Organisation for Economic Co-operation and Development

Thematic workshop on water scarcity

Discussion highlights

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Water scarcity
Thematic workshop, 26-27 April 2022
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The fourth thematic workshop of a series aimed to facilitate the implementation of the economics of the Water Framework Directive in European Member States gathered some 90 participants, including government representatives, Directorate Generals (European Commission), utilities and utilities associations, NGOs, and research institutions.

The workshop, co-convened by the OECD and the European Commission - DG ENV, focused on the economics of water scarcity. The following topics were discussed in three interrelated sessions:

- Allocation regimes, in the context of the WFD: definition of return and e-flows, reflecting flexibility in water entitlements, water allocation reforms, relationship with pricing
- Incentives to increase demand for reclaimed water
- Scaling up nature-based solutions (NBS) to enhance water retention.

Speakers with diverse backgrounds shared their experience related to the economics of water scarcity and the Water Framework Directive goals. Highlights of the discussions are provided below. The agenda, a background note and speakers' slides are available on the meeting webpage.

Key messages

Session 1: Water allocation regimes, in the context of the WFD

- Water allocation regimes are an integral part of measures to achieve the ambition of the WFD. In particular, ecological and return flows should be factored in. Prevailing regimes tend to disregard new users and the navigation sector.
- Water use efficiency can have detrimental effects on water availability and quality, if not accompanied by robust water allocation regimes that determine how to use the water saved through efficiency measures.
- Further work in the context of the WFD would require participation of other sectors (agriculture, energy, fluvial transportation…).

Session 2: Incentives to increase demand for reclaimed water

- The main incentive in place in EU member states is a low price for reclaimed water. Other possible incentives (such as reliability of water supply) do not seem to be considered.
- Reclaimed water requires that water utilities reinvent their business model.
- It is not clear how costs should be shared between different stakeholders. Experience varies across member states.

Session 3: Scaling up nature-based solutions to enhance water retention

- While nature-based solutions for water retention have distinctive advantages, rolling them out at scale faces several practical issues related to lack of data (on costs), challenges to value multiple co-benefits, complex institutional arrangements that blur decision-making and accountability.
- A pending issue of whether and how economic policy instruments can support their deployment at scale.

- Professional education is required so that more engineers are aware and competent for the design and operation of NBS.

Next steps

Participants indicated as priority the following next steps:

- The European Commission to set up an *ad hoc* Task Group on water allocation regimes, with a view to facilitate experience sharing across member states. The Task Group should bring in sectors that use water (agriculture, energy, fluvial transportation…).
- Member states would benefit from further guidance on how to price and finance the production and distribution of reclaimed water. In particular, further analysis on whether – or under which conditions – subsidies can be economically beneficial would be valuable.

Several options were suggested that may accelerate the deployment of nature-based solutions for water retention, where appropriate:

- Clarify how the soon-to-be-released regulation on Nature Restoration can be oriented to favour NBS
- Institutional arrangements and regulation to better combine soil and water management
- Document the economic value NBS generate
- Explore how the taxonomy on sustainable activities provides incentives to direct commercial finance towards NBS
- Set up a helpdesk to support project development and project owners
- Review experience with de-sealing sealed surfaces.

Session 1: Water allocation regimes, in the context of the Water Framework Directive

Over-abstraction is a major problem in the European Union. It derives from a combination of increasing water demand (for urban water supply, agriculture, and other economic activities) and variability of precipitations (both magnified by climate change). Water scarcity triggers justice issues. Exposure and vulnerability to scarcity are heterogeneous among water users and income level. It follows that managing water scarcity is gaining traction as a condition for good status of water bodies and a requisite to deliver on multiple EU strategies (including the EU biodiversity strategy).

Banning specific water uses can only be a short-term response to water scarcity. It fails to reflect the distinctive capacities of different water users to adjust to scarcity. It does not contribute to long term flexibility of water management. When banning is considered as part of a menu of options to address scarcity crises, the protocol needs to be set before the drought occurs.

Water allocation regimes contribute to the objectives of the Water Framework Directive, as regards quantitative status of groundwater and quantitative management of all freshwater sources. They are particularly relevant where water is scarce and competition to use available sources intensifies. Well-designed water allocation regimes can reach economic efficiency, environmental sustainability and social equity. They promote efficiency and reduce waste. They send signals where to invest, such as to increase water storage and water efficiency.

Robust water allocation regimes are based on comprehensive data sets:

- A water balance, to define and monitor resource availability and use. Countries reported cases where fragmented institutional frameworks lead to lack of cohesive view of the water balance
- A definition of the abstractable pool and the capacity to monitor legal and illegal abstraction
- Reference flows. They send a signal about security of supply
- Ecological flows. They determine how much water is required to sustain ecosystems and the services they deliver.

Progress is made, as new sources of data become available. Several countries shared experience with the use of new sources of data (typically Copernicus) to monitor water abstraction, or soil moisture).

In practice, water allocation regimes in Europe still face several pending issues:

- Compliance. Participants at the workshop reported basins where caps on abstractable water are not properly enforced and complied with.
- Environmental flows. In the context of the Common Implementation Strategy, material was developed to guide decisions regarding ecological flows. Little progress has been reported, though, on the definition of e-flows and compliance with set levels. Uncertainty remains on whether e-flows are best defined as an absolute volume of water (number of m^3 required to support ecosystems) or a share of available water (at the risk of affecting the integrity of ecosystems in times of low flows).
- Equity issues. They are particularly acute where allocation regimes fail to account for the need of selected users (e.g. fluvial transportation) or disregard new users (new entrants in a river basin)
- Balance. A balance needs to be found between securing access to water (in particular for high-value uses) and the ability to adjust to shifting circumstances. Robust water allocation regimes deliver in times of plenty and in times of scarcity.
- Transaction costs. Minimal transaction costs are a condition for effective water allocation regimes. They are a distinctive strength of tradable water entitlements in the Murray Darling basin (Australia), where water can be traded via a mobile app.

Groundwater allocation triggers distinctive challenges, for several reasons. First, data on groundwater availability is patchy. Second, monitoring groundwater abstraction and use can be difficult. Unregulated water use is reported in many water basins in Europe.

It is noteworthy that security comes at a cost: higher security in water supply requires access to more expensive resources (storage, or desalination, for instance). The appropriate level of water security ultimately is a political decision, which reflects how much a community is willing to pay for it.

An interesting topic is the interplay between water allocation regimes and pricing mechanisms (here, essentially abstraction charges). According to economic theory, abstraction charges reflect the opportunity cost of using water. They are meant to increase when water is scarce (assuming demand is constant).

Also, increased uncertainty about water availability now and in the future enhances the need for a buffer stock of water, to be used in times of scarcity. Viable cost recovery requires that a "scarcity premium" applies to access that water.

Measures to enhance water use efficiency can trigger a rebound effect, where water saved through efficiency gains is used for other purposes (such as extension of irrigated land, or growing more water-intensive crops). Water allocation regimes are instrumental in addressing this rebound effect. This requires that return flows (or net abstraction) are considered and measured.

Resources shared by participants

- A note on how to tackle illegal water abstraction: https://www.fundacionbotin.org/89dguuytdfr276ed_uploads/Observatorio%20Tendencias/How%20to...ok_enlaces.pdf
- An academic paper on remote sensing-based irrigation water accounting at river basin scale https://www.researchgate.net/publication/344427501_Evaluation_of_Remote_Sensing-Based_Irrigation_Water_Accounting_at_River_Basin_District_Management_Scale
- DIANA project on monitoring non-authorised water abstractions for irrigation: https://diana-h2020.eu/en/index.html
- The OECD Health Check for water allocation regimes (https://issuu.com/oecd.publishing/docs/water-resources-allocation-2015-pol). A companion report on groundwater allocation (https://www.oecd.org/environment/groundwater-allocation-9789264281554-en.htm)

Session 2: Incentives to increase demand for reclaimed water

The session was based on the assumption that technologies are available to treat wastewater at the preferred level of quality before it can be reused. So, the question is: how to stimulate demand for reclaimed water? International experience shows a combination of three instruments works best: quality standards, prices, secured volume of reclaimed water. The discussion highlighted that in Europe the first two prevail, while the third one is hardly considered.

Several countries are gaining experience with reclaimed water in Europe, most notably small islands in the Mediterranean region. Investment is driven by lack of freshwater availability. Similarly, some utilities add the provision of reclaimed water as a feature of their business model (beyond water supply, wastewater collection and treatment)[1].

[1] Interestingly, in countries where water supply service providers are distinct from sanitation service providers, reclaimed water induces competition between these two groups.

These countries had to overcome initial users' reluctance to use reclaimed water, or crops irrigated with reclaimed water. They testify that communication is key to build trust in the quality of the source and the fact that it is fit for certain purposes. Communication needs to be backed by compliance monitoring and enforcement.

Quality standards are being developed, for instance for agriculture use of reclaimed water. Micropollutants found in wastewater streams attract a lot of attention. This can be an issue for food crops; in some jurisdictions, reclaimed water is allowed for trees and vegetables, but not for vegetables that are consumed raw. It is noteworthy that in the context of the Zero Emission policy, the precautionary principle may make the use of reclaimed problematic.

Where demand for reclaimed water is low, treated effluents can be used to maintain environmental flows in times of scarcity (typically in the summer). It can also be used to recharge aquifers, thus benefitting the status of groundwater bodies. Such opportunities actually derive from the WFD: at European level, the Water Reuse Regulation's provisions on risk management require to take into account possible impact on the environment and call for taking in account EU legislation, including in particular respecting the WFD provisions, thus including ecological flow considerations.

Countries are puzzled as regards the right way to charge users for the use of reclaimed water. The prevailing model seems to be the provision of reclaimed water as a distinctively low price, so that it is more attractive than freshwater. In some countries, users only pay the distribution cost of reclaimed water (not the treatment cost). Such a policy is at odds with the need to recover cost of the provision of reclaimed water. It is also inconsistent with the ambition to promote water use efficiency to discourage wastage. It does not contribute to allocating water where it creates most value.

Pending issues in relation to the business model for reclaimed water include:

- How to reflect environmental and resource costs (or benefits) of reclaimed water?
- Can some sort of payment for ecosystem services apply? The option may be valid when reclaimed water explicitly substitutes for the use of groundwater, or scarce freshwater, which can then remain in the environment and support ecosystems.
- Who should pay the additional treatment required to make reclaimed water fit for purpose? Some member states reported government subsidies to cover the cost of tertiary treatment. It remains to be seen whether and under what conditions such subsidies can be economically effective: subsidising the construction cost can attract more users via network externality; subsidising the input (supplied wastewater) can augment the volume of reclaimed water, further addressing water scarcity.

Reclaimed water is more competitive when abstraction charges for freshwater reflect the opportunity cost of using water (through a scarcity premium or similar mechanism). But this is not common practice in Europe.

Resources shared by participants

- Some success cases of wastewater reuse can be found in the EU project: https://suwanu-europe.eu/

Session 3: Scaling up nature-based solutions to enhance water retention

Natural water retention measures are pervasive in several countries. They apply to both flood prevention (e.g. the Room for the River programme in the Netherlands) and mitigation of water scarcity risks (e.g. aquifer recharge to augment supply, or mulching to manage water demand). Pilot projects illustrate that NBS are valuable and appropriate options, which can deliver multiple co-benefits. However, NBS for water retention are not scaling up in Europe.

Some participants contended that cost-benefit analysis can contribute to scaling up NBS. However, traditional CBAs fail to capture the multiple co-benefits triggered by NBS at the appropriate time scale (long term). Methods and data would need to improve. As regards costs, despite their existing track record, data on the capital and operation and maintenance costs of NBS is lacking. Even if NBS are more expensive than grey solutions, NBS for water retention provide a wide range of co-benefits: these include resilience, cooling effect in urban environments, mental health and many others. In parallel, a thorough assessment of the environmental and social footprint of grey infrastructures (including CO_2 emissions, as documented by Deltares) would help make NBS attractive.

Planning has a role to play. From that perspective, it is unclear whether the WFD – which relies on 5-years cycles – promotes or deters NBS for water management: short timelines imposed by regulation to deliver environmental benefits favour grey infrastructures. The co-benefits of NBS can best be captured when planning cuts across sectors: a narrow focus on water retention fails to capture co-benefits, therefore limiting the comparative advantage of NBS. Water agencies will monitor the contribution of NBS to water retention, but co-benefits are likely to remain unnoticed or unreported. Appropriate planning for NBS combines water, soil, sediments, and biodiversity. Participants also discussed the appropriate geographical scale for planning: landscape approaches provide a wider vision that helps to combine multiple perspectives.

In addition, regulation is required. Member states are at diverse stages in the development of policy and regulation for nature-based solutions for water retention. To be considered in practice, NBS can be integrated to regulation, construction, urban planning, and procurement codes. Land management has a lot to do with NBS for mitigation of flood and scarcity risks.

In Europe, a new policy landscape – including the EU taxonomy for sustainable activities – provides opportunities to consider and finance NBS for water resources management. As financial institutions look for opportunities to increase their funding for resilient projects and infrastructures, the taxonomy can direct more finance towards NBS. It is not clear however whether this will materialise at scale.

A distinctive challenge noted by participants is that NBS are often local. They apply in specific contexts. For instance, distinctive soil structure is required for the sponge function to materialise.

Institutional arrangements are critical. To design and implement NBS, water authorities or other public institutions engage with diverse groups of stakeholders: landowners, farmers, water utilities. Financial incentives may not be the only option, but they do help for several reasons: adjusting existing practices and infrastructure can be costly; and NBS include some risks, which need to be compensated. Because such complex and long-lasting engagement is required, ownership of the solution is blurred: it is not clear who will initiate the collaboration and who will be accountable over time.

A pending issue is whether and how economic policy instruments can incentivise the use of NBS for water retention. For instance, while utilities can pay for groundwater recharge or catchment protection that benefit their operation, it is not clear who can pay for larger-scale programmes. How can landowners be incentivised to accept nature-based water retention measures, which imply wet soils near natural streams?

Are taxes on sealed surfaces in urban environment being considered / deployed[2]? Policy reforms and redirection of agriculture subsidies have a role to play.

Resources shared by participants

- The experience of IUCN (https://www.iucn.org/theme/nature-based-solutions/resources/iucn-global-standard-nbs)
- In the Netherlands the Room for the River-programme applied NBS at large scale. The programme ran over more than 10 years and stayed within projected cost and was delivered in time. (https://www.rijkswaterstaat.nl/en/water/water-safety/room-for-the-rivers)
- The MERLIN project, financed by the European Commission under Horizon 2020, commits to transformative ecosystem restoration, mainstreaming nature-based solutions for the urgent systemic change of our society (https://project-merlin.eu/)
- The IMPETUS project, a Horizon 2020 project funded by the European Commission, is an innovative project with the aim of enhancing the resilience of cities in the face of security threats in public spaces (https://www.impetus-project.eu).

[2] France and Germany were mentioned, along cities in the Netherlands (Amsterdam), Wallonia (Jette) and the USA (e.g. Columbia, Philadelphia, Portland).