance.

➤ Comporta (Portugal)

There is no specific regulation for Managed Aquifer Recharge (MAR) in Portugal. Nevertheless, there are two recent resolutions from the Parliament about MAR: [Resolução da Assembleia da República n.º 86/2022](#) - Recommends that the Government encourages managed aquifer recharge to reinforce water efficiency, and the [Resolução da Assembleia da República n.º 87/2022](#) - Recommends the Government to increase the reuse of treated wastewater. The river basin management also refers to the use of MAR, but no specific actions are known.

The MAR systems where natural recharge is enhanced are generally accepted (e.g., infiltration basins typically built to decrease flood impacts) and no restrictions are known.

For the MAR systems using alternative water sources, such as treated wastewater, as the source of water for recharge, the water quality must comply with the quality standards listed in the Annex I of Directive 91/271/EEC (which regulates the discharge of wastewater, transposed by Decreto-Lei 152/97). The proponent must have a permit from the Portuguese Environment Agency (APA) that defines the necessary Environmental Impact Assessment (EIA) studies to enable the issuing of a permit and the necessary monitoring procedures (before and after MAR).

Based on the Portuguese regulations, the following points are clear:

- MAR where natural recharge is enhanced are currently not being considered MAR, therefore they are not subject to an EIA.
- MAR systems using alternative water sources are considered a discharge according to Decreto-Lei 152/97. A permit for discharges and the necessary monitoring procedures can be obtained if the hydrogeological studies prove the harmlessness of the recharge project, although the concept of harmlessness lacks a legal definition.

In Comporta, a permit was issued by the Regional office of the Portuguese Environment Agency (Agência Portuguesa do Ambiente, APA, Administração de Região Hidrográfica do Alentejo, ARH Alentejo) which specifies the maximum volume allowed to be extracted yearly and the monitoring program for both the discharged water and the groundwater.

➤ Waddenregio (Netherlands)

How are water rights quantified: by a specific volume (total volume of m3) or as a proportion (%) of available resources?

The water distribution is basically regulated as follows:

- Both surface water and groundwater may only be extracted outside vulnerable areas;
- For surface water, extraction is based on the capacity established in water board policy;
- Surface water policy is managed and implemented at the water board level;
- When there is a national water shortage, extraction is adjusted downwards based on availability according to a national allocation ladder;
- For groundwater outside protected areas, there is an exemption for up to 8000m³/month; above this, an environmental permit must be applied for from the water board for extractions up to 150,000 m³/year. For extractions over 150,000 m³/year, a permit must be applied for from the Province;
- During periods of water shortage, the competent authority can temporarily suspend the extraction permit through an extraction ban.

Are water rights considered a public or private resource (focus on groundwater, but also discuss surface water and other potential sources)?

The groundwater rights are shared resources which are governed within collaboration. The infographic below provides a simplified overview of the ownership/responsibilities.

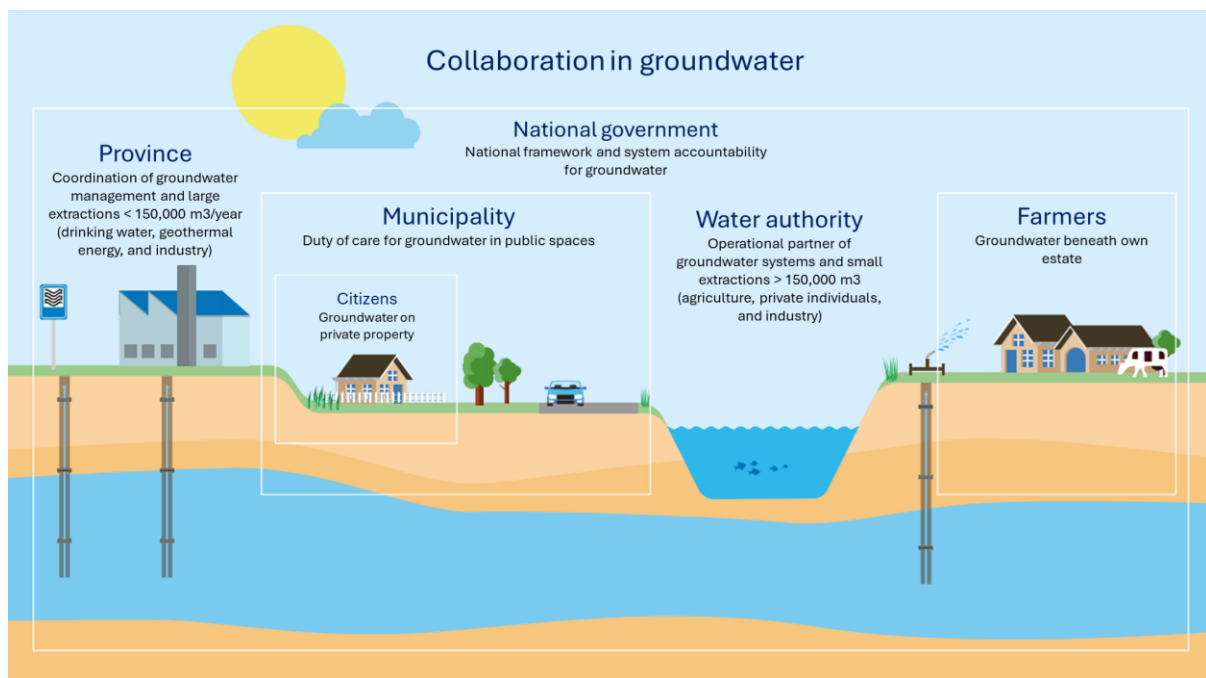


Figure 2: Groundwater rights in The Netherlands.

Which laws govern the allocation of water resources?

This used to be the "Water law", since 2024 water is part of the 'Environmental law'.

Is water bundled to land (i.e., when you buy an irrigated land, you also buy the right to use water)?

No it is not.

What are the various recognized uses of water (as per the basin plan), and how is priority determined among these uses?

In a normal situation, when there is enough water available for all users, there is no prioritisation. When water scarcity occurs, the priority sequence is activated by a national drought council. Category 1 takes precedence over category 2, and so forth.

Category 1 concerns water safety and preventing irreversible damage. In the artificial water system of the Netherlands, it is crucial to maintain certain surface waters as much as possible to prevent instability of the dikes. Preventing irreversible oxidation of peat and drying out of natural areas also falls under category 1.

Category 2 involves drinking water supply and cooling water for power plants. This category is self-explanatory.

Category 3 pertains to high-yielding crops and processed water for high-value industries.

Category 4 includes "other interests," primarily economic ones such as shipping, agriculture, non-irreversible damage to nature, industry, fisheries, and water recreation.

Table 1: Categories of water use prioritisation in The Netherlands.

Category 1	Category 2	Category 3	Category 4
Water safety and avoiding irreversible damage	Utilities	Small-scale high-value use	Other interests (economic interests, also nature)
Stability of water defense structures and levees	Drinking water	Temporary irrigation of high-value crops	Shipping
Settlement and compaction of peet	Energy	Process water	Agriculture

Nature (Bound by soil conditions)			Nature (without irreversible damage)
			Industry
			Water recreation
			Inland fisheries
Has priority to 2 →	Has priority to 3 →	Has priority to 4 →	

Can rights be carried over in time (i.e., if you store water in say an aquifer, can you use that water the following year or it reverts automatically to the public domain?

In the Netherlands, Managed Aquifer Recharge (MAR) has been practised for a long time by drinking water companies. This involves a long-term approach where water infiltrates into aquifers and is also extracted for drinking water purposes. While not yet embedded in the sector policy/water authority policy, the goal is to move towards multi-year storage and rights. Especially in saline aquifers, systems become more efficient as more freshwater is infiltrated, reducing losses at the edges.

What institution allocates and manages water rights?

Groundwater rights in the Netherlands are allocated among various institutions and private individuals. Based on the infographic previously shown, it is briefly explained as follows:

1. The national government is responsible for the main policies/framework regarding groundwater.
2. Provinces coordinate strategic policy-making and are responsible for permits for extractions exceeding 150,000 m³ per year.
3. Water boards are operationally responsible for groundwater policy and for permits for extractions up to 150,000 m³ per year.
4. Municipalities have a duty of care for groundwater in public spaces.
5. Farmers are responsible for groundwater beneath their own land; they require a permit for extractions exceeding 8,000 m³ per month.
6. Citizens are responsible for groundwater beneath their own land.

Is there a requirement for metering?

That depends on your permit and is different for every water authority

Identify key barriers and challenges hampering water rights performance.

Although the foundation of policy is set by the national government, implementation is managed at the regional level. This can lead to differences in laws and regulations over relatively short distances. Despite the Netherlands being small, it's possible that one farmer may need to set up a large and costly monitoring system for underground storage, while another farmer 50 kilometres away can proceed without such requirements because the water board approves it.

Regulations for small-scale Managed Aquifer Recharge (MAR) in agriculture are currently absent and vary per water board.

➤ **Llobregat (Spain)**

Water resources in Catalonia are public hydraulic domains, as established by Legislative Decree 3/2003, of November 4, which approves the Revised Text of the legislation on water in Catalonia. An administrative concession granted by the Catalan Water Agency is required for the extraction of surface and groundwater.

Concessions are granted based on different uses, with a maximum term of 75 years for the supply of populations and 25 years for other uses such as irrigation, industries, aquaculture, etc. Catalan legislation establishes the following order of preference: 1) Drinking water supply, 2) Irrigation and agricultural uses, 3) Industrial uses, 4) Aquaculture, 5) Recreational activities, 6) Other uses.

Water use rights are not transferable, except in exceptional authorised cases. These rights may or may not be linked to a property, depending on each case. The annual volume and maximum instantaneous flow rate are set in the concession, respecting the maintenance or ecological flows.

All new concessions must have systems for measuring the captured flows. The Catalan Water Agency keeps a Water Registry where the granted concessions are registered.

1.1.2.1.2. How does the water allocation system adapt to droughts and water scarcity?

➤ **Comporta (Portugal)**

The Portuguese Environment Agency has several mechanisms to cope with water scarcity: (1) The issuance of permits for the construction of groundwater wells can be temporarily suspended; (2) Irrigation from surface water bodies can be heavily reduced or suspended, ensuring that enough water is stored for urban supply.

In addition, the Permanent Commission for the Prevention, Monitoring and Follow-up of the Effects of Drought, established by Resolution 80/2017 of the Council of Ministers, is responsible for approving and monitoring the implementation of the Drought Prevention, Monitoring and Contingency Plan and for establishing policy guidelines in the context of drought.

Main Obstacles and challenges: in an ageing rural population, and according to recent studies (2020), the vast majority of farmers are not very receptive to crop change and technological innovation, although a relevant minority (around 40%) practise an annual management of their agricultural production according to the results of the immediately preceding year. Thus, a reserved and precautionary attitude probably prevails, but it is substantially linked to the contingency of annual results. [URL: [Uso-da-água-em-Portugal_Estudo-Gulbenkian.pdf](#)].

Another obstacle is the weak awareness of the Portuguese regarding water scarcity, and according to the same study 71% of the Portuguese have not experienced or have no memory of having had a serious problem of water shortage in their region. Water is also the resource that weighs the least on the family budget.

Another structural obstacle is the persistence of the total utilised agricultural area (with a slight increase between 2009 and 2019), despite the fact that the number of farms has decreased. However, one factor to be taken into account is the increase of the average size (ha) of agricultural area used per farm (from 6.7 ha in 1989 to 13.6 ha in 2019, with a slight increase compared to 2009), which potentially favours a more rational management that is better able to accommodate adaptive changes from an economy of scale perspective.

It is also necessary to take into account the general characterization of Portuguese agriculture: Utilised Agricultural Area in the EU28 is mainly occupied by arable land (59,4%), while in Portugal the predominance goes to the permanent grassland (51.7%); the national average holding size is lower than the EU28 average by almost 3 hectares; legal units manage 1/4 of Utilised Agricultural Area in the EU28 and 1/3 in Portugal; over 3/4 of the agricultural workload in the EU28 is carried out by family labour force. In Portugal, that amount is 68%; productivity and efficiency of agricultural work in Portugal is below the EU28 average (INE, 2019).

It is crucial to combat both the scarcity of water, its availability for a variety of uses and quality for human consumption, and (in some areas of the Mira-Sado basin region) the risks of flooding (particularly in three areas of Santiago do Cacém), as well as to mitigate the risks of pollution both domestically and industrially and through agricultural and livestock activities.

We must consider that the irrigable area on the farms of the Alentejo occupies more than 200 thousand hectares, about 95% of the total irrigable area available in the region, which means that the challenge is not so much the increase of the irrigated area but the irrigation systems and the efficiency of agricultural irrigation.

We must also consider that agricultural producers in Alentejo are mainly men (72%), aged 65 or over (51%) and with a full-time dedicated to the farm lower than the national average (12% full-time dedication in the Alentejo, and only 8% in the Algarve). A major challenge is the professional training and rejuvenation of individual agricultural producers, as well as the adoption of agricultural accounting systems and the investment in more efficient irrigation systems such as reinforcing water sharing (irrigation systems for several individual agricultural uses but coming from the same water source) (INE, 2019).

It is curious to consider that, in fact, in a previous similar project regarding MAR adoption, the identification of barriers by stakeholders was mainly of social and technical nature, and not so much economic, legal or otherwise.

➤ Waddenregio (Netherlands)

Strategies

In the Netherlands, the "Delta Plan for Freshwater" was adopted in 2014. This is a long-term strategy including investment funds to make the Netherlands resilient against water shortages and drought. It's a nationwide program executed at regional and local levels. Examples of outcomes include: tightening the priority sequence at regional levels, promoting freshwater availability at local/farm levels to reduce demand from the main water system, water conservation at farm level, and adoption of new efficient irrigation techniques. This is supported by the national Delta Plan for Agricultural Water Management, which implements water projects at the farm level. Additionally, ongoing efforts are in place to optimise water level management in the IJsselmeer. Thus, the strategy applies at both national and regional levels, while stimulating measures at the local user level.

These are long-term measures, which we as Dutch are good at. When it comes to the short term, it's mainly about issuing extraction bans. Then, measures can be taken in the main water system to redirect water and get it to important locations through alternative routes, activating the priority sequence if necessary. If these actions are insufficient, users must accept the resulting damage.

Obstacles

An important obstacle is the design of the Dutch water system. Our system is almost entirely artificial and heavily influenced by human activities. Much of the system is designed primarily to drain water as quickly as possible to the sea, initially to make the delta inhabitable. This setup is disadvantageous for preparing for dry periods because there is little capacity in the system to retain water. Moreover, the densely populated delta area lacks space for water buffering. Therefore, adapting to drought always involves spatial and significant stakeholder challenges.

Challenges

Furthermore, the Dutch are accustomed to having water readily available at all times. Consequently, water is not used very conservatively in agriculture and industry. The strategies increasingly highlight water as a limiting factor, but achieving this requires a significant mindset change

➤ Llobregat (Spain)

During severe droughts, emergency decrees can be issued to impose mandatory water use restrictions on different sectors (urban, industrial, agricultural). These are followed by the prioritisation of water uses.

Main obstacles and challenges:

- Socio-economic impacts of water use restrictions, particularly on the agricultural sector and economic activities dependent on water.
- Ensuring compliance with mandatory restrictions and dealing with potential conflicts or non-compliance.
- Maintaining environmental flows and avoiding ecological damage, while also meeting human water demands.

1.1.2.1.3. How does the water allocation system adapt to climate change?

➤ Comporta (Portugal)

The RBMP provides a list of necessary adaptation measures given the identified problems at River Basin scale. The success of implementation of adaptation measures is evaluated in each RBMP cycle.

➤ Waddenregio (Netherlands)

Within the national Delta Program, climate scenarios from the KNMI (Royal Netherlands Meteorological Institute) are incorporated into the research. This allows adaptation strategies to be tested based on climate models. Subsequently, model calculations are used to prioritise the implementation and financing of measures that promote adaptation.

➤ Llobregat (Spain)

The RBMP provides a list of necessary adaptation measures given the identified problems at River Basin scale. The success of implementation of adaptation measures is evaluated in each RBMP cycle.

1.1.2.1.4. Are there public registers with thresholds and standards fixed that are widely accepted?

➤ Comporta (Portugal)

It is mandatory that already constructed wells or dams are reported to the Portuguese Environment Agency (APA), for which a standardised permit is issued, depending on the characteristics of the infrastructure. APA centralises the wells and dams information in a GIS database. The reported data is used for water-use characterization in the context of River Basin Management Plans.

➤ Waddenregio (Netherlands)

Permits are registered with the competent authority (province or water board) but are not publicly available, but access can be requested. The accessibility differs per governance

body. Not every extraction requires a permit; some only require notification, in which case it is known to the water board but not publicly available. Monitoring data on water quality and groundwater levels are publicly available in many areas (Dinoloket.nl). This is based on monitoring networks of municipalities, provinces, water boards, and nature conservation organisations.

➤ Llobregat (Spain)

The Catalan Water Agency, as the Hydraulic Administration of Catalonia, is the body that must authorise the private uses of water in the internal Catalan basins. It does so through an administrative permit - concession or use - which grants and regulates the rights and duties of those who will use it and benefit from it, and which will be registered in the Water Register.

Depending on the volume of water that you want to use and the origin of the catchment, that is to say where the water is taken from, you must carry out the utilisation or concession procedure.

The owner must request a use permit when the volume of water is less than 7000 m³/year and is captured on the same property where it is then used. The use of rainwater receives the same administrative treatment. In the event that exploitation is located in a police zone and/or a protected aquifer, prior administrative authorization must be requested.

On the other hand, if the volume of water exceeds 7000 m³/year or the catchment point is outside the perimeter of the farm where the water is used, the owner must process a concession.

<https://aca.gencat.cat/ca/laigua/usos-de-laigua/captacions-daigua-i-concessions/index.html>

Open web-based map viewer:

https://sig.gencat.cat/visors/VISOR_ACA.html?param=param&color=vermell&background=topo_ICC&BBOX=152889,933628,4485000,641110.066372,4752000&layers=AIGUA_AQUIFERS

1.1.2.1.5. Are there reported infringements of water rights (water theft, other)?

➤ Comporta (Portugal)

No public data available at the ATM.

➤ Waddenregio (Netherlands)

It does happen that there are extractions without permits. In periods of severe drought, when an extraction ban is issued, enforcement is carried out by the water boards. During these times, unauthorised extractions are detected. There are likely also wells drilled without permits; however, this is not a common problem in the Netherlands because there has generally always been a surplus of precipitation, and periods of drought are relatively manageable.

➤ Llobregat (Spain)

Any person or entity can report to the Catalan Water Agency all actions likely to harm water, streams, banks and nearby areas, aquifers, and also unauthorised discharges into the sea.

<https://aca.gencat.cat/ca/contacte/denuncies/index.html>

1.1.2.1.6. Which enforcement, sanction and penalty systems are in place for addressing illegal abstractions (water theft)?

Outline the legal frameworks utilised to address offences and settle disputes regarding the interpretation of current laws. Highlight the principal obstacles and challenges that hinder adherence to these regulations.

➤ Comporta (Portugal)

The Environmental Agency can order the closure of the illegal well or, for surface reservoirs, the regularisation of the stream. A fine can be issued accordingly.

➤ Waddenregio (Netherlands)

The actions taken when an illegal extraction is discovered depend on the severity of the violation.

1. If an extraction occurs by a permit holder during a period of temporary extraction ban, it often results in a warning and possibly a fine.
2. If an extraction is conducted without a permit/notification in an area where a permit is possible, it usually leads to a request to apply for a permit, possibly accompanied by a fine.
3. If an extraction is conducted without a permit/notification in an area where no permit can be issued, there is generally a strict response. The extraction is disabled, a fine is imposed, and a legal process may follow with the legal costs being recovered from the offender.

➤ **Llobregat (Spain)**

Everything related to sanctions can be checked at the following website: [https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans\(ca|en\)](https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans(ca|en))

1.1.3. Economic policies and instruments

1.1.3.1. How does the tariff system work in the area?

How does the tariff system function, specifically in terms of the types of tariffs applied to surface water and groundwater? Are these tariffs designated for specific purposes? Do the tariffs vary based on the volume of water used (volumetric) or not (e.g., per hectare tariff), and which institution is responsible for implementing these tariffs? Additionally, evaluate the extent to which the tariffs cover financial, environmental, and resource costs. Highlight the main obstacles and challenges that affect the effectiveness of the tariff system.

➤ **Comporta (Portugal)**

The water resources tariff (TRH) (<https://apambiente.pt/agua/taxa-de-recursos-hidricos>) aims to offset the benefit resulting from the private use of the public water domain, the environmental cost inherent in activities likely to cause a significant impact on water resources, as well as the administrative costs inherent in planning, management, supervision, and ensuring the quantity and quality of water. It is applied to the following uses:

- Private use of water from the State's public water domain (SPDM);

- Discharges, direct or indirect, of effluents into water resources, capable of causing significant impacts;
- Extraction of inert materials from the SPDM;
- Occupation of land or water bodies within the SPDM;
- Use of waters, regardless of their nature or legal regime, subject to public planning and management, capable of causing significant impact.

Are subject to the TRH all individuals or legal entities that carry out the aforementioned uses, being, or should be, equipped for this purpose with the necessary usage permits. When the TRH is not due by the end user of water resources, the liable party must pass on to the end user the economic burden it represents, along with the price or tariffs it applies.

➤ **Waddenregio (Netherlands)**

Drinking water tariffs are determined by the drinking water companies. Farmers indirectly pay for water through the tax system of the water authority, typically paying per hectare of land they own.

➤ **Llobregat (Spain)**

In Catalonia the price of water is different in each of the municipalities. The supply of drinking water (management, distribution and purchase of water), as well as sewerage and waste water treatment are municipal competences and it is each municipality that establishes the supply tariff and the sewerage fee. The water fee, however, as a specific income of the Catalan Water Agency, is regional and is the same for the whole Catalan territory.

The municipality establishes the rates and fees and defines its structure based on the costs incurred by the activity. Expenditures that depend on physical and demographic characteristics, such as the topography of the land, the availability of the resource, the density of the population, the seasonality of consumption, the quality of the service, the type of infrastructure financing, the type of management and economies of scale, among others.

With the intention of protecting vulnerable groups, economically and socially, there are social tariffs for the supplied water approved by each of the town councils, or aid from a solidarity fund. With regard to the water rate, there is a social rate for the water rate applicable to all municipalities in Catalonia.

1.1.3.2. How are water trading arrangements regulated and working?

Is water tradable? Is there a use it or leave it clause that affects trading (i.e., if you do not effectively use your water allocation, you lose it legally and cannot gain access to that water the next year)? What type of markets exist, spot market (bilateral trading, not centralised market), exchange centre (clearinghouse), other? Who are the main participants in water trading (public or private entities)? Are there options or futures contracts available for water trading? Do trades typically result in temporary or permanent reallocations of water rights? Have there been any reported instances of illegal water trading? What are the primary obstacles and challenges faced in implementing water trading systems?

➤ Comporta (Portugal)

Water trading mechanisms are not implemented in Portugal.

➤ Waddenregio (Netherlands)

If you have a permit for groundwater extraction it is not the case that you lose the permit when not used. There is not really a trading market yet, but it is becoming more common that farmers 'buy' and ship or truck water from other areas where there is water available. So the (small) water market is private.

➤ Llobregat (Spain)

Water rights in Catalonia are not tradable or transferable between users, except in exceptional cases authorised by the Catalan Water Agency (Agència Catalana de l'Aigua)

1.1.4. Insurance policy in case of droughts or water scarcity

1.1.4.1. What insurance types are in place and how are they financed (focus on agriculture)?

Describe the insurer (commercial/mutual funds, public/private), loss assessment mechanism, type of damage insured (yield, revenue, income), rainfed/irrigated, permanent/ligneous/annual crops, subsidies and state aid (including access to EU Solidarity Funds), reinsurance (public, private, mechanisms), and the conditions (drought, lack of water, water availability lower than water

rights...) under which they apply. Identify key barriers and challenges preventing higher insurance penetration rates.

➤ **Comporta (Portugal)**

Crop insurance is a common instrument within the farmers, as well as state aid and subsidies. At local scale, programs are in place, usually promoted by the irrigators associations, to disseminate adequate irrigation practices and optimise the irrigation systems.

➤ **Waddenregio (Netherlands)**

There are insurances available:

- Insurances to cover drought are available in the Netherlands, but they are not commonly practised in the agricultural sector; drought is too complex to insure.
- Farmers who grow high value and highly vulnerable crops (to frost and hail) are more commonly used.
- Insurance for goose is also available.

➤ **Llobregat (Spain)**

The combined Agricultural Insurance Plan aims to *compensate* for the economic loss of income that occurs due to adverse weather circumstances beyond the control of the owner of the farm .

Who is it aimed at?

To natural or legal persons holding agricultural holdings who meet the corresponding requirements .

The *deadline* for submitting the application *varies according to the type of insurance contracted*:

Insurance that is part of the Combined Agricultural Insurance Plan: the formalisation of the insurance will be considered a request for aid as long as it has been carried out correctly and within the subscription period established.

Insurance for the structures, covers and installations of greenhouses, umbrellas and tunnels , the term will be as follows:

One month , counted from the date on which the policy was subscribed and paid for.

If the payment of the premium is prior to the publication of the call, the maximum *is calculated from the day after the date of publication of the Order in the DOGC* .

Lines of the Plan

For the lines of the Combined Insurance Plan , *a percentage will be subsidised* on the subsidy that the Entidad Nacional de Seguros Agrarios (ENESA) applies to the policy, except in the case of insurance for the collection and destruction of dead animals, where the aid is an amount per animal according to the class of livestock. The maximum percentages depend on the group in which the insurance lines are classified.

A maximum amount of aid is established that depends on the line and the coverages contracted.

Structures, roofs, greenhouses...

The insurance for the structures, roofs and installations of greenhouses, umbrellas and tunnels , independent of the policies subscribed for the insurance of the production they protect, will be subsidised a percentage of the cost of the premium, with the amount maximum per beneficiary staff that is established in each call.

[https://agricultura.gencat.cat/ca/ambits/desenvolupament-rural/assegurances-agraries/index.html#googtrans\(ca|en\)](https://agricultura.gencat.cat/ca/ambits/desenvolupament-rural/assegurances-agraries/index.html#googtrans(ca|en))

1.1.5. Monitoring and enforcement

1.1.5.1. What approaches, technologies, and infrastructure are used to monitor water availability and supplies within the basin?

➤ Comporta (Portugal)

In general, water availability is monitored through the National Water Resources Information System (SNIRH) which presents both surface water and groundwater bodies availability reports by analysing surface flow, surface reservoir stored volumes or groundwater level trends. According to APA (2023): “The National Water Resources Information System (SNIRH) processes, validates, and disseminates all information collected from the monitoring networks of the APA (Portuguese Environment Agency) and other entities (local and regional – Azores and Madeira).

Its mission is to maintain the development of the technological structure for loading, validating, and providing the public with data (hydrometeorological, water quality, ecological, and environmental), information, and knowledge about inland waters (surface and groundwater), coastal and transitional waters, and to promote educational content tailored to young people, with additional features for citizens with special needs.

It also has responsibilities in the field of specialised technical support (for university students, consultants, judicial entities, Ministries, bodies of the European Commission, among others) and is prepared to meet the needs of Portuguese-speaking countries (providing information and technical support).

SNIRH contributes to achieving, among others, the following objectives: assessment of water availability; characterization of water resources; assessment of water quality trends; assessment of extreme drought and flood situations; identification of pollution incidents; assessment and analysis of impacts on water bodies; evaluation of measures programs; verification of regulations; assessment of hydraulic projects; delineation of the public water domain; provision of data and information enabling the development of various studies as well as support for water resources planning and management.”

Extracted volumes are also reported individually, by water users, to the Environmental Agency, which in place issues the water tariff value.

➤ Waddenregio (Netherlands)

The Netherlands has a fairly extensive monitoring network for both surface water and groundwater. The groundwater system is monitored by various involved institutions: Rijkswaterstaat, provinces, water boards, municipalities, and nature conservation organisations. Surface water also has numerous monitoring points for both flow rate and quality. The water management system of barriers, dikes, and pumping stations makes flow

measurements essential. The monitoring of the surface water system is a collaboration between the water authorities and Rijkswaterstaat.

➤ Llobregat (Spain)

The Catalan Water Agency makes available to everyone a set of consultation applications to extract data related to water and the environment. The different inquiries can provide information, among many other options, about the quality and quantity of water, both surface and underground and coastal waters; specific information on flood risk and fluvial spaces and bodies of water in Catalonia.

A catalogue of services and data downloads is also made available, in order to encourage the use and dissemination of information generated by the administration, in a clear desire for transparency and open data.

<https://aca.gencat.cat/ca/laigua/consulta-de-dades/index.html>

1.1.5.2. What approaches, technologies, and infrastructure are used to monitor water extraction and use within the basin?

➤ Comporta (Portugal)

This practice is framed by the stipulations of Article 8 of the WFD, which determines the requirements for the monitoring of water bodies and establishes the Guidelines for the definition of monitoring. The river basin management plan Sado Mira also lists a series of monitoring actions to be carried out on the quality and availability of water as an estimate of the evolution of uses and pollutant loads.

➤ Waddenregio (Netherlands)

Piezometers (deep and shallow) with divers to monitor pressure head and EC.

➤ Llobregat (Spain)

The Catalan Water Agency makes available to everyone a set of consultation applications to extract data related to water and the environment. The different inquiries can provide information, among many other options, about the quality and quantity of water, both

surface and underground and coastal waters; specific information on flood risk and fluvial spaces and bodies of water in Catalonia.

A catalogue of services and data downloads is also made available, in order to encourage the use and dissemination of information generated by the administration, in a clear desire for transparency and open data.

<https://aca.gencat.cat/ca/laigua/consulta-de-dades/index.html>

1.1.5.3. What procedures and processes, if any, are in place to ensure the accuracy and reliability of data relating to the monitoring of water extraction, use, and availability?

Is there a dedicated staff responsible for managing the basin? What kind of resources, such as vehicles, are available for basin management? Has the staff received adequate training for their roles? How frequently are inspections carried out (monthly, yearly, or at other intervals)? Does the management strategy prioritise monitoring the largest water uses, such as agricultural operations and large farms? Is information regarding violations by water users made publicly available? Are water users notified in advance about inspections? Identify key barriers and challenges.

➤ Comporta (Portugal)

APA relies heavily on the existing monitoring networks. Monitoring constitutes the basic information for decision-making (e.g., licensing, implementation of measures during droughts, as well as in coastal planning and management), and is also crucial for compliance with community obligations, namely the Water Framework Directive, Priority Substances Directive, Groundwater Directive, and Nitrates Directive.

➤ Waddenregio (Netherlands)

No available data

➤ Llobregat (Spain)

ACA relies heavily on the existing monitoring networks. Monitoring constitutes the basic information for decision-making (e.g., licensing, implementation of measures during droughts, as well as in coastal planning and management), and is also crucial for compliance

with community obligations, namely the Water Framework Directive, Priority Substances Directive, Groundwater Directive, and Nitrates Directive.

1.1.5.4. Have there been any reported or known infringements of rules, rights, or regulations relating to the use, extraction, or allocation of water within the basin?

➤ Comporta (Portugal)

No available data

➤ Waddenregio (Netherlands)

The island of Texel knows an abstraction ban for groundwater. It is not known if this ban has been violated.

➤ Llobregat (Spain)

Everything related to sanctions can be checked at the following website:
[https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans\(ca|en\)](https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans(ca|en))

1.1.5.5. What sanctions and penalties are applied in the event of a violation of rules, rights, or regulations relating to the use, extraction, or allocation of water within the basin?

➤ Comporta (Portugal)

No available data

➤ Waddenregio (Netherlands)

The actions taken when an illegal extraction is discovered depend on the severity of the violation.

- If an extraction occurs by a permit holder during a period of temporary extraction ban, it often results in a warning and possibly a fine.

- If an extraction is conducted without a permit/notification in an area where a permit is possible, it usually leads to a request to apply for a permit, possibly accompanied by a fine.
- If an extraction is conducted without a permit/notification in an area where no permit can be issued, there is generally a strict response. The extraction is disabled, a fine is imposed, and a legal process may follow with the legal costs being recovered from the offender.

➤ **Llobregat (Spain)**

Everything related to sanctions can be checked at the following website:
[https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans\(ca|en\)](https://aca.gencat.cat/ca/laigua/seguiment-i-control/sancions/index.html#googtrans(ca|en))

1.1.5.6. In what ways, if any, are digital technologies being used within the basin to strengthen monitoring of water extractions, use, and availability?

➤ **Comporta (Portugal)**

The National Water Resources Information System is an important tool to periodically evaluate the overall status of the water bodies, report on scarcity problems (such as droughts) and on extreme events (floods).

➤ **Waddenregio (Netherlands)**

Most of the groundwater monitoring in the Netherlands is performed using telemetric monitoring. At the pilot location the monitoring is all done using digital technologies, this works very well and provides real-time data on distance.

➤ **Llobregat (Spain)**

The Catalan Water Agency makes available to everyone a set of consultation applications to extract data related to water and the environment. The different inquiries can provide information, among many other options, about the quality and quantity of water, both surface and underground and coastal waters; specific information on flood risk and fluvial spaces and bodies of water in Catalonia.

A catalogue of services and data downloads is also made available, in order to encourage the use and dissemination of information generated by the administration, in a clear desire for transparency and open data.

<https://aca.gencat.cat/ca/laigua/consulta-de-dades/index.html>

1.1.5.7. In what ways, if any, are citizens involved in the process of monitoring water extractions, use, and availability?

➤ Comporta (Portugal)

There is no relevant citizen involvement known in the area. However, the public participation process of the proposal on the Preliminary Flood Risk Assessment (APRI, in Portuguese), discriminates the locations most exposed to risks associated with flooding events, for the eight River Basin Districts of the Continent. Indeed, in accordance with Article 10(2) of Directive 2007/60/EC, it is encouraged the participation of all stakeholders in the review, preparation and revision of the management plans of the flood risks.

Public participation was mainly made possible through an email from the National Resource Information System Hidros (SNIRH), Portal Participa, through the event characterization form and APA's email. The Plan involving almost the entire area under consideration (the Mira-Sado River Basin Plan) developed 3 phases of public participation.

The first phase between December 22, 2018 and June 22, 2019, the second phase between december 22, 2019 and September 15, 2020 (to which an online questionnaire was added, given the previous low level of participation), but it is in the last phase that there were more participations, according to the respective report (August 2022) and holding a special session in the region, on June 9, 2029, contributed decisively to more active public participation, regarding the Mira-Sado Hydrographic Basin plan (which covers almost the entire MARCLAIMED study area, in the Portuguese case).

About 170 entities were invited, and 85 participants registered for the session, with 66 participating (19 in person and 47 online).

Meetings were also held with interested sectors, resulting in a more detailed view of the problems and expectations of the sectors and stakeholders involved. However, the final balance of public participation is frankly disappointing, the public participation process appears to continue to favour the registration of public entities, the language used has proven to be too technical, and the low level of receptivity- or no acceptance of proposals

developed by the public only can lead us to a collective frustration.

A final evaluation of the public participation process, developed by the promoters themselves, highlights some of these conclusions and reinforces the need for a procedural and methodological review of stakeholder involvement.

Note, however, a curious intervention from one of the participants in a special sectorial session (November 16, 2022), in the region, about the waste of water that are lost without the possibility of use (João Azevedo/CAP): – Does it make sense not to keep the water that is lost to the sea? We can't [...] reinforce aquifer recharge?

Aquifer recharge is also reported by individual participants and by a university, emphasising that this is a possibility that is already known for the region.

➤ Waddenregio (Netherlands)

There have been initiatives on citizen science, mainly focussing on water quality. In the Waddenregio there is the project 'Boeren Meten Water' ('Farmers Monitor Water') in which farmers actively monitor water quality (EC), groundwater levels and soil moisture on their fields and water quality (EC) in their ditches.

➤ Llobregat (Spain)

Any person or entity can report to the Catalan Water Agency all actions likely to harm water, streams, banks and nearby areas, aquifers, and also unauthorised discharges into the sea.

[https://aca.gencat.cat/ca/contacte/denuncies/index.html#googtrans\(ca|en\)](https://aca.gencat.cat/ca/contacte/denuncies/index.html#googtrans(ca|en))

○ 1.2. Managed Aquifer Recharge (MAR)

1.2.1. Status

Description of policies, instruments, authorities and funding opportunities for MAR and how they are implemented into practice (note we are referring to MAR of any type, not only MAR with AWR).

1.2.1.1. Which specific policies exist to promote the implementation of Reuse and/or MAR, including funding opportunities?

Describe policies to promote the implementation of MAR, including funding opportunities (such as subsidies, grants, other) and economic instruments used to fund them/cost recovery (tariffs, PES, others).

➤ Comporta (Portugal)

The RBMP defined the existent financial instruments for the implementation of the specified measures. No specific funding program targets MAR.

➤ Waddenregio (Netherlands)

The greatest boost to Managed Aquifer Recharge (MAR) in the Netherlands came with the Delta Decisions in 2014. At the national level, it was determined that research and subsidies should be made available for 'self-sufficiency in freshwater' at the local level. MAR projects for agricultural use have been funded through this initiative. Additionally, various regional subsidy funds from natural gas revenues (Waddenfonds) have been supportive in providing subsidies for researching MAR in arable farming. Provinces and water boards also support these developments through their strategic and operational groundwater policies, which focus on increasing buffering and strategic groundwater reserves.

➤ Llobregat (Spain)

The requirements "ROYAL DECREE 665/2023, of July 18, which modifies the Regulation of the Hydraulic Public Domain" must be followed, which establishes a new regulatory framework for MAR (273 quarter of the RDPH). This Royal Decree establishes the administrative procedure, the content of the works and projects to be developed and the main limitations that must be included in the recharge authorizations processed by the basin organisations.

In addition, Royal Decree-Law 4/2023, of May 11, which modifies the water law by adapting the Spanish legal regime to the requirements of the European Regulation (EU) 2020/741, establishes minimum requirements for water quality and control, focused in the context of integrated water management with regenerated water. Previously, this aspect had been defined in RD 1620/2007, of December 7, which establishes the legal regime for the reuse and recharge of treated water.

There is a new RD to be published, that can be consulted in this link: <https://www.miteco.gob.es/es/agua/participacion-publica/proyecto-rd-reglamento-reutilizacion-aguas.html>

1.2.1.2. How is Reuse and/ or MAR integrated into existing water management regulations and instruments?

Describe the regulatory status of MAR in the case study site. What laws are present that allow the adoption of this solution?

➤ Comporta (Portugal)

No regulatory instruments are available for the implementation of MAR in Portugal.

➤ Waddenregio (Netherlands)

MAR is used for drinking water extraction in the dunes, as stipulated in provincial decisions and permits. However, for small-scale applications exceeding 150,000 m³ for farmers, there is currently insufficient general regulation available. This means that each water board must reinvent the rules when an application is submitted.

➤ Llobregat (Spain)

Pag. 5 → Catalanian policy regarding water reuse:
https://aca.gencat.cat/web/.content/10_ACA/J_Publicacions/02-publicacions/11-pla-reutilitzacio-aigua-llibret.pdf

The Catalan river basin district management plan (internal basins) and its Program of measures for the period 2022-2027 foresee an investment of more than 2,437 MEUR, of which nearly 1,428 will be contributed in full by the Agency Catalana de l'Aigua.

The Management Plan is the road map for hydrological planning and is fully focused on mitigation and adaptation to climate change, with the inclusion of indicators and measures to guarantee water demands as well as the preservation and good state of water ecosystems.

In the following link there is the Programme of Measures for the period 2022-2027, among which recharge is a key point.

[https://aca.gencat.cat/ca/plans-i-programes/pla-de-gestio/3r-cicle-de-planificacio-2022-2027/index.html#googtrans\(ca|en\)](https://aca.gencat.cat/ca/plans-i-programes/pla-de-gestio/3r-cicle-de-planificacio-2022-2027/index.html#googtrans(ca|en))

1.2.1.3. Which authorities/actors are responsible for and supporting the implementation of Reuse and/ or MAR?

Describe the main actors/decision-makers and their roles.

➤ Comporta (Portugal)

The Environmental Agency is responsible for evaluating MAR implementation requests and issuing an authorization under specific conditions. Normally, anyone requesting authorization is obliged to comply with a monitoring program established by the Agency and report the status of implementation.

➤ Waddenregio (Netherlands)

The water authority for systems >150.000m³/year

The Province for systems <150.000 m³/year

➤ Llobregat (Spain)

Catalan Water Agency (ACA)

Health Department of Generalitat de Catalunya

1.2.1.4. What is the status of implementation of Reuse and/ or MAR?

Describe the prevalence of MAR in the area. Is this the only MAR? (note again we are referring to MAR of any type, not only MAR with AWR).

➤ Comporta (Portugal)

Several attempts for conducting MAR were made in the past, particularly making use of conventional water sources such as flood water (see EU-funded GABARDINE and MARSOL projects). Comporta WWTP-MAR system is one of the official MAR implementations making use of tertiary treated wastewater.

➤ Waddenregio (Netherlands)

For drinking water use it is common practice. MAR for small scale farmers is new but growing. There are 4 to 5 pilot/demo sites at the moment and the demand amongst farmers is growing.

➤ Llobregat (Spain)

MAR systems currently operating:

- Hydraulic barrier of Delta del Llobregat (reclaimed water)
- Sant Viçent dels Horts infiltration ponds (Marclaimed project)
- MAR mediante inyección profunda en pozo 18 (ETAP Sant Joan Despí)
- Molins de Rei infiltration ponds (permit acquired, pendent of *connection* with the reclaimed water pipe)

No additional recharge pond projects have been executed since in the Vall Baixa area, a dual well project is under study that will constitute a more efficient extraction and recharge system, both technically and logistically.

In the following figure there are the main MAR projects to be implemented in the period 2021-2027 for the recharge with alternative water resources in Catalonia.

Managed aquifer recharge

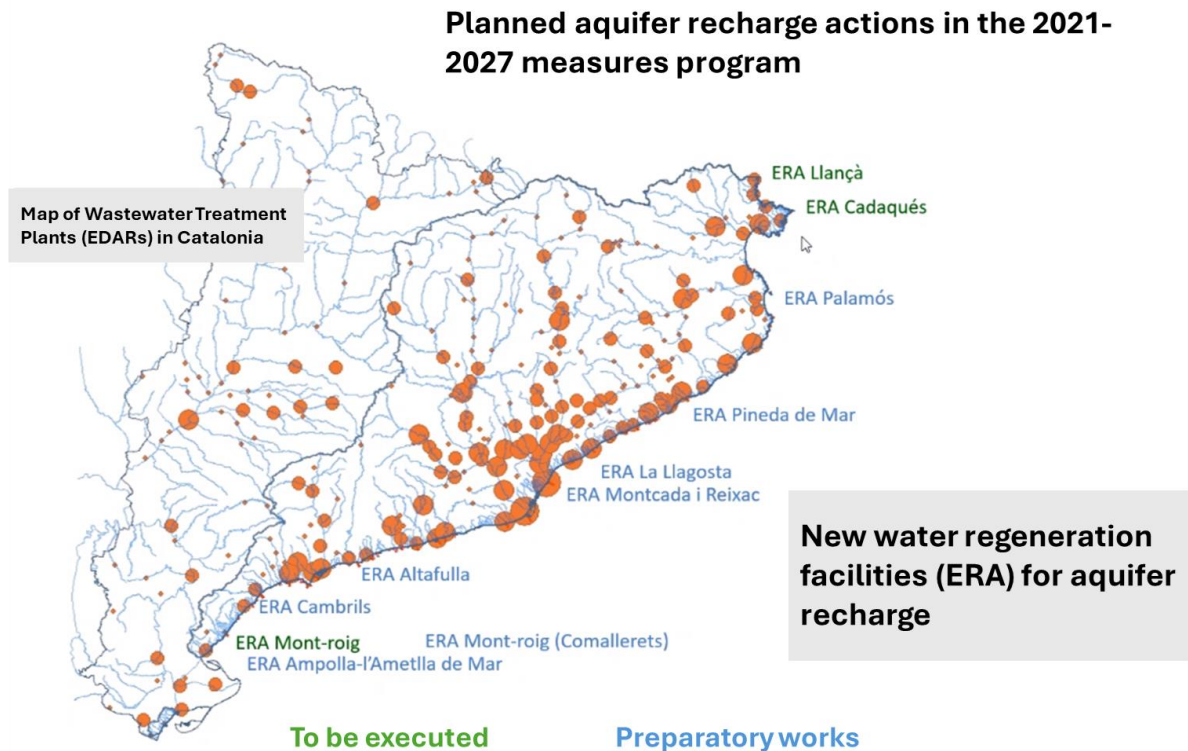


Figure 3: Managed aquifer recharge system in the Spanish Demo site.

1.2.1.5. Identify barriers and enablers for the implementation of Reuse and/ or MAR

What are good practices of successfully implemented MAR, and what factors contributed to their success? What are the potential barriers or challenges to integrate MAR in water management and how can they be addressed?

➤ Comporta (Portugal)

Clarity, acceptability, and efficient control to ensure that the water rights of the beneficiaries are satisfied or those rights can become factors that favor innovation. Clear legal framework regarding the benefits and responsibilities of the source water owner are essential as of the land owner. Acceptance of MAR ownership by local stakeholders can contribute to the success of MAR, but it has to be followed by a high level of accountability in terms of legislation and public.

A weak knowledge regarding benefits or potential hazards of MAR techniques can be a hard barrier to overcome. The priority of water allocation and the possibilities for water reuse must be well defined. Water price might also lead to discrimination among different society classes or among sectors of economic activity by size of the company (considering resistance to change by family farming and the fact that almost half of the companies in Portugal have less than ten employees) or the ability to incorporate technical innovations.

The participation of local organisations and unions can be a factor of success and social acceptance. The communication systems within MAR facilities have to be ensured (internet, mobile signals) as the level of recharge consumption must be provided.

➤ [Waddenregio \(Netherlands\)](#)

The main barriers to the implementation of MAR (Managed Aquifer Recharge) are related to the market readiness of MAR within the arable farming sector. MAR for drinking water is already being applied, and this project does not focus on it. The barriers for MAR in arable farming are linked to further developing the system to make it affordable, increasing user-friendliness for farmers, and making it possible to obtain permits.

- **Technical:** correct application, easy deployment in areas where it is geohydrological feasible, good purification for substances that should not be transported to groundwater, and developing this purification affordably;
- **Financial:** since the innovation is not yet fully developed and tested over multiple years, it is still difficult to determine the ROI (Return on Investment) for an agricultural entrepreneur at the moment of acquisition;
- **User-friendliness:** ensuring that the technology can be applied by the end user, the farmer. Additionally, there are currently no service providers as it is still in the innovative development phase;
- **Permits:** As previously explained in this document, the policy and issuance of permits are not yet clearly regulated. This can form a significant barrier, especially when water authorities require a high monitoring frequency. These water samples are expensive, making the entire process/investment financially unappealing for the farmer.

➤ [Llobregat \(Spain\)](#)

Enablers: drought context.

Barriers: potential health risks, public acceptance, economic investments in MAR infrastructures and legal constraints.

○ 1.3. Alternative Water Resources (AWR)

1.3.1. Status

1.3.1.1. Which AWR are available for Reuse and/ or MAR, and how are they currently utilised?

➤ Comporta (Portugal)

In the Comporta WWTP-MAR system, tertiary treated wastewater is used. Other possible non-conventional water resources besides treated wastewater, or AWR, can be the use of collected rainfall water and road drainage.

➤ Waddenregio (Netherlands)

For this form of MAR, drainage water that comes directly from the land is used. This water has not been in contact with surface water. In this way, the quality of the water can be ensured.

➤ Llobregat (Spain)

The following scheme shows the main reclaimed water sources (ERA) in the Llobregat demo site:

Table 2: the main reclaimed water sources (ERA) in the Llobregat demo site.

<i>Uses m3</i>	<i>2022</i>	<i>2023</i>
<i>Environmental</i>	<i>45.046.355</i>	<i>46.194.959</i>
<i>of which for pre-potable use (*)</i>	<i>290.000</i>	<i>35.848.601</i>
<i>Agriculture</i>	<i>5.115.499</i>	<i>11.566.196</i>

<i>Recreational</i>	<i>139.064</i>	<i>133.669</i>
<i>Urban (tank trucks)</i>	<i>0</i>	<i>4.280</i>
Total	50.300.918	57.899.104

(*) It should be noted that within the environmental use, 77.6% has been allocated to pre-potable water discharged into the Llobregat River to be subsequently treated at the Sant Joan Despí Drinking Water Treatment Plant (ETAP). This volume of water has accounted for 25% of the water destined for the supply of the metropolitan area.

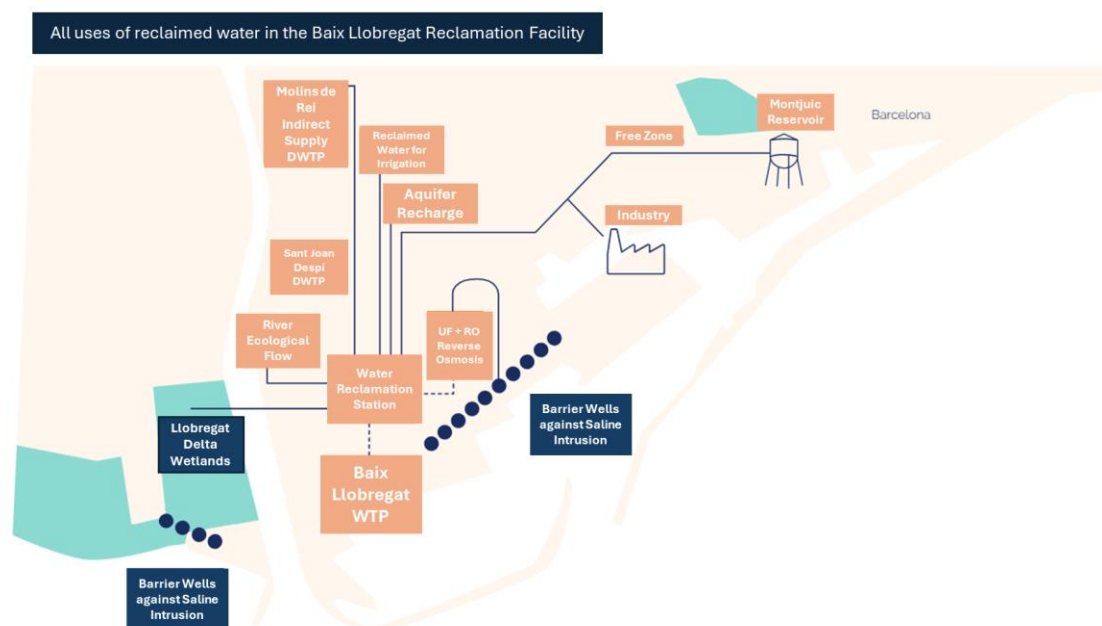


Figure 4: scheme of the main reclaimed water sources (ERA) in the Llobregat demo site.

<https://www.aiguesdebarcelona.cat/documents/42802/481302/Memoria-Explotacion-AB-2023.pdf/>

1.3.1.2. How is the use of AWR for MAR promoted (or controlled) (e.g. awareness, subsidies, monitoring, reporting)?

➤ Comporta (Portugal)

No programs are in place for subsidising AWR for MAR. EU-funded research projects such as MARSOL, MARSOLUT and AGREEMAR underlined the importance of using AWR for MAR and established guidelines for its proper use.

➤ Waddenregio (Netherlands)

The reuse of drainage water for MAR is promoted through subsidies by both provinces and water authorities.

➤ Llobregat (Spain)

In the permits for recharge issued by the Catalan Water Agency it is established the monitoring and control plan as well as the reporting procedures and frequencies.

1.3.1.3. What are case studies of successfully implemented AWR for MAR, if any, and what factors contributed to their success?

➤ Comporta (Portugal)

Comporta WWTP-MAR system is still at an early stage, hence no clear factors for the success are yet established.

➤ Waddenregio (Netherlands)

- Zoete Toekomst Texel (www.zoetetoekomsttexel.nl)
- Spaarwater I & Spaarwater II (www.spaarwater.com)
 - Breezand
 - Borgsweer

➤ Llobregat (Spain)

In Port de la Selva demo case (Catalonia, Spain) in the DEMOWARE EU funded project an infiltration ponds system with reclaimed water was successfully implemented:

<https://www.water-reuse-europe.org/demoware/>

1.3.1.4. What are the potential barriers or challenges to integrate AWR, particularly for MAR, and how can they be addressed?

➤ Comporta (Portugal)

The protection of the groundwater quality under the use of AWR is still one of the major barriers for wide acceptance of MAR using TWW, particularly for the Environmental Agency who has the role of providing the AWR usage permit for MAR.

➤ [Waddenregio \(Netherlands\)](#)

Concerns related to water quality.

➤ [Llobregat \(Spain\)](#)

The protection of groundwater bodies as well as long term effects are the main concern of the Health Authority.

The way to overcome this is by having a robust control of the MAR system and its impact in the groundwater bodies.

Sharing and discussing the results periodically with Public Authorities and main final users helps to gain acceptance and reliability in this kind of system.

2. Defining demo site transformational trust

○ [2.1. Stakeholder mapping and relational competence](#)

2.1.1. Stakeholder mapping & competences

This section will provide understanding of the overall governance regime, key water institutions and their roles including statutory powers.

Complete the following tables to provide an overview of relevant stakeholders.

➤ [Comporta \(Portugal\)](#)

Information in the table is inspired by the stakeholder mapping conducted for the Alentejo region within the AGREEMAR project (Conrad & Heim, 2022, [link](#)).

Table 3: detailed overview of relevant stakeholders in Comporta demo site.

Specific demo site stakeholder	Role and competence related to MARCLAIMED	Needs to MARCLAIMED results	Stakeholder group	Scale
Portuguese Environmental Agency - APA (including the Alentejo regional offices)	River Basin Administration with monitoring and water use licensing responsibilities, which may include MAR licencing once legal framework is established	Improved water resources management; demonstrate MAR capabilities and safety	Water authority, policy maker	National, regional
Águas Públicas do Alentejo (AgdA-AdP)	Operation and management of bulk water supply under a public partnership regime. Provides water for public supply to the region's municipalities and local entities and ensures wastewater treatment	Ensure that MAR has a set of safe methods that allows for an effective valorization of treated wastewater effluents and improvement of water availability	Water supply and wastewater treatment	Regional
Coordination and Regional Development Commission for the Alentejo region (CCDR-Alentejo)	Coordinates various sectoral policies at regional level regarding territorial planning/land use. Provides financing mechanisms to support local authorities and associations with the objective of achieving regional economic and social development	Promote MAR implementation through public financing mechanisms	Policymaker	Regional
Portuguese Farmers Confederation (CAP)	Promotes the development of technical analysis, specialised studies or strategies for improved irrigation practices, promoting water and energy efficient use; represents the	Promote alternative and safe water management practices such as MAR that may provide clear benefits to environmental services	End-users; Sectoral representative	National

	interests of agricultural sector and rural communities			
Municipalities and Alentejo Intermunicipal Communities (AMAL, CIMAA, CIMAC, CIMBAL)	Ensures water distribution at local level; Promotes environmental sustainability practices and increases water user's awareness to water related issues; implementation of local water management strategies	Benefits from alternative water management policies and practices at local level, particularly from environmental services protection for local social and economic development	End-users	Regional, local
Local associations for farming irrigators and beneficiaries (e.g., ABORO, ABROXO, ARBCAS)	Manages water distribution infrastructure for irrigation purposes at local level; manages water allocation and settles disputes related to water availability	Improved water availability and quality due to integrated water management policies at regional and local level	Irrigators associations	Regional, local
Alqueva Infrastructure and Development Company (EDIA)	Public company that manages the Alqueva Multipurpose Project which includes a dam and water distribution infrastructure; one of the largest water provider for irrigation in the Alentejo	Improved and complementary water management practices that contribute for increased availability; ensure that MAR does not affect water quality and removes the pressure over the surface water resources	Irrigation water supply	Regional, local
Portuguese Water Partnership	Encourages an effective link between professionals, institutions and companies in	Promotes innovation in the water sector, facilitating cooperation between companies and	Partnership of water-related companies and research centres	National

	order to project the knowledge and skills of the Portuguese water sector in the world, and to catalyze opportunities in international markets and in the area of cooperation within the framework of the development of sustainable projects in line with the Sustainable Development Goals	research centres; takes an important role in making knowledge in the subject of water resources management available to all possible interested water companies and institutions, both at national and international scales (e.g. Portuguese speaking countries)		
Évora University (UE)	Public higher education and research institution (and foundation), with technical and academic expertise in several scientific areas	Integrate the project outcomes in future research projects	Academia; R&D	Regional
Beja Polytechnic Institute (IPBeja)	Public higher education institution with technical and academic expertise	Integrate the project outcomes in future research projects	Academia; R&D	Regional
National Laboratories (LNEC - civil engineering; LNEG - geological services)	Public research institutions that conduct R&D activities, offer certification and consultancy (including to the government)	Further promote research related activities based on the project outcomes; ensured that innovative practices are considered in policy making	R&D	National
Regional Board of Agriculture and Fisheries (DRAP-Alentejo)	Participates in the formulation and execution sustainable policies in the areas of agriculture, forests, rural development and fisheries, as well	Safer and affordable strategies and policies to secure availability of water for irrigation;	Agricultural authority; policymaker	Regional

	as collaborates in food safety and farming activities policies; provides guidelines in improved water usage techniques for farmers	improved and safe usage methods of non-conventional water sources; support the integration of innovative practices in policy-making		
Tourism-related SMEs	Tourism sector companies aiming to implement sustainable and environmentally responsible leisure activities; promote the protection of environmental services and benefit from local "green" policies	Benefit from the implantation of water resources management policies that can improve water quality and availability	End-users, industry	Local
Large end-users from Agricultural Sector (e.g., SOVENA, WESTFALIA)	Farming companies and water users for irrigation; integrate innovative farming practices	Benefit from the implantation of water resources management policies that can improve water quality and availability	End-users, industry	Regional, local
Construction & environmental consultancy companies	Feasibility studies; design and construction; environmental impact assessment; regulatory compliance implementation (water rights, environmental protection laws and construction codes); R&D	Benefit from ready-to-market MAR implementation guidelines for successful replication and business expansion/promotion of such practices	Industry	National, regional, local

➤ De Waddenregio (Netherlands)

Table 4: detailed overview of relevant stakeholders in De Waddenregio demo site.

<i>Specific demo site stakeholder</i>	<i>Role and competence related to MARCLAIMED</i>	<i>Needs to MARCLAIMED results</i>	<i>Stakeholder group</i>	<i>Scale</i>
Water Framework Directive (WFD) / EU	WFD aims to achieve good ecological and chemical status in European water bodies.	Prove that MAR benefits water quality and ecological value	Government	EU
Dutch national government	Suffice with WFD Suffice with nitrogen norm	Prove that MAR has a positive effect on nitrogen emission/leakages and water quality when applied to farming systems.	Government	National
Province	Support economic development/sustainability in their province Secure drinking water Ensure ecological value	MARCLAIMED benefits the feasibility of MAR in the region, therefore it supports sustainable agriculture/economic development, and it support the goals of the Deltaprogramma Zoetwater which is to support freshwater self-sufficiency; Understand how MAR (positively) affects drinking water supplies. How MAR can also be applied as tool for better ecological management (e.g., reduce nutrient leakages to nature, alternative water supply during droughts)	Government	Province / regional

Waterschap (water authority)	Main water management authority. Their role is to provide/manage the fresh water distribution. It is not their duty to supply fresh water, but they do have an obligation to make an effort and do the best they can. Allround improvement of the water quality.	MAR should be proven to benefit these interests. MAR on farms is a very local way to control water levels. In the current pilots, the water is purified before infiltrating hence this benefits water quality and nature.	Government	Regional / local
Farmers	Invest in MAR Investment opportunity	MAR should support investment	Private / end user	Local

➤ [Llobregat \(Spain\)](#)

Table 5: detailed overview of relevant stakeholders in Llobregat demo site.

Specific demo site stakeholder	Role and competence related to MARCLAIMED	Needs to MARCLAIMED results	Stakeholder group	Scale
Catalan Water Agency (ACA)	Public company in charge of water planning and management. Its action plan guarantees, now and in the future, the supply, availability of water and its quality at source. It also promotes the sanitation of waste water and the protection and conservation of water bodies and associated ecosystems.	Improved management of scarce water resources towards climate resilience and sustainability; maintained long-term, safe and efficient water supply.	Policy makers	Regional
Metropolitan area of Barcelona (AMB)	Public administration with different types of competencies, among which water cycle and water resources, supply, wastewater treatment, reuse and flood prevention.	Ensured and improved quality, continuity and efficiency of water services, considering economic and financial sustainability and the principles of social and environmental responsibility.	Policy makers	Metropolitan
Public Health Agency of Catalonia (ASPCAT)	Authority responsible for the promotion and protection of health, the prevention and management of epidemiological and food alerts, and occupational health.	Guarantee the water supply necessary to safeguard the health of the population, monitoring its quality.	Policy makers	Regional
City councils (<i>Barcelona, Sant Vicenç dels Horts, Molins de Rei...</i>)	Ensures water security and integrity of the environment on a local level.	Guarantee the water supply necessary to safeguard the health of the population.	Policy makers End-users	Local
Consorci del Delta del Llobregat	Protects and manages Llobregat Delta's natural spaces, monitors the development of activities to ensure compatibility with the ecological functions and	Improved protection and management of river natural resources for environmental integrity and continuity of water services; improved data	Public Entity	Local

	services provided by these natural spaces, while facilitating coordination across relevant public authorities.	and knowledge on environmental impacts.		
Associació Catalana de Comunitats de Regants (ACATCOR)	Grouping of all communities and collectivities of irrigators, central water user unions, unions, irrigation water concessionaires, etc. of Catalonia with the purpose of advancing savings in its operation and exchange knowledge and practices for the improvement of irrigated areas in the region.	Improved water management and related costs in Catalunya; improved water availability and quality; water supply security; modernization of activities to increase efficiency; equitable distribution of water resources.	Public Entity	Regional
Grup de Recerca en Ciència i Tecnologia de la Sostenibilitat (UPC)	A research organisation focused on advancing sustainability through innovation, including developing technical and conceptual tools such as modelling and simulation of complex systems.	Improved knowledge in innovative and sustainable solutions; Integrate the project outcomes in future research projects	Academia; R&D	
Polytechnic University of Catalonia (UPC)	Contributes to building a sustainable and fair world through research, technology transfer and knowledge dissemination, by producing engineering, architecture, science and technology graduates.	Analyse the project and follow its progress to acquire useful knowledge and be able to export sustainable practices in other contexts.	Academia	Local
University of Barcelona (UB)	One of its missions is social commitment and, for that, it has assumed global challenges, such as poverty, inequality, climate change, environmental	Analyse the project and follow its progress to acquire useful knowledge and be able to export sustainable practices in other contexts.	Academia; R&D	Local

	degradation, or the fight for prosperity, peace and justice.			
Research Institutes (ICRA, IGME-CSI, IDAEA-CSIC, ICGC)	Public research institutions that conduct R&D activities, offer consultancy (including to the government), and provide technical and academic expertise in several scientific areas	Integrate the project outcomes in future research projects	Academia; R&D	Regional
Grup d'Hidrologia Subterrània (GHS)	Research, teaching and knowledge transfer in the field of hydrogeology and geochemistry, specifically applied to groundwater resource assessment, aquifer management, wetland studies, marine intrusion and underground waste and CO2 extraction.	Improved knowledge in groundwater resource management; integrate results and further research based on the project outcomes	Academia; R&D	
Water Users Community from Llobregat Valley and Delta (CUADLL)	Entity ascribed to the Catalan Water Agency (ACA) with functions of distribution, administration, protection, and preservation of surface and groundwater. Among delegated powers include recharging basins and improving and expanding this infrastructure. The CUADLL represents all water users.	Improved water infrastructure and management of Llobregat groundwaters; improved water availability and quality; water supply security; modernization of activities to increase efficiency; equitable distribution of water resources.	Public Entity	
Irrigation community (Comunitat de regants de la Palma, Comunitat de regants de	Public law corporations attached to the Catalan Water Agency. Their purpose is the collective administration of the water use rights that have been granted or recognized.	Increase water availability and efficiency for irrigation activity; improved use of alternative (MAR) methods and its monitoring to increase efficiency; greater	End-users	Local

<i>Corbera de Llobregat, Comunitat de regants bassa de Ferrer i Mora...</i>)		resilience to water stress and climate change.		
Water utilities (<i>Aqualia, AICSA, Aigües del Prat, Sorea, Sant Vicenç dels Horts</i>)	Carries out the operation and management of water services in the respective municipality, which includes catchment, treatment, distribution, and operation of wastewater treatment stations.	Ensured and improved quality, continuity, and efficiency of water services, considering economic and financial sustainability; improved use of alternative methods such as MAR to increase infrastructure efficiency and achieve environmental sustainability goals such as the increased use of treated wastewater; improved management of demand peaks and decreased stress in natural systems; fair distribution of water.	Water Utility	Local
Catalan Water Partnership	Non-profit strategic association, formed by companies and knowledge centres that operate in the sustainable water use sector with the objective of improving the global competitiveness of its associates.	Developing innovative and sustainable solutions for efficient water use; secure water supply; improved data and knowledge on environmental impacts and monitoring of MAR systems; improved water availability; expansion of water infrastructure and management efficiency for its associate's activities.	Partnership of companies and research centres	Regional
Companies extracting water from the aquifer (<i>Damm, Cementos</i>)	Companies carrying out industrial activities intensive in water consumption. Both companies own wells in the Vall Baixa and Delta	Increase water availability and efficiency for industrial activity; water supply security; expansion of MAR infrastructure;	End-users/ Industry	Local

<i>Molins, Nestle and Celsa)</i>	Llobregat aquifer. Both companies promote the implementation of AWR infrastructures and solutions and solutions.	improved use of alternative (MAR) methods and its monitoring to increase efficiency; reduced water footprint; greater resilience to water stress and climate change.		
Agrupacions de Defensa Vegetal (ADV) (del Baix Llobregat d'Horta and del Delta del Llobregat	Non-profit private entities composed by farmers with the objective of collaborating with competent public administrations in integrated pest management.	Innovative solutions for sustainable agricultural practices and water use; improved data and knowledge on environmental impacts and be able to export sustainable practices in other contexts	Civil Society	Local
Water-related Civil Society Organizations (Associació catalana amics de l'aigua, Agua segura project)	Organisations dedicated to promoting and implementing initiatives and projects related to water, sanitation and hygiene (WASH) with the aim of generating knowledge and a positive impact at the basin, communities and businesses level in Catalonia. These organisations promote solutions and increase awareness on water-related issues in the territory.	Improved data and knowledge on environmental impacts and innovative solutions; Improved management of scarce water resources towards climate resilience and sustainability; maintained long-term, safe and efficient water supply.	Civil Society	Regional
Workers (CUADLL, Aigües de Barcelona)	Workers potentially impacted by the project and its results.	Capacity building; increased efficiency in work activities	Civil Society	Local
Metereologic al Service of Catalonia (METEOCAT)	The Climatology area participates in research projects related to climate change, and also to dissemination of climate knowledge across various fields and to diverse groups.	Knowledge sharing	Public Entity	Regional

2.1.1.1. Stakeholder mapping

➤ Comporta (Portugal)

- *water authorities*
- *municipalities*
- *farmers*
- *tourism sector (touristic projects)*
- *Irrigation of golf courses*
- *What about insurance companies?*
- *who else benefits?*

[add narrative addressing points 1 and 2 above]

List of Stakeholders

Industrials, Data Users:

- *Large end-users from Agricultural Sector (e.g., SOVENA, WESTFALIA)*
- *Construction & environmental consultancy companies*
- *Tourism-related SMEs*

Water Utilities:

- *Águas Públicas do Alentejo (AgdA-AdP)*
- *Municipalities of Alentejo (Alcácer do Sal, Beja, Grândola, etc.)*
- *Alqueva Infrastructure and Development Company (EDIA)*

Local associations:

- *Local associations for farming irrigators and beneficiaries (e.g., ABORO, ABROXO, ARBCAS)*
- *Municipalities and Alentejo Intermunicipal Communities (AMAL, CIMAA, CIMAC, CIMBAL)*

Citizens/Civil Society:

- *Portuguese Water Partnership (PPA)*
- *Water protection associations*

Government:

- *Portuguese Environmental Agency - APA (including the Alentejo regional offices)*
- *Coordination and Regional Development Commission for the Alentejo region (CCDR-Alentejo)*
- *Portuguese Farmers Confederation (CAP)*
- *Regional Board of Agriculture and Fisheries (DRAP- Alentejo)*

Experts and scientific community:

- *National Laboratory for Civil Engineering (LNEC)*
- *National Laboratory of Energy and Geology (LNEG)*
- *Évora University (UE)*
- *Beja Polytechnic Institute (IPBeja)*

- *De Waddenregio (Netherlands)*

Ministry of Infrastructure and water

The main responsible Ministry is the Ministry of Infrastructure and Water (MinlenW). They hold national responsibility for the water program, climate adaptation etc. MinlenW is mainly responsible for the 'Deltaprogramma Zoetwater'.

Deltaprogramma

Zoetwater

This is a program from the ministry of infrastructure and water focussing on freshwater scenario's, availability in the future pressured by climate change. This 'program' consists of civil servants working for the ministries, provinces, and water authorities. Both pilots (Breezand and Texel) are part of the 'decentralised approach' under the Deltaprogramma Zoetwater. Both pilots are directly and indirectly financed from this program as well.

The program is very broad and well accomplished. Many parties in the Netherlands worked under this program and developed tools, models etc. to work together on the water safety of the country.

Ministry

of

Agriculture

The Ministry of Agriculture is a stakeholder but not as prominently as MinlenW.

Acacia

Water

Acacia Water positions itself as an executing partner in the Dutch water sector. They perform on the ground pilots and work with both farmers and authorities together to make a step

towards climate resilience. In this role Acacia Water is expert in performing pilots, communication between farmers and authorities, distilling research questions, data collection and reporting.

Deltares

Deltares is the Dutch research institute on water in deltas. Deltares executes/executed a big part of the research and impact analyses of the Deltaprogramma Zoetwater.

HHNK

Hoogheemraadschap Hollands Noorderkwartier is the water authority of Noord-Holland in which both pilot locations (Breezand and Texel) are located. The water authorities are the oldest democratic institution in the Netherlands and are in place for water management on a regional level; there are 21 water authorities in the Netherlands. The water authorities don't follow the borders of the Provinces. The first water authority was established in the year 1255 and had the main responsibility to ensure safe levees and enough water for the farmers. Nowadays the role and responsibilities of the water authorities is still quite the same. They are responsible for I) water safety, II) enough fresh water, and III) clean water/water quality.

Since the Deltaprogramma Zoetwater is established the water authorities work together with the Province to implement the national program on a local scale. The water authority is also day-to-day operations of the water system, they're responsible for permits and enforcement of the rules.

Province of Noord Holland

The Province of Noord Holland is the regional authority and the second after the national government. They are responsible for regional governance. Within the scope of MAR of reclaimed water there is an important stake in I) water management, mainly the operational side of Deltaprogramma Zoetwater, II) regional economic development, and III) spatial planning.

Seed potato traders

Seed potatoes are among the top three cash crops in the Wadden region, alongside onions and flower bulbs. Seed potatoes hold a unique position concerning irrigation. Since the 1990s, irrigation has been prohibited in the red areas marked on the map below. In these regions, yields are constrained by the lack of access to fresh groundwater or precipitation. Much of the low-lying coastal area in the Netherlands has saline groundwater, rendering fresh groundwater inaccessible. To sustain and boost future yields, water availability is crucial for seed potato traders. In this regard, traders act as intermediaries between

developers/researchers and farmers, although they do not possess an “official” role in the development process.

Flower

bulb

associations

The flower bulb associations find themselves in a similar position to seed potato traders. However, since irrigation is not prohibited for flower bulb growers, the stakes and added value are comparatively lower for them.

Farmers

The farmers are the end users of the MAR systems and benefit from the water. The water made available from the MAR provides a way to sustain the farm business under climate change conditions.

Banks

In the Netherlands there is a traditional role of the Rabobank in financing the agricultural sector. Hereby the bank becomes a stakeholder as many businesses are financed through them and climate and financial sustainability is in their favour.

Water

companies

Water utilities play a minor role in the current development of managed aquifer recharge using drainage water on farms. They are interested in the technology as it could help them organise their extra security buffers. Mainly the use of the horizontal well is of their interest.

➤ [Llobregat \(Spain\)](#)

List of Stakeholders:

Industrials, Data Users:

- *Damm*
- *Cementos Molins*
- *Nestle*
- *Celsa*

Water Utilities:

- *Aigües de Molins de Rei (Aqualia)*
- *Aigües de Castellbisbal (AICSA)*
- *Aigües del Prat*
- *Consorci d'aigües Costa Brava*
- *Sorea - Sant Vicenç dels Horts*

Local associations:

- *Catalan Water Partnership*
- *Associació Catalana de Comunitats de Regants (ACATCOR)*
- *Consorti per a la Protecció i la Gestió dels Espais Naturals del Delta del Llobregat*

Citizens/Civil Society:

- *Associació catalana d'amics de l'aigua*
- *Agua segura project*
- *Agrupació de Defensa Vegetal (ADV) del Baix Llobregat d'Horta*
- *Agrupació de Defensa Vegetal (ADV) del Delta del Llobregat*
- *Workers (Aigües de Barcelona, CUADLL)*

Government:

- *Agència Catalana de l'Aigua (ACA) (associated partner)*
- *Departament d'Acció Climàtica, Alimentació i Agenda Rural*
- *Àrea metropolitana de Barcelona (AMB)*
- *Agència de Salut Pública de Catalunya*
- *Ajuntament de Sant Vicenç dels Horts*
- *Ajuntament de Molins de Rei*
- *Ajuntament de Barcelona (optional)*
- *Santa Coloma Cervelló (optional)*
- *Sant Feliu de Llobregat (optional)*
- *Sant Boi de Llobregat (optional)*
- *Cornellà de Llobregat (optional)*

Experts and scientific community:

- *Universitat Politècnica de Catalunya (UPC)*
- *Universitat de Barcelona (UB)*
- *Institut Català de Recerca de l'Aigua (ICRA)*
- *Instituto Geológico y Minero de España (IGME-CSIC)*
- *Institut de Diagnòstic Ambiental i Estudis de l'Aigua - CSIC (IDAEA-CSIC)*
- *Institut cartogràfic i geològic de Catalunya (ICGC)*
- *METEOCAT, the Meteorological Service of Catalonia*
- *GHS - Grup d'Hidrologia Subterrània*
- *Grup de Recerca en Ciència i Tecnologia de la Sostenibilitat (CITES-UPC)*

Local communities/end-users:

- *Comunitat d'Usuaris d'Aigües de la Vall Baixa i Delta del Llobregat (CUADLL)*
- *Comunitat de propietaris pou nou*

- *Comunitat de regants de la Palma*
- *Comunitat d'usuaris d'aigües de la Cubeta d'Abrera*
- *Comunitat de regants de Corbera de Llobregat*
- *Comunitat de regants bassa de Ferrer i Mora*
- *Comunitat de regants de la Palma de Cervelló*
- *Comunitat de regants del Canal de la Dreta del riu Llobregat*
- *Comunitat de regants reg vell Sant Vicenç dels Horts*
- *Comunitat de regants del Canal de la Infanta*
- *Comunitat d'usuaris de la Cubeta de Sant Andreu de la Barca*
- *Cooperativa agraria de Viladecans, Molins de Rei and Sant Feliu, among others.*

Spain is a decentralised unitary state having a three-tier governance system: central, regional, and local. As a regionalized State, also referred to as “Estado de las Autonomías” Spain is in reality a quasi-federation with autonomous communities (ACs) having a large autonomy. ACs have their specific statutes, allowing for some distinctive features. The territorial organisation resulting from this State of Autonomous Communities has gradually shaped a complex reality in terms of the delimitation of competencies in water governance. In the country, water services are a municipal responsibility; therefore there is no independent regulatory body at the national level. Despite the water sector being highly regulated, it presents a high fragmentation of competencies. At the national level, the Ministry for the Ecological Transition and the Demographic Challenge (MITERD) has competencies in hydrological planning, public water domain control, and concessions on water use.

To supply the entire country and have water reserves, Spain's hydraulic model has relied on the creation of 1200 dams. This makes it one of the countries with the highest proportion of surface area occupied by reservoirs (Naredo, 1999). Despite this, neither water transfers nor this model have solved the problems of water scarcity in the territory (Dalmau et al., 2008). Water management in Spain is a public responsibility, from its source to municipal deposits. In Catalonia, the Generalitat has full competences in the water cycle, in the scope of what is known as internal accounts (rivers that originate in Catalonia and flow into the Mediterranean), while it shares competence with the state in the management of intercommunity basins. As for the management of water in low areas, the competence is municipal, but there are different models of management and governance: public, mixed or through a private company. In all cases, the guidelines are established by the public administrations: the Generalitat or the State in relation to high water, and the municipalities in relation to household supply (Ramírez, 2020). In the year 2000, progress was made in

including citizens in decisions about water management. The European Union ratified a directive, specifically the Water Framework Directive, which proposes several actions for member states with the aim of ensuring the quantity and quality of water, improving the condition of water bodies, distributing costs adequately and promoting public participation in decision-making. In this context, every six years, water management entities, including the Catalan Water Agency and various Spanish water boards and agencies, are required to review hydrological planning. In addition, they must provide spaces for participation so that citizens can intervene, suggest and reach a consensus on the measures that will be included in the hydrological planning.

2.1.1.2. Stakeholder competences – detailed assessment

2.1.1.2.1. What stakeholder serves as the Network Manager coordinating the stakeholders involved in the project?

➤ Comporta (Portugal)

The main agent acting as the Network Manager to coordinate the various stakeholders involved in the project is Águas Públicas do Alentejo, AgdA (partner of the project). LNEC (partner of the project) will support AgdA on the stakeholder engagement actions based on their knowledge on participatory processes in the water sector.

➤ De Waddenregio (Netherlands)

We will ask the Water authority HHNK to provide a network manager for the project.

➤ Llobregat (Spain)

The main agent acting as the Network Manager to coordinate the various stakeholders involved in the project is Aigües de Barcelona (partner of the project). However, Aigües de Barcelona will rely on Comunitat d'Usuaris d'Aigües de la Vall Baixa i Delta del Llobregat (CUADLL) to reach the end-users, as they have a wide network of irrigation communities in the territory. Furthermore, Cetaqua (partner of the project) will support Aigües de Barcelona on the stakeholder engagement actions based on their knowledge on participatory processes in the water sector.

2.1.1.2.2. What stakeholders collect data and monitor enforcement of water management decisions?

➤ Comporta (Portugal)

The Environmental Agency, also the Water Authority (APA) owns a monitoring network — the national water resources information system, SNIRH — that reports on meteorological, hydrological, surface and groundwater quality and quantity, covering the whole Portuguese territories. Other stakeholders, such as farmer and irrigation associations, have their own monitoring networks (e.g., EDIA, a public enterprise that manages the largest Portuguese surface water reservoir and irrigation water distribution system in Alentejo, the Alqueva dam, has its own meteorological, surface and groundwater network). It is mandatory for private stakeholders, such as irrigation associations, to report data to APA. Data from the Comporta MAR system is currently reported by AgdA to APA, based on the permit granted.

➤ De Waddenregio (The Netherlands)

HHNK (and other water authorities): legal entity for the infiltration permit $>150.000\text{m}^3$ /year. They also enforce the permit. HHNK is the main responsible entity for the development and enforcement for water management.

HHNK is the authority that collects data in the catchment. They collect data on both water quality and water quantity.

Acacia Water together with Technical University of Delft (TU-D) conduct the monitoring on the MAR site such as water quality, water quantity and hydrological modelling. Other stakeholders are also involved such as farmers through the initiative 'Boeren Meten Water'.

In the future, regular monitoring of water quality might be required to get permits.

➤ Llobregat (Spain)

The main stakeholder collecting data and monitoring water management decisions is the Catalan Water Agency (ACA), the public company of the Generalitat de Catalunya that is in charge of water planning and management in accordance with the basic principles of the Water Framework Directive.

2.1.1.2.3. What stakeholders conduct climate and hydrogeological modelling?

➤ **Comporta (Portugal)**

The national meteorological office (IPMA) conducts climate modelling (level 3- accomplished) together with Universities and associated research foundations (level 1- developing to 3- accomplished). Usually, hydrogeological modelling is conducted by Geological Services (LNEG), LNEG together with Universities and associated research foundations (level 2- proficient to 3- accomplished). These modelling procedures are typically developed under EU-funded research projects.

➤ **De Waddenregio (Netherlands)**

● **HHNK:**

- Surface water modelling 3

● **Acacia Water:**

- Hydrogeological modelling: 3
- Hydrological modelling : 3
- Soil moisture modelling: 3
- Financial Cost-Benefit : 2 proficient but limited because need of longer time series
- Social cost-benefit :1 developing, so far only conceptual approximation

● **Royal Netherlands Meteorological Institute (KNMI):**

- Climate changing and changing weather: 3 accomplished (also based on the IPCC)

● **Delft University of Technology:**

- Hydrogeological modelling: 3
- Hydrological modelling : 3
- Water quality: 3 developing since PhDs are currently being conducted

➤ **Llobregat (Spain)**

The stakeholders with expertise on climate and hydrological modelling are mainly the universities, which are Universitat Politècnica de Catalunya (UPC) and Universitat de Barcelona (UB). Concretely, the groundwater hydrology research group of the UPC and the Mineralogy, Petrology and Applied Geology department of de UB.

Furthermore, there are also several national and regional institutions, such as Instituto Geológico y Minero de España (IGME-CSIC), Institut de Diagnòstic Ambiental i Estudis de

l'Aigua - CSIC (IDAEA-CSIC), Institut cartogràfic i geològic de Catalunya (ICGC) and METEOCAT, the Meteorological Service of Catalonia.

Some other agents as Comunitat d'Usuaris d'Aigües de la Vall Baixa i Delta del Llobregat (CUADLL) and Agència Agència Catalana De l'aigua (ACA) also have decision support systems for resource management.

2.1.1.2.4. What stakeholders have expertise on business, environmental and socio-economic scenario development or similar skills (e.g. foresights and horizon scan, risk anticipatory skills)?

➤ **Comporta (Portugal)**

The Environmental Agency develops risk and socio-economic scenarios under the RBMPs. AgdA and CAP, among others, develop business models when considering new infrastructures.

➤ **De Waddenregio (Netherlands)**

Water authorities are the main stakeholder when it comes to scenario development of the water policy, availability etc. together with the Province of Noord-Holland and the Ministry of Infrastructure and Water/Delta Programme the water authorities have the opportunity to use the climate and water scenarios.

The province of Noord-Holland is the main authority when it comes to scenario development and understanding of the socio-economic & environmental situation.

The municipality is the second main authority when it comes to scenario development and understanding of the socio-economic and environmental situation.

➤ **Llobregat (Spain)**

On the one hand, the Department of Climate Action, Food and Rural Agenda analyses the socio-economic impacts of these environmental and climate change scenarios on rural communities, employment opportunities, food security, and related industries in Catalonia. On the other hand, the Catalan Water Agency (ACA) conducts assessments of current and future water resource availability, considering factors such as climate change, population growth, and economic development.

2.1.1.2.5. What stakeholders have expertise on impact analysis, including economic, social, and environmental aspects?

➤ Comporta (Portugal)

The impact analysis is usually conducted by the project promoter (private company, public entity, etc.) (with varying qualitative and quantitative capacities) and is evaluated by the Environmental Agency, the Water Authority, or any other public entity depending on the project features (e.g., the ICNF, National Forest Protection Agency if the project is located in or near a National Park, Protected Area or Habitats Directive).

➤ De Waddenregio (Netherlands)

No available data

➤ Llobregat (Spain)

The impact analysis is usually conducted by universities, technologic and research centers or academic institutions (with varying qualitative and quantitative capacities). Depending on the project features, impact analysis can also be conducted by the competent public entities.

In Catalonia, the Directorate General for Environmental Policy and the Natural Environment, along with the territorial services of the Department of Climate Action, Food and the Rural Agenda, are the environmental institutions in charge of environmental assessment.

The central services of the Subdirectorate General for Environmental Assessment process the environmental assessment of plans, programmes and projects, which may have a supra-municipal environmental impact, and sectoral plans and programmes of municipal scope. However, in certain cases, plans, programmes and projects with a territorial scope at the municipal level are also processed by the Subdirectorate.

On the other hand, the Territorial Environmental Action and Assessment Office of Barcelona and the Environment Office of Terres de l'Ebre, process the environmental impact assessment of projects and urban development plans at the municipal level corresponding to the territorial area of each case. Other public entities like the Waste Agency of Catalonia or the Directorate General of the Cultural Heritage can also contribute to impact assessment depending on the expected impacts.

Cetaqua (project partner) holds extensive expertise on environmental, economic and social impact evaluation, developing cutting-edge methodologies and tools to assess and quantify the impacts and resilience of water resources and infrastructure. The Universitat Politècnica de Catalunya (UPC) and Universitat de Barcelona (UB) are also stakeholders holding extensive experience on impact analysis and the formulation of groundbreaking methodologies in economic, social and environmental impact assessments. Concretely, the Research Group on Sustainability Science and Technology of the UPC and the Faculty of Economics and Business of the UB.

2.1.1.2.6. What stakeholders have expertise in risk assessment and management?

➤ Comporta (Portugal)

Universities and associated research foundations, LNEC, LNEG (geological services), Environmental Agency, private companies, etc., with varying qualitative and quantitative capacities.

➤ De Waddenregio (Netherlands)

No available data

➤ Llobregat (Spain)

The Universitat Politècnica de Catalunya (groundwater hydrology research group), IDEAI-UPC (Intelligent Data Science and Artificial Intelligence Research Center) and Cetaqua (project partner) are at the forefront of developing machine learning techniques and risk assessment methodologies for the water cycle. These groundbreaking tools integrate the potential impacts of future changes, including climatic, land use and socioeconomic factors, providing guidelines for mitigation and adaptation measures. These organisations have collaborated in innovative projects enhancing preparedness and operational risk management within the water cycle. These advanced tools are designed to provide emergency agencies and water utilities with robust decision-making capabilities and ensure the resilience of water resources.

Reno (Italy)

No detailed data for risk assessment associated with water management decisions is available. However, in Italy risk assessment in general is managed by insurance companies, which are all reunited under the National Association for Insurance Companies (ANIA).

2.1.1.2.7. What stakeholders have expertise on Policy analysis?

➤ Comporta (Portugal)

The national water authority, APA.

➤ De Waddenregio (Netherlands)

To be discussed with HHNK, the Province of Noord-Holland. This is or should be evaluated in the Deltaprogramma.

➤ Llobregat (Spain)

As the hydraulic authority in Catalonia, the Catalan Water Agency is in charge of the governing policies concerning Catalonia's water bodies, and thus responsible for implementing the principles of the Water Framework Directive in the territory. As the competent actor to manage and plan the water cycle in the region, the Agency conducts policy analysis to develop hydrological planning instruments.

The Department of Climate Action, Food and Rural Agenda of the Generalitat de Catalunya is the competent department of agriculture, fisheries and environmental policies. In order to set strategic guidelines for the institution's public policies, the Department prepares plans and programmes that demand policy analysis in order to specify future target scenarios and actions to be taken to get there.

Àrea Metropolitana de Barcelona (AMB) has competences for the water supply in the Barcelona Metropolitan Area. In order to ensure the correct functioning of both, the actions carried out in the supply network and the associated investment, the AMB agency develops strategic, sectoral plans and programmes in regards to the water cycle.

2.1.1.2.8. What stakeholders have expertise on participatory approaches to problem scoping and solution seeking?

➤ Comporta (Portugal)

NGOs usually promote participatory approaches (e.g., Liga de Proteção da Natureza - LPN, Associação ZERO - level 2- proficient to 3- accomplished).

➤ De Waddenregio (Netherlands)

- Acacia Water: strong and loyal network of farmers
- LTO Noord

➤ Llobregat (Spain)

Cetaqua (project partner) has expertise on participatory approaches involving water utilities, citizens, industries and relevant entities in the water sector. As a Water Technology Centre, Cetaqua's own organisational model is based on the collaborative research and development between the private, public and scientific sectors to facilitate actor's interaction and speed up the implementation of innovative solutions in the water sector.

Local NGO's promote participatory processes engaging citizens, private businesses, governments and organizations to tackle water governance challenges and climate change impacts on catalan water bodies, especially in the current context of water scarcity (e.g Associació catalana d'amics de l'aigua, Agua segura project, Agrupació de Defensa Vegetal del Baix Llobregat d'Horta, Agrupació de Defensa Vegetal del Delta del Llobregat).

In the same way, Comunitat d'Usuaris d'Aigües de la Vall Baixa i Delta del Llobregat (CUADLL) has extensive experience in promoting collaboration and the creation of working groups with end-users.

Finally, the Catalan Water Agency develops participatory processes in each cycle of the hydrological planning (current cycle 2022-2027: The future of water in Catalonia), has experience in creating interests groups and runs annual participatory sessions per district in order to make the information on the evolution of the measures established in the review public and accessible.

3. Steps for CoP implementation and management

○ 3.1. Knowledge sharing spaces

3.1.1. Workshops organisation: general features

Workshops should be meticulously planned and executed with clear objectives in mind, which should be developed together with all involved stakeholders. For that, a CoP roadmap will be established for each demo site (Annex 4) in order to guide the dynamics of the CoPs towards achieving their objectives. In addition to the roadmap, the meetings and workshops of the CoPs should be evaluated to allow for adjustments and/or corrections to the alignment of the planned activities (Annex 5).

To organise an engaging participatory workshop, partners will require at least 2 hours and 30 minutes, though dedicating an entire day is ideal for comprehensive group involvement.

It is important to include brief presentations about the project and its context at the beginning of the workshop to ensure that participants gain valuable insights.

The choice of methods and the decision to run parallel groups or sessions will be influenced by the objective of the workshop, its location (in-person or online) and the number of attendees; managing more than 10 active participants can pose a challenge to achieving balanced participation.

Incorporating exploratory sessions with smaller split groups, followed by presentations of their ideas to the larger group, which then prompts a discussion and debate, can be an effective strategy.

3.1.2. Prepare the workshop

To effectively prepare for a workshop, the following steps should be methodically executed:

Two months prior:

- Select a date through mutual agreement between WP3 coordinator and the demo sites rapporteur, all of them are required to attend the workshop.
- Create a document that outlines the objectives of the workshop.

- Extend invitations to all stakeholders, requesting confirmation of their attendance. The invitation should clearly state the purpose and provide a preliminary agenda of the event.

Two weeks ahead of the workshop:

- Create and finalise a document that outlines the workshop's objectives and provides a comprehensive schedule of events (the document should be at least one page).
- Dispatch a reminder email to all stakeholders, document. Additionally, request that stakeholders nominate a representative to attend on their behalf should they be unable to participate on the day of the meeting.

Material:

To ensure your presentation is effective and interactive, consider preparing the following materials, tailored to the tools and methods you plan to use:

- Develop various materials to enhance your presentation, such as maps, slide presentations, and detailed reports. These can provide a visual and informative backdrop to your discussion points.
- Create posters to facilitate conversation during split sessions, or utilise pre-designed or real-time developed paperboards to capture the flow of ideas and feedback.
- Supply essential items like blank paper, sticky notes, and pens for participants.

For a more interactive experience, consider leveraging web applications that facilitate specific engagement strategies, such as real-time voting or feedback collection. This can add a dynamic element to the workshop, encouraging greater participation and providing immediate insights.

Moderation techniques

The table below aims to support CoP implementation and management with explanations of various moderation techniques for CoP meetings over the course of the project. Each meeting will require a different set of activities to engage the stakeholders and will require different activities as the project progresses. As such, the moderation techniques are organised according to different purposes and activities in sequential order (i.e., introduction, setting the scene, defining scope and direction, brainstorming, making knowledge explicit, and decision-making) to make it easier for the CoP management to select the most suitable moderation technique. This overview draws upon STOP-IT (Brouwer et al., 2018; Freitas et al., 2018), BINGO (Brouwer et al., 2018), NextGen (Andrews et al., 2021), WaterMining (Dirkse-Hulscher & Talen, 2007; Dosièrè & Wilems, 2016) and B-WaterSmart (Rebelo et al., 2021) work in the implementation of stakeholder initiatives.

Table 06: Moderation techniques in participatory approaches

Activities	Technique	Purpose	Benefits
Introduction	Welcome coffee and coffee corners	Aim to stimulate interaction between the participants and help break the ice	Saves time through avoiding formal introductions Facilitates informal networking and introduction
	Interviewing	Interactive introduction technique suitable for larger groups	Prevents people to elaborate too much on their own introduction Stimulates listening to the other person
	The elevator pitch	Allows participants to briefly introduce themselves	Easy and fast way to get to know the participants in the CoP
	Single word introductions	Is an icebreaker technique that can be done in small groups or with all participants	Keeps individual introductions brief Stimulates participation and discussion
	Checking-in	Can be used to check in participants at the beginning of the meeting using a specific pre-determined question	Helps facilitating a sense of community in between the meetings Facilitates the communication between the CoP members
Setting the scene	Team purpose and culture	Helps the CoP to jointly define the purpose (why) and culture (how) to be pursued	Lays the foundation for good collaboration Creates common ground and shared expectancies Defines the purpose of the CoP
	CoP point of departure	Helps define the aim, direction and first steps of the CoP	Saves time through avoiding formal introductions Facilitates networking
	Asking the right questions	Is a way to identify key issues that need to be addressed	Interactive way to identify potential obstacles in the project Facilitates learning and knowledge exchange Facilitates team building, respect and trust
	LEGO PIECES with PESTLE bias	Helps to sort the challenges, risks and solutions into categories that can be further detailed into sub-categories	Supports active participation of all participants Facilitates finding ideas/solutions for tackling specific issues

Activities	Technique	Purpose	Benefits
			Supports out-of-the-box thinking and helps visualising challenges and potential solutions Facilitates uncovering assumptions and positions Supports discussion and learning from other perspectives
	SWOT world café	Allows for the joint map of strengths, weaknesses, opportunities and threats that can be used as a basis for more in-depth discussion and action planning of	Supports active participation of all participants Allows for a relatively fast SWOT analysis Supports informal knowledge exchange, reflection Allows for different perspectives
	"Futuribles" storytelling role play	Aims to map the expectations regarding the project outcomes and to create an understanding of each other's points of view	Helps the creation of a common ground between participants Facilitates expectancies management
Brainstorming	Roundtable	Participants are led to discuss topics separately and agree on the content of the discussion's final output as a group	Supports active participation on all issues and input from all participants Supports building on other ideas Facilitates knowledge exchange
	The other way around	Participants are led to think of the worst-case scenario and then work backwards from that point to find suitable solutions	Helps breaking out fixed thinking patterns Stimulates innovative thinking
Decision making	Perspectives	Based on roleplaying; participants take on assigned roles, brainstorm ideas and share them with the group	Creates more understanding of others perspectives Helps to reach consensus and decisions
	Personas	Stimulates participants to step out of their own perspectives to create more understanding of others' perspectives and jointly identify drivers and barriers to implementing action	Stimulates participants to think from different point of views Helps to identify drivers and barriers Enhances mutual understanding
	Scenarios	Is used to reach a consensus between a wide range of stakeholders and to come to a well-informed decision	Allows a quick overview of the consequences of the identified solutions Helps to reach consensus between CoP participants Helps to come to a joint decision

3.1.3. During the workshop

For the workshop's facilitation team, it is recommended to have three members from the leading partner institution: two individuals dedicated to facilitation duties and one responsible for taking meeting minutes, as well as photographing and video recording the event, especially during plenary sessions.

Ensure the provision of a sign-off sheet to secure consent from participants for the use of their images and recordings. This sheet should also facilitate the collection of professional contact information from all attendees.

Appoint rapporteurs for each side event to ensure the generation of comprehensive written feedback and summaries of all discussions, including those within sub-groups.

Clearly state and post (on the walls) the MARCLAIMED rules of the workshop: transparency, mutual respect and trust, listening, Empathy.

Set clear guidelines for conducting dialogues. These can range from a small, roundtable setting where open discussion is encouraged, to larger gatherings where participants may only speak after following a predetermined protocol, such as raising their hand and being acknowledged by the facilitator.

Clarify roles in a session:

- Facilitators: Their main objective is to foster dialogue. They achieve this by not sharing personal viewpoints but instead asking questions or rephrasing statements to ensure everyone's ideas are clear and understood by all attendees (see moderation techniques).
- Active Participants: These individuals are the main speakers or contributors during the session, actively engaging in the discussion and sharing their insights.
- Listeners/Reporters: Assigning listening roles to certain experts may enhance the discussion by preventing their dominance from discouraging other participants. This approach helps ensure a more balanced contribution, as there's a risk that others may defer to these experts or feel intimidated to share their own thoughts.

Post-workshop, an anonymous assessment is recommended. Conducting this evaluation in paper form at the session's conclusion tends to yield more comprehensive feedback compared to surveys sent out afterwards. This method ensures participants' thoughts and suggestions are fresh and more accurately reflect their workshop experience.

3.1.4. After the workshop

- Document the Workshop: Begin by creating comprehensive minutes and video recordings of the workshop.
- Seek Stakeholder Approval: Following the documentation, reach out to stakeholders for their review of the minutes. Provide them with an opportunity to suggest amendments.
- Share the Minutes Publicly: Once the minutes are finalised and approved by stakeholders, publish them in a dedicated, accessible space online.
- Offer a Summary in Various Formats: consider doing a written, recorded (or another format) summary of the workshop.
- Assess the workshop right after (annex 5) and prepare a report regarding each workshop (annex 6)

3.1.5. Secondary facilitation tools to ensure continuity in the engagement process Storing data and information for all

To ensure a continuity in the engagement of stakeholders, trust, transparency and relevance of the process content are essential. Concretely, this means that stakeholders must, at any time, be able to find information relative to the ongoing process & share data or views with the group.

Specifically, they must be able to find information on:

- The members of the stakeholder group.
- The advancement of the process including agenda and minutes from workshops (and videos).
- The information from “science” tools such as models, sources of data used, and simulation results (database of plausible futures) if already available.

And be able to share with the group members:

- Data or reports they have on the topic of MAR with AWR that can help assess the strategies and scenarios discussed.
- Ideas of strategies they can have
- Positions on some strategies and arguments.

To this end, we rely on communication tools supported by MARCLAIMED and specifically the internet web site (www.marclaimed.eu).

Other options for storing and making data available includes the creation of virtual spaces where stakeholders and scientists can exchange information in between workshops. The choice of an option can be decided with the stakeholders during the first workshop. The options include creating:

- LinkedIn page: ([MARCLAIMED EU: Resumen | LinkedIn](#)) / X: [Marclaimed](#)
- a mailing list: any member of the list can send mails to the list
- a chat & work application such as Discord or Slack: where people can exchange ideas and documents.

Graphical sketch noting

An alternative approach involves utilising visual facilitation tools. This entails capturing all the information and events the scientific team wishes to communicate through sketches and notes displayed on panels predominantly featuring graphics.

Training Sessions for Stakeholders

This idea would allow preparing the stakeholders, or their representative staff, for acting as agents of MAR. Technical training sessions on running a model for instance, and introducing the staff to data inputs and outputs, will increase their involvement and will make common visions more concrete. Training sessions may take place at a further stage of the project, once DSs are confident enough about the tools and models they are employing. Such sessions, which can be in the form of 1/2 day summer or winter schools, will be of mutual benefit, where water labs may make use of the practical value added by stakeholders to their science, and stakeholders would learn new tools that may enrich their skill sets in fields related to water management, monitoring, etc.

○ 3.2. Rules of engagement and governance

In MARCLAIMED, the rules of engagement will build on the Talanoa Dialogue (UNFCCC, 2018), an empathic, inclusive and transparent conversation among participants to share stories, build trust, and make wise decisions for the collective good. In each demo site, we

will establish governance bodies and rules managing the interactions and behavior within the network. To build trust and communication among stakeholders, in each demo site we will appoint a key public stakeholder as network manager. The network manager will govern the network supported by the scientific coordinator. This includes managing possible tensions and competition among stakeholders following well-defined rules of engagement. Moreover, to foster interchange across demo sites, we will establish an international network board or 'network of networks' that includes all network managers and Consortium partners. To ensure communication between stakeholders and the management board, we will set meetings of the governance body every three months.

Governance bodies

In the context of WP3 of the MARCLAIMED project, the governance structure is designed to facilitate collaboration, decision-making, and scientific integrity among various participating entities, including key stakeholders. This framework comprises three key components (Figure 6):

- **Management Board:** The Management Board is the executive decision-making body responsible for the strategic direction and overall management of the WP3 co-creation activities. It ensures the WP3 alignment with its ToR, as per their description in this document, providing a high-level direction. The Management Board will identify designated stakeholder engagement and *impact champions* to ensure that the project Consortium considers and responds adequately to the recommendations and suggestions from stakeholders in demonstration sites as part of WP3 co-creation activities. Impact champions will address, inter alia, issues relative to Responsible Research and Innovation (T4.3) including gender equality (including gender balance and gender-sensitive research aspects), ethical issues, and open access to the research data and results of the project and assess its potential impact among the identified stakeholders. These impact champions are a key mechanism within MARCLAIMED for the partners to prepare for and follow-up from interactions between the Consortium and stakeholders, encouraging knowledge sharing, peer-learning and the incorporation of relevant innovations and developments. The Management Board will monitor these impact champions in each one of its meetings (see Annex xxx for the Impact Champions description and monitoring). The Management Board is composed of one representative from USAL and Cetaqua, as well as the scientific managers below: LNEC, Acacia water, and Aigues. The board will meet 2 weeks before every WP3 3-month meeting using web meeting/conferencing tools.

- **Scientific manager:** The Scientific manager oversees the scientific integrity and direction of initiatives conducted with stakeholders in demo sites. This role is held by the partner leading each demo site, namely, LNEC, Acacia, and Aigues, symbolising a tripartite leadership that brings diverse expertise and insights to the scientific oversight of the MARCLAIMED project.

- **Network Manager:** The Network Manager is a public stakeholder tasked with serving as a co-leader of the stakeholder engagement activities in the demo site alongside the scientific manager. This role involves facilitating communication, aligning activities with the project's objectives, and ensuring that all parties are effectively contributing to and informed about the project's progress. The Network Manager should ideally act as the central hub of stakeholder engagement, but we reckon this may be limited by time or other resource constraints. In those cases where the network manager cannot centralise all stakeholder engagement activities, support will be provided by the demo site scientific manager.

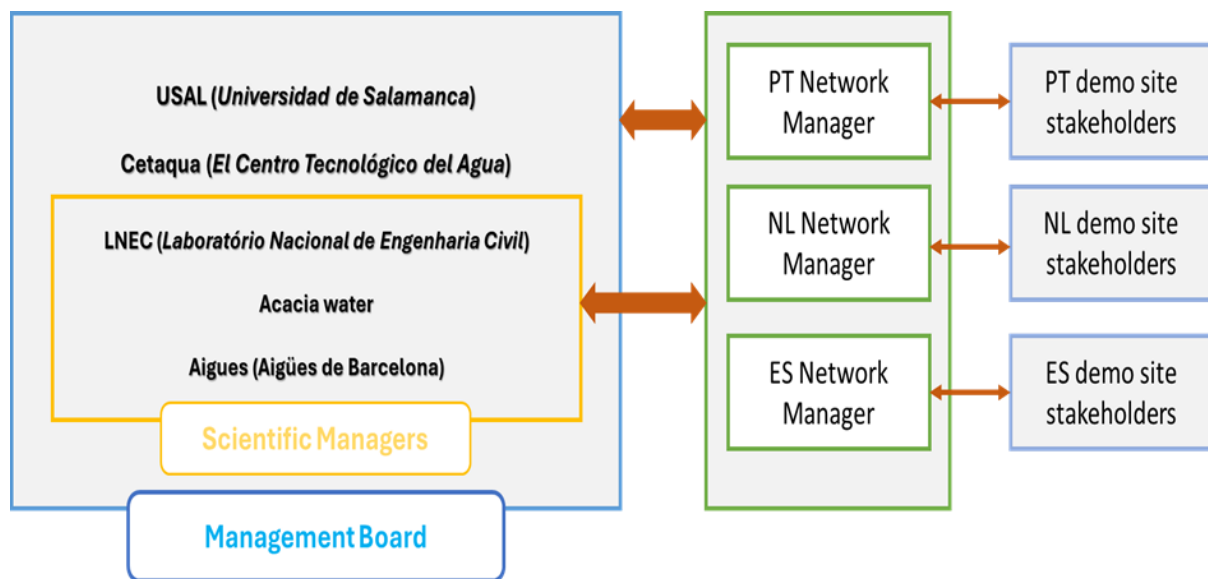


Figure 6: Integrated Governance and Scientific Management Framework Across Demo Sites

Principles

As we tackle the intricate challenges of water resources management, our goal is to foster meaningful advancements through adherence to the highest standards of research and

innovation. Our approach is rooted in a foundation of robust, evidence-based practices characterised by transparency and integrity. We align our efforts with the ethical principles and research integrity guidelines of the EU Horizon Europe Research and Innovation program, ensuring our actions are compliant with both local and international legal frameworks, including the Charter and the European Convention for the Protection of Human Rights and Fundamental Freedoms, alongside the European Code of Conduct for Research Integrity.

- Adhering to the laws and regulations of the European Union and countries or regions where the pilot study takes place is our project's primary principle. We are committed to following all pertinent laws, regulations, and guidelines related to research and innovation. This commitment might sometimes require us to seek approval from specific committees dedicated to evaluating research to ensure it upholds ethical standards. Moreover, we value and build on the existing agreements with organisations involved in the MARCLAIMED project.

- Respect, transparency, and honesty stand as cornerstones of research ethics. It is our commitment to treat every participant with dignity and respect, safeguarding them from harm or discomfort throughout the research journey. This means refraining from any actions that could be seen as disrespectful or discriminatory, and upholding fairness and equality in the treatment of all participants.

The stakeholders in various knowledge networks come from diverse backgrounds, including different countries and cultural contexts. We will be respectful of these differences and will listen actively to each other's perspectives. An open and constructive dialogue will foster collaboration and mutual understanding. We will be transparent and honest about our methods, findings, and any conflicts of interest that may arise during the research process. This includes accurately reporting the results of the research, disclosing any potential conflicts of interest, and acknowledging the contributions of all individuals involved in the research.

Inclusive dialogue places a higher emphasis on inclusivity and creativity rather than on speed and outcomes. This approach is rooted in the understanding that generating knowledge collectively involves a wide range of stakeholders, each with their own unique viewpoints. To enhance the effectiveness of this collective knowledge creation, it's crucial to acknowledge and value the various perspectives of all stakeholders. This includes understanding their different knowledge bases and value systems. By doing so, we can better comprehend how diverse contexts affect knowledge creation and foster a mutual understanding among all involved.

Constructive decision-making and conflict resolution processes are a key factor for a successful stakeholders' engagement, built on mutual trust across different stakeholders and researchers. This is one of the main principles of our dialogue where participants share stories, build empathy and trust, and make wise decisions for the collective good.

Storytelling is an interactive endeavour where a community collectively delves into different scenarios and outcomes associated with water management, climate and policy shifts, contemplating their possible effects. This method allows for a broader examination of potential futures, steering clear of dependency on solitary forecasts, thereby leading to better-informed choices. The use of the human-water model plays a pivotal role in this collaborative story development, offering vital data and insights to mould the narrative. Such a strategy gains significant importance in the context of intricate and unpredictable systems, where conventional forecasting techniques might fall short.

- **Informed consent** means ensuring that all stakeholders involved are thoroughly briefed on the objectives of the research and choose to participate of their own free will. Its primary aim is to guarantee that before becoming part of the knowledge networks, all parties are well-versed in the essence of the study, aware of the potential risks and benefits associated with their involvement, and understand their entitlements as participants.

- **Confidentiality and privacy** are crucial elements of research ethics. Our ethics management plan, developed with these concerns in mind, guarantees the confidential and sensitive handling of data. We are committed to safeguarding participants' identities and securely storing data to ensure their privacy throughout the research process. This commitment encompasses honouring participants' privacy and confidentiality rights, as well as safeguarding them from any potential harm or discomfort. Meetings will be conducted following the Chatham House Rule to ensure the confidentiality of the information sources discussed. This rule allows participants to freely discuss and utilise the information exchanged during the meeting while prohibiting the attribution of any shared information to particular individuals or organisations. The aim of this rule is to foster an environment where open and honest discussions can occur without concerns of attribution or repercussions.

- **Data management** is a fundamental principle we uphold. The exchange of data fosters scientific openness and teamwork, paving the way for novel findings. Our objective is to acquire, process, and produce data that supports research efforts. This includes gathering both new and existing local or regional data relevant to our research, as well as data from stakeholders. We are committed to implementing suitable measures to ensure the privacy of all participants.

o 3.3. *Adaptive efficiency*

The endogenous dynamics of institutions tend to create and reinforce their own stability or equilibrium, potentially leading to a path-dependent process of technological and institutional co-evolution that creates barriers to the diffusion of desirable water reallocation policies such as via MAR with AWR (Wheeler et al., 2017). For example, groups that recognize collective interests will typically lobby in favour of a policy, which in turn relies on a given set of institutions, which in turn have an influence on reform costs (via transaction costs, i.e., the costs of arranging a (re)allocation ex ante, and then monitoring and enforcing it ex post) and can contribute to block reform (e.g. irrigators v. environmentalists) (Kuhn, 1970; Rausser et al., 2011). This explains why institutions typically show patterns characterised by incremental change, rather than transformational, over long periods (Seto et al., 2016). To overcome this limitation, planners must design adaptively robust institutions that can identify and shift to superior policy alternatives as new information on possible futures is made available.

Adaptive robustness requires the avoidance of path-dependent dynamics; which in turn requires lock-in costs minimization. Lock-in costs are the effects of present institutional options on the costs of transitioning to future institutional options necessary for the adoption of superior policies (McCann, 2013). Critically, future institutional options and policies and related lock-in costs are conditional on future states; which, under deep uncertainty, are often unforeseeable. This makes lock-in costs “extremely difficult to predict, measure and manage” (Marshall, 2013).

To circumvent this obstacle, one option is to build upon North's (1990) concept of adaptive efficiency. Adaptive efficiency aims to understand past long-term trajectories of institutional economic performance in contexts of entrenched path dependencies, complexity, uncertainty, and feedback between policy reform and implementation. Adaptively efficient institutions are those expressing capacity to solve evolving and complex dilemmas over long periods of time, in a context of periodic, unforeseeable shocks. Note that the concept of adaptive efficiency mirrors that of adaptive robustness: adaptive efficiency looks at past institutional performance to identify those institutions that were successful and efficient in taking corrective action; and adaptive robustness aims to remove constraints to institutional capacity to take corrective action in the future. While ex-post adaptive efficiency does not equal adaptive robustness, it is reasonable to expect that institutions that have proven to be adaptively efficient over long periods of time are more likely to be adaptively robust in the future (Hegerl and Russon, 2011). Past institutional performance over sufficiently long

periods of time can give valuable information to assess whether we are investing in institutions that are adaptively robust, and the critical variables that explain so.

For example, Garrick (2015) associates adaptive efficiency with three performance indicators: 1) how well the objective(s) have been met (i.e. effectiveness); 2) the average institutional transaction costs (including lock-in costs, static transaction costs and transition costs—see table below) per unit of those met objective(s); and 3) total program budgets. To achieve adaptive efficiency, these three performance targets should be increasing, decreasing and sufficient, respectively. Quantitative information on these three performance indicators could be used to test and further elaborate Garrick's hypothesis, and to find predictors for adaptive robustness through the assessment of the critical variables explaining adaptive efficiency. Yet, although these three indicators are empirically measurable, the insufficient empirical base to measure and monetize transaction costs constrains current capacity to effectively assess adaptive efficiency and adaptive robustness.

To minimise risks and speed up adaptation to change, in MARCLAIMED we will study the organisational structures in place; monitor transaction costs (i.e. the institutional costs of administering, designing, monitoring, implementing and enforcing water policy arrangements—see table below); and design adaptively efficient institutional setups that can identify and shift to superior alternatives as new information is made available, such as by adjusting its scope, changing its management, adapting to members joining/leaving the network, and revising incumbent policies when they can be outperformed by alternative strategies (Garrick, 2015). The relevant transaction costs we will measure are described below. A key advantage for the cost-effectiveness of this task of transaction costs monitoring is that most relevant transaction costs will be incurred by partners involved in the project, thus a simple accounting of the expenses incurred (including monetization of the time spent by external and non-remunerated experts in the relevant tasks, e.g. participation of stakeholders in workshops) will provide a first proxy of transaction costs of MAR with AWR implementation.

Institutional transaction costs include: (1) administering, monitoring, contracting and enforcing current policy arrangements (static transaction costs); and (2) periodically designing, enabling, implementing new and/or transitioning existing management arrangements (transition costs); where (3) transaction cost investments are also affected by previous policy or institutional choices which may enhance or constrain future selections (lock-in costs) (McCann, 2013) (see Table 7).

Table 07: Institutional transaction costs categories. Adapted from Marshall (2013) and Garrick (2015).

Classes	Category	Environmental policy examples	Water market arrangement examples from Australia and the US
<i>Ex-ante</i>	Transition costs	Research and information	River Basin development planning and closure (cap) Hydrologic and socio-economic studies
		Enactment or litigation	Water rights reform (adjudication, conflict resolution, rules)
		Design and implementation	Modification to storage and distribution, Licensing system, Trading rules and registries Price discovery Water accounting system
<i>Ex-post</i>	Static transaction costs	Support and administration	Transaction planning Identification of buyers and sellers Administrative review (injury analysis)
		Contracting	Water rights due diligence
		Monitoring and detection	Water use accounting
		Prosecution and enforcement	Compliance monitoring and enforcement Dispute resolution
	Lock-in costs	Adaptation or replacement	Revise cap Adapt water rights and water user associations rules Acquire water rights for the environment if cap is revised downward

○ 3.4. Co-creation steps

Co-creation processes across demo sites in T3.2 will be realised through a number of tangible outcomes where stakeholders and MARCLAIMED partners: 1) co-design credible

climate and socioeconomic scenarios (input for modelling activities in T1.1-6); 2) co-design relevant AWR strategies in demo sites, including financial mechanisms and partnerships to secure cost recovery and sustainable investments into MAR with AWR (input for modelling activities in T1.1-6); 3) co-develop modelling efforts (input for T1.1-6 and T2.1, and indirectly for all of WP2); 4) co-evaluate AWR strategies, combining mechanistic modelling outputs with heuristics and inductive reasoning (e.g. leveraging on stakeholders' experience to speculate upon the consequences of a given AWR strategy) so to identify strengths and vulnerabilities to selected strategies (this step builds on WP1 results, and provides additional feedback to revise modelling efforts in WP1); and 5) co-identify the AWR strategy(ies) with the highest potential to build resilience of the structural supply systems in the context of climate change. Note that as a result of continuous interaction and deliberation among stakeholders and MARCLAIMED partners, a likely outcome of the co-identification stage is to reset the analysis considering alternative/additional strategies, model settings and/or scenarios. The result is an iterative 'stock-taking' co-creation process, where stakeholders and MARCLAIMED partners learn from each other, collectively create knowledge and build consensus, until a decision is agreed upon and, ideally, collectively implemented (Figure 7).

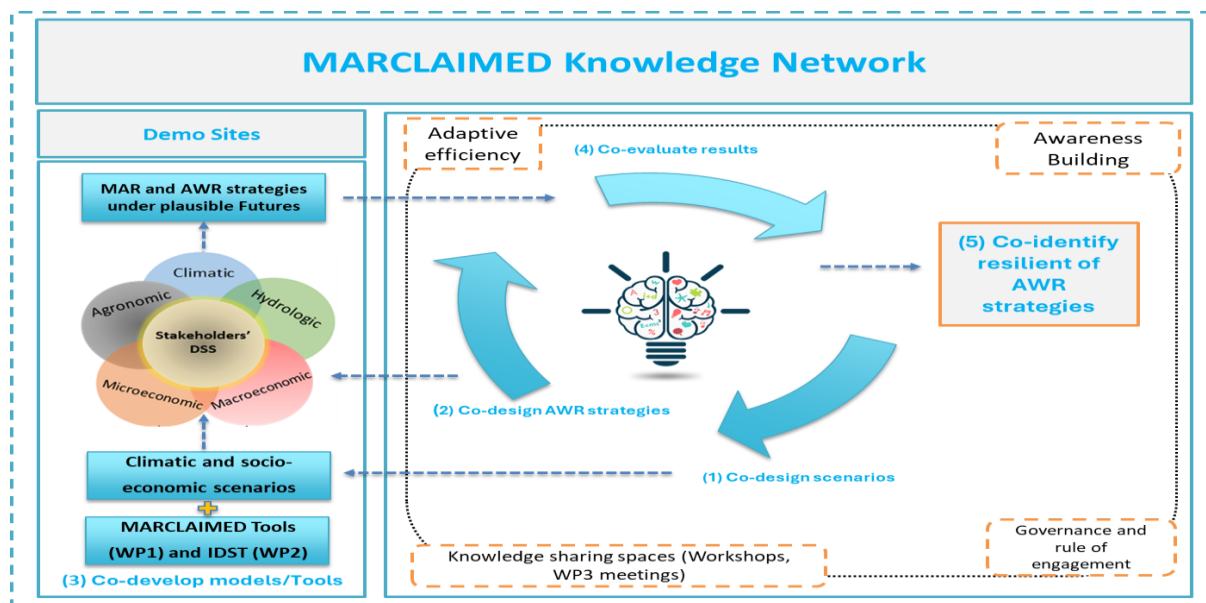


Figure 07: MARCLAIMED iterative 'stock-taking' co-creation process

3.4.1. Co-design scenarios

Scenarios play a crucial role in the MARCLAIMED project, particularly in engaging stakeholders. These scenarios are envisioned as external factors influencing the areas of interest, focusing on their socio-economic growth impacts.

Key dimensions include:

Climate: Recognized for its profound effect on hydrology and water resource availability, climate scenarios are integral. These will serve as foundational inputs for modelling efforts, either directly or through comparative model studies like CMIP6 or ISIMIP.

Exogenous Socio-economic and Technological Factors: These elements are critical as they both limit and define the developmental pathways available to the territory. Additionally, they establish a global backdrop that may either facilitate or hinder the rise of strategies developed within the territory.

Endogenous Socio-economic and Technological Progress: This dimension emphasises innovation and development originating within the territory itself, showcasing the area's capacity to generate internal solutions and strategies.

Demo sites in MARCLAIMED should feature scenarios that are clear and engaging for diverse partners, including stakeholders. These scenarios can be brought to life through narratives or storylines, accompanied by both textual and graphical elements. Additionally, incorporating creative approaches such as mock press articles can enhance the illustration of these scenarios. These narratives should weave together significant trends, change agents, or drivers into a coherent story that impacts crucial variables like population dynamics and land use.

For our project, we propose leveraging the groundwork laid by the IPCC, specifically the 5 Shared Socioeconomic Pathways (SSPs). We aim to tailor and interpret these SSPs for the specific demo sites examined in MARCLAIMED. The SSPs are particularly valuable because they integrate two essential dimensions: the climatic context and socio-economic factors. These dimensions influence both the average and distribution of income and development levels, which are pivotal for creating scenarios on water resilience.

A specific point we should integrate in the scenarios is the occurrence of major water management crises before or after each horizon. These are mechanically integrated in the climate scenarios but it would be different and interesting to integrate them also in the narratives to discuss whether the occurrence of such events happen before or after major investments / adaptation have been taken. These can also be alternative options within the scenarios (that would illustrate the uncertainty within a scenario).

These scenarios will be used to force the modelling framework and generate a baseline.

3.4.2. Co-design AWR strategies

This step is aimed at developing strategies for alternative water resources that will meet specific objectives. It involves collaboration among scientists, stakeholders, and end users within the Community of Practice (CoP) to identify a blend of actions for addressing current water imbalances and adapting water usage to climate change. These strategies will be explored at demonstration sites with the involvement of stakeholders.

The concept of Alternative Water Resources (AWR) is widely recognized in policy and academic discussions, yet its practical application can be challenging for those directly involved in field operations or management. Therefore, it requires practical interpretation and application through tangible measures. The significance of developing strategies for alternative water resources lies in their potential to improve both the availability and quality of water. A prime example of such a strategy is the utilisation of reclaimed water. This entails the treatment of wastewater to eliminate solids and contaminants, rendering it suitable for various uses such as agricultural irrigation, landscaping, industrial processes, and the replenishment of aquifers. By adopting these measures, we can lessen the pressure on fresh water supplies and mitigate pollution by preventing the discharge of untreated wastewater into natural watercourses.

The co-design of AWR strategies involves three critical steps:

Strategy Identification and Characterization: This step involves brainstorming and reviewing existing literature by the MARCLAIMED team to identify potential strategies. Involving stakeholders is crucial; their feedback is gathered through the workshops, where strategy design is a key focus. It's essential to consider all ideas, regardless of how marginal they may seem, to ensure a comprehensive set of strategies is developed.

Strategy Selection: Strategies can be selected with stakeholder involvement during workshops. Alternatively, selection may occur in smaller, more focused meetings if the initial workshop is too large for effective decision-making. The process should foster an open and inclusive debate, aiming for consensus. If consensus is unattainable, voting may be employed as a method to decide on a strategy. Regardless of the method, it's important that the MARCLAIMED team ensures a broad range of strategies are considered and modelled. This allows stakeholders to evaluate the impact of various options and revise their choices accordingly.

Strategy Combination: The final step involves combining the selected strategies. This requires reflection on the general context in which these strategies can coexist and be effective. Considering the asymmetric impacts of various external scenarios on the

strategies is crucial. Utilising a matrix to cross-reference scenarios with strategies and their impacts can be an invaluable tool in exploring effective combinations.

Another tool that aids in the combination and integration of strategies within a particular scenario involves reflecting on the entities that will support and initiate each strategy. This consideration encompasses the stakeholders associated with each strategy. By identifying these stakeholders, connections to the system of innovation approach are established, leveraging the relationships and intentions of the ecosystem's diverse stakeholders to craft relevant strategies. These stakeholders include:

- State or local governments, responsible for creating instruments and regulations.
- Individual water users, such as farmers, domestic users, and industries.
- Third parties, such as technical advisors, solution providers, banks, and insurance companies.
- Collective organisations, whether existing or yet to be established.

The concept of introducing different horizons allows for the adjustment or addition of strategies over time, as recommended by the Dynamic Adaptation Policy Pathways Framework (Haasnoot et al. 2013). This approach suggests that not all options need to be implemented immediately and irrevocably. Instead, alternative pathways may be considered in the future once uncertainties are resolved.

Dynamic Adaptation Pathways represent sequences of potential actions, often visualised as a decision tree or a subway map, focused around critical tipping points. Tipping points are defined as moments when a current action becomes irrelevant or ineffective, necessitating a change in trajectory and the adoption of a new measure or strategy. Each pathway represents a potential route towards achieving an objective through different means. Tipping points can be identified using computer simulations, with each trajectory's costs and benefits analysed and represented accordingly. These processes can be undertaken during MARCLAIMED meetings and workshops.

3.4.3. Co-develop models

Through co-development, we will work alongside stakeholders in demo sites to explore the relevance of the different tools to be designed in WP1 and integrated into the IDST in WP2. Co-development efforts can be implemented at various stages, from the early design of the modelling framework (positive) to the fine tuning of models. MARCLAIMED scientists adopted a proactive approach and defined a modelling approach in the DoW, which stakeholders will contribute to fine tune and validate. Co-development efforts will be thus relevant to adjust the tools proposed in WP1, which have been already tested in the context

of other projects, rather than to develop them. This more normative setup is necessary to ensure a timely delivery of the IDST tool in month 15. Relevance of the tools in WP1 is warranted by previous work with stakeholders towards calibrating them.

The role of stakeholders in co-development will focus on the identification of key parameters and modelling structural gaps towards conducting sensitivity analyses that underpin the development of tools that are capable of identifying AWR strategies that deliver a satisfactory performance under most plausible futures.

Co-development in MARCLAIMED will thus focus on stress-testing the tools in WP1. We will present models to stakeholders, and identify potential weaknesses in model structure. We will next conduct a sensitivity analysis of key parameters/structural aspects to produce a database of simulations where we can identify potential vulnerabilities. Modellers and stakeholders will next scrutinise simulation results and related performance indicators to identify vulnerabilities in selected models: simulation outputs where slight changes in model parameters yield significant changes in the results, and thus the model needs some rework. This process will heavily rely on expert judgement, which uses heuristic methods to identify potential vulnerabilities in modelling. Stakeholder mapping will be highly instrumental in this regard to identify key players in model design.

3.4.4. Co-evaluate results

The evaluation of alternative water resource strategies for future scenarios will be conducted through two synergistic approaches:

- Joint evaluation with stakeholders via workshops or surveys, emphasising the consideration of stakeholders' roles and positions in the analysis of results. The complexity of integrating various assessments will be managed through weighting, with the option to employ alternative methods of deliberation.
- Utilisation of specifically developed modelling tools by MARCLAIMED team for comprehensive assessment.

Performance indicators must be established in collaboration with stakeholders, taking into account the principles of Integrated Water Resources Management (IWRM), including:

- Indicators related to water and ecology, such as the qualitative and quantitative status of aquifers and the condition of water bodies. Additionally, indicators that gauge the level of greenhouse gas (GHG) emissions resulting from various strategies may be utilised.

- Economic indicators, including the income generated in relevant economic sectors and how this income is distributed. The costs associated with implementing strategies should also be evaluated.
- Social indicators, focusing on aspects such as inequalities, are crucial for a comprehensive assessment. This includes analysing the distribution of other indicators over time and space.
- Factors that enable or hinder innovation within the system must be identified to evaluate the impacts and, more importantly, to refine or enhance the strategies.
- The indicators need to be made clear and discussed in MARCLAIMED meetings when modelling is discussed.

Stakeholders should be informed about uncertainties through the use of ensemble modelling, with special focus on the challenges involved in explaining uncertainty. It's important to recognize that decision makers generally resist uncertainty, seeing it as a barrier to engagement. Evaluating the trade-offs among various strategies is essential for informing stakeholders about the benefits and drawbacks of different policies.

The baseline scenario serves as a point of comparison, highlighting the strengths and weaknesses of the strategies being evaluated. It is crucial to compare various strategies to pinpoint the benefits and limitations of alternate policies, understand trade-offs, and find ways to address them. However, this task is complex because it is unlikely that one strategy will excel in every aspect. Therefore, dedicating time to examine different trade-offs is crucial for both stakeholders and decision makers.

3.4.5. Co-identify resilient AWR strategies

MARCLAIMED project aims to help stakeholders identify, for each demo site, a resilient adaptation strategy that contributes to IWRM objectives. It is important that MARCLAIMED can only inform, but not take the decision, since decision making is outside of the scope of the project. However, by assessing the impacts of a diversity of strategies under multiple scenarios, MARCLAIMED will provide the mechanistic inputs that are necessary to inform a resilient decision making which, if complemented with a successful engagement and commitment by stakeholders, can affect decision making. MARCLAIMED will catalyse decision making through stakeholder engagement activities that involve the analysis of the simulation results from models, notably serious games in which these mechanistic inputs from models will be combined with heuristics that leverage on the expertise of stakeholders to identify those policies that are regarded as resilience.

Resilience in water resources management refers to the capacity of water systems to absorb disturbances and still retain their basic function and structure. It's about preparing for,

responding to, and recovering from water-related crises, such as droughts, floods, pollution, and climate change impacts, in a way that ensures water security, protects ecosystems, and supports sustainable development. A resilient water resources management strategy emphasises the anticipation of risks, the absorption of impacts, and the adaptation to and recovery from water-related challenges. It involves a comprehensive understanding of water systems, including the hydrological cycle, water demand and supply dynamics, and the socio-economic contexts within which water management occurs. Such strategies are essential for creating water systems that are robust yet flexible, capable of withstanding shocks without long-term detriment to water availability or quality.

Implementing a resilient water management strategy requires a holistic approach that considers environmental, economic, and social factors. It is an ongoing process that involves continuous learning, monitoring, and adjusting to new challenges and opportunities. By fostering resilience in water management, societies can ensure the availability of clean water for future generations while maintaining healthy ecosystems and supporting sustainable development.

4. Ethical aspects, including data management

Our Ethics Plan prioritises ethical considerations as a fundamental component of project management, highlighting their strategic significance and the need for dedicated focus. It covers ethical behaviour, equal opportunities, and responsible research and innovation, presenting an outline of the ethical dilemmas our research addresses while stressing stakeholder involvement in ethical matters.

Our research aims to mitigate risks in water, land, and climate by implementing sustainable water resources management reforms. These areas require ethical scrutiny, touching on social justice, sustainability, community involvement, and environmental stewardship. We acknowledge the uneven distribution of water access, with vulnerable groups disproportionately affected by scarcity due to disparities in resources, opportunities, and power based on race, ethnicity, gender, socioeconomic status, and location. Our efforts will centre on safeguarding the rights and respecting the cultural practices, beliefs, and values of all communities, especially the marginalised and vulnerable.

The primary goal is to foster sustainable water use and conserve ecosystems, focusing on the needs of marginalised and vulnerable groups. By involving stakeholders in our research, we aim to ensure our work reflects their needs and concerns. We are also committed to minimising the environmental footprint of water reform initiatives. Stakeholder engagement in our knowledge networks necessitates careful planning. We are dedicated to facilitating stakeholder participation in our research, empowering them through knowledge exchange, capacity enhancement, and networking. Recognizing the challenges in selecting representative stakeholders, we will undertake thorough institutional mapping to avoid exclusions. Our commitment extends to respecting stakeholder interests by protecting their privacy, confidentiality, and autonomy, and ensuring their views are

accurately represented in our findings. We will strive for diversity and gender balance among stakeholders, ensuring a wide array of perspectives and experiences that enrich the research process and foster trust and mutual learning.

In our approach, we will address power imbalances with respect and equity, ensuring that all engagements are conducted fairly. Through these efforts, we aim to create a research environment that values diversity, promotes inclusivity, and respects the voices of all stakeholders involved.

Data plays a pivotal role in fostering research and innovation, underscoring the importance of its careful management to preserve trust among stakeholders. To this end, We plan to source data from a variety of outlets, including but not limited to global and regional data services, and to produce original data through our investigative endeavours and the use of research tools. This data will be made available to knowledge networks and wider stakeholders in repositories and formats that are not only easily accessible but also in a form that is readily understandable and usable. Certain datasets will be developed collaboratively with knowledge networks or gathered to encapsulate their insights. Furthermore, network participants are encouraged to contribute their data to the research initiative.

To mitigate ethical and privacy risks, we will limit our data collection to what is strictly necessary to achieve our research goals. Knowledge networks will receive detailed information about the data collection process, including the purpose and intended use of the data. Data security will be fortified through stringent security protocols to thwart unauthorised access, utilisation, or dissemination. Our commitment to ethical standards and compliance with pertinent laws and regulations will ensure that our practices are devoid of any form of discrimination against individuals or groups. The duration of data retention will be confined to the period required to accomplish our objectives, after which data will be securely disposed of or anonymized. We recognize the rights of stakeholders to access, rectify, or request the deletion of their data and will promptly honour such requests.

In parallel, we are formulating a Plan for Dissemination, Exploitation, and Communication (PDEC) activities, which will undergo regular updates to encapsulate narratives and strategies concerning engagements with knowledge networks. Our approach to communication will be tailored to align with network preferences, potentially encompassing consultative and deliberative gatherings, newsletters, webinars, and targeted information campaigns. Key reports and deliverables will include summaries in layman's terms to ensure accessibility to the general public in pilot regions.

CONCLUSIONS

The deliverable 3.1, "Terms of Reference for Stakeholder Engagement," provides a methodological framework for stakeholder engagement in co-creation processes aimed at developing Adaptive Water Resources (AWR) strategies at the level of the three demo sites within the MARCLAIMED project. The deliverable outlines the initial steps for collaboration between experts in the field of MAR and stakeholders from the three demo sites to ensure

the successful implementation of complex concepts in real-world scenarios, where stakeholders and MARCLAIMED partners share stories and exchange points of view to underpin consensus-building that leads to co-creation. In addition, this deliverable highlights the WP3 workflow, connecting and overlapping T3.1-5 with the other WPs of MARCLAIMED.

The document aims to design Terms of Reference (ToR) for stakeholder engagement processes that stimulate fluid and continuous exchange of knowledge between stakeholders and scientists, enhance capability and adaptive efficiency, and organise safe collaboration and experimentation spaces. Moreover, the deliverable seeks to enhance knowledge exchange and contribute to the co-development of AWR strategies that are both resilient and scalable to other locations. Overall, it sets the stage for creating actionable and context-sensitive solutions for water resource management.

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ANNEXES

Annex 1 - MARCLAIMED_Invitation letter

(Location), (day month), 2024

Dear Sir or Madam,

Recently, the MARCLAIMED project has started with the aim of **integrating Managed Aquifer Recharge (MAR) with Alternative Water Resources (AWR) into River Basin I and drought plans**. It will support the adaptation of supply systems in the context of climate change in three demonstration sites (Spain, Portugal, and the Netherlands).

This three-year project will provide an **Integrated Decision Support Tool (IDST)** to improve the operational efficiency, economic sustainability, and social perception of managed aquifer recharge with alternative water resources. More information about MARCLAIMED is available on the website.

(Location) is one of the demo sites where MARCLAIMED solutions will be implemented. In this context, MARCLAIMED Coordination Team is inviting you, as a relevant stakeholder, to actively participate in our **Community of Practice (CoP)**.

What is a Community of Practice?

CoPs are organized groups of people who share an interest in a defined area and want to coordinate efforts to achieve specific goals. We will collaborate regularly to exchange information, learn together, and co-create and validate the MARCLAIMED solutions.

Why are we doing this?

A CoP in **(location)** will facilitate collaboration and experimental spaces to exchange knowledge, enhance capacity, and improve the acceptance and trust in MAR with AWR.

The CoP in **(location)**, will consist of **six online or face to face workshops and/or meetings** over the coming three years. This will allow the MARCLAIMED team to co-create with local communities, promote social acceptance in the integration of AWR in the supply systems through MAR, and deliver a human-centric tool according to your feedback and contributions.

Via different levels of interaction, the CoP will contribute to the project in different ways:

- Co-creation of **AWR strategies**.
- Co-design MARCLAIMED IDST, participating in the **adequation of the tool requirements to the specific demo site needs and context**.
- Contribute to the roadmap for the future development of MAR with AWR **“EU MAR-lines”** to promote policy recommendations and boost regulatory framework.
- Exchange **knowledge**, provide **feedback**, and share **perceptions** on the matter.

Why is your input useful?

(Include text from the table below according to the stakeholder)

What can you get out of this CoP?

(Include text from the table below according to the stakeholder)

We look forward to hearing by (date) whether you or a suitable colleague from (entity name) is willing to join the MARCLAIMED CoP at (location).

We are excited to share this journey with you and together become the driving force behind a paradigm shift in water management strategies for resilient water resources.

Do not hesitate to contact us if you have any questions or comments on the project.

Kind regards,

The MARCLAIMED team

Annex 2 - MARCLAIMED_Impact champions indicators

[MARCLAIMED_Impact champions indicators.xlsx](#)

n.	Indicators	Update -- (month --)		
		Llobregat	Comporta	Waddenregio
	Demo site			
	Indicators on balanced and inclusive involvement			
1	Number and % of women that are part of the demo sites (attending, reporting, contributing) and WP3 meetings			
2a	Number of gender related feedback (particularly on adaptation strategies) collected during WP3 meetings			
2b	<i>Describe gender-related feedback</i>			
3a	Number of different categories of organizations (public authorities and regulators, utilities, users, civil society organizations, industry, and scientists) involved in the demo sites			
3b	<i>List categories of organizations involved (public authorities and regulators, utilities, users, civil society organizations, industry, and scientists)</i>			
	Indicators on interactions with stakeholders			

4	Number and % of stakeholders involved in the workshop (% over total number of members in the knowledge network of the demo site)			
5a	Number of tools used to collect feedback in the workshops (e.g. questionnaires, Delphi, serious games, scenathons)			
5b	<i>List the tools used to collect feedback</i>			
6a	Number of stakeholder meetings other than workshops (bi- and multi-lateral meetings with specific stakeholders, in person or online) carried out in the demo site			
6b	<i>Number of people involved in these meetings</i>			
7a	Number of other interactions with stakeholders other than meetings/workshops (such as mail, social media, other)			
7b	<i>List the type of interactions used, and number of interactions per type</i>			
	Indicators on contributions to co-creation by Stakeholders			
8a	Number of scenarios co-designed by stakeholders			

8b	<i>Number of scenarios co-designed by stakeholders effectively integrated in MARCLAIMED Tools</i>			
8c	<i>% of scenarios co-designed with stakeholders over total scenarios simulated</i>			
8d	Name the Stakeholder groups/types that were involved in points 8 a, b, c			
9a	Number of Alternative Water Resources (AWR) strategies co-designed by stakeholders			
9b	<i>Number of AWR strategies co-designed by stakeholders effectively integrated in MARCLAIMED Tools</i>			
9c	<i>% of AWR strategies co-designed with stakeholders over total AWR simulated</i>			
9d	Name the Stakeholder groups/types that were involved in points 9 a, b, c			
10a	Number of dashboards (or other tools) to share results and impacts of AWR strategies Implemented			
10b	<i>Number of evaluation of stakeholders about the dashboard or other tools, and the utility.</i>			
11	Number of publication, change stories and lesson learned shared with stakeholders			

12a	Number of monitoring indicators proposed by stakeholders			
12b	<u>List</u> the monitoring indicators proposed by stakeholders			
12c	<u>Number</u> of monitoring tools/approaches co-designed with stakeholders			
12d	<u>List</u> the types of monitoring tools/approaches co-designed with stakeholders			
12e	Name the Stakeholders groups/types that were involved in points 12 a, b, c, d			

Meetings details		
Demo site	Features of the meeting	Update
Llobregat	<i>date</i>	
	<i>Relevant notes</i>	-
	<i>Type of scenathon</i>	
	<i>Nº of participants and duration</i>	
Comporta	<i>date</i>	
	<i>Relevant notes</i>	-

	<i>Type of serious scenathon</i>	
	<i>Nº of participants and duration</i>	
Waddenregio	<i>date</i>	
	<i>Relevant notes</i>	-
	<i>Type of scenathon</i>	
	<i>Nº of participants and duration</i>	
International workshops	<i>date</i>	
	<i>Relevant notes</i>	-
	<i>Type of serious scenathon</i>	
	<i>Nº of participants and duration</i>	

Annex 3 - MARCLAIMED Informed consent form

**MARCLAIMED:
Integrated Decision Support Tool for Reliable and Affordable
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Water Resources in River Basin and Drought Management
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Communities of Practice (CoP)

You have been invited to join MARCLAIMED [demo site identification] CoP as a representative of a key sector that plays a pivotal role in developing MAR and AWR in your region/city. Your sector's contribution is crucial, and the Project team is eager to hear your valuable opinion on the current state of water management and the related policies and legislation.

The information collected (sound and video recordings, written notes) will only be used by the Project research team (members of the consortium) and will be treated with the utmost confidentiality. Your data will be anonymized prior to analysis and stored in secure computers and servers accessible only by the research team directly involved in the CoP. After being anonymized and analyzed, the information might be used for the purposes of communicating and disseminating the Project results, but your opinions will not be directly identified, ensuring your privacy and data security. The data will be stored only for as long as it is necessary to carry out these analyses, and no data will be kept beyond the end of the Project (January 2027).

There will be at least one meeting like this per year, in each of the demo sites involved in MARCLAIMED, and your participation is invaluable. We are deeply grateful for your contribution and hope that you will find this debate both useful and engaging!

Should you need more information on the local activities of the project or any clarification regarding the use of data generated during CoP activities, please feel free to contact the CoP Coordinator at any time:

[Insert contact details of CoP Coordinator]

In case you need more information on the overall project contents and its approach or to issue a complaint regarding the use of your data in this project, you can contact the scientific manager:

[Name and e-mail of the scientific manager of each demo site]

You can withdraw your participation at any time and request access to your personal data and information, as well as request them to be deleted should you wish so, through the contacts mentioned. There is no consequence if you decide to give up, and you don't need to provide any reason why.

In fulfilment of the EU General Data Protection Regulation (GDPR, 2016/679), the MARCLAIMED team kindly requests your confirmation and permission for the following:

Informed consent form

	Yes	No
I have understood the objectives of this research, and they were adequately explained to me in a language and terms I can fully understand.		
I had the opportunity to ask questions and clarify any doubts.		
I have voluntarily accepted to participate in the CoP discussion groups and join the activities proposed during this event.		
I understand that I can withdraw my participation at any time and request that my personal data and information be deleted without any consequences or having to give any specific reason.		
I understand that I can refuse to answer and give my opinions on any topic if I don't want to.		
I understand that my personal data (e.g., name, employer, phone number, email address, and post address) will only be collected to invite me to and organize the CoP meetings. It will not be used for other purposes or transmitted to any third parties outside the MARCLAIMED Project.		

I understand that my opinions and information conveyed during the meetings may be used and directly quoted in conference communications, scientific publications, policy briefs, and reports, but they will be anonymized beforehand, ensuring the principles of confidentiality and privacy.		
I understand that in any case where there might be the need to quote my opinions and attribute them to my personal name, I will be informed first and asked for specific and written permission for that purpose (be it a journal article, will be informed first and asked for specific and written permission for that purpose (be it a journal article, project newsletter, conference communication, or any other purpose).		
I understand that anyone can access and use my data and information only if I agree to the confidentiality and privacy requirements stated above.		
I agree that my anonymized data will be securely stored on the Project online repository and in public open-access repositories so that they can be used for future reference, communication, and publications about water management issues.		
I agree to concede any author rights that I might retain regarding the information conveyed during the CoP meetings for purposes of citation in the MARCLAIMED Project's publications and communications.		

Full name: _____

Place and date: _____

Signature: _____

Informed consent form

Collection of video, images and sound

Video, photos, and sound collected during this meeting will only be used by the MARCLAIMED team, in accordance with EU GDPR, to transcribe and analyze the information conveyed by participants in support of the research publications and reports mentioned above.

All personal data will be anonymized prior to analysis and will not be shared with third parties, being used only for the purposes of this Project, as mentioned in the information sheet. All data will be stored in devices protected by password and in the Project online repository with restricted access and will only be accessed by the MARCLAIMED team members. In the case that short video clips or photos are used for communicating the activities of the Project on its website or newsletter, we will always seek specific permission from the CoP participants who appear on the video/audio recordings, respecting your right to control the use of your image and voice.

	Yes	No
I give my permission for the collection of audio recordings during this meeting		
I give my permission for the collection of video images during this meeting		
I give my permission for the collection of photos during this meeting		
I authorize that sound is used for the purposes stated above		
I authorize that images are used for the purposes stated above		
I understand that I can request that my images, video or sound be deleted at any time		

Full name: _____

Place and date: _____

Signature: _____

Annex 4 - MARCLAIMED CoP Roadmap Template

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[Insert here Demo Site]: CoP Roadmap

First CoP Meeting Template

CoP #1	"Setting the Scene" (Or choose another title as you see fit for the first meeting)
Planning	Month
Participants	All stakeholders identified in stakeholder mapping and involved in the LL. No
Objective(s) of the meeting	1. Validate with stakeholders the pre-identified objectives, mission and scope of CoP 2. Validate with stakeholders the composition of the community and fill any gaps (are we missing any important stakeholders?) 3. Co-define with stakeholders the short and long-term value and impact of CoP 4. Co-define with stakeholders the specific ways the CoP will operate, namely, decision-making procedures, communication strategy in between meetings, activities for the community in between meetings, responsibilities of members, contact person(s), etc. 5. Other as needed.
Related WP (optional)	Indicate which WPs/ Demo Sites will add content to this meeting and indicate what content the WPs/Demo Sites will add.

In-between Focus Group Meetings Template

CoP #2 – CoP#5 (in-between meetings)	Topic (define the topics for the subsequent CoP meetings)
Planning	Month (tentative – indicate in project month number and actual month and year)
Participants	All stakeholders identified in stakeholder mapping and involved in the LL, as well as any new ones identified in the first CoP meeting. Any invited guest as needed (e.g., stakeholders potentially interested in the products of the project, for transferability).
Objective(s) of the meeting	Indicate to the best of your knowledge now the possible objectives for the subsequent CoP meetings.
Related WP (optional)	Indicate which WPs/ Demo Sites will add content to this meeting and indicate what content the WPs/Demo Sites will add.

In-between Focus Group Meetings Template

Focus Group (FG) Meetings (identify the FG as A, B, C, etc)	Topic (define the topics for the subsequent FG meetings)
Planning	Month (tentative – indicate in project month number and actual month and year)
Participants	A subset of stakeholders from the CoP community based on the topic selected for the FG meeting. You may want to keep the meeting open to also the other CoP members even if it is not their topic of expertise. Add any invited guest as needed (e.g., stakeholders potentially interested in the project's products for transferability).
Objective(s) of the meeting	Indicate to the best of your knowledge now the possible objectives for a focus group meeting.

Related WP (optional)	Indicate which WPs/ Demo Sites will add content to this meeting and indicate what content the WPs/Demo Sites will add.
------------------------------	--

Last CoP Meeting Template

CoP #6 (last)	Final deliberations and next steps
Planning	Month <i>(tentative – indicate in project month number and actual month and year)</i>
Participants	All stakeholders identified in stakeholder mapping and involved in the Demo Site as well as any new ones identified along the CoP implementation. Add any invited guest as needed (e.g., stakeholders potentially interested in the project's products for transferability).
Objective(s) of the meeting	1. Last resolutions. 2. Future of CoP/outputs – beyond the project. 3. Other as needed.
Related WP (optional)	Indicate which WPs/ Demo Sites will add content to this meeting and indicate what content the WPs/Demo Sites will add.

Annex 5 - MARCLAIMED CoP meetings evaluation form

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CoP meetings evaluation form

You have been invited to join this MARCLAIMED CoP as a representative of a key sector that is fundamental for developing MAR and AWR in [insert demo site region/city]. Therefore, it is very important for the Project team to get to know your opinion on the current state of MAR and AWR implementation.

Location: _____

Date: _____

It was a pleasure having you in this meeting. We would like to know your opinion so that we can improve future events and meet your expectations. Thank you for your collaboration!

Name (optional): _____

Organization (optional): _____

Please rate the extent to which you agree with each of the following statements:

1. Meeting logistics and stakeholder engagement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Not applicable

1.1 I received the information about the meeting and main materials[JC1] well in advance						
1.2 The venue was adequate for the purpose of the meeting						
1.3 The meeting had the right duration in time						
1.4 During the meeting I improved or made new connections for my professional network						
1.5 The presentations and speakers were clear and understandable						
1.6 During the meeting, I felt safe to behave spontaneously and unfiltered						
1.7 I believe others were communicating openly with me						
Comments (optional):						

2. Awareness and increased understanding	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Not applicable
2.1 I believe that all relevant stakeholders were present at the meeting						
2.2 I had sufficient opportunities to provide input to the discussion						
2.3 Differences and (potential) conflicts among us were addressed in a constructive manner						
2.4 All ideas/perspectives were included and respected during the discussion						
2.5 I feel that the right topics were discussed during the meeting						
2.6 I have a better understanding of the perspective						

of the stakeholders						
2.7 The way the discussion was facilitated and moderated supported the meeting objectives						
Comments (optional):						
3. Outcomes and conclusions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Not applicable
3.1 There was enough time to reflect on our collective experience and functioning as a group						
3.2 I believe that clear conclusions were formulated at the end of the meeting						
3.3 I believe that clear actions were formulated to improve solutions						
3.4 The meeting inspired me to take follow-up actions in my own organization						

3.5 Participating in the meeting increased my knowledge on the solutions						
3.6 My expectations on the outcomes of the meeting were met						
3.7 I am aware of my own role in the project and how each of us can contribute to the project's goals						
Comments (optional):						
Pros and cons of the local CoP						
What is your overall rating of this CoP meeting (1 to 5)?						

In your opinion, what were the most positive and less positive aspects of the meeting?

Most positive:

Less positive:

What suggestions for improvement do you have for future meetings?

Note: 1=strongly disagree; 2=disagree 3=neutral; 4=agree; 5=strongly agree; N.A.=not applicable

Thanks for your evaluation!

Please give this questionnaire back to the workshop organizer before leaving.

MARCLAIMED: Integrated Decision Support Tool for Reliable and Affordable Application of Managed Aquifer Recharge with Alternative Water Resources in River Basin and Drought Management Plans

[Insert here Demo Site]: CoP meeting report

General information

- Title of CoP meeting (key topic of the meeting):
- Organising partner:
- Moderator/Facilitator:
- Meeting Place:
- Date:
- Number of stakeholders attending:

Agenda for the meeting

- Please insert the agenda of your meeting

Objectives

- Describe the CoP meeting objectives

Stakeholders' characterization

Institutions/sectors	No. of participants (registrations)			
	Total	Male	Female	Non-binary
Project members				
Water authorities				
Policymakers				
Representatives of other sectors				
Research organizations/academia/R&D				

Institutions/sectors	No. of participants (registrations)			
	Total	Male	Female	Non-binary
Project members				
Water authorities				
Policymakers				
End-users				
Irrigation associations				
Water supply				
Wastewater treatment				
Others: name/sector				

A list of participants is available in the annex to this report.

Description of meeting's activities

- Provide a summary of activities carried out. Were there plenary or working group sessions? Presentations by whom on what?
- Describe the moderation technique and method for open dialogue applied.

All presentations given at the meeting are available in the annex to this report.

Main achievements

- Describe briefly the main outcomes and results from the meeting, including the answers on the central questions such as outlined in Section 4.1 'Key topics of CoP meetings', as well as any actions to be taken by members, as agreed upon.

- Summarise the perspectives of the stakeholders (i.e., stories as anecdotal evidence).

Reflection notes

- Describe your observations on stakeholder engagement (e.g., do we need to add others?)
- Describe any relevant observations for further steps
- Questions such as below can be asked:
 - What did you enjoy most/less about this workshop?
 - Which methods/tools were most successful/least [JC1] successful?

In your opinion, what were the positive/negative aspects of the workshop?

Pros:

- xxx
- xxx
- xxx

Cons:

- xxx
- xxx
- xxx

What suggestions do you have for improving future workshops?

- xxx
- xxx
- xxx

CoP meeting report: Annexes

- Include additional information (e.g., participant list, presentations, etc.)

MARCLAIMED will support decision makers to integrate Managed Aquifer Recharge (MAR) with Alternative Water Resources (AWR) in River Basin and Drought Management Plans supporting the adaptation and resilience of structural supply systems in the context of climate change. The main outcome will be the MARCLAIMED Integrated Decision Support Tool (IDST) that will provide solutions to tackle existing and emerging threats and support decision making and adaptation policies.



MARCLAIMED



**Funded by
the European Union**