

Climate adaptation in local water management:

Dealing with salinization of surface water

EUWMA members are national associations of local and regional water boards. These organisations are authorized by national and regional laws to perform water management tasks, including water supply, wastewater treatment and discharge, flood and coastal protection, water quality management, drainage regulation and irrigation. In a broader sense, these boards can also be considered responsible for the protection of the environment, biodiversity and wetlands. EUWMA members represent public, local and regional water management organizations from 10 EU member states, covering a surface of more than millions of hectares of cultivated land in the interest of their customers and/or members; i.e. a diversity of private and public entities. Water boards are essential for the development and the economy of rural areas in many regions of the EU; in some areas, it has already been this way for hundreds of years.

Local and regional water boards have observed that climate change drastically affects waterbodies. Last year, EUWMA declared that local water boards accommodate most of these challenges that we are facing. The classic way of managing water systems no longer complies with access to fresh water in the entire water system. Additionally, salinization is one of the most important causes of contamination of fresh water resources in coastal areas.

1. (How to simplify) A complex problem with different causes

Salinization can be defined as “an increase in the Total Dissolved Solids (TDS) of an aquifer, caused by natural or anthropogenic factors”. In coastal areas, salt from the sea is an important Dissolved Solid (DS) which enters the surface water and aquifers in different ways:

- Through an era of fluctuating sea levels, coastal areas alternately inundated and parched, causing the clayey alluvial soil to become brackish and store immense amounts of salt in the subsurface. As surface water levels descend in times of drought, brackish water swells to the surface.
- Close to the sea, saline water can intrude through sea barriers when surface water flows from the hinterland slow down. Coastal flooding also causes surface water to salinize. In addition, high sea levels can result in a salt water flow through dikes and water locks.
- Another cause of salt intrusion in coastal areas is the deposition of marine aerosols in windy conditions.



Lastly, surface water can be salinized by runoff of brackish water (saline groundwater), which is used for irrigation if there is no fresh water available.

Different consequences of salinization can be observed in coastal areas, as the local geological & geographical, the hydrological and the meteorological conditions vary thoroughly, as well as factors related to water management and agricultural use and management.

2. Concerns of the local water boards

The Water Framework Directive seeks to improve water quality, which is threatened when ecosystems in creeks and ditches become brackish. Water consumers desire to have access to clean and usable water, instead of receiving salinized water.

Therefore, EUWMA declares that local water boards through all corners and in a vast part of Europe are concerned about the fresh water supply. As consequences differ in the coastal areas, water boards (are forced to) approach salinization distinctly and intuitively. Still, the mid-term congress - organized by EUWMA in Flanders on the salinization topic- that was attended by representatives of the Member States and scientists demonstrated that this approach has resulted in building local expertise, as water managers could boast of responding to the challenge - dealing with salinization. However, practice shows that for local water management, an adequate solution for salinization is yet to be found.

3. Dealing with the consequences

Setting up and performing conductivity measurements, as well as monitoring and communicating about the results afterwards, is required to keep track of the salinity of the water system. Due to complex salt water flow patterns, measurements must be regularly performed on the same key locations in order to obtain a valuable data set. Setting up this measurement campaign takes time and effort, so water boards are currently often forced to use external information or they simply lack the necessary information to draw adequate and correct conclusions about the state of the water system.

Even if the data is unavailable, water boards can counteract salinization by washing away salt water, as long as fresh water is available. Moreover, keeping water levels high prevents seepage of salty groundwater to the surface water. Both countermeasures require fresh water availability, which is often a problem during periods of drought. In the Netherlands, experiments with a combination of fresh water and air injection show that it could be a successful approach to decrease the necessary amount of fresh water. Changes in the water system morphology to create a barrier for salt water intrusion also yielded positive results.

4. (Policy) Recommendations / further steps

It is clear that local water boards need to invest their time and effort to combat the negative effects of salinization of the surface water system in order to preserve the fresh water availability. Certain investments coincide with solutions that improve other aspects of integral water management too, such as flood protection and drought prevention, e.g. through the creation of space for water. With these kind of solutions, the entire surface water system - starting from the source - can and should be regarded. However, salinization should be of key importance in the configuration of the full water system.



Besides, water managers and stakeholders should further seek for solutions that involve accepting a higher salinity in the water system as the new reality. Scientific research shows that the choice for nature based solutions, the selection of appropriate crops (saline farming) and the application of level controlled drainage systems and creek ridge infiltration systems provides a good yield for salt-sensitive parcels. A lot of work needs to be done in order to create resilience.

In conclusion, research on salinization shows that scientific efforts and knowledge of local water boards is a treasure of knowledge which is helpful for all water managers. This proves the added value of intense cooperation with our different partners i.e. researchers, water users, local water boards - and demands to extend those cooperations to further counter salinization, as climate change will intensify the consequences of this phenomenon.

EUWMA reaches out to partners who suffer from the consequences of salinity or fear future problems in their water system because of this phenomenon due to changing circumstances. The European Water Management Association strives to communicate the problems and solutions to the European commission, in order to incorporate salinization governance in the future guidelines and legislation.