NATIONAL REGULATIONS, PLANS & STRATEGIES

in Mediterranean countries regarding non-conventional water use

El Prat del llobregat, Spain. Credit : Rémi Declercq, Ecofilae

Water availability is a recurring challenge in the Mediterranean basin as water stress affects one third of the area all year round, and almost 180 million people suffer from water scarcity causing conflicts. Meanwhile even more frequent and more severe water scarcity and drought events are expected due to climate change and to increasing population thus putting continuous pressure on populations and the environment. As a result, state water planners are searching for solutions. Water reuse appears to be one of them.

The reuse of reclaimed water (treated wastewater) can provide significant benefits such as reducing water abstraction, mitigating risks of hazardous effluent discharge, and offering alternative water resources. Water reuse practices have evolved in recent years and thus legislative frameworks are shifting as well in many countries. Considering the disparity in regulation frameworks, the lack of a general overview, and the growing interest in water reuse practices in the Mediterranean region, Plan Bleu has decided to detail the current state of affairs of regulations and national strategies in the Mediterranean area.

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Reuse: Everyone's business now and then

In the Mediterranean, the predominant planned use of reclaimed water is direct agricultural irrigation. Other uses include substitution for certain uses currently met by potable water in urban and peri-urban areas, and the recharge of freshwater resources. In the European Union this practice is stipulated under the EU 2020/741 regulation released in 2020, while in the Mediterranean basin some countries, such as Tunisia and Spain, have already implemented water reuse schemes for decades. In Nabeul (Cap Bon peninsula, Tunisia) reclaimed water from 2 municipal wastewater treatment plants has been reused since the 1980s to recharge an aquifer and to irrigate 5 farms with a total of 550 ha of citrus, forage crops, tobacco, and olive trees. A tertiary treatment facility is planned to be added soon to ensure compliance with regulations. In El Prat de Llobregat (Barcelona area, Spain) around 300 000 m3 of reclaimed water are, or will soon be, reused per year for different authorized uses such as irrigation, industries, urban uses, groundwater recharge (for instance to combat seawater intrusion) and surface water recharge. This study focuses on current water reuse regulations in the Mediterranean area. It targets planned water reuse practices. Planned reuse is the direct or indirect reuse of reclaimed water, ensuring its conveyance through specially designed facilities and systems for treatment, storage, and distribution (Plan Bleu n°11, 2012; Asano et al., 2007). The study focuses on:

- Contracting parties of the Barcelona Convention (UNEP/MAP)

- Treated urban wastewater (containing a high percentage of domestic wastewater) using centralised collection and treatment systems: urban wastewater treatment plants. Water from industrial WWTP is not included.

- Water uses listed in Table 1.

The data collection methodology used was based on a literature review and on interviews of local national experts in 18 mediterranean countries.

Treated wastewater: A goldmine of diverse applications.

The main results are presented in the Table 1. These results are then analysed 1) by region and 2) by use of water. Next, a focus on the main control procedures and regulatory constraints is presented, and finally a summary of existing national strategies.

Category of use	Reuse of Reclaimed water from urban wastewater treatment plant	European Union	Spain	France	Italy	Slovenia	Croatia	Bosnia Herze.	Monte negro	Albania	Greece	Turkiye
Irrigation	Agricultural irrigation											
	Cattle drink											
	Golf course irrigation											
	Green areas irrigation											
Groundwater and surface recharge	For environmental purposes											
	For indirect agriculture irrigation											
	For indirect potable water											
Industrial uses	Industrial uses (food and beverages)											
	Industrial uses (NO food and beverages)											
Urban uses	Urban uses (street cleaning)											
	Urban uses (vehicles cleaning)											
	Urban uses (sewage cleaning)											
Domestic uses	Domestic uses : toilet flush											
	Domestic uses : others											
Other category	Direct potable reuse											
	Fire fighting											

Category of use	Reuse of Reclaimed water from urban wastewater treatment plant	Syria	Lebanon	Cyprus	Malta	Palestine	Israel	Egypt	Libya	Algeria	Tunisia	Morocco
Irrigation	Agricultural irrigation											
	Cattle drink											
	Golf course irrigation											
	Green areas irrigation											
Groundwater and surface recharge	For environmental purposes											
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Domestic uses	Domestic uses : toilet flush											
	Domestic uses : others											
Other category	Direct potable reuse											
	Fire fighting											

No data
Not regulated
Authorised by regulation
Unauthorised by regulation

Table 1 : Current water reuse regulations in the Mediterranean region

Analysis by region

The European Union (EU) introduced a regulatory framework for agricultural irrigation in 2020. It comes into effect in all EU countries in 2023 and thus EU countries need to adapt their national legislation to fit (excepting those countries that do not permit water reuse). By the end of 2023, most EU countries are still in a transition period (Italy, France, etc.). In Malta, transcription of the EU regulation in its national regulation has already been implemented. Some EU countries already had national regulations covering multi-uses such as in Spain with agriculture, green spaces, golf course irrigation, and urban uses integrated within one single decree. The practice of reuse appears to be very limited in the Mediterranean Balkan countries, and there are presently no regulations on the subject. Türkiye on the other hand has clear regulations covering multiple uses, including irrigation, industrial and urban uses.

In Lybia there is no clear strategy, nor regulation concerning water reuse, mainly due to the unstable economic and political context. For Lebanon and Syria, both of which share a complex political context, no information was found. However, some unsuccessful attempts have been made in the past (e.g., Lybia). Palestine has developed a legislative framework conducive to the growth of agricultural irrigation, however, the geopolitical context tends to hinder the operational deployment of this solution. Israel is still a referent in terms of planning and development of water reuse practices with a legislative framework that authorizes several uses.

Egypt's water reuse potential is very high. National legislation for direct practices is quite restrictive (agricultural irrigation is not authorized for vegetable crops eaten raw, regardless of the treated water quality), while the national strategy for water reuse is very ambitious and oriented toward indirect practices (a mix of water resources), especially in the Nile Delta area. The Maghreb countries are very dynamic on the topic of water reuse. Tunisia has had water reuse schemes for decades, while Morocco has implemented an ambitious water reuse policy and regulation strategy thus leading to a fast-growing development of the practice. Algeria is also proactive, setting numerous quantified objectives regarding water reuse and making massive investments in the field.

Analysis by use of water

Agricultural irrigation is the most widespread use for reclaimed water in the Mediterranean area: it also stands out as the most legislated use, with almost two-thirds of Mediterranean countries having a specific legislation. Those regulatory texts often contain restrictions, precautions to be taken, and barriers to control the sanitary risks, such as imposing different levels/thresholds of water quality to different types of crops and to different irrigation methods (e.g., EU, Türkiye, Algeria, Egypt, Morocco, etc.). Cyprus also has different thresholds, but according to the size of the WWTP. The barrier approach is also often applied to other uses.

The existing legislation is often extended to green space irrigation (including golf courses) with nearly half of Mediterranean countries having a specific reference to this practice in their legislation. These practices are increasing significantly in tourist areas. Other urban uses, such as street and vehicle cleaning, as well as high water-pressure sewer cleaning, are also on the rise, as is the aspect of fire protection. While they may require smaller volumes compared to irrigation, these urban uses are often a top priority as they enable potable water savings with high added value. Almost one third of Mediterranean countries have specific references to urban cleaning in their regulations.

The recharge of surface and groundwater bodies is also authorized according to the indirect uses of water that are targeted downstream. While water reuse for agricultural irrigation or to fight against salinization and desertification is a very common practice, such as in Egypt along the Nile River and its Delta, indirect potable water reuse is still forbidden in most countries. France has the first pilot demonstrator for indirect potable water reuse, whose results will likely be used as a benchmark. As for direct potable reuse it is still forbidden in all mediterranean countries.

Lastly, there is a growing interest among industry to reuse reclaimed urban water, driven by two primary motivations: cost optimization and water supply security during restrictions. Process and cleaning uses are a priority. The food industry is often excluded from regulations, except in Croatia and Algeria. In many countries where water uses are regulated, there are minimum water quality thresholds applied to multiple uses.

In the field, this facilitates the implementation of more beneficial multi-use projects. For example, in Türkiye, the same thresholds are used for green space irrigation and industrial purposes, while in Greece, the same standards are used for irrigation, groundwater recharge, and industrial purposes.

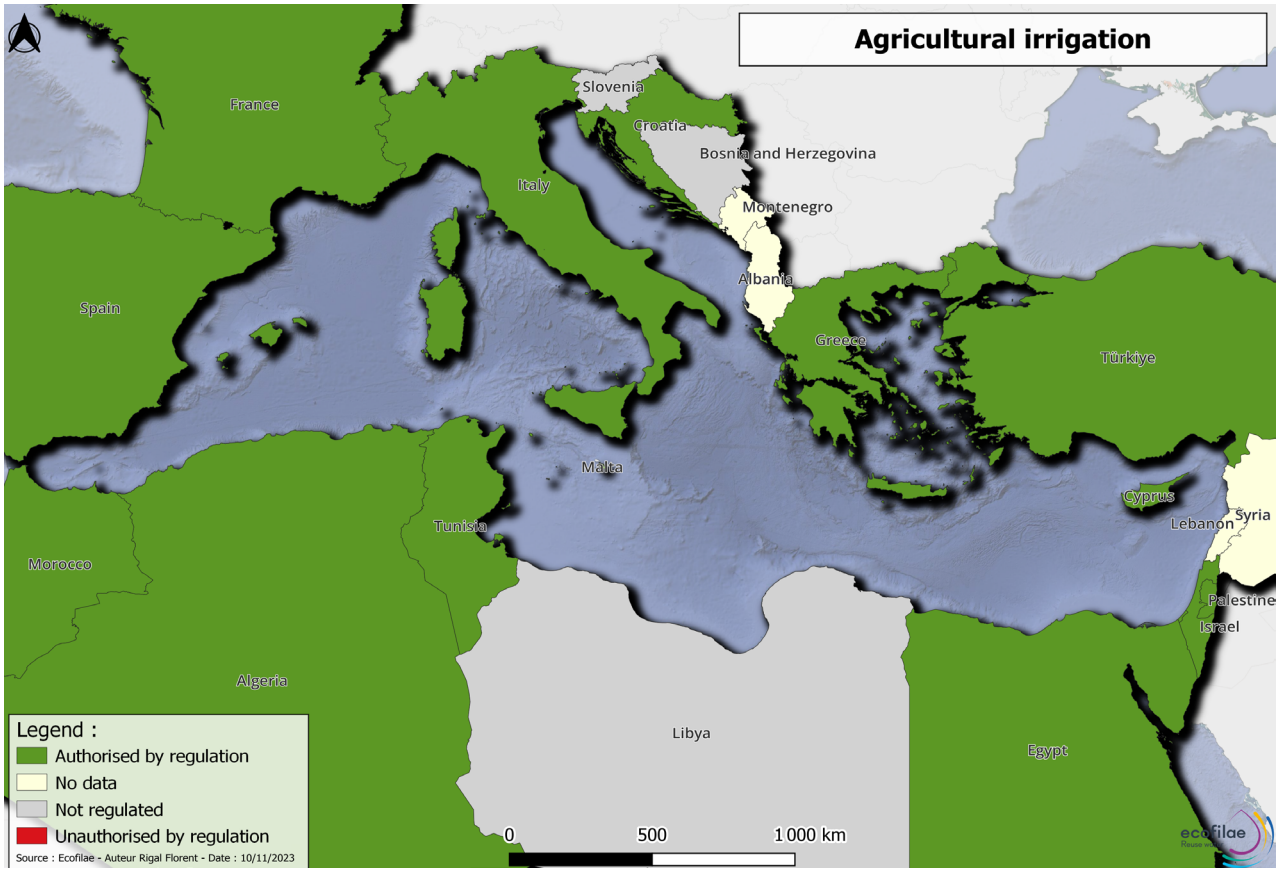

Figure 2 : Current water reuse regulations in the Mediterranean region - Agriculture irrigation

Main authorization procedures and regulatory constraints

Feedback from literature and from local national experts have revealed a significant convergence in authorization procedures and in regulatory constraints. Below is a non-exhaustive list focusing on the main authorization procedures and regulatory constraints:

- Authorization procedures with State water and sanitary authorities are always required. The 2020 EU regulation includes a risk management plan within the procedure.

- Enforcement is relatively strong for new planned water reuse schemes, but regularization of previously undeclared schemes is often slow (e.g., Algeria, Tunisia and Morocco).

- Monitoring (lab analysis) of water quality to assess performance of schemes and to ensure control of health and environmental risks.

The required water quality levels sometimes lead to significant increases of project costs due to treatment level. Monitoring is also often expensive and challenging to implement (e.g., too many parameters to monitor in Italy for agriculture), and frequently there are difficulties in monitoring due to the availability and capability of local laboratories.

- Immediate suspension of installations is required if failure is observed by state authorities, but in practice there is often too much at stake to stop irrigation in the middle of summer.

- No specific focus nor monitoring of emerging pollutants and microplastics are required in the Mediterranean countries' regulatory documents and standards for water reuse.

Regional and national strategies

Awareness of the benefits of water reuse has been accelerating in recent years. The proactive stance of Algeria, Tunisia and Morocco is particularly noteworthy. The structuring of national strategies has materialized in two different forms. It can take the shape of regulatory obligations, as seen in Tunisia, where Article 10 of its "Water Pollution Control" law mandates municipalities to study the feasibility and relevance of irrigating golf courses through reuse. More commonly, this can also manifest through political incentives that involve subsidy programs to make the implementation of reuse projects attractive for both the private and public sectors. In Algeria and Morocco, strategic planning documents for water reuse outline objectives to be achieved by 2030, accompanied by substantial subsidy programs.

Conclusion and recommendations

Conclusion

The legislative frameworks and national strategies for water reuse in the Mediterranean basin target mainly the safety of operators and end-users. In the field, a legislative framework can facilitate or hinder the implementation of sustainable projects.

The complexity, restrictive nature, and uses considered within a regulatory framework are a direct reflection of the political context, the sanitation situation, and the level of water stress.

Recommendations

- Development and access to robust, sustainable and high-performance reclamation solutions.

- Training and awareness-raising for operational, institutional, and regulatory actors.

- Development and sharing of knowledge and practices among different countries.

- Support from institutional and regulatory actors for initiatives carried out in the field.

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