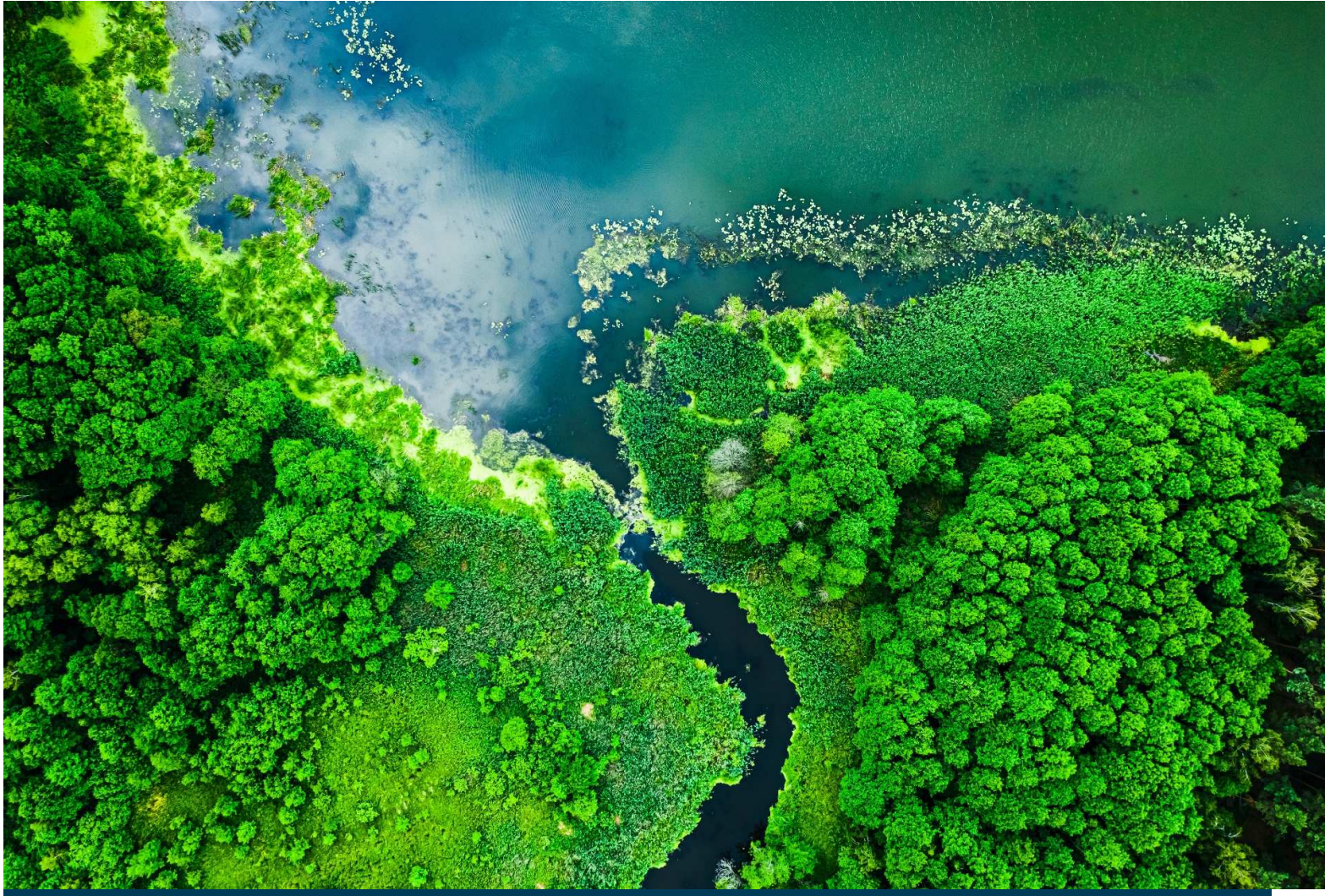

GOVAQUA policy matrix Part A – Review of national water allocation policies in six European countries

GOVAQUA Deliverable 2.1

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1.1	30.04.2024	Josselin Rouillard	Ready for country information review
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1.3	29.07.2024	Josselin Rouillard	Revisions made based on the internal reviewers' comments and suggestions.

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List of Abbreviations

Abbreviation	Explanation
ASB	Abstraction Sensitivity Band (England)
CAMS	Catchment Abstraction Management Strategies (England)
CAP	Common Agricultural Policy
DMP	Drought Management Plan
EA	Environment Agency
EC	European Commission
EFI	Environmental Flow Indicator
EU	European Union
HMWB	Heavily Modified Water Bodies
MS	Member States
NGO	Non-Governmental Organization
NbS	Nature-based solution
OUGC	Organisme Unique de Gestion Collective (Agricultural Water User Associations) (France)
PTGE	Plan Territorial de Gestion de l'Eau (Quantitative Water Management Plans) (France)
RBA	River Basin Authority (Spain)
RBD	River Basin District
RBMP	River Basin Management Plan
SEL	Sustainable Extraction Limit (France)
WFD	Water Framework Directive

Introduction

Allocation mechanisms can be defined as the combination of institutions which enable water users and water uses to take or to receive water for beneficial use according to a recognised system of rights and priorities (Taylor, 2002). These mechanisms define who is allowed to access water, how much may be taken and when, how it must be returned, and the conditions attached to the use of the water (OECD, 2015). In the context of the European Water Framework Directive (WFD), allocations must account for the range of uses needing specific flows or levels of water in rivers and lakes such as the environment, navigation, recreational users including anglers, water-based tourism and fisheries (Rouillard and Schmidt, 2024).

Reforming water allocation regimes to support the environmental objectives of the EU Water Framework Directive and the environmental and climate agenda of the European Union (EU) was one of seven policy options highlighted in the European Commission (EC)'s 2007 communication on water scarcity and drought (EC, 2012). However, no specific EU activity has supported further work on the topic. More recently, a new impetus was given under the European Green Deal which identifies water resources allocation as an integral part of its broader sustainability agenda. In particular, the EU Climate Change Adaptation Strategy (EC, 2021a) specifically points towards the need to improve the use of water-permitting and allocation systems to mitigate climate driven water scarcity and droughts impacts. The EU Biodiversity Strategy for 2030 (EC, 2021b) calls for reviews of water abstraction and impoundment permits to implement ecological flows to achieve WFD good status. The topic is now covered by the ad-hoc task group on water scarcity and drought, with a specific activity on drought management and on water allocation.

The WFD does not explicitly regulate water allocations, but several elements of the WFD are relevant to the design and operation of water allocations. Under the WFD, Member States must achieve good status for all water bodies, which as a result obliges Member States to consider ecological needs when allocating water in the form of ecological flow requirements (EC, 2015). This may be expressed in terms of specific flow regime and volumetric allowances in surface water and groundwater that can support well-functioning and healthy freshwater ecosystems.

River Basin Management Plans (RBMPs) must support the implementation of measures addressing unsustainable abstraction, hydromorphological and pollution pressures on water bodies, in order to reach the WFD environmental objectives. With the WFD, emphasis has been put on consolidating demand management and better regulatory control of abstractions (EC, 2006). Measures taken in RBMPs are nevertheless very varied across Member States, and include actions such as water saving campaigns, water losses and efficiency measures, the development of alternative water sources (e.g. reclaimed water, rainwater harvesting), new storage schemes, land-use or cropping-pattern changes, natural water retention measures, water pricing and limits to the quantity and timing of abstraction (Buchanan et al., 2019).

The WFD requires Member States to implement permitting and licensing regimes to regulate water abstraction and discharge activities. Water users, including industrial, agricultural, and domestic sectors, are required to obtain permits or licenses to abstract, divert or modify water flow from surface water bodies or groundwater sources and to discharge treated or untreated wastewater. The Commission's assessment of the 2nd cycle RBMPs (EC, 2019) notes that registration, permitting and metering of water uses are now well established in the majority of Member States, but reports sometimes widespread cases of illegal abstraction and lack of metering, as well as concerns surrounding exemptions from controls and permitting requirements for small abstraction. Concerns have also been raised that permitting regimes may only regulate water abstraction and not sufficiently water 'consumption'. Water consumption is an important consideration as it relates to the share of water that is abstracted but is not returned to the freshwater environment in the form of direct discharges or return flows following infiltration in soils (GWP, 2019).

The Common Implementation Strategy of the WFD differentiates between water scarcity conditions and drought conditions. Water scarcity can be defined as a situation where insufficient water resources are

available to satisfy long-term average requirements. It refers to long-term water imbalances, where water demand exceeds the average water resources exploitable under sustainable conditions (EC, 2006). Droughts refer to important deviations from the average levels of natural water availability and are considered natural phenomena (EC, 2008). In addition to measures addressing abstraction pressures and water scarcity in RBMPs, the European Commission recommends establishing Drought Management Plans (DMPs).

DMPs consists of three key elements: using indicators and thresholds that trigger the onset, ending and severity levels of prolonged drought conditions, measures to be taken in each drought phase to prevent deterioration of water status and to mitigate drought effects and a framework for making decisions during droughts and subsequent updating of the DMPs (CIS, 2006; Schmidt et al., 2023). DMPs are in place in 12 Member States, and in development in eight additional Member States (Schmidt et al., 2023). Beyond preparedness and mitigation measures, Member States may set limits on the quantity and timing of abstraction during droughts, including a pre-defined prioritisation of water allocation between water uses. Such a hierarchy of water uses exists in 15 Member States, with the primary use usually being critical infrastructures (e.g. dykes, hospitals, nuclear power stations, fire protection), followed by drinking water and public water supply (which therefore can include not only domestic users but also smaller industries and livestock production) and the environment (EC, 2023c).

Research Objectives

This report focuses on the challenges to design and implement water allocation regimes. It aims to contribute to the ongoing policy discussions on the role of water allocation in sustainable water management and the implementation of the WFD. Its specific objectives are:

- To provide insights into how water allocation regimes are designed and implemented in Europe
- To discuss current challenges with the implementation of water allocation regimes that support sustainable water management in line with the requirements of the WFD
- To identify opportunities for innovative solutions to implement sustainable water allocation regimes in Europe

The focus of the analysis is on the six case studies forming the network of Living Labs of the EU project GOVAQUA, including five EU countries (Spain, France, Romania, Finland, Sweden) and England. Although England is not part of the EU, water policy and management remains highly structured around the WFD.

This report is one of three parts composing Deliverable 2.1 of the GOVAQUA project. Part B addresses in more detail the legal and regulatory approaches in relation to ecological flows and Part C focuses on the regulation of value chains to support sustainable water management.

Methodology

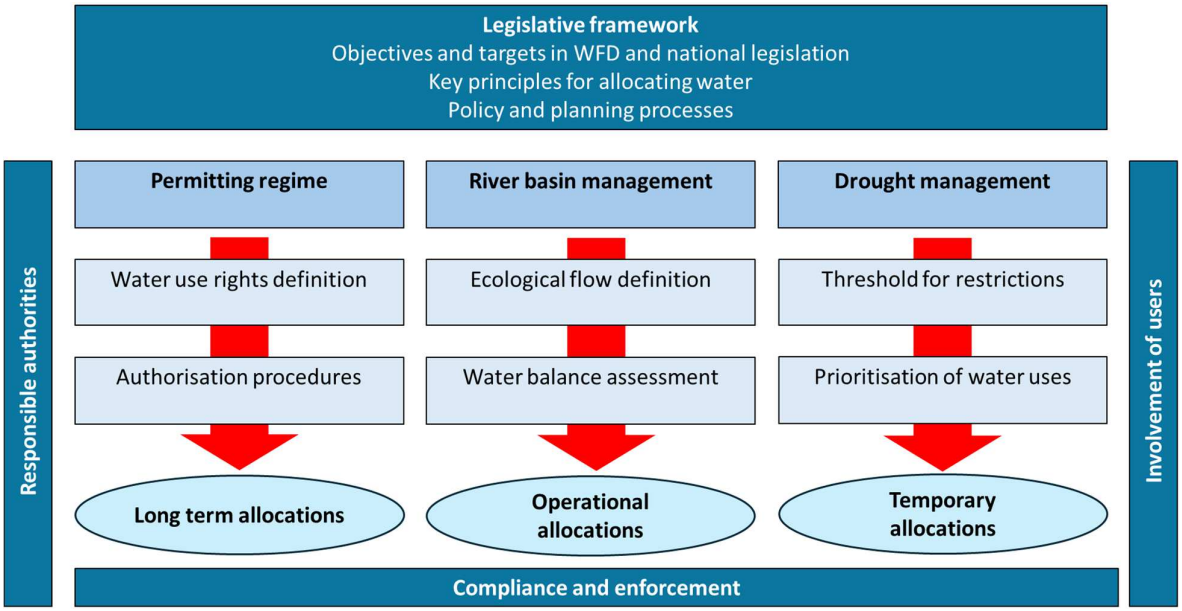
Building on a review of European legislation on water management and existing guidance on water allocation, key building blocks of an allocation framework in the context of the implementation of the WFD were developed to guide the data collection in the six countries (Figure 1). This is structured around the characterisation of key institutions, including the legislative and regulatory framework, the responsibilities and powers of authorities and involvement of users in allocation decision-making, and compliance and enforcement arrangements. Three ‘Pillars’ of European water management planning influence water allocation:

- The permitting regime, which consolidates and formalises water use rights through permits, and establishes a process for authorising, modifying and revoking permits. This supports the definition of ‘long term’ allocations, or, in other words, entitlements of a share of the available resource

- River basin management planning (RBMP) under the WFD, which consolidates the implementation of ecological flow requirements and lead to the definition of an allocable pool through a water balance assessment. This supports the definition of 'operational' allocations that meet the priorities of river basin planning, and may be further adapted annually and seasonally according to recharge of surface water and groundwater storage
- Drought management that applies during water shortages, which includes the definition of indicators and thresholds for restricting water uses, and the prioritisation of water uses. Restrictions result in temporary changes in water use rights as defined in permits (i.e. long term allocations/entitlements described above) or in 'operational' allocations where river basin planning already alter water use rights defined in permits.

Figure 1 below shows how water users' rights to use water are influenced by these three sources of regulatory and planning interventions (permitting, river basin planning and drought management).

Figure 1 Building blocks for reviewing national allocation arrangements in the context of the WFD



Based on this framework, a template for collecting data at national level was developed (Annex 1). This template was filled in by national experts of the GOVAQUA project through desk based review of documentation. Interviews with nine national experts from governmental bodies and agencies were carried out to complement the data collection (Annex 2). They lasted between one and two hours and were carried out by video conference or in person. Interview questions were tailored to each national context.

Outline of the report

This report is structured into five chapters. It starts by characterizing the overarching legal, regulatory and institutional settings of water allocation regimes in the six countries, followed by an examination of the organizational responsibilities and stakeholder engagement process relevant for water allocation. The national permitting regimes are also described. Attention is then turned onto the boundary conditions for identifying the allocable pool (amount available for human uses) and the rules regulating and influencing allocation and reallocation including during droughts. Elements on compliance and enforcement are finally examined. Based on these more descriptive chapters, the discussion highlights key challenges in implementing water allocation regimes for sustainable water management in Europe and concludes with

avenues for further work on innovations and solutions that can facilitate future implementation of water allocation policies.

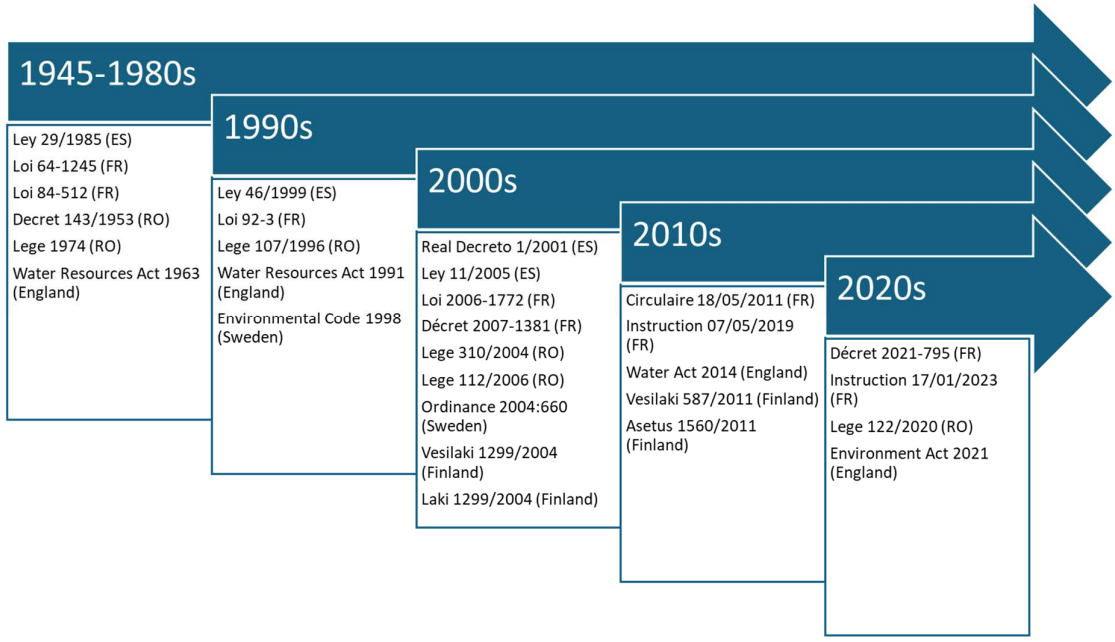
Overarching legal, regulatory and policy framework

Allocations are governed by a combination of national laws, regulations, and policies, as well as international agreements and conventions where applicable, which provide clarity on the principles governing the rights to use water and establish planning processes and guidelines for allocating water in various circumstances. In Europe, the WFD has a central role in current water management planning. However, each country has unique institutional contexts and histories. They are examined below, while more specific descriptions of powers and responsibilities of authorities and stakeholders are presented in the next chapter.

Legislation and regulation addressing water allocation

The WFD provides a common regulatory basis for water management in the five countries reviewed. However, the legal framework relevant for water allocation – including the nature of water rights, the permitting system and drought management – dates back in most countries from before the WFD (Figure 2). Permitting regimes have been progressively consolidated at national level in the post-war period, while arrangements for river basin and drought management were consolidated in the 1980s and 1990s. Substantial revisions occurred with the enactment of the WFD and the strengthening of ecological flow requirements, and increasingly so, to address water scarcity and droughts.

Figure 2 Chronology of key legislative instruments for allocation in the six reviewed countries



Spain first formalized a dual model of water rights through the Water Laws of 1866 and 1879, whereby surface water is public and governed by a 'concessionary' regime, while groundwater remained outside public control (Sanchis-Ibor et al., 2021). The 1985 Water Law (SG, 1985) repealed the 1879 Water Law, consolidating the concessionary regime for surface water. Groundwater abstractors obtained a period to either register their historical right as public (concession) for 50 years (Registry of public waters) or keep it

as private in perpetuity (Catalogue of private waters). If held privately, the right cannot be modified. Hence, a request to deepen the well or increase the volume extracted would transform the private right into a concession under the public regime (Llamas et al., 2015). The 1985 Water Law also first established the concept of environmental flow and drought management procedures. Following the adoption of the WFD, Spain adopted a Royal Decree 1159/2001 (SG, 2001) to consolidate the legal basis for drought management, and the water Law 11/2005 (SG, 2005) and Water Planning Instructions of 2008 (SG, 2008) to consolidate the implementation of environmental flows (Sanchis-Ibor et al., 2021). Exchanges of water rights between users are possible in Spain under the 1999 Water Law (SG, 1999).

In France, navigable waters have been under royal control since the middle ages, and access to all forms of surface water and groundwater has gradually been restricted following the adoption of the Civil Code of 1804 (Rouillard and Rinaudo, 2021). The 1964 Water Law (RF, 1964) formalised the creation of a national permitting regime on all abstraction, storage or diversion of surface water and groundwater. The 1992 Water Law consolidated the notion that water is a common good subject only to rights of use regulated by the State. Since then, France progressively formalized a dual system for managing droughts and water scarcity (RF, 2011; Figureau, 2012). On the one hand, the 1992 Water Law (RF, 1992) established the legal basis for the use of drought restrictions, which led to the adoption of various decrees specifying drought management procedures. On the other hand, procedures for reducing long term quantitative deficits at the level of river basins, including groundwater, were formalized following the transposition of the WFD under the 2006 Water Law followed by decree 24 sept. 2007. In parallel, France formalised a national approach to ecological flows under the 1984 Water Law (RF, 1984), consolidated progressively through the 1992 Water Law and 2006 Water Law (RF, 2006), as well as various decrees and circulars. More recently, Décret no 2021-795 (RF, 2021) further specified procedures for 'structural' water management and drought management.

In Sweden, landowners own the right to control (rådighet) both surface and groundwater within their properties. In addition, a permitting regime regulates water use. Furthermore, land ownership is not always necessary, and water use rights can be obtained via application to the permitting regime. The 1998 Environmental Code establishes the current legal basis for permitting water operations. It also provides the legal basis for environmental aspects of abstraction and other waterworks (Swedish Parliament, 1998a). The Ordinance 2004:660 delegates authority to adopt a set of environmental quality standards to be respected through permitting (Swedish Parliament, 2004).

In Finland, water and land areas are privately owned. However, according to the Water Act 587/2011 (Finnish Parliament, 2011), the owner of water or land area can only administer surface water or groundwater as a resource. This means that the owner needs a permit for any significant use of water, and that non-owners also have the possibility to apply for such a permit. Water in spring and water in artificial storage is directly owned. Water uses are also moderated through river basin management established through Act 1299/2004 (Finnish Parliament, 2004) transposing the WFD, and the consolidation of the permitting regime under the Water Act and Water Decree 1560/2011 (Finnish Government, 2011). No legislation or regulations establish drought management in the country.

In Romania, the 20th century saw the enactment of several water law, starting in 1924 with the first Water Law and the 1953 Decree 143 (RG, 1953) regarding the rational use and protection of waters. The adoption of the 1965 Constitution and the second Water Law 1974 (RG, 1974) firmly established surface water and groundwater as public goods owned by the state (Platon and Constantinescu, 2018). This was restated following the adoption of the new constitution in 1991 and the adoption of the National Water Law in 1997 (RG, 1996). This law provides the general framework for water management, including the overarching rules for authorising the right to use surface water and groundwater, environmental protection and the legal basis for drought management restrictions. Romania progressively adopted EU water legislation in the process of joining the EU in 2007 with major modification transposing the WFD in 2004 (RG, 2004) and 2006 (RG, 2006a). An Order (RG, 2006b) was adopted in 2006 specifying the methodology for restrictions during droughts. More recently, the Water Law 122/2020 amends the 1996 Water Law to consolidate the registration of water rights, reinforce restrictions on unreasonable use of water resource and improve the

protection of groundwater, in particular by restricting groundwater use by irrigation (Pascu and Savastre, 2020).

In England, riparian rights are historically the main legal principle governing the use of surface water, while groundwater has not been governed by a clear set of principles. Under English common law, riparian rights pertain to the use of surface water by landowners over whose property the water flows, entitling them to use the water for domestic or agricultural purposes. However, absolute ownership of surface water or riparian rights to percolating water has never existed under common law. Governmental action and national controls emerged as pressure over water resources increased over the 19th and 20th century. The current legal framework regulates access to water but does not define ownership. The Water Resources Act 1963 (UK Parliament, 1963) consolidated a nation-wide system of water abstraction licensing and regional planning of water management. The Water Resources Act 1991 (UK Parliament, 1991) established the current institutional and organisational arrangements for water management, while more recently, the Water Act 2003 (UK Parliament, 2003) transposed the WFD. Further reforms were adopted following the 2011 government white paper Water for Life (Defra, 2011) and formalised in the Water Act 2014 (UK Parliament, 2014). This aimed largely at restoring sustainable abstraction in the UK, and removed, for example, the ability of abstractors to claim compensation for losses resulting from modified or revoked permits. It also harmonises requirements related to abstraction with England's environmental permitting regime (UK Parliament, 2016). Further reforms and adjustments to processes surrounding licenses are also detailed in the Environment Act 2021 (UK Parliament, 2021), for example modernising the process for license modifications and adjusting the requirements related to water companies' Water Resource Management Plans.

Principles enshrined in law or guidance for allocating water

Under the WFD, all reviewed countries have the overarching objective to achieve good status in surface water and groundwater bodies – an objective still implemented in England since Brexit. In theory therefore, governments should ensure that allocation decisions do not hinder but rather contribute to the preservation and improvement of water ecosystems.

The WFD under Alinea (11) also aims "*to contribute […] to the rational utilisation of natural resources"* and places a strong emphasis on the polluter pays principle. All reviewed countries also encourage the principle of promoting the conservation and efficient use of water resources. This can in theory result in specific criteria guiding allocation decisions to favour or incentivize more water efficient uses. The efficient use of water resources however is only started in general terms in the legislative framework of the reviewed countries. In national policies, only France has recently adopted overarching targets for water savings (i.e. reduction of 10% of abstracted water) in its new Action Plan for Resilient and Concerted Water Management (RF, 2023). In other countries, such as Spain, the efficient use of resources is recognized to the same degree as the importance of satisfying demand from sectors: "*achieve the good ecological state of the public hydraulic domain and the satisfaction of water demands, the balance and harmonization of regional and sectoral development, increasing the availability of the resource, protecting its quality, economizing its use and rationalizing its uses in harmony with the environment and other natural resources*" (SG, 1985).

The WFD promotes the idea that "*water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such*". In the reviewed countries, the principle regarding the equitable sharing of water resources does not usually appear as is any reference to a human right to water, although recognized by the UN General Assembly and the Human Rights Council as part of binding international law in 2010 (UN, 2010). In Sweden nevertheless, groundwater shared between several properties using the water for domestic consumption should be shared according to what is "*reasonable*".

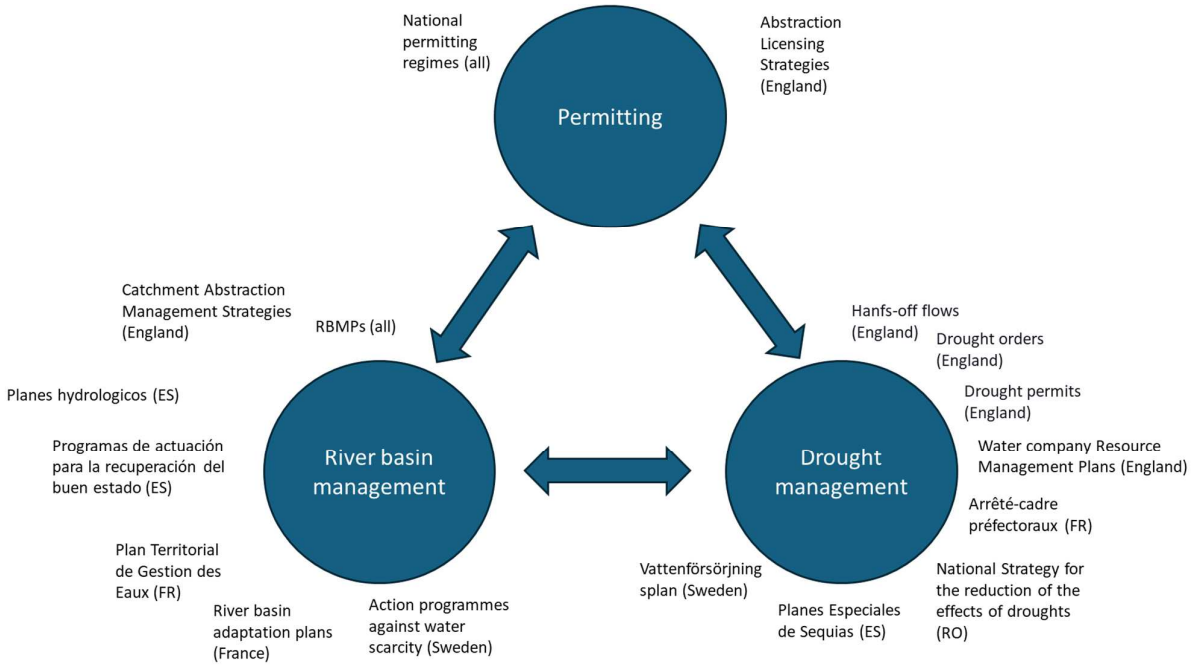
The protection of indigenous rights only appears as a general principle in the Finnish and Swedish legislative frameworks. In Finland, the law stipulates that a project that is located or that has impacts on the Sami homeland must be implemented so that the possibilities of the Sami to exercise their constitutional rights

as an indigenous group to maintain and develop their culture and practice their traditional livelihoods are not undermined to *'no more than a minor extent'* (Finnish Parliament, 2011). In Sweden reference is made to reindeer husbandry (which is only practiced by Sami people), stipulating that: '*land and water areas that are important for reindeer husbandry or commercial fishing or for aquaculture must be protected as far as possible against measures that can make their use for such purposes significantly more difficult*" (Swedish Parliament, 1998a).

Policies addressing water allocation

An identification was carried out of the various policy instruments used by Member States that can affect water allocation through the permitting regime, river basin management and drought management (Figure 3). The permitting regime is elaborated in the Chapter on Permitting regimes. Below the instruments on river basin management and drought management are described. In addition, some instruments are sector-specific, for instance drought management in water supply utilities.

Figure 3 Instruments identified in the reviewed countries that are relevant for water allocation



River basin management

Under the WFD, Member States must prepare RBMPs to achieve good status of water bodies. Where abstraction is a pressure, RBMPs may include measures such as monitoring programmes for water levels and abstraction, water saving measures, nature-based solutions (NbS) and Natural Water Retention Measures (www.nwrm.eu), or economic instruments, such as volumetric fees for abstraction. More broadly, RBMPs should define ecological flows that preserve the natural flows of rivers and mitigate pressures from abstraction, storage and diversion of water. The implementation of ecological flows is usually associated with obligations in permits and restrictions on water uses during droughts. The setting of ecological flows, obligations in permits and restrictions during droughts are examined in later chapters of this report. Part B of this deliverable examines in more detail the regulatory aspects of ecological flows.

France and Spain have integrated more formal allocation mechanisms to address water scarcity, i.e. long term imbalances between water availability and demand in catchments and groundwater basins. By addressing term water imbalances through for instance, a reduction in water consumption or an increase in the availability of resources, the objective is to reduce the risk of frequent drought restrictions on water

abstraction. In Spain, River Basin Plans provide an official forecast of allocation of surface water between uses based on water availability. When groundwater basins are declared overexploited by River Basin Authorities, an action programme for the recovery of the good state of the groundwater body must be prepared (see Textbox 1). As a pilot initiative to enhance groundwater management, the Duero Basin Authority has made Groundwater User Associations mandatory in the latest RBMP (2021-2027).

Textbox 1 Programme for recovery of good state of groundwater body in Spain

The groundwater management plan may outline measures aimed at annually reducing individual extraction limits linked to concessions and private rights, aiming to reach a sustainable extractable volume in cases where the aquifer is deemed overexploited or when water bodies are at risk of failing to meet Water Framework Directive (WFD) objectives. A comprehensive program incorporating initiatives for restoring the water body's good status must be endorsed and integrated into the River Basin Management Plans' program of measures. This action plan will dictate the extraction regime to promote a sustainable utilization of resources, striving for the attainment of a favorable status for groundwater bodies and the enhancement of associated ecosystems. Possible measures may encompass prohibiting the drilling of new wells (enhanced control over access rights), halting the issuance of new concessions (heightened scrutiny over extraction rights), or imposing temporary volumetric constraints on individual wells.

Source: Llamas et al (2015)

In France, procedures are also in place to address long term overallocation. At river basin level, water agencies have set target management flows (debit d'objectif d'étiage), taking into account ecological flows and user needs. In sub-basins deemed to have a long term, structural imbalance between water demand and availability (called 'Zone de Restriction des Eaux'), an overarching plan for quantitative water management (Plan Territorial de Gestion des Eaux, see Textbox 2) is required, setting out various measures to address imbalances (RF, 2019; 2023). Measures may include resource mobilization and water saving measures, as well as an allocation plan, which specifies volumetric abstraction allowances between the three main consumptive sectors (public water supply, industry, agriculture) (MTECT, 2023).

Textbox 2 Plans for quantitative water management in France

In priority basins for quantitative water management, a program of action must be established to revise abstraction authorizations, aiming to align with targeted abstraction volumes established by the water balance assessment. This program necessitates engagement and collaboration with all relevant stakeholders. Typically, it is structured around a set of measures intended to promote water conservation, encourage the cultivation of less water-intensive crops, and, under specific circumstances, facilitate the construction of new reservoirs.

If the implementation of this action program requires financial support from the water agency for reservoir construction, it must adhere to the framework of a "territorial project" (referred to as PGRE or PTGE). The guidelines for territorial projects emphasize the following main elements:

- Striving for balanced resource management without compromising water quality.
- Ensuring that consultation involving all stakeholders within the region, encompassing all water usage domains, is integral to the project.
- Establishing coherent demarcations based on hydrological or hydrogeological considerations.
- Incorporating measures aimed at reducing overall abstraction and exploring alternatives to reservoir construction.
- Defining a schedule for reinstating quantitative equilibrium.

Moreover, contractual agreements formalize the commitments made by the involved parties.

Source: RF (2024)

In Sweden, there are partial action programmes against water scarcity 2022-2027, with measures mainly providing information and advice on water efficiency. No specific measures are applied on managing permits, but guidance and legislative review is planned on how merits would be modified in areas of scarcity where many stakeholders are involved in water resources (see e.g. Vattenmyndigheten i Södra Östersjöns vattendistrikt, 2022).

In England, the WFD has largely determined the current structure for water management and allocations. RBMPs are developed for the eight river basins in England and were last updated in 2022. They include measures to address pressures that affect surface waters natural flow conditions and groundwater quantitative status. The Water Abstraction Plan 2017 (Defra, 2017) sets out how water abstraction management will reform over the coming years. It states how this will protect the environment and improve access to water in line with the RBMPs. The plan has 3 main parts to: address unsustainable abstraction; develop a stronger catchment focus and modernise regulation. The key implementing measure in relation to water quantity is Catchment Abstraction Management Strategies (CAMS).

Introduced in 2001, CAMS assess water availability in each catchment and identify where demand affects the water balance. CAMS supports river basin planning by providing an indication of whether there are sufficient water resources to support a healthy ecology and sustainable abstraction, and information on how much water is available for future licensing whilst protecting the environment. It also helps to identify water bodies that are failing or are at risk of failing to meet GES by 2027 due to water resource pressure. CAMS is complemented by Abstraction Licensing Strategies (ALS) which are produced for each catchment based on CAMS assessments. They in turn determine abstraction licensing within the catchment boundaries (Benson et al., 2022).

In addition, the 2020 National Framework for Water Resources requires that regional plans are developed to outline how a sustainable water supply for people, business, industry, and agriculture will be achieved (EA, 2020). In 2023, Defra introduced its Plan for Water (Defra, 2023), covering both water quality and quantity issues. This includes the improvement of water supply infrastructure, increasing resilience to drought, securing water supply for farmers, and sustainable abstraction management. Attention is now given to ensure the sustainability of water permits by considering future changes in natural flows due to climate change. It involves providing abstractors with information to invest in new technologies or storage solutions to maintain sustainable water businesses.

In Romania, the National Strategy for Water Management Romania 2023-2035 (SNGA) outlines as objectives the achievement of the level of “zero pollution” and energy independence until 2050, strengthening of the adaptation capacity and limiting of the vulnerability to climate change and ensuring the access to water through a socially equitable transition and in a financially efficient manner (RG, 2023).

Drought management plans

Under the WFD, DMPs aim to address exceptional circumstances of temporary water shortages, while RBMPs focus on addressing water scarcity (long term imbalances between demand and supply). DMPs should set out indicators and thresholds defining drought conditions and a list of pre-defined preparatory, emergency and recovery actions for the different impacted water uses to minimise losses, damages and fatalities. Although the WFD strongly encourage their preparation, not all of the reviewed countries yet have any, such as Finland and Sweden – although their legal framework provides powers to authorities to prioritise certain uses during water shortages. The situation in each country is described below.

In France, drought management establishes thresholds for water levels in rivers, wetlands and groundwater (taking into account the needs of ecosystems, in particular protected ones). Different threshold levels are established to account for the level of urgency/crisis: vigilance, alert, reinforced alert and crisis levels – with increasing use restrictions attached to each level. A priority use scale is applied that prioritises certain uses and guarantees certain levels of supplies during drought conditions (MTE, 2021). Furthermore, some "arrêté-cadre" may adopt exceptional measures to preserve drinking water supply or aquatic ecosystems when implementing the pre-defined set of restrictions will not achieve so.

In Spain, drought management ("Planes Especiales de Sequias") do not have a compartmentalised sectoral focus but an integrated one, providing a joint response to all sectors and to the environmental needs through both RBMPs and DMPs, according to the legal priorities for water resource allocation (SG, 2024a). It must be noted that these planning tools do not take into account drought impacts outside the scope of the use of water (e.g. rainfed agriculture, forest management or heat waves). The risk management scheme is articulated through preparedness (RBMP for drought risk management measures and DMPs protocolizing the management of water systems during drought episodes), mitigation (phased measures in the DMPs to mitigate social, economic, and environmental impacts), relief and restoration measures that must be established as mandatory content of the DMPs. The hazard / exposure / vulnerability scheme is not explicitly applied but the elements for its characterization are included (meteorological and hydrological variability, detailed knowledge of uses and demands, exposed population and economic activity, vulnerability reflected in non-compliance with desirable supply guarantees).

In Sweden, there is currently no official protocol for drought management, though the Act (1998:812) Containing Special Provisions concerning Water Operations provides powers to County Administrative Boards to implement restrictions to preserve public water supply or other general causes (Swedish Parliament, 1998b). No legislation unequivocally regulates the prioritisation of e.g. drinking water in an emergency water situation. There is also no law that prevents prioritisation on a general level, however prioritisation could in some cases involve conflicts between different legislations. Developments for future work to combat drought in the MS are proposed as part of the water authorities' work with the Sub-Management Plan against drought and water scarcity.

In Finland, a guide for preparing DMPs, targeted to local governments, was prepared in 2020 (Parjanne, Ahopelto and Parkkila, 2020a). Preparing a DMP is not compulsory in Finland; however, at a regional level, such a plan has been prepared for the river basin of Sirppujoki, located in South-Western Finland as part of a pilot project in 2020 (Parjanne, Ahopelto and Parkkila, 2020b). A national DMP is being developed (Ahopelto, 2024). The Water Act enables the permit authority to restrict during drought abstraction by less essential uses to secure public water supply (Finnish Parliament, 2011).

In Romania, the National Strategy for the reduction of the effects of droughts on short-, medium-, and long-term is the framework document promoting the preparation and adoption of measures aiming to reduce the impact of droughts (RG, 2007). Water allocation in case of drought is done according to the plans for restrictions and water use during droughts elaborated and updated when necessary and/or in case of emergencies by the River Basin Administrations. The regulation sets three characteristic sizes of water scarcity: normal phase, attention/waring phase and restriction phase. Specific actions and measures are defined by the regulation for each of these phases. The characteristic sizes for ensuring the water requirements of different uses are set by the plans of restrictions and use of water in dry periods.

In England, a drought response framework (EA, 2017) outlines roles and responsibilities between regions, water companies, and the Environment Agency. The National Framework highlights drought orders and drought permits as two legal mechanisms allowing for flexibility in water management during dry periods. Drought orders are issued by the Secretary of State for the Environment and involve more significant interventions. Drought orders go beyond Hand-off-Flows (see Chapter on Ecological flows), further restricting abstraction, require reservoir releases to support ecological flows, and directly restrict water usage, potentially leading to measures like water rationing and restrictions on non-essential water usage

activities. As drought severity increases, the government becomes more involved in managing the crisis, treating it as a civil emergency. More details on drought permits can be found in the Chapter on Permitting.

Sectoral plans

In addition to river basin planning, the reviewed countries have adopted sectoral plans that affect sectoral water demand and allocation. These usually prepare the sector for drought situations or, increasingly so, support water saving measures.

In Finland, water services are identified as part of the pool of critical infrastructure and operators have duties to draw up a plan to prepare for incidents such as water shortages. In Sweden, some regions have put together water supply plans (vattenförsörjningsplan). The purpose of a water supply plan is to ensure the availability of water resources for drinking water supply in an area in the long term. Water supply plan as a concept appears in the national environmental goals on groundwater of good quality and living lakes and watercourses, where the introduction of a water supply plan is encouraged. A set of guidelines for such plans were published to support and respond to the need the county administrations may have when they have to produce and update regional water supply plans in 2020 (Blad, Maxe and Källgården, 2009).

Although the Swedish guidance was not to provide any support for distribution/prioritisation between different interests and competing water uses, it also recognised that drinking water supply is related to other water uses. If the regional water supply plan clearly describes the various water needs that exist in the region, both now and in the future, the plan can form a good basis for making well-balanced permit decisions. However, the plan is not binding and there is no mandate to formally allocate shares of the available water resources between different interests.

According to French legislation, drinking water operators must contribute to reduce water stress by preparing plans to reduce water losses in distribution networks to achieve 85% efficiency (RF, 2010). Public water supply operators are also targeted by DMPs, but each operator must also have a specific plan for their distribution network. In the industrial sector, water saving plans and drought plans usually apply to the large industrial plants regulated under the Industrial Emission Directive and each adapted to their specific production process. For energy, including hydroelectricity and nuclear power, specific drought management approaches are negotiated between the State and infrastructure operators (mostly national electricity provider).

In England, water companies must prepare Water Resource Management Plans to reduce demand, halve leakage rates by 2050, develop new supplies, move water to where it's needed, and reduce the use of drought measures. These plans need to follow regional plans prepared regionally under the 2020 National Framework for Water Resources (EA, 2020). In addition, water companies must prepare their own drought plans, which are short-term plans outlining how the water supply will be secured and how the environment will be protected in the case of a drought. These are prepared in line with Environment Agency guidance, as well as following the requirements of the Water Industry Action 1991 (UK Parliament, 1991b), Drought Plan Regulations 2005 (UK Parliament, 2005) and Drought Framework (EA, 2017).

Regarding agriculture, drought restrictions are usually set in DMPs. Regarding water efficiency, national governments may establish specific programmes such as the Spanish Programme for the Modernisation of Irrigation Infrastructures Berbel and Gutierrez-Martin, 2017; Caixa Bank Research, 2024). At the EU level, conditionalities set on agricultural subsidies distributed under the Common Agricultural Policy (CAP) require abstracting farmers to have a valid permit and meter the volume extracted (EC, 2023). The CAP Strategic Plan also supports investments and agri-environment schemes (mainly through rural development) into measures that strengthen the resilience of farms to droughts and water scarcity, through water saving and efficiency measures or changes in crop systems. In England, much focus is now on supporting agriculture to adapt to restrictions on water use. Initiatives with government include supporting farmers to implement water resource planning projects and local resource options such as smaller reservoirs, effluent reuse, and rainwater harvesting.

Other plans

All reviewed countries have national adaptation policies (Climate-Adapt, 2024). However, these plans do not address the issue of allocation specifically, but focus on other measures for mitigating water scarcity and droughts. In France for instance, the National Adaptation plan (RF, 2018) promotes primarily water efficiency and saving measures, such as climate resilient production systems in agriculture, and NbS such as enhancing soil quality for increased water storage in soils and groundwater. Adaptation plans are also developed by each region (sub-national administrative unit), several (but not all) "départements" and by water agencies as a strategic planning document complementing their RBMP (e.g. Rhin-Meuse river basin adaptation plan). All these plans focus on the management of water scarcity rather than droughts and focus more on water efficiency and sector adaptation than guiding water allocation policies.

Responsibilities and involvement of actors

In managing allocations for water resources, state authorities and stakeholders play crucial roles in ensuring effective and equitable distribution. State authorities, including government agencies and regulatory bodies, are responsible for developing and implementing policies, laws, and regulations that govern water allocation. They oversee the allocation process, establish water rights frameworks, and manage infrastructure projects to facilitate the distribution of water resources. Additionally, stakeholders such as water users, communities, and non-governmental organizations (NGOs) contribute through perspectives, expertise, and feedback to the decision-making process. Collaboration between state authorities and stakeholders is essential to address diverse interests, balance competing demands, and promote sustainable management of water resources.

Responsible authorities

Each reviewed country has established unique organisational settings to manage water. We differentiate three main functions regarding water allocation decision-making:

- Long term water resource planning – linked with RBMPs and catchment management plans, for the definition of ecological flows and managing long term imbalances between demand and supply
- Issuance and management of permits, including enforcement of permit requirements
- Drought planning and management including prioritization between uses during droughts and enforcement of drought restrictions

In France, water resource planning is delegated to water agencies at the level of river basin. In addition, where local actors agreed to develop one, catchment management plans have been adopted and managed by local public water agencies (EPCI/EPTB) for sub-basins. They may also be quantitative water managements plans (PTGE), also where catchment management plans have not been adopted. A range of local and regional organisation can be in charge of the PTGE.

Water agencies are independent national administrations under the supervision of the Ministry of Environment and governed by a partnership between the State, regional administrations (regions, departments, local councils) and users. Catchment management is also supervised by similar partnerships. Responsibilities for water resource planning are separated from responsibilities to issue and manage permits and those for drought planning and management. These powers are entrusted to the State through its regional and departmental services (DDT(M)). In addition, a national independent agency under the supervision of the Ministry of Environment (the Office Francais pour la Biodiversité, OFB) can support for the processing of requests for authorization or declaration relating to the water law, and carry out together with State Services inspections to ensure compliance with regulations.

In Spain, river basin authorities play an important role as they regroup responsibilities for water resource and drought planning, permitting, enforcement of permit requirements and drought restrictions. River basin authorities are under the supervision of the Ministry of Environment, except for river basins and groundwater bodies which are not shared between several regional governments, in which they are under the supervision of regional governments (occurs in Andalucia and Catalonia as well as the Balearic and Canary Islands). Decisions of river basin authorities are governed by a council of state and regional government and user representatives. Through the national Hydrological Plan, the Ministry of Environment is also responsible for managing inter-basin transfers to balance demand and supply, and may impose national drought restrictions.

Sweden presents a regionalized approach to river basin planning, drought planning and enforcement of drought restrictions, whereby counties are the primary authorities. Permitting, however, is the duty of the Land and Environment Court, while the Swedish Agency for Marine and Water Management (SwAM) is tasked to ensure that water resource planning leads to the protection, restoration and sustainable use of freshwater resources and seas, mainly by providing (binding) guidance.

In Finland, the regional state administrative agencies serve as the permit authorities, while supervisory responsibilities (monitoring and enforcement) are shared between the Centres for economic development, transport and the environment (state supervisory authorities) and municipal environmental protection authorities (local supervisory authorities). While the Water Act empowers the state supervisory authority to undertake certain tasks and supervise municipal actors, the powers of the state and local supervisory authorities are largely overlapping. The Centres for economic development, transport and the environment are responsible for making RBMPs. Drought management planning is not required in legislation in Finland; however, the existing regional plan was prepared by the Centre for economic development, transport and the environment of that region and the 2020 guide is directed at the actors (e.g. water suppliers) and the Centres for economic development, transport and the environment (Parjanne, Ahopelto and Parkkila, 2020a).

In Romania, the Ministry of Environment together with Agriculture and Rural Development elaborates, coordinates and implement the national strategy for reduction of the effects of droughts and, coordinates, substantiates, elaborates and updates the National Action Plan for the reduction of the effects of droughts and desertification. The Committee is responsible for the elaboration of drought strategies and action plans necessary for combating land degradation and desertification in Romania. There are 46 members of this committee, state secretaries from the ministries with responsibilities in drought management, representatives of national authorities for water, forests, land improvements, academia and research institutions. The lead authority for all matter of water management (RBMP, drought management) at national level is the National Administration “Romanian Waters”. It is responsible for monitoring, enforcement and compliance with allocation.

In England, the lead authority setting policy priorities for river basin planning and drought management at national level is the Department for Environment, Food and Rural Affairs (Defra). The authority responsible for implementation, including permitting, river basin management, CAMS (see Chapter on Policies) and enforcement of drought orders is the Environment Agency. The issuance of Drought Orders, however, is the responsibility of the Secretary of State for the Environment.

Involvement of users and stakeholders

The approach to stakeholder engagement varies between countries. Some countries such as France and Spain have established river basin authorities governed collegially by authorities, users and civil society – though each country have unique arrangements with regards to representation and role of stakeholders in decision making. In Finland, Sweden and England, stakeholders do not have co-decision powers but are consulted during the preparation of planning documents. Arrangements also vary depending for river basin planning, drought management, and decisions on permitting. The situation in each country is described below.

In France, representatives of users and civil organisations participate in decisions over river basin management. By law, it must concern 20% of the decision-making power of the river basin committees, and must include representatives of various interests, including agriculture, industry, energy, environment, fisheries, and consumer rights. Similar set up in terms of stakeholder representation exists for catchment planning committees. Thus, there is a strong involvement of local and regional interests in decision making on river basin and catchment management targets and broad allocations. Similarly, quantitative water management plans must include local and regional stakeholders (MTCET, 2023).

Different fora have been established for drought management. Stakeholders are involved in drought management committees and have a consultative role on the specification of priority uses during droughts, the definition of thresholds and measures, as well as a role to inform decision making during the drought. Drought committees have a large role in the design and operation of the DMPs, but they officially only have a consultative role, and decision-making is in the hand of the Préfet (MTE, 2021). They meet at least 1) at the end of the winter to assess the hydrological situation, 2) during the summer period when needed, and 3) at the end of the summer period to assess the past year.

The issuance or renewal of permits are primarily a State decision, and no specific stakeholder consultation is required, unless the requested permit requires an Environmental Impact Assessment, in which case third parties may be consulted. With the Water Law 2006, agricultural abstractors situated in basins classified in structural imbalances no longer obtain an individual permit from the State. Instead, an agricultural user associated (called 'OUGC') is created: it holds a collective permit for all irrigators situated in the basin and is responsible for issuing yearly allocations to each irrigator (RF, 2007). The participation of users in the issuance of yearly allowance this case is therefore much stronger (Textbox 3).

Textbox 3 Agricultural user associations in France

The OUGC is responsible for managing the bulk volume that can be abstracted for agricultural use in a given sub-basin/territory. The aim is to build, on a geographical scale that is consistent with the resource, a collective management system that allows a better distribution between irrigators of an available but limited resource. For the State it is also a recognition that it does not have the power to operate and monitor use at this scale, delegation to users being a necessity painted as a virtue (devolution; participation). In this context, the OUGC's compulsory tasks include:

- To submit the application for a Single Multiannual Irrigation Abstraction Authorisation (AUP). The aim of this procedure is to draw up impact documents covering all the abstractions in the area covered by the OUGC, rather than carrying out a piecemeal study of the impact of each individual abstraction. This authorisation replaces all previous individual authorisations;
- To propose each year a plan for allocating the authorised volume of water between irrigators. This plan must take into account the impact of the proposed allocation;
- To define rules for adapting the allocation in the event of the temporary limitation or suspension of water use during a crisis. These rules are specified in the OUGC's internal regulations.

In some places, agricultural water user associations such as the OUGC, are more pro-active, and take preventive measures before drought restrictions, to delay or avoid the drought restriction orders.

Source: CGEDD-CGAAER (2020)

In Spain, river basin authorities are governed by a river basin council composed of authorities from central government and the Autonomous Regions as well as representatives of users. Various collegial committees, largely dominated by authorities and consumptive users such as agriculture, drinking water supply operators and industry, exist for planning and managing water (Estrella and Sancho, 2016). A forecast of surface water allocations is included in the River Basin Management Plan, which works as a framework document that guide yearly allocation decisions by the 'Comisiones de Desembalse' (i.e. water allocation

commissions, see Sanchis-Ibor et al., 2022). These Commissions have oversight over the filling and emptying of surface water reserves (reservoirs) and groundwater reserves at river basin level, respecting concessions and water use rights. They usually meet three meetings a year (October, February, May) and are composed of the main users (irrigation, drinking water, energy). In addition, Juntas de Explotación manage sub-systems, taking into account decisions of the Comisiones de Desembalse. When the aquifer has been declared overexploited or where groundwater bodies are at risk of not meeting WFD objectives, its management is delegated to a groundwater user association. The groundwater user organization supervises the implementation and effective control of the extraction plan prepared with supervision from RBAs. In 2024, about 50 groundwater user associations exist in Spain (Berbel, personal communication).

Regarding permitting, the Spanish system follows a series of 13 pre-defined steps (SG, 2024b) which involves other (potential) users and interests. In the initial stages, any new application for a concession usually goes through an open competition with other proposals. In later stages, any interested party has the opportunity to raise comments and concerns regarding applications for concession. Regarding drought management, users are involved during the preparation of the DMP and its implementation during droughts through Permanent Drought Commissions (Estrella and Sancho, 2016).

In Sweden, the counties consult with the authorities, municipalities, organisations, operators and individuals affected by the decision during the preparation of the RBMPs. According to the Ordinance (2017:872) on water delegations, the countries shall establish reference groups with various stakeholders to enable this cooperation (Swedish Parliament, 2017). In the case of the river basin Västerhavet, for instance, the consultation resulted in circa 800 comments that were taken into account when further developing the plan (Vattenmyndigheten Västerhavet, 2022). The partial drought action programmes against drought and water shortages are also prepared in consultation with stakeholders. For instance, the measures included in the programme for the Södra Östersjön river basin district were developed in consultation with stakeholders and in dialogue with the respective central authority (Vattenmyndigheten Södra Östersjön, 2022). Regarding permitting, the Land and Environment Courts publicly announce the permit application and invite stakeholders to submit comments regarding the permissibility and the conditions for the permit (Swedish Parliament, 1998a, Chapter 22, Section 3; SEPA report 2017, p. 26). When the claims and opinion have been presented, the permit authority will schedule a public hearing. Parties to the proceedings and certain stakeholders may also file an appeal concerning the permit authority's decision (Swedish Parliament, 1998a, Chapter 16, Section 12). As per 1 January 2024, a non-profit association or another legal entity whose main purpose is the safeguarding of nature conservation or environmental protection interests, that is non-profit, that has existed in Sweden for at least three years, and that has at least 100 members or otherwise shows that it has public support also has the right to appeal permit decisions (Swedish Parliament, 1998a, Chapter 16, Section 13).

In Finland, stakeholders are consulted in the preparation of the RBMPs in accordance with the Act on the Organisation of River Basin Management and the Marine Strategy (Finnish Parliament, 2004). As part of the consultation, stakeholders have a right to examine the preparation and background documents and state their opinions in writing or electronically. As in Sweden, any parties are invited to comment on any permit application. The Centre for economic development, transport and the environment that prepares the RBMP needs to arrange sufficient cooperation and interaction with the different authorities and other parties in its operating area at the different stages of preparation of the plan and set up a cooperation group. The Water Act differentiates stakeholders, with an interest in the application due to the impact of the application on their rights, benefits or obligations, and third parties who do not have a specific interest in the application (Finnish Parliament, 2011). Stakeholders can lodge an objection while third parties can express opinions. The permit authority must respond to the individual requirements set out in statements and objections in its decisions. It does not need to respond to the opinions expressed by other parties. To note, a registered NGO "whose purpose is to promote the protection of the environment, human health or nature conservation or a pleasant residential environment and in whose operating area, as specified in the applicable rules, the environmental impacts in question arise" is entitled to object and appeal in the permitting process.

In Romania, water users in River Basin Committees are consulted for the preparation of the RBMPs and of the plans for drought restrictions. Final decisions are made by the National Administration Romanian Waters.

In England, stakeholders are consulted in the preparation of RBMPs. These consultations are led by the Environment Agency, as well as Defra, Natural England, and the UK Water Framework Directive Technical Advisory Group (UKTAG). In its most recent consultation on the update of RBMPs, the Environment Agency received 270 responses. In 2019, UKTAG carried out a consultation on Proposed Biological and Environmental Quality elements, including on river flow standards. The Water Leaders Group assembles representatives from key sectors and organizations in the water system to work closely with the Environment Agency on the development and implementation of RBMPs (EA, 2022).

Additionally, a number of collaborative frameworks exist in England that aim to bring a diversity of actors together around abstraction issues (Benson et al., 2020). Defra established the Catchment Based Approach (CaBA) in 2013 as community-led partnerships to promote sustainable water use. CaBA is at the center of the government strategy to build compromise and consensus, leading to co-development and co-implementation of catchment actions. The 2017 Water Abstraction Plan established 10 Water Resources Priority Catchments at the catchment level bringing together farmers, local councils, NGOs and other interested stakeholders to promote sustainable abstraction. Water Abstractor Groups are another collaborative approach centered on farmers in eastern England who aim to protect their water rights while working with government agencies (Benson et al., 2022).

The permitting regime

A permitting regime refers to a system or framework established by regulatory authorities to control and regulate the extraction, use, and allocation of water resources within a given jurisdiction. Under this regime, individuals, businesses, or other entities are required to obtain permits or licenses to abstract, divert, consume, discharge, or otherwise utilize water from surface water and groundwater bodies. In other words, a permit formalises the right of an individual or organisation to use water according to rules set by the public. Permits typically outline the terms, conditions, and limitations of water use, including the quantity of water allowed to be withdrawn, the purpose of use, the location of extraction or discharge, and any environmental safeguards or mitigation measures.

Type of permits

The reviewed countries establish a variety of permit types that are typically based on the risk posed to the water environment. Different permit types (e.g. notification instead of authorisation) or even exemptions are established for domestic users (including domestic vegetable gardening) and smaller abstraction capacities (Table 1). As a water scarce country, Spain applies the strictest threshold below which no permit is required. Although abundant with rain, England also apply low thresholds – a situation possibly related to the small size of English catchments combined with high population density (high water demand for public water supply) and high level of pressure in some catchments due to irrigation. France has higher pumping thresholds but requires a minima notification of any pumping facilities and abstraction. Faced with lower risks of water scarcity, Sweden and Finland have the highest thresholds.

Permits usually presents information such as the location of the abstraction point, the authorised pumping, the nature of the use which the permit is associated with, and various conditions attached to the use of water. None of the reviewed countries include standard requirements for return flows; hence only abstraction is regulated and not consumption. Some public water utilities may however have discharge permits with specific requirements for discharge volumes, thereby indirectly regulating net consumption in the associated water supply network.

Some details are provided for each country below.

Table 1 Thresholds for obligation to obtain abstraction permits

Country	No permit required	Notification	Authorisation
France	See table below		
Spain	In water bodies in good status, below 7000 m^3/year (equivalent to 19m^3/day)	-	All abstraction in the public domain above 7000 m^3/year All water bodies in less than good status
Sweden	According to Law, water operations where public or private interests are manifestly not going to be harmed and water abstraction for the personal consumption or heat supply of a one- or two-family property or agricultural and forestry property, gardening water, commercial activities on a smaller scale (e.g. small crafts)	Below 600 m^3/day, and up to 100,000 m^3/year	Above 600 m^3/day and 100,000 m^3/year
Finland	Below 100 m^3/day According to Law: use that is temporary and for "personal needs" within a "reasonable" quantity, e.g. household use or small-scale commercial use	Above 100 m^3/day and below 250 m^3/day	Any permanent abstraction above 250 m^3/day Projects under 250 m^3/day where negative impact is possible
England	Below 20 m^3/day	-	Above 20m^3/day
Romania	Below 0,2 litres/second (equivalent to 17m^3/day), intended exclusively to satisfy the needs of the own household	-	Above 0,2 litres/second for household needs All other users

In France, prospective abstractors must obtain permits for creating or installing the infrastructure (e.g. a weir and intake, a pump, a well) and one for abstracting the water. Different types of permits – a simple declaration and a more complex authorization – are required depending on the characteristic of the infrastructure and scale of abstraction (Table 2) (RF, 2024). The authorization requires pre-approval from State authorities, while the declaration procedure allows users to carry out the infrastructure development or abstraction, following submission of the required paperwork. The State can still oppose a 'declaration' within 2 months. Thresholds above which an authorization is required are stricter when the resource has been designated part of sub-basin or aquifer in structural water imbalance, in ecologically sensitive areas, and in areas protected for drinking water production.

An abstraction permit in France defines the nature of the use, point of abstraction, the maximum pumping flow rate, and a maximum annual volume sometimes broken down seasonally or monthly for groundwater. No return flows obligations are included.

Table 2 Declaration and permitting requirements in France

Priority area	Type of resource	Significance of extraction (volume based on pumping capacity use over one year)	Administrative procedure for well or borehole	Administrative procedure for abstraction permit
Outside sensitive areas	Groundwater	Groundwater: annual extraction < 1 000 m^3/yr. (domestic use)	Local council declaration	No declaration
		Groundwater: annual extraction between 1 000 m^3/yr. and 10 000 m^3/yr.	Declaration to state	No declaration
		Annual extraction between 10 000 m^3/yr. and 200 000 m^3/yr.	Declaration to state	Declaration to state
		Annual extraction > 200 000 m^3/yr.	Application for authorisation (state)	Application for authorisation (state)
	Surface (including alluvial aquifer)	Below 400m^3/h or below 2 % of river flow (QMNA5)	-	Local council declaration
		Between 400m^3/h and 1 000m^3/h or between 2 % and 5 % of river flow (QMNA5)	-	Declaration to state
		Above 1 000m^3/h or above 5 % of river flow (QMNA5)		Application for authorisation (state)
In sensitive areas	Surface water and groundwater	Below 8 m^3/hr.	Declaration to state	
		Above 8 m^3/hr.	Application for authorisation (state)	

In Spain, the regime of concession applies to all public water, while private waters do not require a permit but should be registered in the Catalogue of Private rights (see also Chapter on Legislation). Any change to the characteristics of a private groundwater right would transfer the right into the public domain, requiring application for a concession. Concessions include the following information: a) nature of use (urban/industry/agriculture/…); b) point of abstraction; c) maximum total / seasonal volume; d) guarantee level (i.e. for urban uses: 99,8% guarantee; irrigation in regulated rivers: 90% guarantee; irrigation in non-regulated rivers: no guarantee).

In Sweden, the permit conditions for abstraction activities cover the amount that can be taken out at certain time. Conditions on measuring the impacts and water levels are also common, as are conditions to ensure that the activity does not jeopardise achievement of environmental quality standard and deteriorate the water environment. From 2029 onwards, permits will be legally required to list e.g. the duration of the permission, the purpose, location, scope, safety of the activity and technical design in general, and supervision. Certain water activities may require a declaration rather than an authorisation, although authorities may issue an obligation to apply for an authorization in certain circumstances. In all cases, certain measures or restrictions may be in place to meet environmental requirements (Swedish Parliament, 1998a).

In Finland, the permit includes the purpose of the water abstraction, its location, and the maximum quantity of water to be abstracted.

In England, abstractors require an abstraction licence in the case where abstractions will exceed 20 cubic meters of water per day. Temporary licenses for abstraction above 20 m^3/day for a maximum of 28 consecutive days are also possible. The construction and extension of boreholes, wells, or related works (springs, quarries, mineral workings) require also consent based on an assessment of the potential impact of the groundwater abstraction. An abstraction licence specifies the abstraction point, the authorised

quantities, what you can use the water for and any conditions to protect other water users and the water environment (EA, 2014).

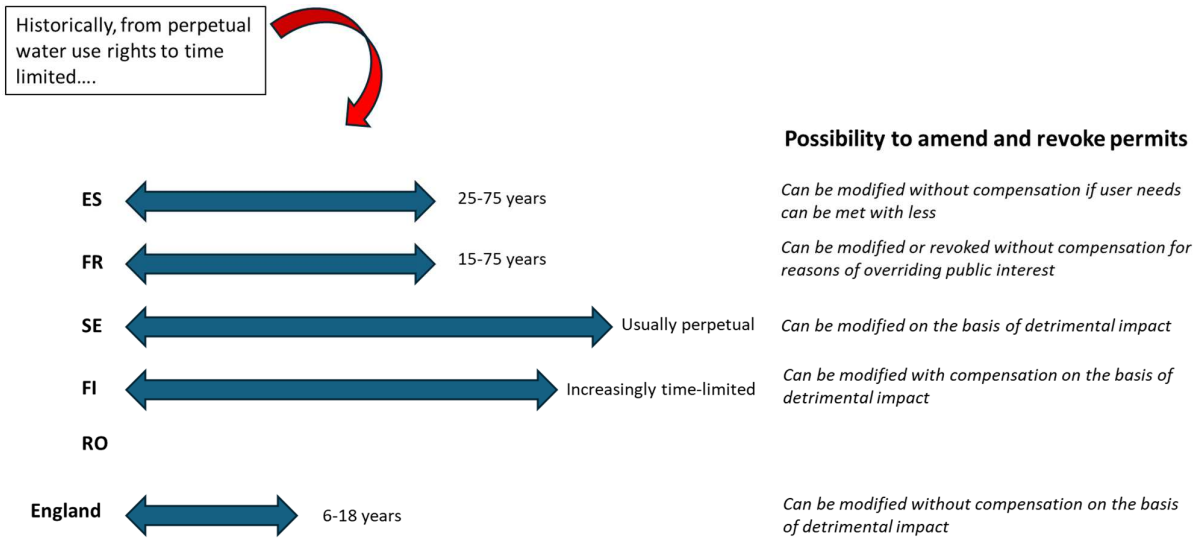
England also has established drought permits which take precedence over normal licenses when drought conditions are officially recognized through a drought order issued by the Secretary of State. The drought permit allows changes to the abstraction conditions of the water company (e.g. where, how much). These permits aim to mitigate water supply issues caused by deficient rainfall, with checks in place to ensure minimal environmental impact. Typically lasting up to six months, they provide flexibility for water companies to maintain drinking water supplies during droughts (EA, 2017; Interview English experts, 2024).

In Romania, no information was available.

Duration of permits

A large variety of permit duration can be observed, depending on whether it is attached to the infrastructure and abstraction activity, but also for abstraction permits (Figure 4). Countries such as Sweden and Finland still use non time limited permits. However, recent decades have generally seen a shortening of the duration of permits, going down to 12 years in England and 15 years for certain abstraction permits in France. Changes in permit duration for new permits is not systematically associated with a revision of existing permits, resulting in significant heterogeneity of permit conditions between authorised users. In all cases, authorities have powers to change permit conditions during its period of validity, with or without due compensation, pending justification such as water conservation efforts (e.g. Spain), reasons of overriding public interest (France), unforeseen detrimental impact (Finland) or if adopting new processes or technologies could notably enhance human health or the environment (Sweden). Violations to permit conditions can also result in changes to permits. Specific information is provided below for each country.

Figure 4 Duration of permits and conditions attached to their modification



In France, historically, permits for infrastructures had a set time horizon of 75 years. Nowadays, a time horizon of 25-50 years now generally applies for new permits or permit renewal (Kampa et al., 2017). For abstraction, no specific time limits were historically set out in abstraction permits – though restrictions have increasingly been included in the last 20 years to new or renewed permits. For example, new collective permits for agricultural user associations (OUGC) in priority areas for quantitative water management (see Chapter on Policies) generally last for 15 years (Rouillard and Rinaudo, 2020). The State can revoke any permit without compensation when justified for reasons of overriding public interest.

In Spain, during the transition phase of the 1985 Water Law, permits (concessions) were issued for a period of up to 75 years, though they tend to be of a duration of 25 years now. Concessions can be revoked by authorities with or without compensation, according to specific rules (Sanchis-Ibor et al., 2022). For example, concessions are subject to legal reassessment and potential reduction if it can be demonstrated that the concession holder's needs can be met with a lesser allocation or through more efficient resource utilization, thereby aiding in water conservation efforts. RBAs may conduct audits and inspections of concessions to assess the effectiveness of water resource management and utilization under the concession agreement.

In Finland and Sweden, there were, historically, no time limit on abstraction or infrastructure permits unless there were reasons for doing otherwise. Nowadays, in Finland, infrastructure permits are usually perpetual while abstraction permits are time limited. In Sweden although not used extensively, the current Environmental Code allows for time-limited permits. In the two countries, authorities can alter or revoke the permit when they have detrimental effect on environmental quality according to specific rules which differ slightly between the two countries:

- In Finland, permit regulation review or new regulations are feasible under certain conditions such as unforeseen detrimental impacts, changes in conditions, or safety concerns, within 10 years of project completion. Changes to permits can be initiated by public authorities in response to applications from various stakeholders including those with private benefits facing detrimental impacts, municipalities, supervisory authorities, or those supervising public interests. Such a review or new permit regulation may not "significantly reduce the benefit gained from the project" and the applicant will be ordered to compensate for the losses that are not deemed minor. Furthermore, temporary measures can be ordered by permit authorities in cases of natural disasters posing hazards. This framework, although primarily applicable to water regulation projects, extends to other water uses regulated by permits (Finnish Parliament, 2011).
- In Sweden, the Environmental Code allows for alterations or revocation of permits, particularly if the activity significantly violates environmental standards or if adopting new processes or technologies could notably enhance human health or the environment (Swedish Parliament, 1998a). However, amendments must not impact the activity so far that it cannot be conducted or excessively complex. Applications for review can be made by various authorities including the land and environmental court, the Swedish Environmental Protection Agency, and others.

In England, there has been a transition (about 20 years ago) from permanent licenses to time-limited licenses. The shift to time-limited licenses allows for periodic reassessment and adjustment to ensure sustainability. All new abstraction licences are now time limited, and are tied to the "common end date" (CED) of the area's Catchment Abstraction Management System, which are planned every 12 years. Depending on when the application is submitted, this means that license durations can range from anywhere between 6-18 years but will generally be 12 years. Discussions are currently ongoing to extend this duration for abstraction linked to new large investments such as those planned for new large reservoirs and transfer infrastructure for public water supply in view of increased drought risks under climate change (Interview English experts, 2024).

In Romania, no information was available.

Defining an allocable pool

The allocable pool is the amount of water that can be used by sectors. Defining the allocable pool is a key step supported under the WFD through the definition of water balances (Schmidt, 2024). According to the EC (2015), a water balance should be holistic, integrating long term water availability including climate change, short term temporal (interannual variability) and spatial fluctuations in water availability, storage capacities of reservoirs and aquifers, the role of groundwater in sustaining river baseflow, and groundwater recharge rates, among others. It should provide information on how much can be extracted for different time steps (e.g. daily, monthly, seasonal, annual) and where. It must also consider both needs of consumptive users, such as public water supply, irrigated agriculture and thermal power plants, and the needs of non-consumptive sectors such as navigation, tourism and fisheries.

When establishing an allocable flow and volume of water, several factors must be accounted for. It must accommodate ecological needs through the definition of ecological flows, considering impacts on habitats and species in rivers, lakes and coastal waters, and safeguarding crucial groundwater-dependent ecosystems. Other specific requirements must be accounted for, such as e.g. water quality, the interdependence of downstream and upstream users on flows, etc.

Ecological flows

In France, the regulatory framework requires the setting of minimum biological flows guaranteeing the life, reproduction and circulation of water species downstream of infrastructures affecting river flow (RF, 1984). These minimum biological flows are servitudes on the operators of the infrastructures (also called 'Débit Réservé"), and are gradually adopted as they only apply to new authorisations, renewal of existing authorisations, or of existing ones upon request of the State. They are established based on studies focused on local hydrological statistics and considering the linkages between hydraulic and ecological conditions (RF, 2011). In all cases, minimum flows cannot be set below 1/10 of average natural annual flow, or 1/20 for rivers with an average natural annual flow above 80 m3/s. The average flow rate should be based on all the data years available, with a strict minimum of 5 years, and should remove recreate an estimate natural flow removing the impact of extraction, discharges and water transfers. The 1/20 also applies as a minimum servitude for infrastructure used to produce peak time electric production.

In addition, a set of river flow targets are established for major river nodes in RBMPs and in catchment management plans. They represent objectives guiding operational management decisions. Called "target low flows" (in French, i.e. "Débit Objectif d'Etiage" or DOE), they represent the monthly average flow above which authorities consider that downstream water demand can be satisfied without impacting good ecological status under the WFD. Target low flows must include minimum biological flows so they guarantee the life, reproduction and circulation of water species across the river basin. Target flows can vary between seasons. Target low flows are set in a nested manner, at the most downstream point of each hydrological sub-units of the river basin, i.e. individual catchments, sub-catchment and other management units. Targets groundwater piezometric levels are also set for aquifers connected to surface water bodies, to avoid that drop in aquifer levels impairs the achievement of minimum biological flows. The flow targets are considered achieved if it is observed a posteriori that the lowest 10-days average flow (or aquifer levels) was maintained above 80% of its value. Flow targets must be met on average 8 years out of every 10 year-period. These target low flows are used to calculate the sustainable extraction cap.

Spain has established ecological flows at water body level. It is not considered as a use, but as a restriction prior to water use under the Water Planning Instruction (Sanchiz-Ibor et al., 2021). The ecological flows set requirements for different flow parameters, including minimum flows, maximum flows, generating flows (ordinary and natural flood that conditions the morphology and structure of the channel and river habitats) and rates of change. Reservoir releases and water flows are strictly regulated to meet agreed targets for ecological flows and water allocation to users.

In Finland, ecological flows are not defined in regulations, though RBMPs define it as the adequate flow to ensure the functioning of the river ecosystem and achieve good ecological status. No clear concept defines the type of flows that should be included in ecological flows. There may be minimum and maximum flow requirements in permits. No specific programme exists for revising old permits according to ecological flow requirements.

In Sweden, ecological flows are not defined in regulations, though environmental quality standards are used to set 'sufficient flows to maintain basic ecological functions' for good ecological status and ensure connectivity (Swedish Parliament, 2004). A programme for revising hydropower permits is now set to support the achievement of ecological flows (Swedish Government, 2020; Michanek and Zetterberg, 2021).

In Romania, ecological flows are not defined in regulations, but are used following guidance HG 148/2020[1]. A temporary reduction of the ecological flows is allowed during prolonged droughts, with a maximum of up to 50% of the minimum flow rate.

In England, ecological flows are defined by the Environmental Flow Indicator (EFI) methodology, which establishes the percentage deviation from the natural flow in a water body. When defining environmental flows, besides hydrology, other key elements are taken into account, including 'Abstraction Sensitivity Bands' (ASB). The ASB helps determines the EFI, defining the quantity of water needed to protect the ecology of the river, and thus also the amount of water that can be abstracted (see Chapter on Water Balances). They are determined on the basis of physical habitat characteristics of the river, fish monitoring data, and invertebrate monitoring data. There are three ASB levels (1 to 3, 3 being the highest sensitivity). Typically, upper reaches of catchments are the most sensitive, followed by middle reaches and lower reaches being the least sensitive. While water quality criteria are not directly used, the focus remains on species sensitivity to natural flow changes, ensuring a comprehensive approach to environmental flow management (EA, 2020b; Interview English experts, 2024).

Alert flows and drought indicators triggering restrictions

In Spain, the drought plans usually set three threshold levels (pre-alert, alert, and emergency) to trigger water demand and supply measures when entering a drought period. Thresholds are based on basin-specific 'temporary water scarcity indexes' computed as weighted average of relevant observed variables at selected control points, for example precipitation, streamflow, piezometric series, contribution of non-conventional sources, water demands and returns of the different uses, ecological flows, characteristics of reservoirs, canals, and other infrastructures (SG, 2018). Thresholds are established by matching water stored with the volume of allocated demands and environmental needs in the coming months, under pessimistic inflow hypotheses (percentiles 1 to 5 or historical minimums of the hydrological series). The index is normalized to bound between 0 and 1 and significant threshold are set at 0.50 (pre-alert), 0.30 (alert) and 0.15 (emergency). The alert threshold should correspond to the impossibility of the natural regime to provide the ecological minimum flows established in the RBMP. Once the index falls below each threshold, specific measures are proposed (restrictions, extraordinary supplies…) designed to overcome extreme episodes. It also uses the Territorial Drought Unit (UTS) to trigger derogations under the prolonged drought procedure. When the standardized indicator falls below the value of 0.3, the actions foreseen for situations of prolonged drought may be applied, provided that the rest of the legal conditions are met: less demanding ecological flows and justified admission of the temporary deterioration of the status or potential of the water bodies.

In France, triggers in drought emergency are defined as average daily river flow and aquifer levels (in particular alluvial aquifers and aquifers connected to surface water) (MTE, 2021). Regulations require water authorities to establish two levels of restrictions, i.e. "alert" and "crisis" flows below which restrictions on

[1] H.G. 148/2020; The Method of Determining and Calculating the Ecological Flow. The Government of Romania: Bucharest, Romania, 2020.

water extractions and uses apply so that essential water uses and the environment are prioritised in the event of droughts:

- "Alert" level is the average daily flow and aquifer level that indicates that water demand for all water uses downstream may not be met without impacting the aquatic environment. First restrictions on non-priority uses apply.
- "Crisis" low flow is the average daily flow and aquifer level below which top priority uses (e.g. essential drinking water provision for humans and animals, and good functioning of freshwater species) are endangered. All non-priority uses are not allowed to extract water.

Experience has shown that they are not sufficient to prepare users to restrictions and provide a more progressive approach to implementing restrictions. Hence, two additional levels (not required under the law but commonly used) have been established. A "vigilance" level is set before the "alert" level, which does not lead to any restrictions but encourages water uses to save water. A "reinforced alert" level is set before the "crisis" level in order to smooth the implementation of the alert level (some restrictions) to a crisis situation (full restrictions).

Specific restrictions on water uses apply at each level. An equivalent system based on groundwater levels applies to unconfined aquifers. These targets are set considering the interaction between surface and groundwater, based on studies conducted during the planning process (SDAGE or SAGE).

In England, the Environment Agency has a non-statutory drought framework (EA, 2017) that sets out drought planning and management (see Chapter on Drought management plans). A range of different triggers for drought orders are used to identify if a drought is happening, including rainfall, river levels and flows, reservoir storage and groundwater levels, and environmental indicators such as water quality and ecology.

In Finland, the Water Act refers to "long-tern drought or another similar reason" (Finnish Parliament, 2011). These terms are not explained in the Act, and no indicators are available. Similarly, in Sweden, the Act (1998:812) Containing Special Provisions concerning Water Operations mentions the possibility of water shortages by drought, but no indicators are defined (Swedish Parliament, 1998b).

In Romania, restrictions are also based on river flow and aquifer levels.

Water balance assessments

A water balance is a calculation of the water quantity available during a specific time period (such as a month or a year) in a river basin, considering water abstraction, use and consumption. This calculation can be used to maintain sufficient water levels in water bodies, to ensure their good status/potential, to allocate water to the different users, to avoid overexploitation of natural water resources, and to build resilience against climate change. According to the Blueprint, water accounts (or balances) "tell water managers how much water flows in and out of a river basin and how much water can realistically be expected to be available before allocation.

In Spain, water balances are part of the operations to be carried out in Spanish hydrological planning. They are compulsory, as stated in the Water Law and in the Hydrological Planning Regulation (SG, 2001). They are carried out at a national and basin scale. They are based on the use of two tools. The SIMPA model is a rainfall-runoff model, considering the dynamics of water storage in soils and aquifers and simulating hydrological processes at monthly and annual intervals, and providing averages with short and long time series (Schmidt, 2024). This is complemented with the AQUATOOL decision support tool which uses the SIMPA output (natural flow timeseries) together with resources management data and requirements (e.g. water demand units including abstraction characteristics, reservoirs, diversion infrastructure, ecological flows) to provide information on the expected levels of water supply guarantees, non-compliance risk with minimum ecological flow regimes and contribution of planned measures. Water balances are regularly

updated. A minima, they are re-calibrated for each RBMP cycle), integrating the latest data on climate change impacts.

In France, a risk assessment helps identify which subbasins and aquifers may suffer from an imbalance between water supply and demand. These aquifers, or sub-basins and connected groundwaters follow a regulatory procedure to classify them as priority zones for quantitative management ZRE) under the 1992 Water Law. The 1992 Water Law conferred the state powers to more strictly regulated permits issued in these zones (see Chapter on Legislation). Since 2006, authorities together with stakeholders must carry out detailed water balances in these priority basins and aquifers and quantify the Sustainable Extraction Limit (SEL).

The SEL is legally defined as the volume of water that can be extracted without impairing the environmental objectives of the WFD, i.e. good ecological, chemical and quantitative status of water bodies. Operationally, the SEL is set to ensure that the low flow targets adopted in the basin plans (see Chapter on Policies) can be met 8 years out of 10. If the basin is fully allocated within the SEL, allocations will still need to be curtailed on average 2 years out of 10 (drought years). In other words, the SEL is the quantity of water that can be withdrawn with an 80% reliability. The SEL ultimately takes the form of an annual volume of water that can be abstracted from specific management units (RF, 2006). Management units can be sub-catchment, parts of a sub-catchment or different aquifers (connected or not connected to surface water). The volume is also subdivided in seasonal (e.g. summer/winter), sometimes monthly and weekly steps.

SEL studies are directed by a steering committee appointed by the river basin authorities (or catchment management organisation where existent) (see Chapter on Responsibilities) and including all stakeholders potentially affected by the SEL. Methodologies for assessing the SEL vary greatly, ranging from simple statistical analysis to sophisticated integrated surface-groundwater models. The Rhone-Mediterranean basin conducted a series of studies (Etude des Volumes Prélevables) to define available water resources and inform quantitative water management (PGRE, now called PTGE, see Chapter on Policies). Similarly, the Loire-Bretagne Agency provided guidance to carry out studies crossing information on Hydrology Habitats Uses and Climate (analyses Hydrologie Milieux Usage Climat – analyses HMUC) as a diagnostic for the development of PTGE (AELB, 2022).

In Sweden, water balances are carried out at different scales, but primarily on local scales in selected areas (Schmidt et al., 2023). Water balances are used in permit applications for water abstraction, to assess impacts at water body level. Only in selected areas of regional importance, the entire catchment area has been studied/modelled with regard to water balances (Schmidt et al., 2023). Some areas have been more thoroughly studied because they have experienced water shortages. The absence of a unified register of water abstraction makes it difficult to get accurate information for water balance calculations, with the exception of water diversion for power production, where knowledge of abstraction and discharges is collected. For surface water and mapped groundwater bodies, Sweden has good knowledge of integrated water flows. In permit applications, information about interactions needs to be produced if they are deemed necessary for the water balance calculation in the area. New modelling / calculations regarding groundwater supply to water bodies are ongoing (Schmidt et al., 2023).

In Finland, water balances are at the stage of research, though water balances are discussed in permits and environmental impact assessments for specific sites. No nationwide water balances are in place. The national hydrological model calculates GW and SW interaction to some extent, but not used for water balance assessments (Schmidt et al., 2023).

In England, water balances are carried at the catchment level through the Catchment Abstraction Management Strategy (CAMS). As part of CAMS, a resource assessment is made of water available for future human use while protecting the environment and maintaining good ecological status.

The resource assessment results in limits expressed as Hands Off Flows which are then set as conditions in licenses. Surface water bodies are classified according to their susceptibility to certain effects through ASBs (see Chapter on Ecological flows). The amount of water available for abstraction is calculated at specific reference points of a river basins. Different amounts of abstraction are possible according to different flow regimes as percentage of natural flow regime (e.g. 10% of Q95). Four different flow parameters are used: Q95 (the flow of a river which is exceeded on average for 95% of the time i.e., low flow), Q70, Q50, and Q30 (higher flow). For a highly sensitive river (ASB3), at Q95, 10% abstraction of the flow is permitted upstream of the reference point. For a less sensitive river (ASB1), 20% abstraction of the flow is permitted at Q95. In theory, the sum of permitted abstraction flow upstream of the reference point should match that abstraction limit. In practice, there are challenges to adapt existing permit conditions accordingly (see Chapter on Allocation) (EA, 2020b; Interview English experts, 2024).

Abstraction limits for groundwater are based on target groundwater levels and a volumetric mass balance to meet good quantitative status. Limits are based on groundwater recharge, impact on connected surface waters, saline or other intrusions occurring within the unit because of groundwater abstraction, and impact on groundwater dependent ecosystems such as wetlands fed by the groundwater unit. Textbox 4 below presents an extract of a licensing strategy showing the outcomes of the assessment and how the Environment Agency communicates the availability of water resources to users.

In Romania, no information was available.

Textbox 4 Extract from the Kent Abstraction Licensing Strategy

Surface water

If you want to abstract water, you need to know what water resources are available within a catchment and where abstraction for consumptive purposes is allowed. To show this we have developed a classification system which indicates:

- *the relative balance between the environmental requirements for water and how much is licensed for abstraction;*
- *whether water is available for further abstraction;*
- *areas where abstraction may need to be reduced.*

The availability of water for abstraction is determined by the relationship between the fully licensed and recent actual flows in relation to the EFI. The results mapped onto these water bodies are represented by different water resource availability colours showing the availability of water resource for further abstraction. The water resource availability colours are explained in Table 1. In addition to these water resource availability colours we"ve classified some surface water bodies as „high hydrological status" which are coloured blue on the maps. In these water bodies very little actual abstraction occurs and they show virtually undisturbed, or close to natural, flow conditions.

Another category of water body are Heavily Modified Water Bodies (HMWB). These can be classified for many reasons but for water resources they are classified if they contain a lake and/or reservoir that influences the downstream flow regime of the river. The downstream „flow modified" water bodies are also classified as heavily modified.

We will add any conditions necessary to protect flows to a new licence during the licence determination procedure. We will base licence conditions on the water resource availability at different flows (high to low). Table 1 lists the implications for licensing for each water resource availability colour.

In cases where there is a flow deficit (RA is below the EFI) or risk of a flow deficit (FL below the EFI), there may be water available for abstraction at higher flows. This means that water may be scarce at low flows, but may be available to abstract at medium or high flows. A licence may still be granted but with conditions which protect the low flows. This usually takes the form of a Hands-off Flow (HOF) condition on a licence which requires abstraction to stop when the river flow falls below a certain amount. A river

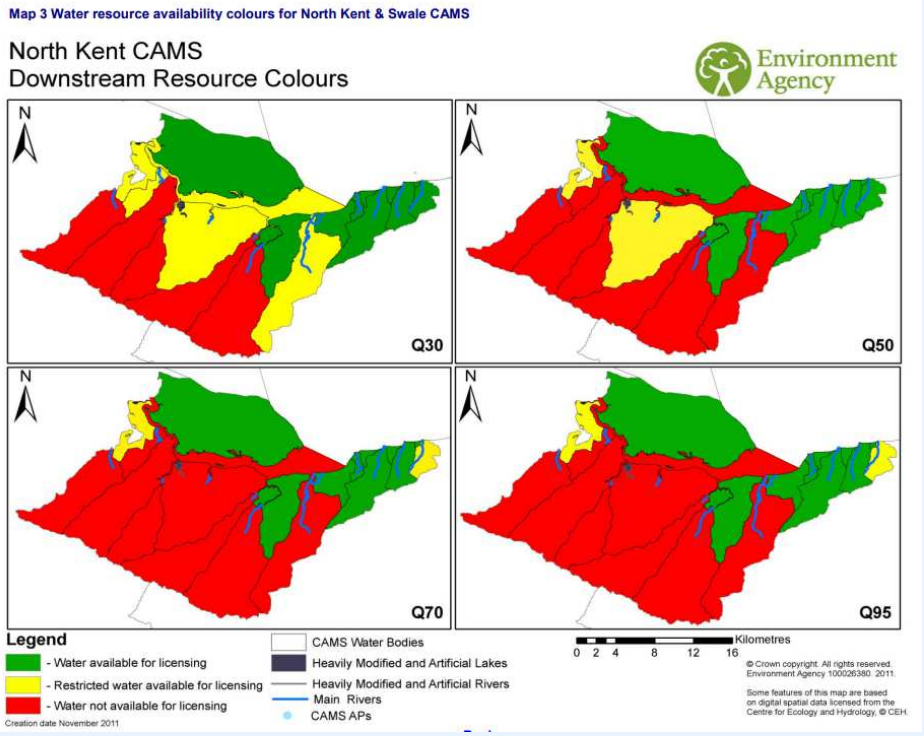
may also be heavily supported by flows from a reservoir and may have unnaturally high „low" flows which means that the river environment is most vulnerable at medium flows.

Water resource availability colour	Implication for licensing
High hydrological regime	There is more water than required to meet the needs of the environment. However, due to the need to maintain the near pristine nature of the water body, further abstraction is severely restricted.
Water available for licensing	There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts.
Restricted water available for licensing	Full Licensed flows fall below the EFIs. If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.
Water not available for licensing	Recent actual flows are below the EFI. This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status (as required by the Water Framework Directive Note : we are currently investigating water bodies that are not supporting GES / GEP). No further consumptive licences will be granted. Water may be available if you can buy (known as licence trading) the amount equivalent to recently abstracted from an existing licence holder.
HMWBs (and /or discharge rich water bodies)	These water bodies have a modified flow that is influenced by reservoir compensation releases or they have flows that are augmented. These are often known as 'regulated rivers'. They may be managed through an operating agreement, often held by a water company. The availability of water is dependent on these operating agreements. More detail if applicable can be found in section 4.2.1 Surface Water There may be water available for abstraction in discharge rich catchments, you need to contact the Environment Agency to find out more.

<u>Groundwater</u>

Groundwater availability is guided by the surface water resource availability colours unless we have better information on principal aquifers or are aware of local issues we need to protect.

The map below shows the water resource availability colours in the North Kent & Swale area. The same availability is applied to groundwater and surface water."



Source: EA, 2013

Allocating and reallocating water

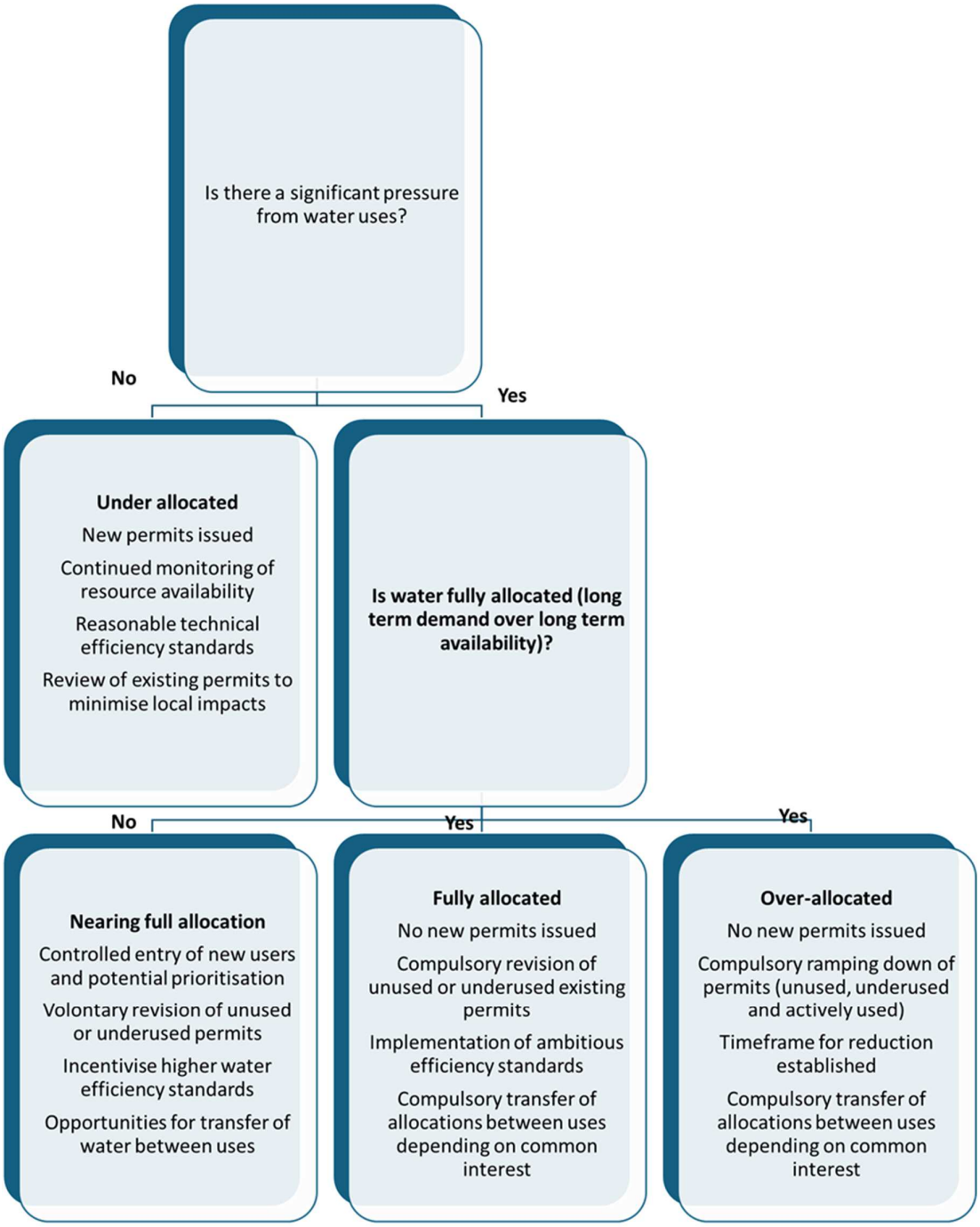
Allocation refers to the set of criteria and procedures used to determine how water resources are shared among existing and prospective users (claimants). Several aspects are relevant, such as the rules regulating the integration of new users (i.e. regulating abstraction / access to water), and those that regulate the sharing of water between authorised users. Of particular interest are the situations when the water body, catchment or aquifer is identified as full or overallocated (i.e. there is a long-term imbalance between demand and supply) (Figure 5). In these situations, obtaining an authorisation to abstract water will typically be more difficult. Some cases may involve reducing water use rights of existing users to match demand with water availability. Attention is also given to the rules that are used during periods of limited supply due to meteorological drought conditions. These rules are applied only during these exceptional (temporary) circumstances, as opposed to rules addressing long term imbalances (i.e. water scarcity). Finally, rules may facilitate the exchange of allocations between users through monetary and non-monetary mechanisms.

Integrating new users

All the reviewed countries have set specific checks to issue new permit for abstracting water, thereby limiting access to water resources. These may take the form of an assessment of third-party impacts or an environmental impact assessment. A range of hydrological and ecosystem impacts may be considered. These can include, for example, impacts on ecological or minimum flows, groundwater recharge, associated surface water (for groundwater permits), groundwater dependent terrestrial ecosystems, and downstream flows. Authorities in all reviewed countries can alter or refuse permit applications on the basis that the abstraction impact other users or hinder ecological flows. In Sweden, Finland and Spain, a public inquiry is also mandatory whereby stakeholders other than the prospective user can raise concerns with regards to the permit application. Further discussion on each case is developed below.

In France, the assessments required during permitting differs for each type of permits (see Chapter on the Permitting regime). For declarations to the local council, only information on the characteristics of the abstraction and its associated use is required. For declarations to the State, a study of “incidence” (“étude d’incidence”) is required. For authorisations, an impact assessment – which is more detailed and must be mandated to external experts – is required. The study must include impacts on fauna and flora, impacts on Natura 2000 areas, third party impacts (other uses), cumulative impacts and other nuisances. The study must also include compensatory measures and substitution solutions. Permit applications must not hinder the achievement of ecological–flows below the infrastructure. In addition to these checks, the State will not issue any new pumping permit if the basin is declared fully allocated (ZRE, see Chapter on Policies). In these priority basins, agricultural user associations holding a collecting permit on behalf of all irrigators (see Chapter on Involvement of users and stakeholders), can craft specific rules to allow new claimants while complying with overarching collective permit conditions (see Rouillard and Rinaudo, 2020).

Figure 5 Potential decision tree of a water allocation model (adapted from: LWF, 2012)



In England, the Environment Agency evaluates permit application using rules agreed in the Abstraction Licensing Strategy, which is based on the catchment resource assessment and part of CAMS (see Chapter on Policies). Any new license will include Hand-Off Flow conditions in the license to account for ecological flows and groundwater level targets. When establishing the abstraction limits through CAMS over the last 20 years, the Environment Agency approach has been to maintain existing users ('grandfathering') and issue new licenses in a queueing system: first come, first served. As the basin gets fully allocated, hand-off

flows tend to be stricter, i.e. restrictions come at higher flow levels, which therefore reduce the security of supply of new users. It does not issue any new licenses where the water unit has been identified as fully allocated, unless the abstractor can show that the abstraction will not impact good status (Interview English experts, 2024).

Beyond the assessment of water resource availability, applications are evaluated against their impact on river habitats and species using the Environmental Flow Indicator and Abstraction Sensitivity Bands (see Chapter on the Allocable pool). Depending on the scale of the abstractions, the Environment Agency defines the supporting information required during the application process, such as an environmental impact assessment. Application may require public notice, although this is not systematic (EA, 2014). A hydrogeological impact appraisal is required for applications planning to use groundwater to assess the impact of groundwater abstractions on groundwater level and groundwater dependent features (EA, 2007).

In Sweden, the impact of abstraction from permit applications are assessed against the quality standards set for each water body. Environmental quality standards include limit and target values, and indicators that guide and bind authorities and courts, for example, in permit review, supervision and physical planning (Swedish Parliament, 1998a, Chapter 5, Section 2). When applying, prospective users must include certain documents, e.g. relevant drawings and technical descriptions with information on the conditions on the site, an environmental impact statement when required, a proposal on protective measures or other precautionary measures, and a proposal for monitoring and control of the activity. For water operations, the application must also contain information on whether or not there are properties affected by the water operations and on the compensation amounts that the applicant offers to each owner, if such information should not be appropriate due to the scope of the business. The permit procedure includes a compulsory hearing of the public (Swedish Parliament, 1998a, Chapter 22, Sections 1 and 3).

In Finland, the permit application shall include the information sufficient for deciding on the matter regarding the purpose of the project and the impacts of the project on public interests, private interests, and the environment. This does not, however, mean that an official Environmental Impact Assessment is needed for all applications. The Water Decree specifies the information that must be provided for each water resources management project type. For instance, for water abstraction, the applicant must present an assessment of the purpose of abstraction, its quantity and the fluctuation of abstraction at different times; a report of the other alternatives for acquiring the necessary water; and a report of the other wells and abstraction sites in the areas, the impact the planned activity will have on them, the information on the quantity of water abstracted from such sites, their permit decisions and a plan for guaranteeing the availability of water (Finnish Government, 2011). The permit procedure requires that the application is announced by public notice. As explained, a right must be reserved to the stakeholders and other parties to express their objections and opinions.

In Romania, no information was available.

Adjusting existing rights to match available resources

The process of adjusting existing rights to match available resources remain rare in the reviewed countries. In Finland and Sweden, no processes are in place to permanently change permit conditions according to volumetric water balances – though, in Sweden, a process of permit revision for hydropower is ongoing. France, Spain and the UK have set up a process for revising or adjusting permits according to long term volumetric resources available annually and seasonally (see also Chapter on Water balances). However, progress has been slow and mainly focused so far on ramping down on unused permits. Adjustments have also been made to permits associated with uses engaged in water efficiency programmes. Details on the approaches taken in France, Spain and England are presented below.

In France, subbasins and aquifers identified as priority zones for quantitative water management can undergo a State-led process of permit modification and reallocation to match results of available annual and seasonal volumetric water balances. Withdrawal permits granted to users must be adjusted to meet

that limit. However, in practice, this remains rare and processes have so far focused on revising agricultural permits. In these cases, the agricultural user associations play an important role to define the rules for ramping down individual irrigators' allowances (see textbox 5). More frequently, the State revises permits following state-funded initiatives improving water efficiency in public and private water facilities.

Textbox 5 Reducing allowances of individual irrigators in agricultural water user association in France

When formalising water use rights of individual irrigators following the transfer of individual permits into a collective one (see Chapter on Policies), agriculture water user associations (OUGC) have employed a form of grandfathering, wherein the bulk volume is allocated proportionally based on past withdrawals. This may involve averaging or setting a maximum use over a reference period, or aligning it with the authorized flow rate specified in the original individual pumping permit, particularly in cases where accurate data on past extraction volumes for each farmer were unavailable. Such an approach establishes a consistent allocation for each irrigator, enhancing security for existing claimants and safeguarding the value of irrigated land. However, this practice has often led to overallocation, prompting agriculture water user associations to devise strategies to scale back individual allocations to align with Sustainable Extraction Limits. To facilitate this reduction process, initial bulk permits typically permit agriculture water user associations to allocate more water than their share of the Sustainable Extraction Limit during the initial years, with subsequent adjustments mandated over a period typically spanning 3 to 5 years.

Three primary strategies were used for reducing individual allocations to ensure they do not exceed the Sustainable Extraction Limit for agriculture beyond the permitted timeframe: the 'use it or lose it' approach, applying uniform reductions across all allocations with protective measures for smaller allocations, and maintaining initial allocation levels while implementing an annual reduction coefficient reflective of resource availability. While many agriculture water user associations have successfully reduced allocations, few have significantly curtailed water extractions. The implemented ramp-down regulations have primarily targeted dormant allocations—volumes systematically allocated but largely unused.

Source: Rouillard and Rinaudo, 2020

In Spain, there are few cases where authorities have reduced concessions permanently and they have usually been associated with unused permits or where efficiency gains have been achieved (Sanchis-Ibor et al., 2022). Instead, surface water rights undergo a permanent process of temporary adjustments, first through the hydrological plans of the RBMP and then annually in water commissions. For groundwater, when an aquifer is declared 'overallocated', temporary reduction of existing use rights is implemented annually according to available resources. Reductions are decided by groundwater user associations created for that purpose, in conjunction with river basin authorities (Chapter on Policies). In some cases, the reduction is proportional while in others it is not. For example, in La Puebla-Fuencaliente, after declaration of overexploitation, the same limit has been defined for all users (Berbel et al.; 2018).

In England, many existing licenses did not initially include Hand-Off Flows and some uses have historically been exempt from licensing (see Chapter on permitting regime). For instance, groundwater abstraction primarily used for farming often do not include hands-off flow conditions and are less controlled than surface water sources.

In areas where abstraction was deemed unsustainable, the Environment Agency implemented the Restoring Sustainable Abstraction (RSA) programme from 2008 to 2018. This initiative empowered the Agency to assess, modify, and revoke abstraction licenses that were deemed environmentally harmful. The focus has been on addressing acute over-abstraction issues, particularly prioritizing habitats directive sites. Now nearly completed, the program has changed over 300 abstraction licenses – with a volume of 37 million m^3 of water returned to the environment so far. 80% of the license changes since 2008 have been

voluntary, while the remaining 20% involved some form of financial repayment (Interview English experts, 2024).

In parallel, the Environment Agency has also revoked unused or underused licenses and reviewed time-limited license renewals, 'releasing' 100 million m^3 of water since 2015. Further catchment permit reviews (especially of permanent licenses) are planned from 2028 onwards with a focus on catchment scale sustainability. At that stage, the Environment Agency will have been granted new powers which do not require any financial compensation for revoking licences (Interview English experts, 2024).

Allocations during exceptional circumstances (e.g. droughts)

As discussed in Chapter on Drought management plans, some of the reviewed countries (ES, FR, UK, RO) have adopted DMPs which sets out pre-defined responses to drought situations together with a list of priority uses. SE and FI do not yet have formal DMPs, but their legal framework provides powers to authorities to prioritise certain uses at water shortages. All the reviewed countries except England presents a legal framework with a clear prioritisation of environmental protection and domestic uses such as drinking water, over economic uses (Table 3). The situation in each country is presented below.

Table 3 Order of priority in the event of restrictions due to droughts

Use	FR	England*	SE	FI	ES	RO
Environment	2	1			1	No information available
Domestic water supply	1	2	1	1	1	
Civil safety (hygiene, fire, cooling of nuclear power plants)	1	3	1	2	2	
Energy production (hydropower, cooling water)	3	3	1	3	3	
Agriculture	3	4		3	3	
Industrial	3	4		3	3	

** Not predefined in law or regulations*

In Spain, restrictions from drought management protocols are supplementary to the decisions by water commissions and groundwater user associations (see Chapter on Responsibilities), responding dynamically to meteorological conditions during a drought. The Law also pre-defines which uses take priority over others. Urban water should be fully supplied, so that reservoirs keep a volume equal to three years urban demand 'as safety reserve'. The rest can be used by economic uses (e.g. agriculture, industry). During drought period, economic uses are first restricted, while domestic use and ecological flows are managed and balanced during the drought as first priority uses.

In France, priority allocations between uses are set in the Environmental Code, according to the following: health-related issues and public health first as well as civil safety (including nuclear power stations), then biological functioning of water systems, and finally needs of sectors including agriculture and industry. This prioritisation is further specified in DMPs at the level of each 'departement'. Each of these documents may set out a specific order of priority, but they should be coherent with the principles set nationally and regionally. The prioritisation must indicate which uses are restricted at which crisis level and how. Because drinking water, health and civil safety civil are of the highest priority, restriction over water use may result in not prioritizing ecological flows when reaching the highest crisis levels.

In Sweden, the priority water use is public water supply and any other public needs. The Act Containing Special Provisions concerning Water Operations mandates withholding water for public supply during severe shortages caused by drought or similar circumstances, enforced by fines if necessary (Swedish Parliament, 1998b). This provision, aimed at safeguarding public water supply during disasters, has not

undergone judicial scrutiny. While Sweden historically has not faced water scarcity issues, plans for drought management primarily focus on improving water efficiency through information dissemination.

In Finland, the Water Act places priority on household and community water supply during droughts (Finnish Parliament, 2011; see Textbox 6). Restrictions are decided by the permit authority based on an application filed by the entity that needs water. Legislation specifies the priority order and enables modifying the permits to better respect the circumstances of flooding and droughts. The restrictions that concern existing permits always require a new decision made by the permit authority. If the restriction causes unreasonable loss of a benefit to the owner of the water facility, the permit authority may order the applicant requesting the restriction and others gaining an essential benefit from the restriction to compensate for the loss of benefit.

Textbox 6 Prioritisation of uses during droughts in Finland

In Finland, prioritization of water uses in the Water Act in the following manner:

1) abstraction of water for use in the proximity of the abstraction site for ordinary household use of real estates;
2) abstraction of water for the water supply of the local community;
3) abstraction of water for the use of local industry or otherwise for use in the locality and abstraction of water serving the water supply of a community outside the locality;
4) abstraction of water to be conducted or transported for use elsewhere for a purpose other than supplying water to a community.

The preparatory works explain that this order of precedence was selected to ensure the priority of local water use over water transports (Finnish Government, 2009, p. 81). This order of precedence applies not only to new permits but also to the modification of old permits (Finnish Government, 2009, p. 82).

In England, priority uses are established through Drought Plans and are prioritized according to the magnitude of their environmental impact, water resources benefit, and ease of implementation. There does not appear to be a pre-defined priority order established by legislation or the Environment Agency for different uses of water. Interviewees mentioned that environmental needs usually take precedence, followed by domestic water supply, critical infrastructure like power plants, and then industrial and agricultural uses. However, the allocation may vary based on the specific context of each situation. Restrictions on abstraction are first based on 'hands-off flows', which are usually added as a condition on a license to allow a certain amount of abstraction. For example, the hands-off flow at Q95 means that 10% can be abstracted ("take"). During more severe droughts, drought orders may be issued to establish stricter restrictions during which only drought permits – usually reserved for essential uses such as drinking water – are allowed to abstract (Interview English experts, 2024).

In Romania, no information was available.

Re-allocating between existing users

In the reviewed countries, the exchange of permits between users with or without monetary retribution is not possible. In particular, the trading of water allocations is not possible in France, Sweden, Finland and Romania. Instead, authorities regulate the transfer of water use rights through the issuance, amendments and cancellation of permits, individually with each user.

The right to use water is nevertheless associated with land ownership in most of the reviewed countries (see Chapter on Legislation and Regulation). Hence a change in land ownership is usually associated with an automatic transfer of the abstraction permit. However, this is not necessarily automatic in some countries such as France, where transfer of water permit with a change in land ownership is at the discretion of authorities. Therefore, it is also possible for authorities to annul the permit associated with land ownership.

To facilitate exchange of water between irrigators, and optimise the use of the new collective licence imposed on agricultural water users (Chapter on Policies), French authorities authorise Agricultural Water User Associations (OUGC) to annually transfer allowances between single claimants as long as they collectively meet permit requirements (see Textbox 7).

Textbox 7 Re-allocation between existing claimants in agricultural user associations in France

Irrigators are prohibited from transferring volumes among themselves without obtaining authorization from the Organized User Group for Groundwater Consumption (OUGC). Nevertheless, OUGCs have established protocols for temporarily reallocating water among users. During the irrigation season, if the OUGC anticipates that one or more irrigators will not fully utilize their allocation, it may opt to transfer it to other users. This transfer process is rigorously overseen by the OUGC, following internal regulations, to prevent the emergence of informal water markets. Internal regulations may specify, for example, that unused volume will be prioritized for reallocation to cattle breeders or small-scale farmers. Such regulations are ratified by OUGC members during plenary assemblies.

In Spain, local exchanges of water have historically been possible, albeit with limited transparency and understanding of their impacts. Since the Water Law reform in 1999 (SG, 1999), two legal avenues have been introduced for temporary transfer of water rights. These instruments include the Leasing of Water-use Rights (LWR) for temporary cessions and Centres for Water-use Rights Exchange (CWRE), commonly known as water banks, managed by River Basin Authorities. These mechanisms, primarily utilized during droughts, allow for the temporary or permanent exchange of water rights, facilitating transfers between concessionaires within basins or across demarcations.

Despite their implementation, transactions have been limited, with exchanges typically representing a small fraction of total water use. Most notably, during drought periods, the majority of transactions have been directed towards environmental purposes, indicating a prioritization of mitigating drought impacts on natural ecosystems.

In England, trading of water licenses is possible within the same catchment or groundwater unit (EA, 2014). Rules attached to trading are usually defined by the Environment Agency in the abstraction licensing strategies at the catchment level. Rules may address, for example, the location of abstraction, season, quantity, rate, and purpose. They must ensure that no deterioration to the water body occurs through trading. It has been observed that trading in England has usually occurred within the same surface water body and during the same season, with the same purpose and effect on the water body (Benson et al., 2022). Trading of licenses has never materialized at a large scale in England (Interview English experts, 2024). Trading is most useful during drought periods, to allow a transfer of water from one user with surplus to another user in need. However, the strict constraints on where and how much can be abstracted makes it difficult to change abstraction patterns in a catchment, especially during a drought when restrictions usually affect the whole catchment (Interview English experts, 2024).

Compliance and enforcement

A fair and effective enforcement of collective rules are key in natural resource management (Ostrom, 1990). In addition to who is involved (see Chapter on Responsibilities and involvement of actors), important dimensions include monitoring, reporting and control activities, as well as the penalties used to dissuade non-compliance.

Monitoring, reporting and controls

In France, under the 1992 Water Law, users are required to keep a record of monthly abstraction. Monitoring of other parameters may be required such as the number of pumping hours, use and condition of use, conditions for discharging water and incidents that may have occurred during the pumping operations. Reporting to the regional and departmental services and to river basin authorities is required at the end of each civil year or abstraction season if the nature of abstraction are seasonal (e.g. irrigation). However, many wells and abstraction points are not known. Controls by the Water Police are carried out as a priority on watersheds where flows are low and subject to significant anthropogenic pressure. Despite information and awareness-raising actions, violations of the law or regulations may be noted and give rise to administrative or legal action. Controls concerning quantitative water management ensure in particular: compliance with restrictive measures; holding a pumping authorization; meter equipment allowing samples to be monitored; compliance with e-flows downstream of the reservoirs.

In Spain, concession holders and holders of private water rights are required to monitor their use, but reporting of use to authorities is not required except by large users. Some arrangements may require reporting by all users, for instance when a groundwater user association is established. River basin authorities hold extensive real-time surveillance programmes of river flows and groundwater levels, monitoring the releases, diversions and abstraction of water across river basins. However, there remains a significant amount of illegal abstraction, in particular in groundwater bodies, where users do not register or monitor adequately their water use, or do not abide to the conditions of their concessions or private right (Schmidt et al., 2020). Nevertheless, endeavors are underway to enhance monitoring capabilities, including the allocation of funds from the Next Generation EU program for this purpose (Interview Spanish expert, 2024).

In Sweden, there are various compilations of water abstraction, both statistically registers can be available at national, water district, and county levels (SCB), but information is also available based on, for example, land use, and locally in water extraction permits. The operators of water operations such as hydropower, are obliged to conduct self-monitoring of abstraction and the risk posed to human health and the environment. Based on the self-monitoring obligation, the operator needs to continually and systematically investigate, assess and document the risks of the activity from a health and environmental point of view. If an operational disruption or similar event occurs in the activity that may lead to nuisance human health or the environment, the operator shall immediately inform the supervisory authority of this (Swedish Parliament, 1998c).

In Finland, the permit decision contains a monitoring obligation, which obliges the permit holder to monitor the implementation of the project and its impacts. Under the permit, the permit holder may be obliged to present a monitoring plan concerning the organization of monitoring, and the authority that accepts the plan may amend it regardless of the validity of the permit (Finnish Parliament, 2011). Water abstraction data is reported by waterworks managers and industries to national databases, but often only annual data is available. Data on small scale irrigation is not available (no permits required when the individual impact of the scheme is not significant). No knowledge or data on return flows.

In England, flows and abstraction are not monitored in every water body. Rather, government agencies have gauging stations at certain points in river basins (Assessment Points) and use hydrological models to interpret what is taking place between these stations. These models can cover an entire catchment and

identify where there is a depleted reach or where e-flows are not being met, and decide how to address the situation. Similarly, groundwater levels are also monitored and compared against abstraction licenses to identify where e.g. over-abstraction may be occurring. Moreover, active environmental groups (Rivers Trust, WWF, etc.) provide valuable feedback, contributing to effective monitoring and management practices. Emphasis now is on developing on smart metering and real-time telemetry, in particular in agricultural catchments, to improve compliance monitoring (Interview English experts, 2024).

In Romania, no information was available.

Sanctions for non-compliance

In France, the State is in charge of enforcing fines when users do not comply with their allocation. Most sanctions fall under the administrative sanction, and rarely do sanctions proceed to penal cases. Some agricultural water user associations have started to implement sanctions on irrigators failing to report water use information.

In Spain, RBAs can apply sanctions and even the cancelation of permit. Water Agency initiates administrative process but usually it ends in Courts. Normally sanctions are administrative fines, but they become penal, including imprisonment, in cases where the volume of the violation is high, the user is engaging in repeated offenses or there is a serious environmental impact.

In Sweden, according to the Environment Code, authorities may issue an injunction if a permit holder disregards a condition set out in the permit or otherwise breaches environmental legislation (Swedish Parliament, 1998a). Injunctions may differ, e.g. ordering the permit holder to follow the permit conditions, to submit information for supervisory purposes or to prepare an investigative report concerning the activity and its environmental impact. An injunction may also order the permit holder to cease operations or to prohibit an operator from starting a specific operation. Supervisory authority may also attach a fine to an injunction to enhance compliance with it. The authority can then submit an application to the Land and Environment Court to impose the fine through its ruling.

The fine is a special environmental sanction charge to the operator. Such a charge must amount to a minimum of SEK 1,000 and a maximum of SEK 1,000,000. The permit authority may also withdraw the permit either entirely or partially and prohibit further activity or revise it. When a crime has occurred, environmental penal provisions are also possible in the Environmental Code. The penalties range from fines to imprisonment for up to six years.

The SEPA report (SEPA, 2017) explains the relationship between administrative sanctions (e.g. injunction and environmental sanction charges) and criminal offences by noting that the former relate to operators of activities as natural/legal persons and the latter always to natural persons “either in the capacity of direct offender or as the representative of a legal person within whose operations the offence has occurred.

In Finland, a difference is made between administrative enforcement proceedings and criminal offences. Administrative enforcement proceedings focus on stopping the prohibited activity, order the user to fulfil its obligations or rectify it. Criminal offences are conducted on users who, intentionally or through gross negligence, degrade the environment. They consist in a fine or imprisonment up to six years. Illegal abstractions are generally sanctioned through a fine.

In England, violations of permits may lead to enforcement measures, with the Environment Agency pursuing an approach of ‘outcome-focused enforcement’ (EA, 2019). The array of enforcement interventions begins with (i) providing advice and guidance to suspected violators to encourage behavioural change, progressing to (ii) issuing warnings, (iii) serving enforcement notices, (iv) applying civil sanctions, and ultimately (v) initiating criminal proceedings. For minor breaches, fixed monetary penalties may be imposed, while more serious offenses could result in variable monetary penalties. Severe infringements may lead to criminal proceedings, potentially culminating in fines or imprisonment. Additionally,

compliance can be reinforced through alignment with other government policies, such as cross-compliance conditions for accessing government funding (Benson et al., 2022).

In Romania, no information was available.

Discussion

Despite the unifying WFD, approaches to water allocation differ widely in Europe, with countries presenting more or less advanced frameworks for regulating access, use and sharing of water. The previous chapters provided a descriptive account of national approaches. The following paragraphs aim to highlight a number of national implementation challenges observed in the reviewed countries as well as some reflection on the priorities that could be sought at European level to support the consolidation of allocation regimes across the continent.

National level challenges

The following discussion presents a series of challenges identified, classified according five aggregated themes: the level of institutional development around rules for water allocations, the scope of regulatory powers entrusted to public authorities over water allocation decisions, the role of stakeholder engagement and of wider social factors, compliance and enforcement arrangements and remaining scientific and technical barriers to water allocation. The points highlighted do not aim to be exhaustive but aim to reveal the most salient points identified in the review of the GOVAQUA participating countries.

Institutional development

At the policy level, **the development of a comprehensive regulatory and planning framework is essential for effective water allocation**. From the six reviewed countries, a clear progression in institutional development is evident across Europe. Countries with a longer history of water scarcity and droughts, like Spain and France, or with high abstraction pressure due to population density such as England, have institutionalized more formal practices for water allocation. They include various aspects such as permitting regimes to regulate access to and use of water resources, drought planning and preparedness, and more importantly river basin planning approaches to establish environmental flows and sectoral priorities, assess water balances and strategies that aim to address overallocation. In these three countries, river basin allocation planning (Speed et al., 2013) is a central instrument to reduce abstraction pressures and improve hydrological and morphological quality elements in view of achieving the WFD targets.

In contrast, countries like Finland and Sweden primarily rely on the permitting regime to control water abstraction, with limited consideration of basin-wide needs. Environmental requirements may be defined when issuing the permit, but a formal process for reviewing permits according to e.g. updated water balances or revised water use priorities is lacking. Drought procedures focus on emergency decisions and preparedness, and are not as formalized (planned) as in Spain, France and England. Overall, Finland and Sweden lack a supporting policy and regulatory framework for basin wide allocation planning and drought restrictions. This can represent a barrier for further implementation of water allocation policies supporting the achievement of the WFD.

Progress in regulating surface water and groundwater allocations holistically is mixed. All the reviewed countries do consider, when issuing groundwater permits, the impact of abstraction on connected surface waters (e.g. alluvial aquifers and rivers, groundwater levels and wetlands). Furthermore, pilots and projects on managed aquifer recharge (where 'excess' surface water is used to recharge groundwater) exist in several reviewed countries. Few examples exist however on more active coordinated use of surface water and groundwater, optimizing allocations according to water availability with the intention to increase

security of supply of all users while minimizing environmental impact (e.g. in a form of 'conjunctive' use, see UNESCO, 2019). Examples include the protection of aquifers of strategic importance in France and Germany which involves substituting groundwater abstraction to surface water to preserve groundwater for emergency crisis or future generations (Hérivaux and Rinaudo, 2016), and, increasingly so, collective efforts in agriculture user associations to adapt to environmental constraints (Rouillard and Rinaudo, 2020). Establishing such unified allocation regime across surface and groundwater can challenging due to physical, technical, economic, political and legal constraints (Lund, 2020).

Finally, **the reviewed countries only regulate water abstraction and not water consumption** (i.e. net water use after water losses are accounted for). This can be an issue when water losses are addressed through water efficiency programmes, thereby reducing water lost to the environment through leakage or evapotranspiration (e.g. in irrigated agriculture). Although beneficial in terms of promoting a rational use of water, reducing water losses can unintendedly reduce soil infiltration, groundwater recharge and return flows to surface water bodies (Dumont et al., 2013). More robust allocation systems should therefore not only establish controls on water abstraction levels, but also on discharge quantities, water consumption and water losses (GWP, 2019).

Regulatory powers

When countries move to 'closing' access to water resources due to issues of overallocation, this has usually resulted in 'grandfathering' existing water uses and limiting the issuance of new permits – thereby benefiting historical water users (see also Rouillard et al., 2021). However, with growing scarcity and drought impacts, there are challenges with balancing water needs of a broad range of public and private interests and societal priorities around water. **A key challenge therefore lies in the capacity of authorities to modify or revoke water permits, or facilitate their reallocation**, in order to adapt to new knowledge, conditions, and societal priorities.

In the reviewed countries, the timespan of permits ranges from 12 years (England), 20-75 years (France, Spain), and even broadly unlimited (Sweden). Unlimited or very long permits can lock the system into unsustainable practices, while short permits offer greater adaptability but could discourage investments with longer time horizons, such as hydroelectric and water supply infrastructure or other means of economic production (e.g. development of water dependent industries) (OECD, 2015; GWP, 2019). The key challenge is therefore to set a permit duration that offers a sufficient security of tenure by users to enable private investments, while providing sufficient powers to authorities to amend or revoke permits in case of needs.

Authorities in the six countries reviewed have very different powers to review and modify existing permits. In some countries, such as England, France and to a more limited extent Spain, the State has extensive powers to amend or even revoke running permits without compensation. However, it has proved challenging to execute these powers due to strong opposition of water users. To date, most changes to permits in these three countries have focused on revoking unused permits and amending used permits according to actual use or an improvement in the rational use of water. In England, the government has introduced new regulations in 2017 to strengthen the ability of the Environment Agency to adjust and revoke licenses according to ecological flow requirements.

The transfer of allocation between users is primarily orchestrated by authorities through permitting. However, this creates a heavy administrative burden on authorities especially in catchments where hundreds if not thousands of permits must be managed. This can lead to a lack of flexibility in water reallocations, lack of attention to local contexts and needs, potentially resulting in outcomes that are suboptimal or inequitable (Berbel, 2018a; 2018b). Some of the reviewed countries have adopted other forms of reallocations, such as water trading in Spain and the UK, and user-based reallocations in France – with varying degrees of success (see Benson et al., 2022; Rouillard and Rinaudo, 2022; Sanchis-Ibor et al., 2022).

Another challenge regarding regulatory powers relate to exemptions to permitting. The reviewed countries all present exemptions to permitting. For instance, in England, certain historical abstractions have until recently been lawfully exempt from licensing control, meaning that these users could abstract unlimited supplies of water even in areas that are water stressed. More frequently, exempt users include domestic users and small water users. The reason for exempting smaller users relates to the excessive administrative burden that would result from regulating all abstractions. However, interviews indicate the exemptions have disadvantages. They can limit the effectiveness of permitting in protecting freshwater ecosystems, hinder the legitimacy of allocation regimes, and create inequalities between users. To overcome the administrative burden of licensing all abstraction while keeping track of small and domestic abstraction, France has established two types of permits – a notification whereby the user is allowed to abstract once it notifies the local authority of its domestic or small abstraction, and an authorization which requires approval by state authorities.

Stakeholder engagement and social dimension

A key challenge accompanying water allocation reform is entrenched habits in water use and the belief of unlimited supply (e.g. through the possibility to increase supply through technology and infrastructure). As a result, there is a significant lack of attention by economic sectors and investment policies to existing patterns of water availability and security of supply in catchments and river basins. This is particularly important, but not limited, to northern countries. For instance, in England, public awareness about water conservation and sustainability remains relatively low, highlighting the need for increased education and awareness campaigns (Interview English experts, 2024). Reforming water allocations ultimately requires changing cultural and social norms and promoting a 'water saving and sharing' culture.

Addressing these challenges requires attention on how to communicate and raise awareness of the social value of preserving water resources and the negative long-term impacts of uncontrolled use and free-riding. It also requires providing the right signals, through permits and eventually prices, on the scarcity and variability of the availability of water resources. In addition, it requires a strong link between investment and economic sector development policies and water allocation policies. In none of the reviewed countries were such approaches strongly promoted.

Aligning long term allocations (permits) with societal goals requires procedures to support legitimate and transparent decisions over water reallocations. This should involve assessing the impact and trade-offs of reallocating water between different uses, considering not just the economic costs, but also the broader social and environmental benefits of various allocation options. **In the reviewed countries, stakeholder engagement on water (re)allocation is either inexistant or very limited**. Sweden, Finland and England currently lack formal procedures for stakeholder involvement in allocations, while France has nascent ones and Spain presents a very institutionalized approach. In Spain, the composition of existing participatory fora strongly favour representation of irrigation and other major water users, to the detriment of environmental interests, fisheries, tourism (bathing, watersports) and navigation. This situation reflects the situation in other European countries (Rouillard and Schmidt, 2024).

Efforts in some countries are ongoing to broaden the range of users involved in quantitative water management. In England, a second round of regional plans are being developed aimed at long-term water demand assessment across five regions. Unlike the previous plans focusing solely on public water supply and environmental needs, the new approach includes considerations for aquaculture and energy sectors as well. This shift aims to promote cross-sectoral planning, ensuring that water infrastructure projects like desalination plants or reservoirs cater to multiple sectors' needs such as public water supply and energy production. The regional planning approach involves forecasting future demands, considering factors like population growth, leakage in distribution networks, climate, etc., to guide infrastructure investments over a 50 to 80-year timeline.

Compliance and enforcement

The reviewed countries commonly report major challenges regarding the monitoring water allocations. Metering of abstraction is compulsory under the WFD, and the legal and policy standards of the reviewed countries usually place a responsibility on the user to appropriately monitor and record its water use, including any incident that may have occurred, and have it available during inspections by the regulator. Countries report challenges in adequately resourcing regulatory authorities to monitor all abstraction points and follow up cases of illegal water use. This issue was strongly shared in Spain where illegal groundwater abstraction is a major challenge (Interview Spanish expert, 2024). The problem is exacerbated by the limited use of available technologies, such as ICT and satellite technologies, which could enhance compliance monitoring but are not fully utilized (Schmidt et al., 2020).

Although pilots exist, none of the countries have yet systematised the use of real-time metering of abstraction. Spain and France have programmes to consolidate approaches to monitoring water use. In France, the recent national policy strategy aims to generalise the use of tele-metering which automatically shares abstraction data in real time.

Many Member States also struggle with implementing appropriate compliance mechanisms, particularly regarding permit conditions. Penalties for non-compliance are often inadequate and fail to deter illegal activities effectively. In many cases, the benefits of transgression outweigh the penalties imposed. Strengthening penalties is deemed necessary in several Member States, including France, Spain, and England, to improve compliance. In Spain, illegal abstraction is controlled and prosecuted in certain "hot spots," but overall monitoring remains inadequate due to authorities' lack of resources and capacity (Schmidt et al, 2020).

Scientific and technical challenges

Reforming water allocations involves addressing significant scientific challenges, particularly in defining global extraction limits and assessing their impacts on water resources. There are considerable uncertainties associated with the spatial and temporal variability of climatic and environmental conditions and the complexity of interactions between surface and groundwater resources (Molle, 2023). Consequently, controversies arise among stakeholders who contest scientific assumptions that may serve their own interests. Transparency and participation are essential to ensure that the extraction limit imposed on users is perceived as technically and scientifically sound, despite remaining uncertainties.

Water balance methods vary greatly between countries, despite EU guidance. Authorities may lack the necessary decision-support tools, knowledge, information, and data to assess the impact of different allocation scenarios on river basin and catchment water balances, as well as reaching e-flows and maintaining the good status of individual water bodies. For example, in some countries like Sweden and Finland, there is incomplete scientific knowledge about the allocable pool, with insufficient information on total allocable resources and the impacts of certain water abstractions. Similarly, in Spain and England, there is a lack of adequate decision-making support tools and monitoring systems, particularly for groundwater management.

EU level challenges

With growing scarcity and droughts across the continent, European countries will need to develop a level playing field with regards to the exploitation of their water resources and addressing impacts of abstraction on ecosystems. The WFD provides a starting point for developing a common baseline and requirements, but a lack of attention to the issue of water scarcity and drought in policy development and expert exchange in the Common Implementation Strategy since the enactment of the WFD means that current approaches remain heterogenous. The following presents, on the one hand, areas which would require

further development to establish common standards and harmonise approaches, and on the other, areas for which good practice can be shared.

Developing common standards

Common standards are essential to ensure European countries implement a coherent protection of their freshwater resources, ensure a rational and socially just exploitation of water, and establish an equitable and fair level playing field for their water-using industry (e.g. energy production, irrigated agriculture). Although not exhaustive, the list below aims to highlight areas where countries may benefit from a more common understanding and where possible more comparable regulatory approach. These include:

- To further develop a common understanding and definitions of key terms including e.g. allocations, water 'use' rights, entitlements, water scarcity, droughts, overallocation, over abstraction, consumptive and non-consumptive use
- To clarify the role and scope of permitting, river basin allocation planning and drought planning in the implementation of the environmental objectives of the WFD and building resilience for water uses
- To further harmonise thresholds for hydrological quality elements for surface water and groundwater, and define criteria and targets for the definition of comparable e-flows standards
- To homogenise approaches to permitting of water uses - including the assessments and mitigation of the impacts of abstraction, storage and diversion infrastructure; the permitting of small abstraction; etc
- To establish comparable triggers for drought restrictions, comparable drought restrictions and rules for prioritisation and exemptions

Exploring good practices

Beyond the importance of having common standards to ensure an equitable implementation of EU law, much can be learned from national experiences in the implementation of water allocation regimes and shared for mutual learning in the European fora.

Based on the common challenges identified above, the list below is an attempt at identifying areas where such an exchange could be beneficial:

- Methodologies for holistic water balances and set targets for quantitative water management
- Approaches to just, fair and meaningful stakeholder engagement in different stages of water allocation (permitting stage, river basin planning, drought planning)
- Mechanisms to facilitate the transfer of water allocations in a socially equitable, economically sound and environmental effective way
- Strategies to modify permit conditions, including justifications and legal ground for state intervention on amending and revoking permits
- Strategies to enhance sustainability of water using sectors, reducing water demand to match available resources, adapting practices and the transformation of economic sectors
- Plans and policies to enhance the integrated management of surface water and groundwater resources, including through groundwater recharge, to minimise environmental impacts and increase security of supply and water resilience of society and economic sectors
- Technological, social and regulatory strategies for effective monitoring and enforcement of water allocation policies and permit conditions

Conclusions

European countries present varying degrees of complexity and formalisation with regards to institutions for water allocation. While permitting regimes and drought management planning are advanced across all studied countries, river basin planning of water allocation is non-existent in Finland and Sweden, nascent in France and England, and more formalised in Spain. There are shared weaknesses in the coordination of responses to water scarcity vs. drought conditions, and incomplete provisions for an integrated management of surface water and groundwater. The reviewed countries also present limited powers to modify permits according to water availability conditions, and to facilitate the transfer of water use rights to limit the social and economic impact of a stricter regulation of water abstraction. Major challenges exist in transforming society and economic sectors towards a water saving culture, especially in the countries and regions with higher water scarcity or exposure to droughts. Stakeholder engagement could be further institutionalised in different steps of the regulatory framework for permitting, planning and enforcing water allocations. Monitoring programmes need to be further supported as well as processes for sanctions and compliance control, as well as scientific knowledge and tools for water allocation planning.

The description and assessment of key characteristics of legal and regulatory frameworks of water allocation in six European countries in this report will be used as a starting point to extract research questions for more in-depth analysis of policy instruments for the design and implementation of water allocation in the GOVAQUA good practice inventory. Potential questions for the next steps of research on legal and regulatory instruments for water allocation include the following, with indications of potential good practice approaches from the countries studied:

- How can water use rights be made more flexible to deal with climate variability and change , while providing sufficient visibility to water users?
  - Changes in regulatory powers were adopted in England to facilitate adoption of changes to permit conditions
  - In Spain, specific conditions exist for revising concessions. More could be learned on the exercise of these powers
  - In France, the adoption of water balances usually leads to a revision of permit conditions. More could be learned from these initiatives
- How can allocation regimes support conjunctive management of surface and groundwater resources?
  - Spain and France have developed groundwater recharge programmes. More could be learned from their governance
- What strategies exist for reducing the impacts of implementing restrictions on water use of economic sectors and reallocating water to the environment?
  - In Spain, water banks have been adopted to help authorities buy concessions for environmental purposes
  - In France, plans and strategies for quantitative water management have been adopted, taking a holistic approach between demand and supply. More could be learned from the governance and planning of these strategies
  - In France, agricultural user associations can reallocate water as long as the requirements of the collective permit is met. More could be learned from the strategies for reallocating water within these organisations
- What arrangements support a more effective enforcement of water allocation decisions?
  - In Spain, several programmes have been put in place to reduce illegal abstraction. A review of these programmes and lessons learned could be carried out
  - In France, agricultural user associations may have established a system of recording and control in the use of water by individual irrigators

Further work in WP2 of GOVAQUA will explore, document and assess selected good practice approaches.

References

AELB (2022). Analyses Hydrologie-Milieux-Usages-Climat (HMUC) – Guide et recommandations méthodologiques. Agence de l'Eau Loire Bretagne, 64pp.

Ahopelto, L. (2024). Kuivuusriskien hallinnan kansalliset suuntaviivat. Lausuntoluonnos 13.5.2024. Maa- ja metsätalousministeriö. Available at: https://www.lausuntopalvelu.fi/FI/Proposal/Participation?proposalId=9402de00-687f-431c-9f77-c3c71864c076&proposalLanguage=da4408c3-39e4-4f5a-84db-84481bafc744 (3.6.2024)

Benson, D., Cook, H., Ak, M. Y., Demirbilek, B. (2022). England and Wales: countering 'unsustainable abstraction' with the catchment based approach. In Rouillard, J., Babbitt, C., Challies, E., Rinaudo, J. (Eds.) Water Resources Allocation and Agriculture: Transitioning from Open to Regulated Access. London: IWA Publishing. ISBN: 9781789062793

Berbel, J. & Gutiérrez-Martín, C. (2017). Efectos de la modernización de regadíos en España. Cajamar Caja Rural, Almería

Berbel, J., Expósito, A., & Borrego-Marín, M. M. (2018). Conciliation of competing uses and stakeholder rights to groundwater: an evaluation of Fuencaliente Aquifer (Spain). International Journal of Water Resources Development.

Berbel, J., Schellekens, J., Expósito, A., Borrego, M.M., Montilla-López, N. (2018a). Review of alternative water allocation options. Deliverable to Task A4B of the BLUE2 project "Study on EU integrated policy assessment for the freshwater and marine environment, on the economic benefits of EU water policy and on the costs of its non-implementation". Report to Directorate General for the Environment of the European Commission.

Berbel, J., Schellekens, J., Expósito, A., Borrego, M.M., Montilla-López, N. (2018b). Review of alternative water allocation options – Annex Report. Task A4B of the BLUE2 project "Study on EU integrated policy assessment for the freshwater and marine environment, on the economic benefits of EU water policy and on the costs of its non- implementation. Report to Directorate General for the Environment of the European Commission.

Buchanan, L., Cherrier, V., Whiting, R., Whitfield, G., Roy, S., Strosser, P., de Paoli, G., van Duinen, R., Delacámara, G., Psomas, A., Sorensen, M.M., Farmer, A. (2019). Integrated Assessment of the 2nd River Basin Management Plans: EU-wide storyline report. European Commission. Doi :10.2779/640259

Caixa Bank Research (2024). The use of water in agriculture: making progress in modernising irrigation and efficient water management (caixabankresearch.com). Visited 11/06/2024.

CGEDD-CGAAER (2020). Bilan du dispositif des organismes uniques de gestion collective (OUGC) des prélèvements d'eau pour l'irrigation. Mission CGEDD n° 13017-01 – CGAAER n° 19089. MTE-MAA (Ministère de la Transition Écologique et Ministère de l'Agriculture et de l'Alimentation)

Climate-Adapt (2024). Country Profiles (europa.eu) . Visited 11/06/2024

CIS (2006). Water scarcity management in the context of the WFD. MED Joint Process WFD /EUWI.

Defra (2011). Water for Life. ISBN 9780101823029. Available at: https://assets.publishing.service.gov.uk/media/5a7c7b64e5274a559005a299/8230.pdf

Defra (2017). Water Abstraction Plan. Available at: https://www.gov.uk/government/publications/water-abstraction-plan-2017

Defra (2023). Plan for Water. Available at: https://www.gov.uk/government/publications/plan-for-water-our-integrated-plan-for-delivering-clean-and-plentiful-water/plan-for-water-our-integrated-plan-for-delivering-clean-and-plentiful-water

Dumont, A., et al., 2013, 'Is the rebound effect or Jevons Paradox a useful concept for better management of water resources? Insights from the irrigation 48odernization process in Spain', Aquatic Procedia 1, pp. 64-76 (DOI: https://doi.org/10.1016/j.aqpro.2013.07.006).

EA (Environment Agency) (2007). Hydrogeological impact appraisal for groundwater abstractions. Available at: https://assets.publishing.service.gov.uk/media/5a7c4eade5274a2041cf31ec/scho0407bmah-e-e.pdf

EA (Environment Agency) (2013). North Kent % Swale Abstraction Licensing Strategy. Available at: https://assets.publishing.service.gov.uk/media/5a7c18dae5274a1f5cc75c3b/LIT_1815_765a21.pdf

EA (Environment Agency) (2014). Guidance: Apply for a water abstraction or impounding license. Available at: https://www.gov.uk/guidance/water-management-apply-for-a-water-abstraction-or-impoundment-licence

EA (Environment Agency) (2017). Drought response: our framework for England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625006/LIT_10104.pdf

EA (Environment Agency) (2020). Meeting our Future Water Needs: a National Framework for Water Resources. Available at:

https://assets.publishing.service.gov.uk/media/5e70c2c4e90e070acfef5077/National_Framework_for_water_resources_summary.pdf
EA (Environment Agency) (2020b). Water resources national framework. Appendix 4: Longer term environmental water needs. Available at: https://assets.publishing.service.gov.uk/media/5e6a5f6086650c727adb438f/Appendix_4_Longer_term_environmental_water_needs.pdf
EA (Environment Agency) (2022). River basin management plans, updated 2022: record of consultation and engagement. Available at: https://www.gov.uk/government/publications/river-basin-management-plans-updated-2022-record-of-consultation-and-engagement/river-basin-management-plans-updated-2022-record-of-consultation-and-engagement
EA (Environment Agency). (2019). Environment Agency Enforcement and Sanctions Policy. Environment Agency, Bristol, UK.
EC (2006). Water scarcity management in the context of the EU WFD. Water scarcity drafting group, Common Implementation Strategy, MED Joint Process WFD/EUWI. SCG agenda point 8b, WGB/15160506/25d.
EC (2008). Drought management plan report. Water Scarcity and Drought Expert Network. Technical report 2008 - 023
EC (2012). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Report on the Review of the European Water Scarcity and Droughts Policy.
EC (2015). Ecological flows in the implementation of the Water Framework Directive. Guidance Document No. 31. European Commission. doi: 10.2779/775712
EC (2019). REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC): Second River Basin Management Plans; First Flood Risk Management Plans.
EC (2021a). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change.
EC (2021b). EU biodiversity strategy for 2030 : bringing nature back into our lives, Publications Office of the European Union. https://data.europa.eu/doi/10.2779/677548EC (2023). Mapping and analysis of CAP Strategic Plans. Assessment of Joint Efforts 2023-2027. doi: 10.2762/71556
Estrela, T., and Sancho, T. A. (2016). Drought management policies in Spain and the European Union: From traditional emergency actions to Drought Management Plans. Water Policy, 18(S2), 153-176.
Figureau, 2012 Gestion quantitative de l'eau d'irrigation en France : bilan de l'application de la loi sur l'eau et les milieux aquatiques de 2006. Avec la collaboration de Montginoul, M. et Rinaudo JD. BRGM/RP-61626-FR
Finnish Government (2009). Government proposal to Parliament concerning new water legislation. Hallituksen esitys Eduskunnalle vesilainsäädännön uudistamiseksi, HE 277/2009 vp.
Finnish Government (2011). Water Decree. Valtioneuvoston asetus vesitalousasioista (1560/2011).
Finnish Parliament (2011). Water Act. Vesilaki (587/2011).
Finnish Parliament (2004). Act on the Organisation of River Basin Management and the Marine Strategy. Laki vesienhoidon ja merenhoidon järjestämisestä (1299/2004).
GWP (Global Water Partnership) (2019). Sharing water: The role of robust water-sharing arrangements in integrated water resources management. Perspectives paper.
Hérivaux, C., and Rinaudo, J.D., 2016, *Pourquoi et comment préserver les eaux souterraines pour leur rôle d'assurance? Tour d'horizon de l'expérience française*, Rapport final. BRGM/RP-65631-FR, pp. 60
Interview English experts (2024). Two national civil servants on water regulation and eflows. Interview carried out in first half of 2024. P
Interview Spanish expert (2024). One national expert on water regulation and management. Interview carried out in first half 2024.
Kampa, E. Tarpey, J., Rouillard, J., Bakken, T. H., Stein, U., Godinho, F. N., Leitão, A. E., Portela, M. M., Courret, D., Sanz-Ronda, F.J., Boes, R., and A. Odelberg (2017). Technical Deliverable 5.1. Review of policy requirements and financing instruments. H2020 project FIThydro Fishfriendly Innovative Technologies for Hydropower.
Llamas, M. R., Custodio, E., De la Hera, A., & Fornés, J. M. (2015). Groundwater in Spain: increasing role, evolution, present and future. Environmental Earth Sciences, 73, 2567-2578.
Lucavetchi, E (2007). Case study on the Right to Water and Sanitation in Romania. Workshop on equitable access to water, July 5-6, 2007, Paris
Lund, J. (2020). Conjunctive Use of Surface and Groundwaters with California Examples, 2020 presentation
Land and Water Forum (2012). Third Report of the Land and Water Forum. Managing Water Quality and Allocating Water. New Zealand, October 2012
Michanek, G. and Zetterberg, C. (2021). Den svenska miljörätten. Iustus.

Molle, F. (2023). Aquifer Recharge and Overexploitation: The Need for a New Storyline. Groundwater 61 (3). (10.1111/gwat.13299).
MTE (Ministère de la Transition Écologique) (2021). Guide de mise en œuvre des mesures de restriction des usages de l'eau en période de sècheresse
MTECT (Ministère de la Transition Ecologique et de la Cohésion des Territoires) (2023). Guide d'élaboration et de mise en œuvre des Projets de Territoire pour la Gestion de l'Eau, à destination des porteurs de projets et des acteurs de la démarche. République Française, 99p
OECD (2015). Water Resources Allocation: Sharing Risks and Opportunities, OECD Studies on Water, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264229631-en
Parjanne, A., Ahopelto, L., and Parkkila, P. (2020). Ohjeita kuivuusriskien hallintasuunnitelman laadintaan. Available at <https://www.ely-keskus.fi/documents/10191/46616838/Ohjeita+kuivuusriskien+hallintasuunnitelman+laadintaan_14_12_2020.pdf/ef44b6d0-bd08-a1f7-393b-48a9bfb74808?t=1651245592182>. (Parjanne, Ahopelto and Parkkila 2020a)
Parjanne, A., Ahopelto, L., and Parkkila, P. (2020). Sirppujoen vesistöalueen kuivuusriskien hallintasuunnitelma. Available at <https://vesi.fi/aineistopankki/sirppujoen-vesistoalueen-kuivuusriskien-hallintasuunnitelma/>. (Parjanne, Ahopelto and Parkkila 2020b)
Pascu, A., and Savastre, A. (2020). An overview of water recent updates in Romania. MPR partners. Available at: https://www.lexology.com/library/detail.aspx?g=a236ac80-f428-4d3b-8a91-8fc25a4f3aad
Platon, V. and Constantinescu, A. (2018) Water resources in romania during 1945-1989. Romanian Journal of Economics, 47, 20-33.
RF (République Francaise) (1964). Water law. Loi n° 64-1245 du 16 décembre 1964 relative au régime et à la répartition des eaux et à la lutte contre leur pollution
RF (République Francaise) (1984). Water law. Loi n°84-512 du 29 juin 1984 relative à la pêche en eau douce et à la gestion des ressources piscicoles
RF (République Francaise) (1992). Water law. Loi n° 92-3 du 3 janvier 1992 sur l'eau » and the « Loi n° 2006-1772 du 30 décembre 2006 sur l'eau et les milieux aquatiques
RF (République Francaise) (2006). Water law. Loi n° 2006-1772 du 30 décembre 2006 sur l'eau et les milieux aquatiques
RF (République Francaise) (2007). Décret n°2007-1381 du 24 septembre 2007 relatif à l'organisme unique chargé de la gestion collective des prélèvements d'eau pour l'irrigation et modifiant le code de l'environnement
RF (République Francaise) (2010) Loi n° 2010-788 du 12 juillet 2010 portant engagement national pour l'environnement (loi ENE, dite Loi Grenelle II.
RF (République Francaise) (2011). Circulaire du 18 mai 2011 relative aux mesures exceptionnelles de limitation ou de suspension des usages de l'eau en période de sécheresse
RF (République Francaise) (2019). Instruction du Gouvernement du 7 mai 2019 relative au projet de territoire pour la gestion de l'eau.
RF (République Francaise) (2021). Décret no 2021-795 relatif à la gestion quantitative de la ressource en eau et à la gestion des situations de crise liées à la sécheresse
RF (République Francaise) (2023). Instruction du 17 janvier 2023 portant additif à l'instruction du Gouvernement du 07 mai 2019 relative au projet de territoire pour la gestion de l'eau
RF (République Francaise) (2024). Protection de la ressource en eau.
RG (Romanian Government) (1953). Decret 143/1953 din 4 aprilie 1953 privind folosirea raţională, amenajarea şi protecţia apelor.
RG (Romanian Government) (1974). Lege 8 din 29 martie 1974 legea apelor
RG (Romanian Government) (1996). Law 107/1996
RG (Romanian Government) (2004). Law 310/2004
RG (Romanian Government) (2006a) Order no 9 from 6.01.2006.
RG (Romanian Government) (2006b). Lege 112/2006 din 4 mai 2006 pentru modificarea şi completarea Legii apelor nr. 107/1996
RG (Romanian Government) (2007). National Strategy for reduction of the effects of droughts on short-, medium-, and long-term. Bucharest, Official Gazzette no 565/2007.
RG (Romanian Government) (2020). Lege 122/2020 amending and supplementing the Water Law (No. 122/2020)
RG (Romanian Government) (2023). Strategia Națională pentru gospodarirea apelor România 2023-2035.
Rouillard, J. & Rinaudo, JD (2020) "From State to user-based water allocations: An empirical analysis of institutions developed by agricultural user associations in France," Agricultural Water Management, Elsevier, vol. 239(C).
Rouillard, J. and Rinaudo, J.D. (2022). Managing a common resource in agriculture: an overview of the French nested water allocation system. In Rouillard et al., Water Resources Allocation and Agriculture: Transitioning from Open to Regulated Access. IWA Publishing. DOI: https://doi. org/10.2166/9781789062786_0093.

Rouillard, J. and Schmidt, G. (2024). Implementation of water allocation in the EU. Developed under the Framework Contract 'Water for the Green Deal' - Implementation and development of the EU water and marine policies (09020200/2022/869340/SFRA/ENV.C.1).
Sanchis-Ibor, C., Pulido-Velazquez, M., Valero de Palma, J., García-Mollá, M. (2022). Water allocation in Spain. Legal framework, instruments and emerging debates. In Rouillard et al., Water Resources Allocation and Agriculture: Transitioning from Open to Regulated Access. IWA Publishing. DOI: https://doi.org/10.2166/9781789062786_0093.
Schmidt, 2024. Final report on the implementation of water balances in the EU. 09020200/2022/869340/SFRA/ENV.C.1. European Commission
Schmidt, G. et al. (2023). Stock-taking analysis and outlook of drought policies, planning and management in EU Member States. Final report under contract "Technical and scientific support to the European Drought Observatory (EDO) for Resilience and Adaptation - Lot 2: In-depth assessment of drought management plans and a report on climate adaptation actions against drought in different sectors" (ENV/2021/OP/0009) for the European Commission, Directorate-General for Environment
Schmidt, G., De Stefano, L., Bea, M., Carmody, E., van Dyk, G., Fernandez-Lop, A., Fuentelsaz, F., Hatcher, C., Hernandez, E., O'Donnell, E., Rouillard, J.J. (2020). How to tackle illegal water abstractions? Taking stock of experience and lessons learned. Fundacion Botin. https://www.fundacionbotin.org/89dguuytdfr276ed_uploads/Observatorio%20Tendencias/How%20to...ok_enlaces.pdf
SG (Spanish Government) (1985). Water law. Ley 29/1985, de 2 de agosto, de Aguas.
SG (Spanish Government) (1999). Water law. Ley 46/1999, de 13 de diciembre, de modificación de la Ley 29/1985, de 2 de agosto, de Aguas
SG (Spanish Government) (2001). Real Decreto Legislativo 1/2001, de 20 de julio, por el que se aprueba el texto refundido de la Ley de Aguas.
SG (Spanish Government) (2005). Ley 11/2005 de 22 de junio, por la que se modifica la Ley 10/2001, de 5 de julio, del Plan Hidrológico Nacional.
SG (Spanish Government) (2008). Orden ARM/2656/2008, de 10 de septiembre, por la que se aprueba la instrucción de planificación hidrológica
SG (Spanish Government) (2018) Instrucción técnica para la elaboración de los planes especiales de sequía y la definición del sistema global de indicadores de sequía prolongada y de escasez. Availabe at: https://www.miteco.gob.es/images/es/pp-orden-instruccion-tecnica-elaboracion-planes-especiales-sequia-nov2017_tcm30-434700.pdf
SG (Spanish Government) (2024a) https://www.miteco.gob.es/es/agua/temas/observatorio-nacional-de-la-sequia/planificacion-gestion-sequias/
SG (Spanish Government) (2024b). https://www.miteco.gob.es/es/agua/temas/concesiones-y-autorizaciones/regulacion-usos-aprovechamiento/concesiones.html
Speed, R., Yuanyuan, L., Le Quesne, T., Pegram, G., Zhiwei, Z. (2013). Basin Water Allocation Planning: Principles, Procedures and Approaches for Basin Allocation Planning. UNESCO, Paris.
Swedish Government (2020). Government decision on the National Plan for Modern Environmental Conditions for Hydropower. Regeringsbeslut, Nationell Plan för Moderna Miljövillkor. Available at https://www.havochvatten.se/download/18.1bd43926172bdc4d64881cc0/1708959747462/regeringsbeslut-nationell-plan-moderna-miljovillkor.pdf; for the text, https://www.havochvatten.se/download/18.1bd43926172bdc4d64881cc1/1684753165617/bilaga-2-nationell-plan-moderna-miljovillkor.pdf.
Swedish Parliament (1998a). Environmental Code 1998:808. Miljöbalk 1998:808.
Swedish Parliament (1998b). Act Containing Special Provisions concerning Water Operations 1998:812. Lag (1998:812) med särskilda bestämmelser om vattenverksamhet.
Swedish Parliament (1998c). Decree concerning self-reporting 1998:901. Förordning (1998:901) om verksamhetsutövares egenkontroll.
Swedish Parliament (2004). Decree on the management of the aquatic environment quality. Vattenförvaltningsförordning (2004:660).
Swedish Parliament (2017). Regulation on Water Delegated Committees (2017:872). Förordning (2017:872) om vattendelegationer.
UK Parliament (1963). Water Resources Act 1963, c. 38.
UK Parliament (1991). Water Resources Act 1991, c. 57.
UK Parliament (1991b). Water Industry Act 1991, c. 56.
UK Parliament (2003). Water Act 2003, c. 37.
UK Parliament (2005). The Drought Plan Regulations 2005, No. 1905.

UK Parliament (2014). Water Act 2014, c. 21.
UK Parliament (2016). The Environmental Permitting (England and Wales) Regulations 2016, No. 1154.
UK Parliament (2021). Environment Act 2021, c. 30.
UN (2010). Resolution A/RES/64/292. United Nations General Assembly, July 2010
UNESCO (2019). Conjunctive Management – An Introduction. International Hydrological Programme.
Vattenmyndigheten Södra Östersjön (2022). Delåtgärdsprogram mot torka och vattenbrist 2022—2027: Södra Östersjöns vattendistrikt. Available at: https://www.vattenmyndigheterna.se/download/18.47dc7e74182e92fe269baec/1662097861637/Del%C3%A5tg%C3%A4rdsprogram%20mot%20torka%20och%20vattenbrist%202022-2027%20S%C3%B6dra%20%C3%96stersj%C3%B6n.pdf.
Vattenmyndigheten Västerhavet (2022). Förvaltningsplan för vatten 2022–2027: Västerhavets vattendistrikt. Available at: https://www.vattenmyndigheterna.se/download/18.47dc7e74182e92fe269b943/1662094813588/F%C3%B6rvaltningsplan%20f%C3%B6r%20vatten%202022%E2%80%932027%20V%C3%A4sterhavets%20vattendistrikt.pdf.

Annex I – Analysis template (Regulating water use and water allocation)

Enabling institutions for water allocation

Question 1a – How are key requirements set for water allocation set in your country? *Multiple options are possible* *Describe their main role (e.g. establishing ownership over water, the permitting regime, drought management, etc.) Depending on the type of response chosen, provide detailed information on the requirements set. E.g. in case of specific national legislation, please provide law number, articles, and content of requirements. Provide key references of relevant documents.*
☐ In national legislation (clearly explain if it is national water law/water act; or a decree; or a regulation; or a specific regulation): ☐ In regional legislation: ☐ In national guidelines or non-binding standards: ☐ In regional guidelines or non-binding standards: ☐ In sector-specific guidelines (e.g. water allocation within the agricultural sector): ☐ Case-by-case requirements (no overarching legislation or guidelines): Please explain:
Question 1b – Which policies and plans address water allocation? *Multiple options are possible* *Describe the role of e.g. River Basin Management Plans, Drought Management Plans, Climate Adaptation Strategies, economic and sector plans. They may establish allocation plans, priority use rules, restrict access and extraction of water, etc.*
☐ RBMP ☐ Drought management plans ☐ Climate adaptation strategies ☐ Sectoral policies ☐ Other Please explain:
Question 2 – Does your legal and policy framework clearly differentiate entitlements in the form of permits and temporary modification of these permits in the form of allowances?
☐ We allocate water through permits and permits cannot be modified temporarily (e.g. through drought orders) ☐ We allocate water through permits, and the state can restrict water use rights temporarily through e.g. drought orders ☐ We allocate water through permits and droughts orders, but we also implement seasonal/monthly allowances that modify permits conditions (e.g. anticipation of a drought, reduction of structural imbalance between issued permits and available resources) ☐ Other Please describe:
Question 3a – Which public authorities are responsible for water allocation and which role do they have? *Please describe the role of ministries, state agencies, river basin organization, etc.* *Describe their role, i.e. are they responsible for policy, planning, issuing entitlements vs allowances, monitoring, enforcement*

Note that there may be different organizations responsible for permitting as opposed to setting specific allowances (see glossary in introduction for definitions)

a) Who is the lead authority on water allocation?
Explain (please specify if different for entitlements vs allowances):

b) Who is responsible for defining water allocations to each user?
Explain (please specify if different organisations are responsible at river basin level, catchment levels or within sectors; please specific if different for entitlements vs allowances):

c) Who is responsible for monitoring, enforcement and compliance with allocations?
Explain (please specify if different for entitlements vs allowances):

Question 3b – What users and stakeholders are involved in decisions over water allocation, and which role do they have?
Multiple options are possible
Describe their role, i.e. are they responsible for policy, planning, issuing entitlements, monitoring, enforcement

☐ Farmers
☐ Fisheries
☐ Water utilities
☐ Hydropower
☐ Navigation
☐ Tourism
☐ Environmental NGOs
☐ Other citizen groups

Please describe their role:

Question 3c – What level of influence would you say stakeholders have in the decision making over water allocation?

☐ They are only informed of decisions
☐ They are consulted. They can comment on proposals
☐ They are involved. They have a seat at the table, but authorities decide at the end.
☐ They are in control, i.e. allocation decisions are devolved to a local association

Please explain (also if different stakeholders have different levels of influence):

Question 4a – How would you categorize the ownership of surface water resources?
Choose one option (except if different types of surface water resources have different legal standings)
Please provide the legal definition of water ownership and refer to the legal instrument(s) establishing this ownership

☐ public/state
☐ private
☐ common
☐ not clearly stated in available legal sources

Please describe:

Question 4b – How would you categorize the ownership of groundwater resources?
Choose one option
Please provide the legal definition of water ownership and refer to the legal instrument(s) establishing this ownership

☐ public/state
☐ private
☐ common

☐ not clearly stated in available legal sources

Please describe:

Question 5 – When allocating water, are any of the principles below required by law or recommended through national guidance?
Multiple options possible.
Please explain explicitly with reference to the source

☐ Conservation and protection of the country's water resources
☐ Efficient management of water resources
☐ Use of water to promote economic development
☐ Equitable division of the resource among all potential users (please provide definition in your country)
☐ Human rights to water (please provide definition in your country)
☐ Protection of indigenous communities and other marginalized groups

Please describe how authorities should take these principles into account (e.g. does it have an impact when prioritizing water uses, establishing permit condition):

Permitting regime

Question 6 – Which permits do abstractors need to obtain to extract water?
Multiple options possible

☐ Installing a pump to access surface water body (access, no extraction)
☐ Extracting surface water from an authorized pump
☐ Drilling a borehole to access groundwater and install a pump
☐ Extracting groundwater from an authorized borehole
☐ To divert and exploit wastewater
☐ Other:

Please describe:

Question 7 – What assessments are carried out to issue a new permit or change the conditions of an existing permit?
Multiple options possible
Please note if different conditions apply to issuance of new permit or changes to an existing one, and if conditions differ based on e.g. the size of the allocated amount of water

☐ An assessment of third-party impacts is obligatory
☐ An environmental impact assessment is obligatory
☐ A public inquiry is mandatory (e.g. the request to obtain a permit made to authorities must be publicly notified and the public and stakeholders are allowed to present objections to the request)
☐ Other:

Please explain:

Question 8 – What hydrological and ecosystem impacts are considered when issuing permits?
Multiple options possible

Impact on ecological flows: ☐ Yes ☐ No ☐ Somewhat
Impact on minimum flows: ☐ Yes ☐ No ☐ Somewhat

Impact on groundwater recharge (when issuing a permit for surface water): ☐ Yes ☐ No ☐ Somewhat
Impact on associated surface water (when issuing a permit for groundwater): ☐ Yes ☐ No ☐ Somewhat
Impact on groundwater dependent terrestrial ecosystems: ☐ Yes ☐ No ☐ Somewhat
Impact on downstream flows (when issuing a permit for wastewater reuse): ☐ Yes ☐ No ☐ Somewhat
Other environmental impacts (please specify): ☐ Yes ☐ No ☐ Somewhat

Please explain:

Question 9 – How are water permits defined?
Multiple options possible

☐ Permits specify a maximum flow of water to be extracted at any time (for instance, pumping capacity in m^3/s)
☐ Permits specify a maximum volume of water to be extracted over a longer period. *Specify the time step (e.g. annual, seasonal, monthly, weekly, daily):*
☐ Permits do not specific a maximum flow or volume of water, but is defined as a share of the available resource
☐ Permits specify the use for which the extracted water can be used for
☐ Permits specify a maximum amount that can be consumed or a return flow obligation
☐ Other:

Question 10 – What is the duration of the permit?
Permits may be issued for a specified amount of time or in perpetuity.
Different types of uses may have different type of permit (for instance hydropower may have a 50 years permit or more, while agricultural users may have 10 years permits)s. Please describe the different cases, also if types of permits differ according to other criteria

a) Are permits issued for a specified amount of time or in perpetuity? Explain, indicating also the typical durations):

b) Does the duration differ for different water uses?
☐ Yes, duration differ according to type of water uses (please describe)
☐ No
Please describe:

c) Does the duration differ for new permits and existing permits?
☐ Yes, the duration differs between existing permit conditions and new permit conditions (e.g. due to a reform in the policies setting permit characteristics)
☐ No
Please explain:

d) Do permits duration differ according to other criteria?
☐ Yes, other criteria are used (please describe)
☐ No
Please explain:

Question 11 – Are there specific types of users that do not need to have a permit?
Multiple options may apply for question a)
Specific types of users or small water users below a certain threshold may not require a permit (e.g. just notification or registration).

a) Which abstracting water users need a permit?

☐ Water utilities
☐ Private households not connected to a water utility
☐ Hydropower
☐ Industry
☐ Small irrigation intakes (individual irrigator)
☐ Large irrigation intakes (collective irrigation schemes, where several irrigators share the same irrigation water supply infrastructure – please specify if individual irrigators require an individual permit in this case or whether the organisation in charge of the irrigation schemes hold the permit)
☐ Other

b) Are there exemptions of water uses below a certain volume from abstraction permits?

☐ Yes, exemptions apply (please describe)
☐ No
Please explain:

c) Are abstractions of temporary nature subject to permit?

☐ Yes (please describe)
☐ No
Please explain:

d) Any other exemptions from a permit?

☐ Yes, other exemptions exist (please describe)
☐ No
Please explain:

Question 12 – How can permits be withheld or cancelled?
Multiple options possible

☐ Public authorities can withhold or cancel the permit without compensating impacted users
☐ Public authorities can withhold or cancel the permit but they must compensate the impacted users
☐ Public authorities can withhold or cancel (part of) a permit only if the allocated amount is not fully used (i.e. the user is not extracting or not extracting the full amount allocated - application of the "use it or loose it" principle)
☐ Other

Allocable pool

Question 13 – Is there a cap on the total amount of water that can be allocated?
Multiple options possible

☐ No, there is no such cap anywhere in the country
☐ Yes, in certain catchments
☐ Yes, in certain groundwater bodies
☐ Yes, for whole RBDs
Please describe:

If yes, at what scale is this cap defined?

☐ surface water body level
☐ groundwater body level

☐ catchment level
☐ RBD level
☐ other

If yes, what is the time step of that cap?
☐ Instantaneous
☐ Daily
☐ Weekly
☐ Monthly
☐ Annual
☐ Other

Question 14 – What hydrological and ecosystem impacts are considered when setting the cap?
Multiple options possible
Note: we differentiate the impacts considered when issuing a specific permit to a user (see earlier question) to the impacts considered when setting limits to the total amount that can be allocated in a hydrological unit such as a basin, catchment or aquifer

Impact on ecological flows: ☐ Yes ☐ No ☐ Somewhat
Impact on minimum flows: ☐ Yes ☐ No ☐ Somewhat
Impact on groundwater recharge: ☐ Yes ☐ No ☐ Somewhat
Impact on surface water ecosystems dependent on groundwater inflow: ☐ Yes ☐ No ☐ Somewhat
Impact on groundwater dependent terrestrial ecosystems: ☐ Yes ☐ No ☐ Somewhat
Other environmental impacts (please specify): ☐ Yes ☐ No ☐ Somewhat

Please explain:

Rules over (re)allocations

Question 15 – Is there a process through which permit conditions are being modified to reduce abstraction, and if so how?
Choose one option
In some cases, permits may be modified permanently. In other conditions, restrictions apply each year / season on individual permits without changing the permits.

☐ No, there is no such process in the country
☐ Yes, in certain catchments
☐ Yes, across the whole country

If yes, could you describe what changes to permit conditions are being implemented?
☐ Permits are modified permanently
☐ Permits are not modified but authorities issue each year / season allowances that restrict the full use of the permit
☐ Other:

Question 16 – When the permitted flow or volume is being ramped down, how this is implemented?
Multiple options are possible

☐ All users see their permits reduced equally (proportionally)
☐ Certain users see their permits reduced more than others
☐ Other

Could you describe how it is implemented?

Question 17 – How are priority uses defined during exceptional circumstances (e.g. droughts)?
Choose one option

☐ National legislation or decree specifies the priority order
☐ National legislation or decree provides general orientation but there is room to adjust at local level
☐ Entirely decided at local level
☐ Other

Please describe:

Question 18 – How are "exceptional circumstances" defined?
Multiple options possible
Different indicators may be used such as a drought index, river flows, groundwater levels, etc.

☐ Drought indicators. Please specify:
☐ River flows. Please specify:
☐ Groundwater levels. Please specify:
☐ Other:

If specific indicators are used, could you describe the thresholds used (e.g. if different levels of emergency are defined) and what are the criteria used to defined these thresholds?

Question 19 – What is the order of priority in the event of restrictions due to droughts?

Please add a number, starting with 1 being of the highest priority

Environment:	
Domestic water supply:	
Civil safety (hygiene, fire, cooling of nuclear power plants):	
Energy production (hydropower, cooling water):	
Agriculture:	
Industrial:	
…	

Question 20 – Can water allocations be transferred or traded?
Multiple options possible

The answers below apply to ☐ permits ☐ allowances

☐ They can be transferred temporarily between two users but they cannot be traded (no financial retribution)
☐ They can be transferred permanently between two users but they cannot be traded (no financial retribution)
☐ They can be leased between two users for a specified duration (temporary transfer with financial retribution)
☐ They can be traded between two users (permanent transfer)
☐ They cannot be transferred or traded
☐ Other:

Please explain the procedures around transfers / trades, including any conditions which must be fulfilled to allow transfer/trade:

Question 21 – Who has the oversight over the exchange or trade of water allocations?
Multiple options possible

☐ Ministry. Please specify:
☐ Public agency. Please specify:
☐ River basin authority. Please specify:
☐ Water user association. Please specify:
☐ Other:

Enforcement and compliance

Question 22 – Are all abstractions monitored and reported? Describe how
Multiple options possible

☐ Metering
☐ Aerial surveillance
☐ Other

Please explain:

Question 23 – What financial or legal deterrents exist to reduce non-compliance?

Question 24 – Describe the procedures or sanctions in place for infractions and conflict resolution.

Barriers

Question 25 – Which of these barriers do you think apply most?
Multiple options possible. Barriers may vary between different places in the country. We ask for an overall judgement, but please explain in what ways your judgement should be qualified below.

On a scale of 1 (very important), 2 (important), 3 (less important) to 4 (not important)
For each of the selected options, please explain.

The implementation mechanisms set out in the legal framework **are not sufficiently precise and detailed** Explain possible reasons (use examples/mention specific cases, if applicable): …	
There is no established planning process to assess, review and modify allocations Explain possible reasons (use examples/mention specific cases, if applicable): …	
There is insufficient power given to authorities to review and modify existing permits Explain possible reasons (use examples/mention specific cases, if applicable): …	
Too many exemptions to holding a permit exist, meaning that too many users are not regulated (e.g. too many cases where only notifications apply, abstraction thresholds for permit requirement set too high) Explain which stakeholders are left out, possible reasons (use examples/mention specific cases, if applicable): …	
There is a **lack of stakeholder engagement** to discuss options for reallocations Explain possible reasons (use examples/mention specific cases, if applicable): …	

Stakeholder are engaged but **no-one is willing to compromise** due to e.g. the economic impacts of changing allocations Explain possible reasons (use examples/mention specific cases, if applicable): …	
Scientific knowledge on the allocable pool is incomplete leading to uncertainties and opposition to reform Explain possible reasons (use examples/mention specific cases, if applicable): …	
Monitoring is insufficient, for instance knowledge on who abstracts is incomplete, leading to uncertainties and opposition to reform Explain possible reasons (use examples/mention specific cases, if applicable): …	
No adequate tool or clear methodologies exists to support decision-making, for instance by modelling available resources, the impacts of reallocations, or identifying trade-offs between users Explain possible reasons (use examples/mention specific cases, if applicable): …	
Water allocation decisions/policies are not considered in sectoral policies and decisions, leading to incoherences between sector investments and incentives (e.g. CAP, tourism expansion, hydropower development) and the amount of water available in specific catchments /groundwater body area Explain possible reasons (use examples/mention specific cases, if applicable): …	
Permits and allowances cannot be exchanged leading to disproportional impacts and opposition from water users Explain possible reasons (use examples/mention specific cases, if applicable): …	
Illegal abstraction is a problem (unregistered points, overconsumption) Explain possible reasons (use examples/mention specific cases, if applicable): …	
Authorities lack resources and capacity, e.g. they are not sufficiently staffed to plan water allocation, identify cases of non-compliance, etc. Explain possible reasons: …	
Penalties for non-compliance are too low to be effective Explain possible reasons (use examples/mention specific cases, if applicable): …	
Other Explain: …	

Question 26 – Are there any steps planned to develop further the existing legal and regulatory framework for water allocation?

Good practice

Question 27 – please report here any good practice / front runners that are implementing a more successful water allocation mechanism that you may come across when filling this questionnaire *Compiling such examples will be useful for Task 2.2 on innovative governance mechanisms*

Suggestions for interviews

Please propose a national authority expert who can be interviewed on the topic of regulating water use and water allocation in your country
Interviewee:
Please list topics from this template which the interviewee can help to further clarify
List issues:

Annex II – Expert interviews

The following lists the interviews carried out with nine national experts to complement the data collection for Deliverable 2.1 concerning water allocation, eflows and water value chains regulatory regimes. The interviews that provided material for this report on water allocation are cited directly in the text.

1. Sweden, interview 1, civil servant, Ministry
2. Sweden, interview 2, judge, Land and Environment Court
3. Finland, interview 1, civil servant, Ministry
4. Finland, interview 2, judge, administrative branch
5. Spain, interview, national expert on water regulation and management
6. France, interview, one national expert on eflows & one civil servant at environmental agency
7. England, interview, two national civil servants on water regulation and eflows
8. Romania interview 1 civil servant, water administration
9. Romania, interview 2, NGO