Chapter 3

The current water allocation landscape

This chapter presents the main findings from the OECD Survey of Water Resources Allocation covering 37 examples of allocation regimes from 27 OECD and key partner countries (BRIICS as well as Colombia, Costa Rica, and Peru). The survey captured information on the current design and functioning of allocation regimes. Overall, the survey provides a solid basis to identify opportunities to improve the performance of current allocation arrangements and informed the development of the policy guidance on allocation presented in the "health check" of Chapter 5.

Key messages

- Findings from the OECD Survey of Water Resources Allocation indicate that most allocation regimes make use of the elements of allocation design that can encourage a robust system yet operate with significant limitations. There are a number of areas that could be **adjusted to improve performance** of allocation in terms of economic efficiency, environmental sustainability and social equity.
- There can be **ambiguity between various legal regimes** within a given jurisdiction (e.g. customary rights versus rights designated in different laws). This legal "pluralism" is a source of conflict among water users and increases the likelihood of "allocation by litigation" or "allocation by adjudication", a costly and time-consuming process.
- **Environmental flows are not secured** in at least one-quarter of allocation regimes surveyed. Only 57% of allocation regimes surveyed report **accounting for the potential impacts of climate change** in their allocation arrangements.
- **A sequence of priority uses** is clearly established in nearly all allocation regimes surveyed. Water for "essential uses" (e.g. drinking water, water for national security purposes) usually figures among the highest priority uses, as would be expected. **Water for the environment is rarely among the highest priorities** in times of scarcity and often figures among the lowest.
- While a significant majority of allocation regimes (92%) have a clear definition on the **limit (or "cap") on consumptive use**, these limits may not be respected in practice and only a few rely on flexible limits.
- **All allocation regimes** surveyed report having **legally defined entitlements** to access to water granted either to individuals, to collective bodies, or both. There is clearly scope to broaden the application of **abstraction charges**.
- Most of the allocation regimes surveyed permit some form of **trading, leasing or transferring water entitlements among users**. However, a wide variety of conditions are placed on such transactions, increasing transaction costs and limiting the extent of trade that occurs in practice.

Despite its importance for water management and for reaping the benefits of water resources, a solid evidence base of how water allocation works across a range of contexts is lacking. This chapter helps to fill this gap by providing an overview of water allocation in practice, based on 37 examples of allocation regimes from 27 OECD and key partner countries (BRIICS as well as Colombia, Costa Rica, and Peru). It is based on information gathered via the OECD Survey of Water Resources Allocation.[1] The survey captured information relevant for understanding the current design and functioning of allocation regimes, summarised in Box 3.1. This chapter presents the main findings from the survey.

Box 3.1. **OECD Survey of Water Resources Allocation**

The survey captures key elements of allocation regimes, including:

- ***General contextual information at national level:*** To provide the overarching institutional and legal context within which water allocation regimes operate and to signal recent efforts to identify areas where water scarcity is becoming a problem. Respondents were also requested to signal any recent or ongoing reforms of allocation regimes.
- ***Key elements of the allocation regime:*** To provide a detailed view of the functioning of specific allocation regimes, the questionnaire captured information about specific examples. In countries where there are a number of different approaches to water allocation (for example, different allocation regimes for surface or groundwater, or variations in allocation from one province/state/river basin to another) several examples from each country could be provided. The specific information collected relates to:
  - *Physical characteristics of the water system concerned*. This includes variability of flow, the nature of existing infrastructure (if any), as well as an estimation of the relative share of water uses.
  - *How the available resource pool is defined*. This includes identifying if there is a clear limit on consumptive use and if so, how this is defined. It also includes information about how a number of factors are taken into account in determining the available resource pool, including environmental flows, base flow requirements, climate change, etc.
  - *How users access water.* This section documents if and how water entitlements are defined and administered. It covers the main types of arrangements: informal, administered regimes (priority ranking), based on economic instruments (prices, markets).
  - *How access to water works in practice*. Building on the previous section, this includes more detailed information on the characteristics of entitlements (e.g. possibility to trade, lease or transfer) and the possibility to restrict new entrants.
  - *How exceptional circumstances are managed*. This concerns unplanned events or "shocks" that negatively impact on the water resource. It captures information on how such shocks are defined and managed, in terms of the implications for water allocation.
  - *How access is monitored and enforced*. This covers whether and how withdrawals for various categories of users are monitored and the sanctions for non-compliance (if any).

Countries were asked to provide general contextual information (legal and institutional) at the national level as well as flag recent (within the past 10 years) or ongoing reforms of allocation regimes. They were also asked to provide in-depth information about how specific allocation regimes function. In some countries, there is only one allocation regime that prevails across the entire territory. In many other countries, there exist a number of different allocation regimes. For instance, allocation may differ from one province/state/river basin to another. Allocation may also differ for surface water and ground water systems. Therefore, countries were asked to provide at least one or more examples of different allocation regimes. This analysis is based on the specific examples in Table 3.1.[2]

Table 3.1. **Examples of water allocation regimes**

	Allocation regime example(s) provided
Australia	Murray-Darling Basin.
Austria	Surface and ground water systems in Austria (referred to under the Water Act).
Brazil	São Francisco Basin. São Marcos Basin.
Canada	Province of Alberta. Province of Manitoba. Province of Newfoundland and Labrador. Province of Nova Scotia. Province of Prince Edward Island. Province of Quebec. The Yukon Territory.
Chile	Limarí River Basin. Maipo River's, 1st Section; Santiago de Chile.
The People's Republic of China (hereafter "China")	Yellow River Basin.
Colombia	Ubaté-Suárez River Basin.
Costa Rica	National scale.
Czech Republic	Water use system in the Czech Republic (referred to under the Water Act).
Denmark	National scale (4 river basin districts, 23 sub-basin districts).
Estonia	National scale.
France	Organisations for the collective management of irrigation (national scale).
Hungary	Tisza-Körös Valley Management System.
Israel	Three types of regimes at national scale: • Wastewater treatment. • Desalination. • Municipal/regional water corporations.
Japan	Tone-Gawa River System, five prefectures: Ibaraki, Tochigi, Gunma, Chiba, Tokyo.
Korea	Water systems in Korea (referred to in the River Act).
Luxembourg	National scale.
Mexico	National scale (13 hydrological regions).
Netherlands	The Dutch Polder System (in the western part of the Netherlands).
New Zealand	Waikato Region.
Peru	Parón River's Sub-Basin.
Portugal	Tejo River Basin.
Slovenia	National scale.
South Africa	Inkomati, Jan Dissels and Mhlatusa River Basins.
Spain	National scale.
Switzerland	National scale.
United Kingdom	England and Wales.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Examining the survey results in context

The information captured in the OECD survey provides a varied view of the current allocation landscape across a range of countries with diverse water endowments, different types of challenges relating to freshwater supply and demand, and varying legal, institutional and policy settings. Although this set of responses provides a diversity of allocation examples, to put the results into context it is important to note several factors that influenced the type of examples collected and the extent to which they are likely to be representative of broader conditions for allocation worldwide.

First, the questionnaire requested specific and detailed information relating primarily to *formal* arrangements for allocation. Examples of informal allocation were therefore unlikely to be captured, although they may be common in many countries. Countries that have traditionally faced water scarcity issues are, in general, more likely to have put in place formal policy responses to address this. The comprehensive water policy reforms in the Murray-Darling Basin are a good example. However, traditionally water-abundant countries facing *emerging* scarcity issues, such as the Netherlands, tend to have fewer formal arrangements in place for managing allocation, and hence, less to report via the questionnaire. Finally, the questionnaire captured the legal, institutional and policy arrangements as reflected in formal arrangements, but this survey is not well-suited to capture how these arrangements are implemented in practice. The difference between formal allocation arrangements and how allocation functions in practice could be significant, with important implications for the sustainable use of the resource.

For example, for Korea, the questionnaire response covers allocation arrangements as reflected in the River Act, although there is ambiguity about how the River Act relates to water use claims under Civil Law, which recognises customary rights, but does not define precisely how this should be done. This legal "pluralism" and ambiguity is a source of significant conflict over water allocation in the country. In a similar vein, the response for Japan covers formal allocation arrangements of the Tone-Gawa River System, but it does not cover issues related to water entitlements under customary law. The response for England and Wales reflects current arrangements in the abstraction licensing regime, but does not reflect numerous legacy issues, such as non-time-limited permits, which represent a significant claim on water resources. The main point here is that while this analysis of the current allocation landscape can provide a number of very useful insights, the survey approach and the information captured need to be understood as reflecting certain aspects of allocation, while leaving others to be further explored in other endeavours.

The following sections will examine the survey results for each element of the allocation framework described in Chapter 2, drawing out key findings.

Reforming water allocation regimes

The survey confirmed the assumption that water resources allocation is a dynamic policy area, with a number of countries either currently reforming allocation arrangements or have recently done so (Table 3.2). Seventy-five per cent of countries (including responses from Canadian Provinces and Territories) indicated that their allocation regimes had been recently reformed. Ongoing reforms were flagged by over a majority (62%) of countries (including responses from Canadian Provinces and Territories).

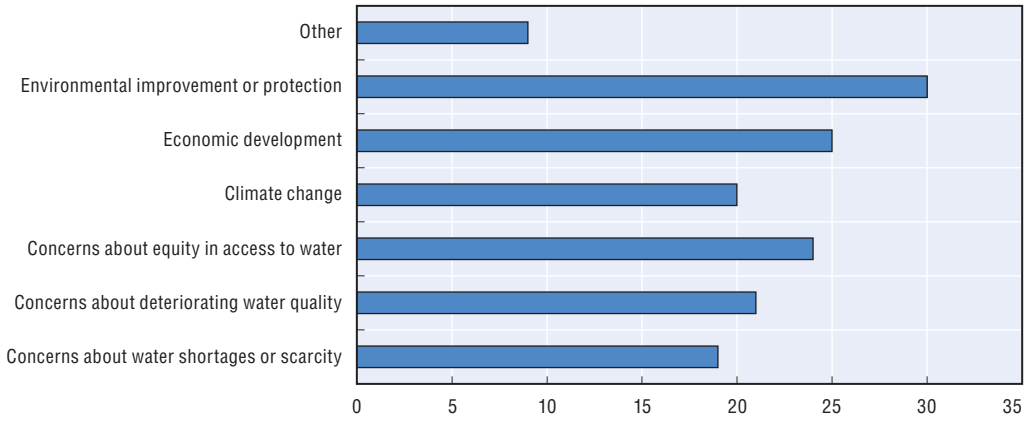
Table 3.2. **Countries with recent or ongoing water allocation reforms**

	Australia	Austria	Brazil	Canada	Chile	China	Colombia	Costa Rica	Denmark	France	Israel	Luxembourg	Mexico	Netherlands	New Zealand	Peru	Portugal	Slovenia	Spain	South Africa	Switzerland	United Kingdom
Recent reforms	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•		•
Ongoing reforms	•			•	•	•	•	•		•	•		•	•	•	•		•	•	•	•	•

Note: For Canada: recent reforms were flagged by Manitoba while ongoing reforms were flagged by Alberta, Quebec and the Yukon Territory.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Environmental improvement or protection was the most frequently cited driver of both recent and ongoing reforms of allocation regimes. For ongoing reforms, the second most frequently cited driver was concerns about equity in access to water. For recent reforms (in the past 10 years), economic development was the second most frequently cited driver, following environment improvement or protection. Drivers of recent and ongoing reforms cited by countries are summarised in Figure 3.1 (multiple responses were possible).

Figure 3.1. **Drivers of recent and ongoing reforms of water allocation regimes**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

In addition to the drivers of reform indicated in Figure 3.1, countries provided additional reasons for pursuing reforms of allocation regimes. For example, the main driver cited by Mexico was to achieve better control of water resources and to discourage illegal practices. New Zealand noted that addressing Māori rights and interests regarding fresh water was among the drivers of both recent and ongoing reforms.

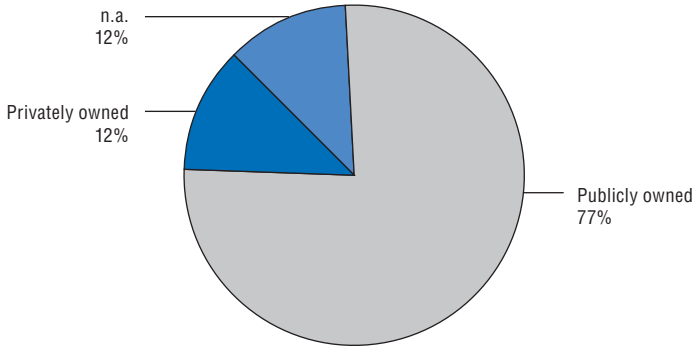
General contextual information for allocation

General contextual information provides useful background for understand the setting within which allocation regimes operate. Information about the legal setting allows for an understanding of the ownership of water resources (ground and surface water). Insight into the institutions primarily responsible for water allocation and their main responsibilities allow for a basic understanding of the organisations responsible for allocation. Countries also provided information about whether they were tracking water scarcity.

Legal setting for water resources

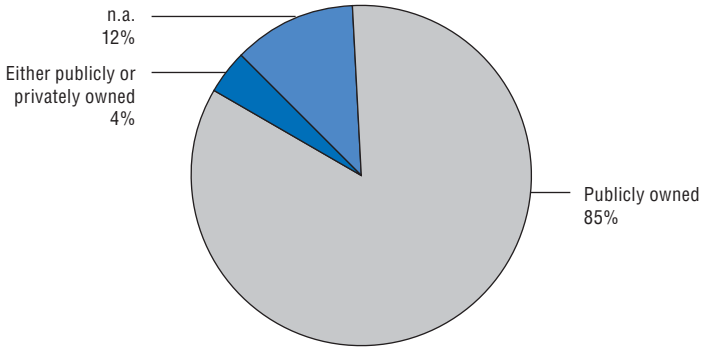
When asked how the ownership of water resources (both surface and groundwater) was legally defined (if at all), the large majority of countries (85% for surface water, 77% for ground water) indicated that they are publicly owned (Figures 3.2 and 3.3). It is important to note that "ownership" here refers to ownership of the resource itself, *not* the entitlement or right to use the resource (discussed in a later section). Instances of privately owned water resources usually relate to ground water. Estonia is the sole exception where surface water may be either publicly or privately owned.

Figure 3.2. **Ownership of groundwater resources**



Note: Does not include Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Figure 3.3. **Ownership of surface water resources**



Note: Does not include Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

In the case of groundwater, the resource may be privately owned by the owner of the property overlying it. Austria is a case where groundwater is privately owned. Japan and Portugal indicated that groundwater may be privately owned in some cases. In some countries, it is explicitly stated that water resources are not the subject of legal ownership, either public or private (indicated as "n.a." in Figures 3.2 and 3.3). In these cases, water resources in these cases may be designated as *res nullius*, or "ownerless property" in legal terms.

To illustrate the various legal doctrines applied to water resources, Table 3.3 summaries diverse examples.

Table 3.3. **Examples of legal basis/doctrine applied to water resources**

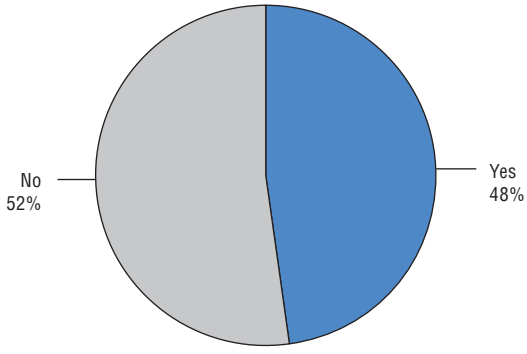
Country/region	Legal basis/doctrine applied to water resources
Australia	Owned by the Crown.
France	Ground and surface water are defined as the "Common Heritage of the Nation".
Japan	Surface water cannot be made the subject of private ownership.
Luxembourg	Surface and groundwater is legally defined as *Res nullius* ("ownerless" property).
Mexico	Property of the Nation.
Province of Manitoba, **Canada**	Owned by the Provincial Crown.
United Kingdom	Water is not "owned" as such, but the land adjacent to it or overlying it can be.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Institutional setting for water resources allocation

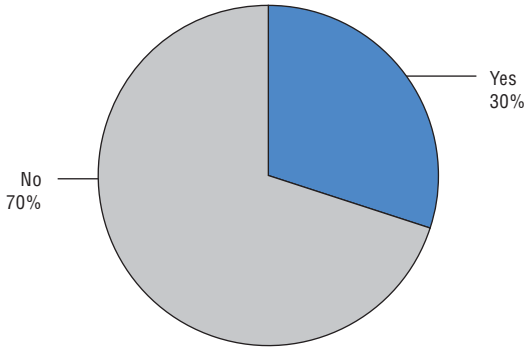
In most countries, the responsibility for water allocation is shared among several institutions, at various levels of government (national, state/provincial/regional, basin, and local). Key responsibilities relate to policy, planning, issuing water entitlements, as well as monitoring and enforcement. As summarised in Figure 3.4, slightly fewer than half (48%) of countries indicated a role for the Ministry of Environment in water allocation. Even fewer (30%) indicated a role for a basin authority (Figure 3.5). Countries often indicated that a sub-national authority (or authorities), such as a department or agency responsible for water, figured among the institutions with responsibility for water resources allocation.

Figure 3.4. **Percentage of responses indicating a role for the Ministry of Environment**



Note: Considered responses indicating Ministry of Environment at the national level (does not consider sub-national environmental authorities/departments).
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Figure 3.5. **Percentage of responses indicating a role for a basin authority**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Tracking water scarcity

In a majority of countries (74%), a mapping exercise has been undertaken to identify areas where surface and ground water scarcity is becoming a problem (Table 3.4). Links to specific studies can be found in the country profiles.

Table 3.4. **Countries recently assessing water scarcity**

	Australia	Austria	Brazil	Canada	Chile	China	Colombia	Costa Rica	Czech Republic	Denmark	Estonia	France	Hungary	Israel	Japan	Korea	Luxembourg	Mexico	Netherlands	New Zealand	Peru	Portugal	Slovenia	South Africa	Spain	Switzerland	United Kingdom
Tracking scarcity	•	•	•	•	•	•	•	•			•	•	•			•		•	•	•	•		•	•	•		•

Note: For Canada: the Provinces of Alberta, Quebec, Nova Scotia, and Newfoundland and Labrador indicated that an assessment had been undertaken, while Manitoba and the Yukon Territory indicated that no assessment had been undertaken. For Israel: an assessment is now under preparation. For New Zealand: the assessment recently undertaken only covers surface water.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

The information summarised above on allocation reforms as well as the general contextual information (legal and institutional setting, as well as information about tracking water scarcity) was captured at the national level.[3] Respondents to the survey also provided specific and detailed information about one or more allocation regime examples (as detailed in Table 3.1). The remaining sections of this chapter summarise information from these 37 examples.[4]

Understanding the physical features of the water resource and demand profile

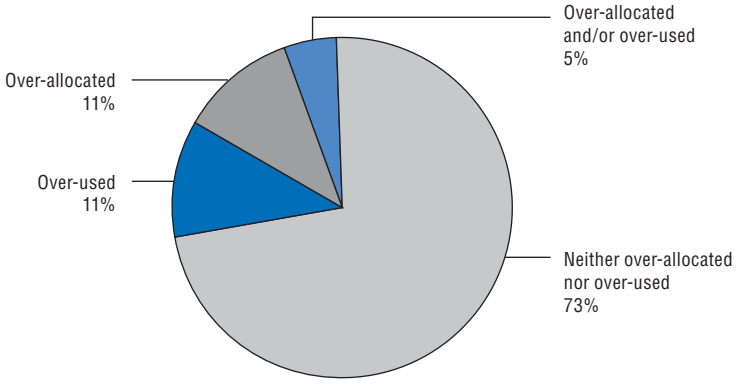
An understanding of the physical characteristics of the water system, the demand profile of users in that system and the current status of the resource are pre-requisites for designing an appropriate allocation regime. Physical characteristics include the variability of flow, connectively with ground and surface water bodies, the nature of existing infrastructure (if any), the extent to which the flow rate can be controlled or not, as well as an estimation of the relative share of water uses. The current status of the water system is indicative of the need for various degrees of elaboration of an allocation regime.

Current status of water system

Generally, the greater the pressure on the resource, the greater the need for formal control of the resource and well-defined and flexible allocation arrangements. Respondents were asked to characterise the status of the water system in one of three categories (Figure 3.6):

- **Over-used:** existing abstractions exceed the estimated proportion of the resource that can be taken on a sustainable basis.
- **Over-allocated:** current use is within sustainable limits but there would be a problem if all legally approved entitlements to abstract water were actually used.
- **Neither** over-allocated nor over-used.

Figure 3.6. **Proportion of water allocation examples by current status of water systems**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

The majority (73%) of allocation examples are currently considered neither over-allocated nor over-used. Eleven per cent are considered over-allocated, 11% over-used. Two examples, the Maipo River, 1st Section, in Chile, and various regions in Spain are considered either over-allocated and/or over-used. For the allocation regimes considered over-allocated or over-used, respondents reported a number of different measures being undertaken to address this issue. For instance, in New Zealand's Waikato region, measures are in place to phase out the exceedance of allocable flows by ceasing new allocations, encouraging voluntary reduction, and promoting augmentation of water supplies. In Australia, a range of programmes have been initiated to recover water entitlements in regions where water abstractions are in excess of the sustainable diversion limit. Once recovered, these entitlements are transferred to the Commonwealth Environmental Water Holder and managed for environmental purposes.[5]

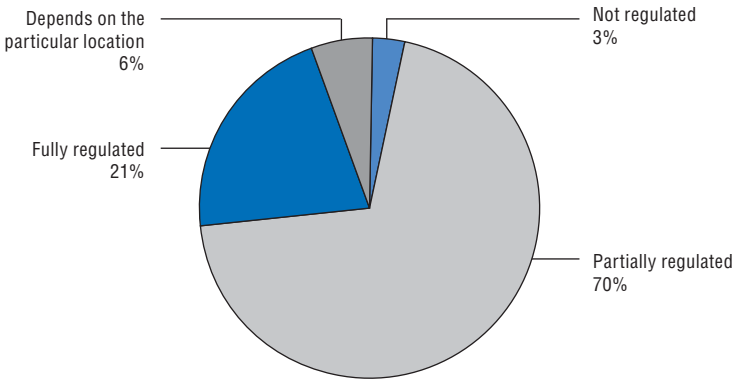
Degree of regulation of flow rate of water resources

To provide an understanding of the extent to which the flow rate of a given water system can be managed or controlled, respondents were asked to classify the water system by the degree it is regulated. Water systems could be characterised as:

- **Fully regulated:** the flow rate can be controlled fully.
- **Partially regulated:** the flow rate can be controlled to some extent.
- **Not regulated:** the flow rate cannot be controlled.

For some examples, particularly those that cover an extensive water system or reflect responses at the national scale, respondents indicated that the degree of regulation of the system depends on the particular location. Responses are summarised in Figure 3.7.

Figure 3.7. **Degree of regulation of water system**



Note: Ubaté-Suárez River Basin (Colombia), Mexico, and South Africa are not included.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

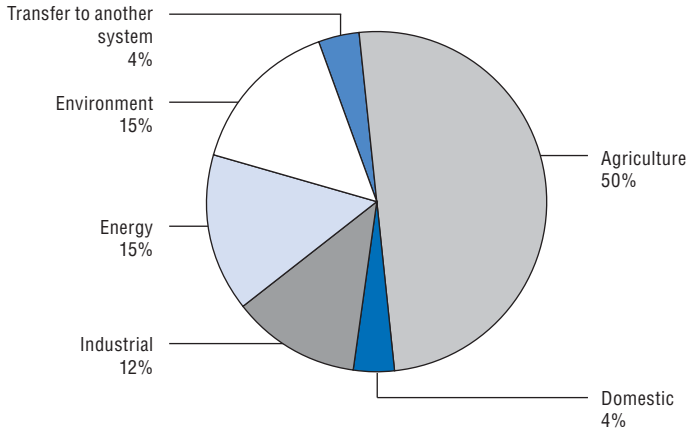
The flow rate of water system is partially controlled in 70% of allocation examples, indicating the presence of the technical capacity and infrastructure to facilitate allocation. In the Murray-Darling Basin, Australia and in England and Wales, the flow rate can be either fully, partially or not at all, depending on the particular location. In only one of the examples collected, the Yukon Territory in Canada, the water system is completed unregulated.

Consumptive use profile

The breakdown across categories of users in a water system provides useful information on the particular demand profile served by an allocation regime. Both consumptive and non-consumptive uses are relevant. To capture the breakdown across consumptive uses, respondents were asked to provide a general estimate of the percentage of mean annual inflow/recharge[6] that is consumed across specific categories (agriculture, domestic, industrial, energy production (not including hydropower), environment (evapotranspiration), transfer to the sea or another system, or "other". Figure 3.8 summaries the proportion of examples according to the dominant type of water user.

Agriculture is the dominant water user in half of the 26 examples analysed. The Czech Republic, Estonia, France and Mexico indicated energy production as the dominant water user. In the São Francisco and São Marcos Basins in Brazil, and the Province of Manitoba in Canada most of the water is available for environmental purposes (with a portion consumed for evapotranspiration). However, this does not preclude tensions regarding water use between various uses in these basins due to the specific timing and location of water use.

Figure 3.8. **Proportion of water allocation examples according to dominant type of water use, per category**[1]



Note: A number of examples were excluded: Murray-Darling Basin (Australia), Newfoundland and Labrador, Nova Scotia, Quebec (Canada), Maipo River's, 1st Section (Chile), Denmark, the Dutch Polder System in the western part (the Netherlands) Tejo River Basin (Portugal), Parón River's Sub-basin (Peru), Slovenia, and England and Wales (United Kingdom).

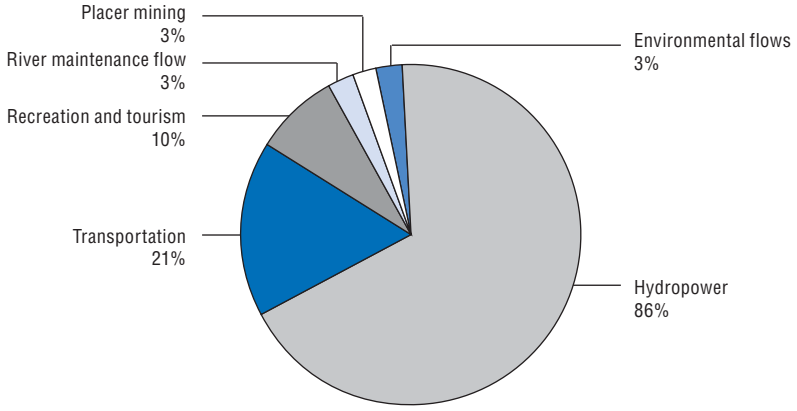
1. Note that in the questionnaire, "water use" by the environment was considered evapotranspiration.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Significant non-consumptive uses

Significant non-consumptive uses were indicated in 78% of the examples. Of the examples reporting significant non-consumptive uses, the proportion of examples reporting various types of non-consumptive use are summarised in Figure 3.9. Hydropower is clearly a dominant type of non-consumptive use, indicated in 86% of the allocation examples that report significant non-consumptive use. Transportation and navigation was the second most frequently cited significant non-consumptive use (multiple responses were possible).

Figure 3.9. **Proportion of water allocation examples indicating significant non-consumptive use, by type**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Defining the available ("allocable") water resource pool

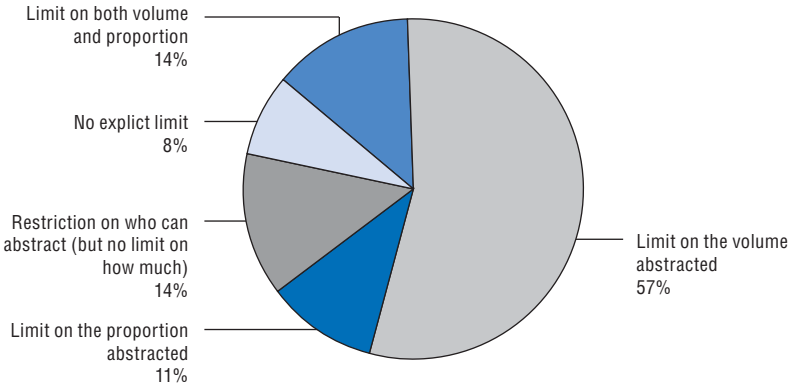
As described in Chapter 2, the definition of the available resource pool that can be allocated for consumptive use is a key element of a robust allocation regime. This definition determines the repartition between water available for *in situ* uses and diverted uses. It can be used to set a clear limit, or "cap", on abstractions, which can be adjusted over time as circumstances change. This section examines important "system level" information, summarising how allocation regimes define the limits on abstraction, whether environmental flows (e-flows) are secured and whether various other factors are taken into account in the definition of the available resource pool to contribute to the hydrological integrity of the regime.

Defining limits on water abstraction

Respondents were asked if there is a clear definition of the limit on consumptive use, and if so, how this limit is defined, among the following options (responses summarised in Figure 3.10):

- A limit on the **volume of water** that can be abstracted.
- A limit on the **proportion** (e.g. percentage of flow) of water that can be abstracted.
- Restrictions on **who** can abstract water (but no limit on how much water can be abstracted).

Figure 3.10. **Proportion of examples according to type of limit on water abstraction (if any)**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

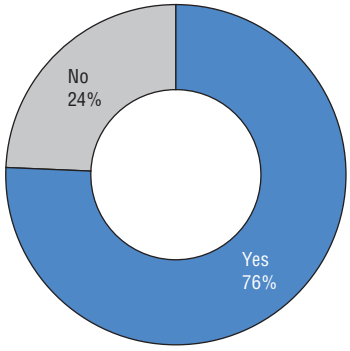
A significant majority of allocation regimes (92%) have an explicit limit on abstraction for consumptive use. Only three examples report having no explicit limit on abstraction: the Czech Republic, the Netherlands and the Yukon Territory in Canada. A limit based solely on the volume abstracted is the most common type of definition with 57% of examples using this approach. Only a few examples (11%) use a limit based solely on the proportion abstracted. A hybrid approach is taken by 14% of examples, with limits that are set both in terms of volume and proportion. Fourteen per cent of examples have a restriction on who can abstract water (but no limit on how much).

Of those allocation regimes with an explicit limit on abstractions, 42% indicated that the amount of water available for consumptive use in the resource pool is linked to a river basin management plan and 33% indicated that it is linked to another planning document. Around a fifth of responses (21%) indicated that the limit is not linked to any planning document. For those examples that have linked the limit on consumptive use to an official planning document (river basin management plan or otherwise), just over half (56%) indicated that the document was a statutory instrument that must be followed, while the remainder indicated that the plan was considered a guiding document.

Defining environmental flows

A significant majority (76%) of examples indicated that environmental flows are defined (Figure 3.11). A wide range of methodologies to do so was reported. For example, in Israel, in some places a minimum quota of water has been set aside and must be allocated to ecosystems. In Slovenia, the ecologically acceptable flow is set depending on the type of water use and type of ecological needs. In England and Wales, environmental flow indicators are used to determine the flows required by the environment by particular ecosystems. In Portugal, minimum environmental flows are determined on a case by case basis. In China, the warning-level river flow against the drying out of a downstream river course shall not fall below 200 cm^3/second at Xiaheyan hydrological stations. In the Murray-Darling Basin, Australia, the Basin Plan limits water use at environmentally sustainable levels by determining long-term sustainable diversion limits for both surface and groundwater resource. A key component of the Basin Plan is the environmental watering plan, which co-ordinates all environmental watering across the basin. The Plan also contains a water quality and salinity management plan and water quality targets which influence how environmental flows and the water resources are managed.

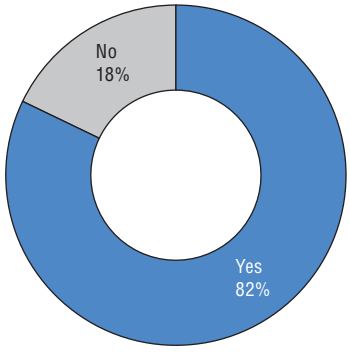
Figure 3.11. **Proportion of examples that defined environmental flows**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

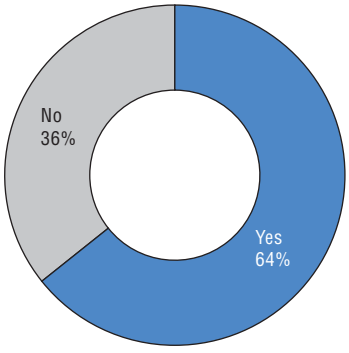
Of the examples indicating that environmental flows are taken into account, 82% take freshwater biodiversity into account in the definition of e-flows and 64% take terrestrial biodiversity into account (Figures 3.12 and 3.13). For example, in France, the minimum biological flow and the reserve flow required are based on the observation of ecological needs.

Figure 3.12. **Proportion taking freshwater biodiversity into account in the definition of e-flows**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Figure 3.13. **Proportion taking terrestrial biodiversity into account**



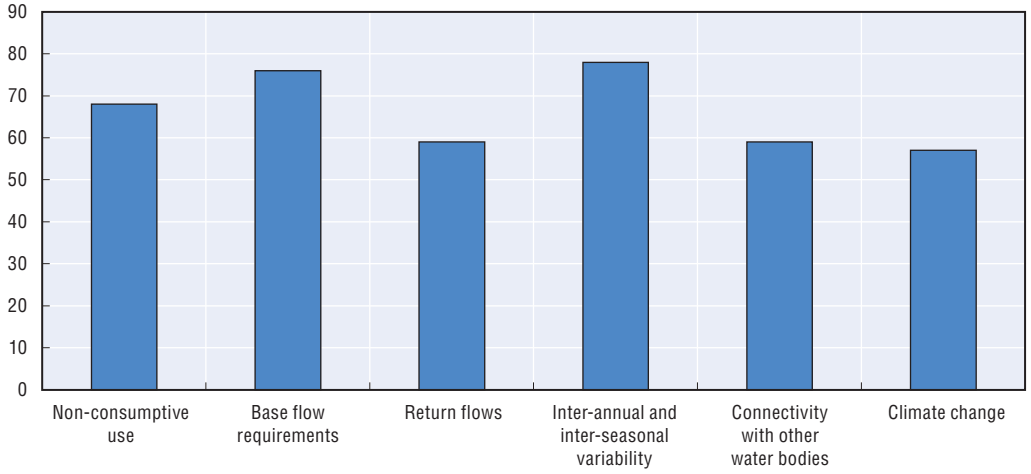
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Factors accounted for in the definition of the available water resource pool

When defining the available resource pool, various factors can be taken into account, to ensure the hydrological integrity of the system and account for variability. Figure 3.14 depicts the proportion of allocation examples that report that key factors are taken into account in the definition of the available resource pool. Specific information about how this is done, such as the methodological approach used, are reflected in country profiles.

Figure 3.14. **Proportion of water allocation examples taking into account various factors in the definition of the available resource pool**

Percentage of responses



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Inter-annual and inter-seasonal variability is the factor most frequently taken into account (in 78% of the allocation regimes surveyed). For example, in England and Wales, environmental standards take into account inter seasonal activity, as do seasonal abstraction licenses. Inter annual variability can be taken into account via time-limited

licences. In Alberta, Canada, before an abstraction license is issued, a review will be undertaken of the seasonal maximum and minimum flows and the license will specify amounts that may be withdrawn based on annual variability.

Base flow requirements are also frequently taken into account in the definition of the available resource pool (in 76% of regimes surveyed). In France, base flow is mandatory and is not included in the volumes defined as abstractable. Recent reforms of freshwater management in New Zealand require all regions to set environmental flows (including an allocation limit and minimum flow) by 2025. Current approaches to base flow vary by region. For example, the Waikato region sets minimum base flows as a percentage of the one in five year 7-day low flow following detailed habitat and river studies.

Non-consumptive uses are considered as a factor in defining the available resource pool in 68% of the examples. In the case of England and Wales, non-consumptive uses are included in the abstraction management system. They require a license and their right to abstract is protected.

Only 57% of allocation regimes report taking into account climate change, about the same proportion that consider return flows and connectivity with other water bodies. Taking climate change into account in the definition of available resources typically involves periodic updating of the scientific basis. For instance, in Austria, the impact of climate change on the availability of resources is investigated scientifically on a regular basis.

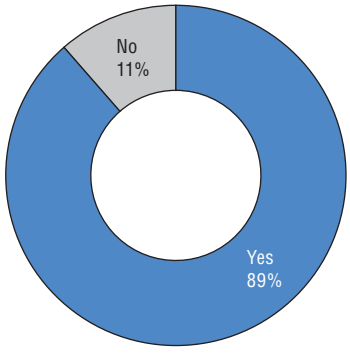
How users access water and how this works in practice

To better understand "user level" issues in an allocation regime, detailed information was collected about how water entitlements (referred to in some countries as abstraction licenses or permits, or water use rights) are defined and work in practice.

Legal definition of water entitlements

In all allocation regimes examples collected, with the exception of the Netherlands' polder system in the western part of the country, water users' entitlements to abstract or divert water from the resource pool are legally defined. The majority of examples (89%) allow for legally defined private entitlements (Figure 3.15).

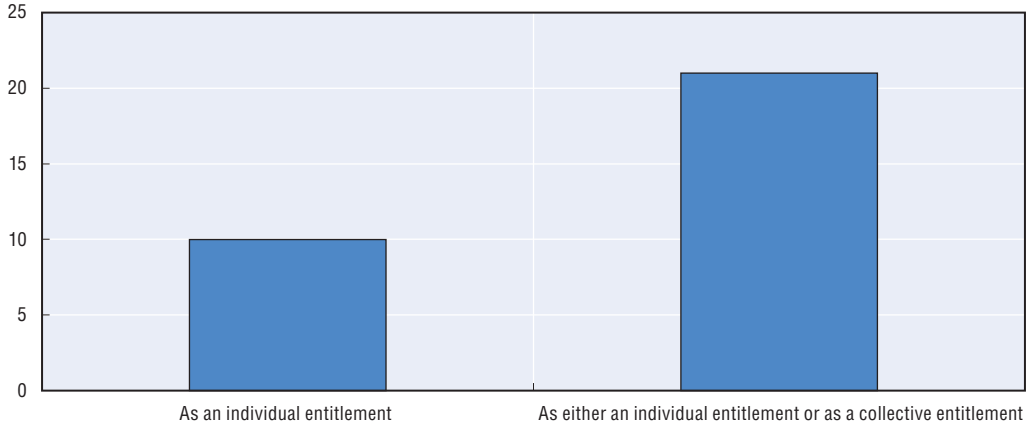
Figure 3.15. **Proportion of water allocation regimes with legally defined private entitlements**



Note: Does not include: the Dutch Polder system in the western part of the country (the Netherlands) and the Inkomati, Jan Dissels and Mhlatuse River Basins (South Africa).
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Private entitlements can take several forms, including an individual entitlement (to an individual person), a collective entitlement (to a group of persons/organisation/city), or an alternative arrangement. Figure 3.16 indicated the number of allocation regimes that report that entitlements are granted to individuals (10 examples) and the number of regimes in which an entitlement can be granted to either an individual or a collective body (21 examples).

Figure 3.16. **Number of water allocation examples by type of entitlement (individual, collective)**



Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

For allocation regimes where collective entitlements are possible, a number of arrangements to allocate water among specific users were reported. For example, in the Murray-Darling Basin, Australia, for collective irrigator groups with a collective entitlement, the individual entitlement is defined as a share of the collective entitlement based on the rules of association of their membership. For urban authorities providing town water supply, individuals enjoy unlimited supply on a pay for use basis (typically on a full cost basis). Different levels of restriction may be imposed to further limit demand and subsequent use in periods of low allocation to the urban entitlement.

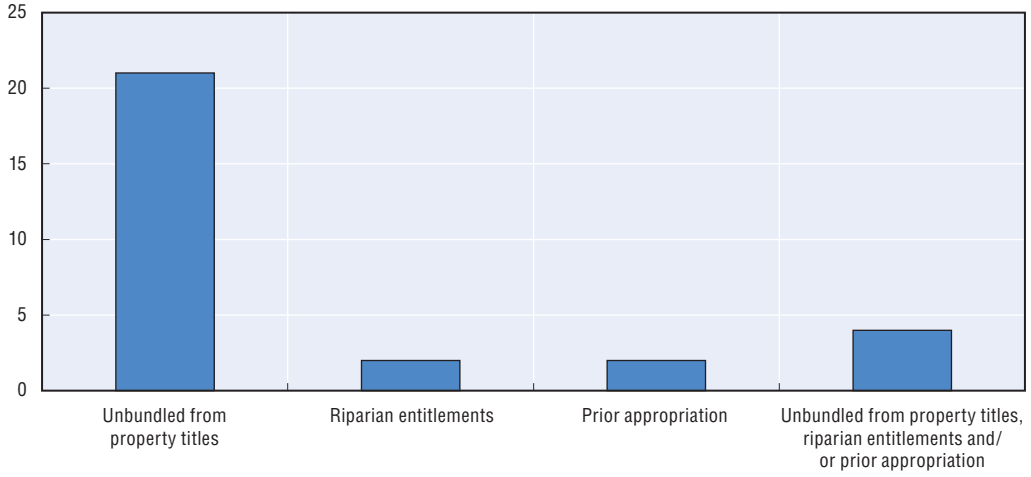
In Alberta, Canada, in the case of collective entitlements, allocation of water among individual users within a group of users is based on a bargaining process and informal trading. In the Yellow River Basin, China, collective entitlements are assigned to an institution representing water users. Irrigation districts and public water companies access water to consume by paying a fee. In some irrigation districts, authorities assign water abstraction rights to clients under a permit system. For Costa Rica, in the case of collective entitlements, the Ministry of Energy and Environment grants a concession to each Society of Water Users according to the Water Law. These societies have the authority to decide internally the form of water distribution amongst their members through agreements of the general assembly of members, or through their own regulations. In Spain, there are both individual and collective entitlements. Collective entitlements may be granted to Water Users Associations or Irrigators Communities, for instance. Finally, in the case of France, the recently created Single Collective Management Bodies (OUGC) provide a structure and incentives for irrigators to devise their own rules to allocate a set volume of water among themselves at the catchment level. These rules are subject to approval by the Ministry of Ecology, Sustainable Development and Energy.

Nature of water entitlements

Water entitlements can be defined in a number of different ways: as entitlements to abstract water unbundled from property titles, as riparian entitlements linking the access of water to the ownership of adjacent land, or via a system of prior appropriation, where reliability of water access is a function of the date the entitlement was first issued (further discussion in Chapter 2). In the allocation regimes surveyed, a majority reported that water entitlements were unbundled from property titles (21 of 29 examples), with only a few using riparian entitlements or prior appropriation (Figure 3.17). Four examples indicated that entitlements were defined as a combination of these various approaches or depended the particular context.

Figure 3.17. **Nature of water users' entitlements**

Number of examples



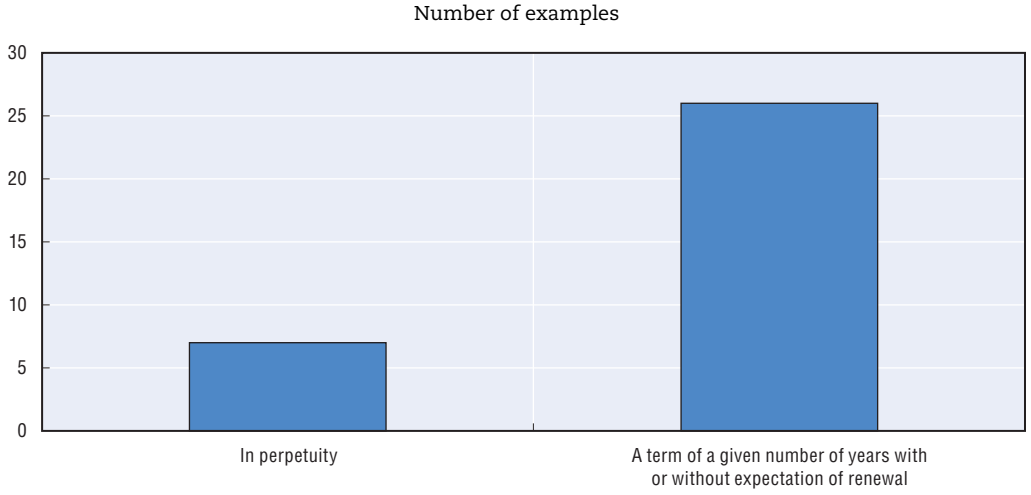
Note: Does not include: Nova Scotia, Prince Edward Island (Canada), Ubaté-Suárez River Basin (Colombia), wastewater reuse, large scale desalination and municipal/regional water corporations (Israel), the Dutch polder system in the western part of the country (the Netherlands), and Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Period of time water entitlement granted for

In most cases, water entitlements are time bound, either with or without an expectation of renewal. The majority of the allocation regimes surveyed grant water users' entitlements for a given number of years, with the expectation of periodic renewal. However, seven allocation regimes in four countries granted entitlements in perpetuity. In Chile (both the Limarí River Basin and the Maipo River, 1st Section) entitlements are granted in perpetuity without conditions relating to beneficial use. In the Murray-Darling Basin, Australia, as well as the three examples from Israel (wastewater re-use, large scale desalination and local/regional water corporations), entitlements are granted in perpetuity, but conditional upon beneficial use. In Peru, entitlements are also granted in perpetuity, but conditional on continuity of use.

Figure 3.18 summarises the incidence of examples indicating a fixed period of time for entitlements (a given number of years) versus the incidence of allocation examples granting entitlements in perpetuity. Most of the examples in which entitlements are granted for a certain number of years indicated that there was an expectation of renewal.

Figure 3.18. **Period of time water entitlement granted for**



Note: Does not include: Prince Edward Island (Canada), the Dutch polder system in the western part of the country (the Netherlands), South Africa (Inkomati, Jan Dissels and Mhlatuse River Basins) and Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Four examples indicated that entitlements were granted for a fixed period of years without the expectation of renewal – Denmark, Estonia, the Tisza-Koros Valley management system in Hungary and the Waikato Region in New Zealand.[7]

The allocation regimes that have time-bound entitlements report a wide range of time periods for which entitlements are granted. The time period is typically dependent on the type of water use or user. Hydropower is afforded the longest duration, by far. Table 3.5 provides a range of illustrations.

Return flows

As discussed previously, "return flows" consist of the water physically withdrawn from a system and returned back to the same or a different body following use. Specifying return flow obligations in water entitlements provides a more accurate reflection of the proportion of water actually consumed and the proportion potentially available for another use (depending on the extent to which the location and quality has changed).

Allocation examples in which return flow obligations were not specified (52%) outnumber those in which return flow obligations were specified (29%), as summarised in Figure 3.19. The remaining 19% of cases specified return flows only in certain cases, or on a case by case basis.

Consequences of non-use of water entitlements

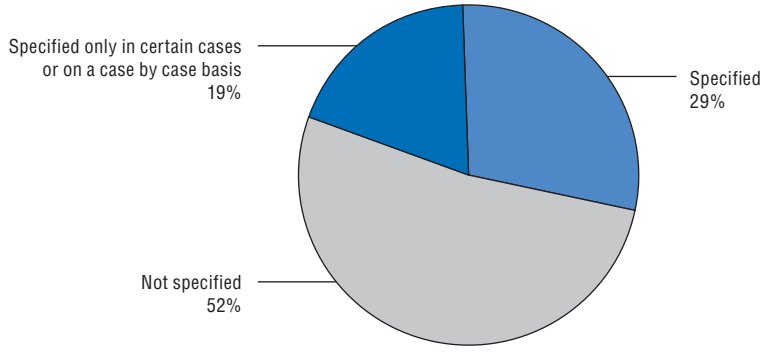
Allocation regimes can place conditions of the exercise of water entitlements and also provisions that allow for entitlements to expire or be revoked in the case that they are not actually used. This is usually to avoid hoarding of entitlements.

In instances where water users' entitlements are not used for a certain period of time, this is usually addressed in one of two ways: either the entitlement is kept in place for the period it was issued (despite not being used) or the entitlement will be lost (applying a "use it or lose it" approach). As summarised in Figure 3.20, 16 allocation regimes reported using a "use it or lose it" system, with 13 reporting that entitlements remain in place for the period they are issued

Table 3.5. **Examples of period of time water entitlements are granted for**

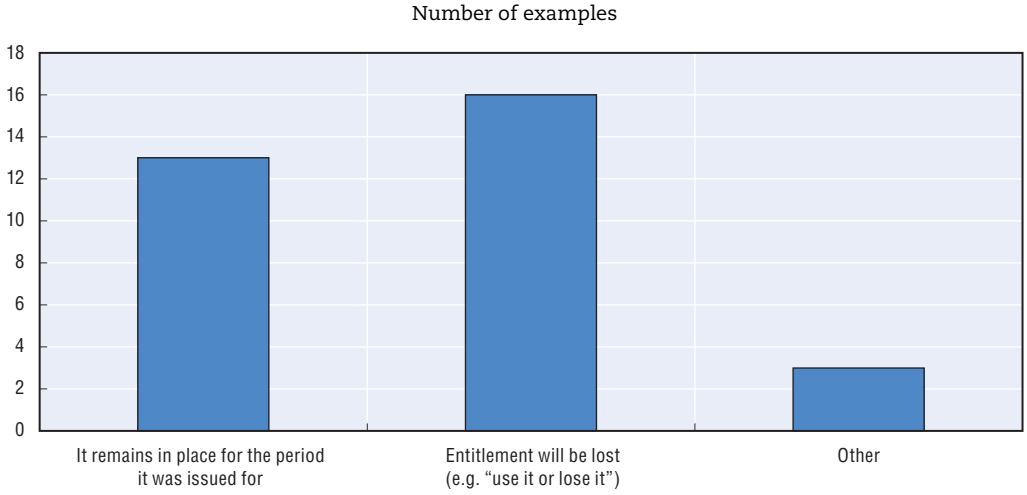
Example	Reference to number of years entitlements are issued for
Australia (Murray-Darling Basin)	In **perpetuity**, conditional on beneficial use.
Austria (surface and ground water systems)	No more than of **90 years** (e.g. for hydropower plants). **12 years:** Maximum term of abstraction for irrigation purposes.
Brazil (São Francisco Basin and São Marcos Basin)	**10 years:** Irrigation of areas up to 2.000 ha; industry with maximum withdraw flow of 1 m^3/s; aquaculture; animal consumption; mining; others. **20 years:** Irrigation of areas over 2.000 ha; industry with maximum withdraw flow over 1 m^3/s. **35 years:** Dams of flood control or hydropower generation and others hydraulic works; public water supply and sanitation.
Canada (Newfoundland and Labrador)	**5 to 50 years:** depending on user.
Chile (Limarí River Basin and Maipo River's, 1st Section)	In **perpetuity**.
China (Yellow River Basin)	A term of a given number of years (e.g. **5-10**) with the expectation of renewal.
Colombia (Ubaté-Suárez River Basin)	**10 years:** For concessions can be granted for a term not to exceed amount of years. **Up to 50 years:** For public services or the construction of public or social interest.
France (single collective management bodies for irrigation (OUGC))	**Few years to several decades:** Permanent use like drinking water abstraction. **6 months:** Temporary uses (seasonal uses and/or irrigation).
Japan (Tone-Gawa River System)	A term of **10 years** with the exception of 20 years for hydropower generation.
Korea (surface water systems under the River Act)	A term of **10 years** with expectation of periodic renewal.
Luxembourg	A period of **5 to 20 years**, which can be renewed.
Mexico	A term of **5 to 30 years**, with the expectation of periodic renewal.
New Zealand (Waikato Region)	A term of **15 years** without expectation of renewal. However, under the Resource Management Act they can be issued for up to **35 years**. Existing consent holders have the right to have an application for a new permit for the same activity to be considered before other applicants.
Peru	In **perpetuity**, but conditional upon continuity of activity.
Spain	A term of no more than **75 years**.
United Kingdom (abstraction licensing system in England and Wales)	A term of **12 years**, linked to cyclical reviews of water availability in a catchment, with the expectation of periodic renewal.

Figure 3.19. **Proportion of water allocation example specifying return flow obligations**



Note: Does not include: Prince Edward Island (Canada), Maipo River, 1st Section (Chile), Ubaté-Suárez River Basin (Colombia), the Dutch polder system in the western part of the country (the Netherlands), Switzerland, South Africa (Inkomati, Jan Dissels and Mhlatuse River Basins).
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Figure 3.20. **Consequences of non-use of water entitlements**



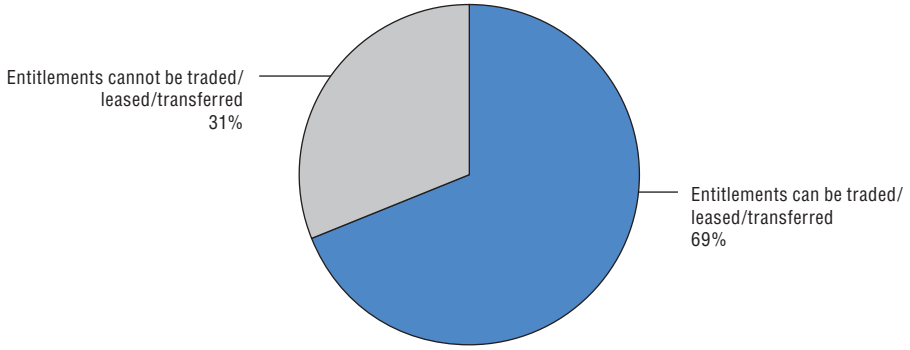
Note: Does not include: Newfoundland and Labrador (Canada), the Dutch polder system in the western part of the country (the Netherlands), Mexico, South Africa (Inkomati, Jan Dissels and Mhlatuse River Basins), and Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

for, despite going unused. Alternatives to these two approaches were reported and typically reflected a modified version of one of these two approaches, by allowing the option to revoke entitlements after a certain lapse period of non-use or subjective to certain conditions.

Possibility to trade, lease or transfer water entitlements

To understand the flexibility given to water entitlement holders to make autonomous adjustments to allocation, respondents were asked to indicate if entitlements could be traded, leased or transferred in any way. As shown in Figure 3.21, in the majority of examples (69%), entitlements can be traded, leased, or transferred. Trading arrangements included more advanced, formalised markets to trade entitlements, such as the Murray-Darling Basin, Australia, Chile, Spain, or the abstraction licensing system in the United Kingdom as well as pilot projects on water entitlement trading, such as those being carried in some areas of the Yellow River Basin, China.

Figure 3.21. **Proportion of allocation examples that allow some form of trade, lease or transfer of water entitlements**



Note: Does not include: the Dutch polder system in the western part of the country (the Netherlands) and Switzerland.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Allocation regimes reporting the possibility to trade, lease or transfer entitlements also indicated various (sometimes extensive) conditions on trade. These are summarised in Table 3.6. Only Israel reported that illegal practices, especially on farms, have become a serious issue affecting allocation and transfer of water resources.

Table 3.6. **Summary of various conditions on trade, lease or transfer of water entitlements**

Example	Summary of various conditions on trade, lease or trade of water entitlements
Australia (Murray-Darling Basin)	Trading occurs as a function of market demand and supply of water, which is in turn related to climatic and environmental conditions, commodity markets and the current and expected level of allocations. Prices reflect changes in demand and supply of water entitlements and contracts are exchanged between buyer and seller. Trades of entitlements (and lease or transfers) are subject to approval by licensing authorities (both the buyers and sellers, as these may be different).
Austria (surface and ground water systems)	In general, permits are linked to the location where the water abstraction takes place. Thus, a change of owners implies the transfer of the permit, but the competent authority has to be notified. There is no trading.
Brazil (São Francisco Basin and São Marcos Basin)	Water permits cannot be traded or leased, but can be transferred. Moreover, they can function as a financial instrument.
Canada (Alberta)	The transfer of allocation is voluntary, with a willing seller and buyer deciding for a price. There are no administrative charges associated with this trade. However, restrictions on trading are as follows: the transfer can be made only if the water can be physically transferred; the transfer must be authorised in a water management plan or through an order of Cabinet; the holder of the allocation must be in good standing; the transfer must not negatively impact other users or the aquatic environment. Furthermore, entitlements can function as a financial instrument.
Canada (Manitoba)	Transfers are permitted upon sale of the business (e.g. livestock operation, irrigation farm, water park, golf course, etc.). The new owner of the land must be able to put the water to beneficial use otherwise the Crown will not transfer the license.
Canada (Nova Scotia)	Only to be transferred through an assignment indenture.
Canada (Quebec)	All water withdrawal authorisations will be transferable. A transferee must, however, inform the ministry of the transfer within 30 days after it is made. This procedure will be in force when the new regime is adopted.
Canada (Yukon)	Can be leased or assigned to another user.
Chile (Limarí River Basin)	Transactions between owners of water rights can be made only under the authorisation of the General Direction for Water (DGA).
Chile (Maipo River, 1st Section)	Trading allocation is a function of the market demand and supply for water. No previous authorisation is required from any authority.
China (Yellow River Basin)	The Yellow River Conservancy Commission has not yet developed uniform water rights trading regulations, but some local governments are carrying out pilot projects. In 2003, pilot projects of water rights transfer were implemented in Ningxia and the Inner Mongolia Autonomous Region. Water-saving renovations in irrigation districts were funded by new industrial projects, reducing water losses and transferring the water saved to new industrial projects for payment. Thus far, 39 water transfer projects have been approved, with 337 million m^3 of water transferred. With no increase in total water consumption, newly-added water demand for socio-economic development is satisfied, thus promoting industrial restructuring and the transformation of economic development pattern.
Colombia (Ubaté-Suárez River Basin)	Water rights can be transferred totally or partially with prior authorisation. However, the competent environmental authority may deny it when reasons of public utility or social interest deem appropriate.
France [single collective management bodies for irrigation (OUGC)]	They can be transferred freely, for instance to the new land owner in some cases (Beauce area).
Israel (reuse of treated wastewater for agriculture, large scale desalination, municipal/ regional water corporations)	Farmers can apply to the Ministry of Agriculture and request the reallocation of quotas. In some cases, reallocation is also done illegally.
Japan (Tone-Gawa River System)	Only if they succeed to obtain the approval of the river administrator.
Mexico	Rights can be legally transferred.
New Zealand (Waikato Region)	Transfer of surface water permits is provided in the Regional Plan subject to conditions (within the same catchment and water management class, for a use that already has consent or if permitted by the plan). Trading an entitlement requires a new permit or change to the permit and an assessment of the effect of the change. Transfers of groundwater permits work in a similar way. Trading is determined by individual arrangements between permit (entitlement) holders. Trading allocation requires a new permit or change to the permit and an assessment of the effect of the change. The Regional Council determines administrative costs for new permits or changes to permits.
Portugal (Tejo River Basin)	The user´s entitlement can be transferred through communication to the competent authority, with a minimum of 30 days in advance. They can also be traded or leased by notifying the competent authority, one month in advance. They can also be transferred to the heirs or legatees.
Slovenia	The right can be transferred to another person in the same manner that a new water permit is granted.
South Africa (Inkomati, Jan Dissels and Mhlatuse River Basins)	The existing user relinquishes the entitlement to use, on the condition that the new applicant gets the water entitlement. The beneficiary of a transfer is treated in the same way as new license applicant. Price is decided by the agreement between the buyer and seller. There is an administrative cost related to new applications. Water cannot be traded outside the basin.
United Kingdom (abstraction licensing system in England and Wales)	Buying or selling rights to abstract water require that an application is made and approval sought from The Environmental Agency to receive a new license or to vary an existing one. Restriction may apply.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Water entitlements in some countries (Brazil, Canada, Chile, Peru, and the United Kingdom) can also function as a financial instrument to obtain credits, loans, capital or as requirements to start or add value to businesses. These examples are summarised in Table 3.7.

Table 3.7. **Summary of examples where water entitlements can be used as a financial instrument**

Example	Use of entitlement as a financial instrument
Brazil (São Francisco Basin and São Marcos Basin)	Water permits can function as a financial instrument. Banks usually require water permits from water users in order to concede loans. This procedure ensures that private parties will have adequate access to water when developing their enterprises.
Canada (Alberta)	Water entitlements can function as a financial instrument. The license in some cases can be used as collateral for obtaining credit or a loan from a financial institution.
Canada (Manitoba)	Water entitlements can function as a financial instrument, to be used at some financial institutions.
Chile (Maipo River, 1st Section)	Water entitlements can function as a financial instrument, for instance as a mortgage to get a credit/loan.
Peru (Parón River Sub-Basin)	Water licenses guarantee the development of public and private investment projects.
United Kingdom (abstraction licensing system in England and Wales)	Water entitlements can function as a financial instrument. A license can be sold and therefore has a financial value. It can also add value to a business that depends on water and therefore add value to the sale of a business.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Pre-requisites to grant new water entitlements or expand existing ones

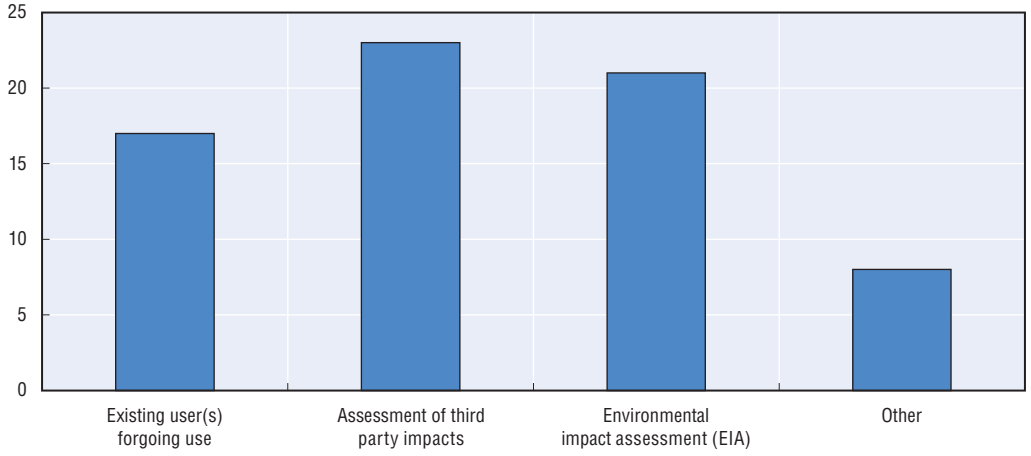
Nearly all of the allocation regime examples impose conditions on granting new water entitlements or expanding existing ones. Only two of the allocation examples surveyed indicated that there were no restrictions to granting such requests (Nova Scotia, Canada and Estonia). For the Murray-Darling Basin, Australia, the catchment is "closed" and access to surface water for new entrants is limited to purchasing entitlements (or leasing entitlements or purchasing allocations annually) from existing owners. Access to ground water is conditional on the assessment of third party impacts, environmental impact assessment (EIA) and existing users forgoing use.

Most allocation regimes reported at least one and often multiple conditions on new or expanding water use. Assessment of third party impacts is the most frequently cited conditions, with an EIA nearly as common. Existing user(s) foregoing use was also a frequently reported condition. Other conditions listed include the availability of unused water, adequate water balance, ecosystem improvement, equity, public inquiry, special authorisations, linking to planning instruments (summarised in Figure 3.22).

Users not required to hold water entitlements to access water

Most allocation regimes examples report that certain users or uses do not require formal water entitlements to access water. Typically, these exceptions are small scale uses relating to fulfilling basic human and animal needs, subsistence crop purposes or native people holding title rights. In many cases, examples clearly designate the mode of intercepting/capturing water as by manual means only (collecting water in a bucket, for instance). These types of small scale uses are usually considered "insignificant" in terms of their impact of the overall resource. However, the actual volumes abstracted are not always well-documented or known to authorities, as the cost of monitoring such uses would greatly outweigh the

Figure 3.22. **Pre-requisites to grant new water entitlements or expand existing ones**



Note: Does not include: the Dutch polder system in the western part of the country (the Netherlands) and Mexico.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

benefits of formal control. Several allocation examples (Yukon Territory in Canada, the Yellow River Basin in China, Costa Rica, Luxembourg and the Waikato Region in New Zealand) also indicate water use for emergencies or to deal with exception circumstances or threats, such as firefighting, floods, droughts or other emergencies do not require entitlements.

Most allocation examples surveyed did not consider that these types of uses were becoming an issue, however the case of the Waikato Region, New Zealand is a good illustration of how these types of uses could pose a problem as their demand on the resource increases (Box 3.2).

Sequence of priority uses in water allocation

Nearly all allocation regimes surveyed have an established sequence of priority uses. In most cases, it is used to establish priority access to water during times of scarcity, when "exceptional circumstances" have been declared, such as in the case of drought. Some allocation regimes use the sequence of priority uses to determine which uses should receive water entitlements in cases where there is competition for access to water even in average conditions.

Most allocation regime examples define domestic and human needs as the highest priority use. Exceptions include the Netherlands, a small number of Canadian Provinces, water uses in Israel, and Peru. Several countries indicate several uses among the highest priority use. For instance, in the case of Austria, the highest priority use indicates both domestic (services for drinking water supply within sustainable abstraction limits) and the environment. In Brazil, both human and animal water consumption are designated among the highest priority uses. In the Waikato region of New Zealand, the highest priority uses include agriculture (milk cooling and dairy shed wash down), domestic uses, municipal supply, and renewable energy.

Box 3.2. **Unconsented water use in the Waikato Region, New Zealand**

In the Waikato Region, New Zealand, users not required to hold a water entitlement to abstract water include individuals taking water for reasonable domestic needs, or the reasonable needs of their animals for drinking water, and users taking water for firefighting purposes.* These uses are permitted so long they are not, or are not likely to, have an adverse effect on the environment. In addition, the Regional Plan also allows, *conditionally*, abstractions without a permit for supplementary surface and groundwater takes of a certain size (1.5-15 m^3/day) and temporary takes of 150 m^3/day for no more than five days per annum, and aquifer or well testing for 2 500/d for no more than 3 days.

Modelling was recently undertaken to estimate the magnitude of unconsented water use in the Waikato Region. Key findings from the study include:

- "Water use for dairy farming was found to have the most influence on model predictions. This was not surprising due to the high density of dairy cows in the region and the large volumes of drinking water required by lactating cows and the large volumes of water required for dairy shed operations.
- The relative water demand from permitted use and activities allowed to have unconsented water use in relation to the allocable flow was assessed in 202 catchments. In 35 of the catchments more than 50% of the allocable flow is taken for these activities alone, and in 16 of these the use exceeds the allocable flow. When consented authorised water takes are included with the permitted and unconsented water takes, there are 77 catchments with more than 50% of the allocable flow taken and of these, in 41 catchments the use exceeds the allocable flow.
- If intensification of dairying continues, the amount of animal drinking water required will for the most part increase without restrictions due to the high priority it is afforded by provision relating to unconsented water takes of the Resource Management Act. In many catchments this may result in nearly all the allocable flow being utilised solely for unconsented animal drinking water purposes."

Measures to address adverse impacts of an increase in these uses include monitoring permitted and unconsented takes and using these estimates to inform limit setting when flows and allocations are reviewed.

* According to national legislation [Sections 14(3)(b) of the Resource Management Act].
Source: www.waikatoregion.govt.nz/Services/Publications/Technical-Reports/A-Model-for-Assessing-the-Magnitude-of-Unconsented-Surface-Water-Use-in-the-Waikato-Region/.

A number of countries include water uses for national security purposes among the sequence of priority uses. In the Netherlands, for example, safety (preventing dyke collapse) and preventing irreversible damage to the environment are the highest priority use. In France, the cooling of nuclear power plants is considered a national security use. The most commonly reported second priority is either agriculture or environmental uses. Some allocation regimes have a very detailed designation of priority uses (6 distinct levels in the case of Hungary, Mexico, and Peru; 5 distinct levels in the case of Spain and South Africa). Others designate only one or two priority uses as compared to all others (São Francisco Basin, Brazil, Estonia, wastewater reuse in Israel, and Slovenia). The various ways in which the sequence of priority uses is defined across the allocation regimes surveyed are summarised in Figure 3.23.

Figure 3.23. **Sequence of priority uses in water allocation**

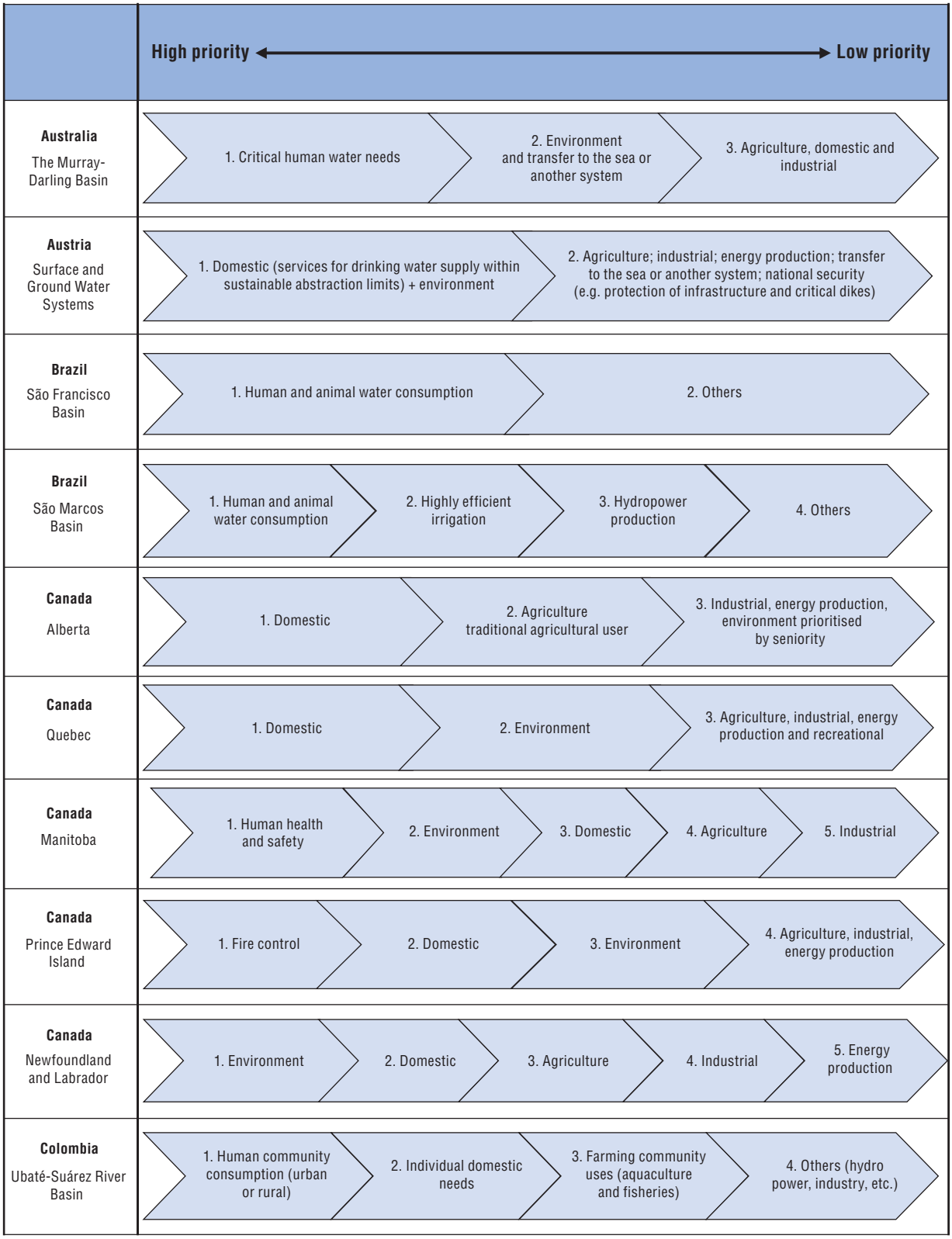


Figure 3.23. **Sequence of priority uses in water allocation** *(cont.)*

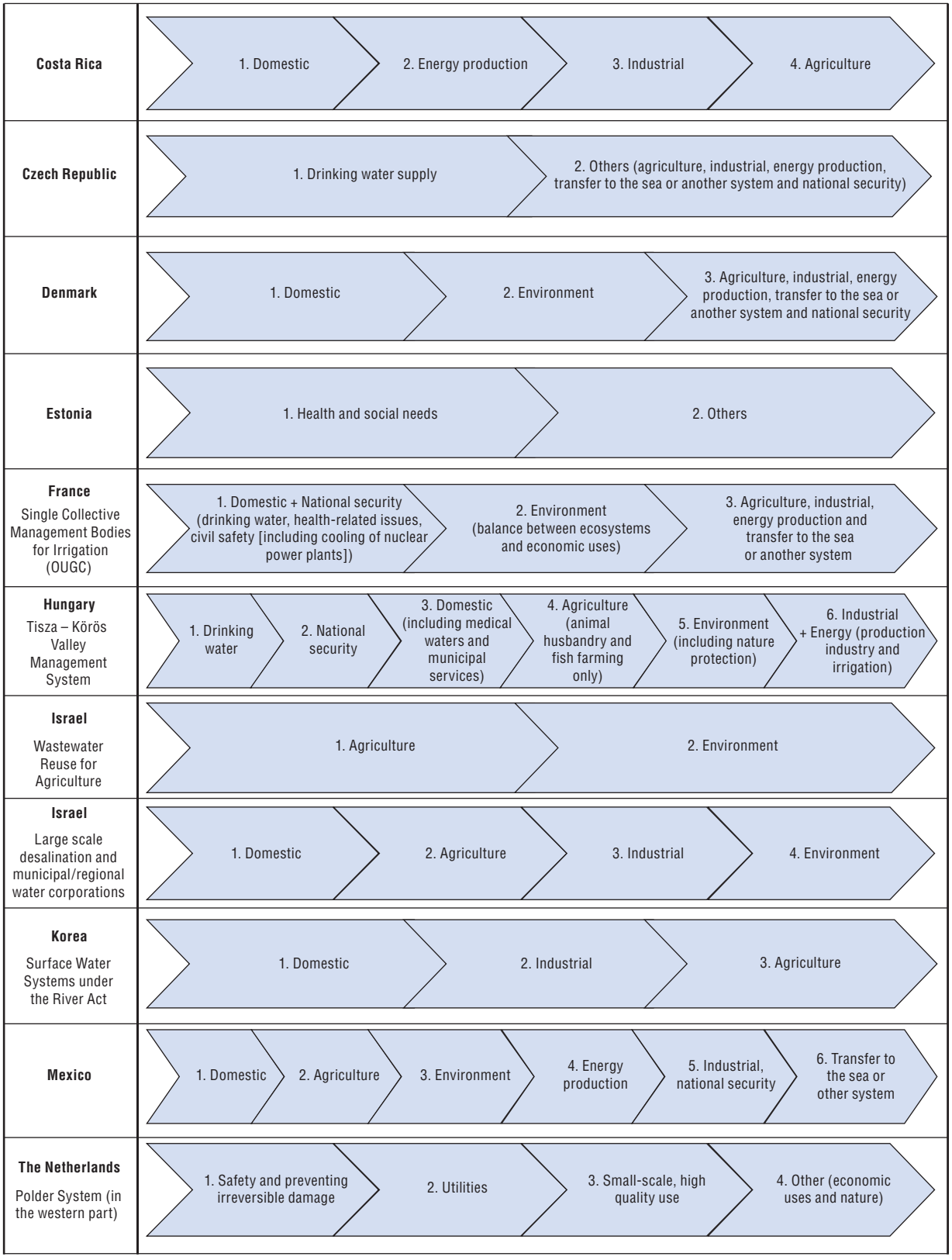
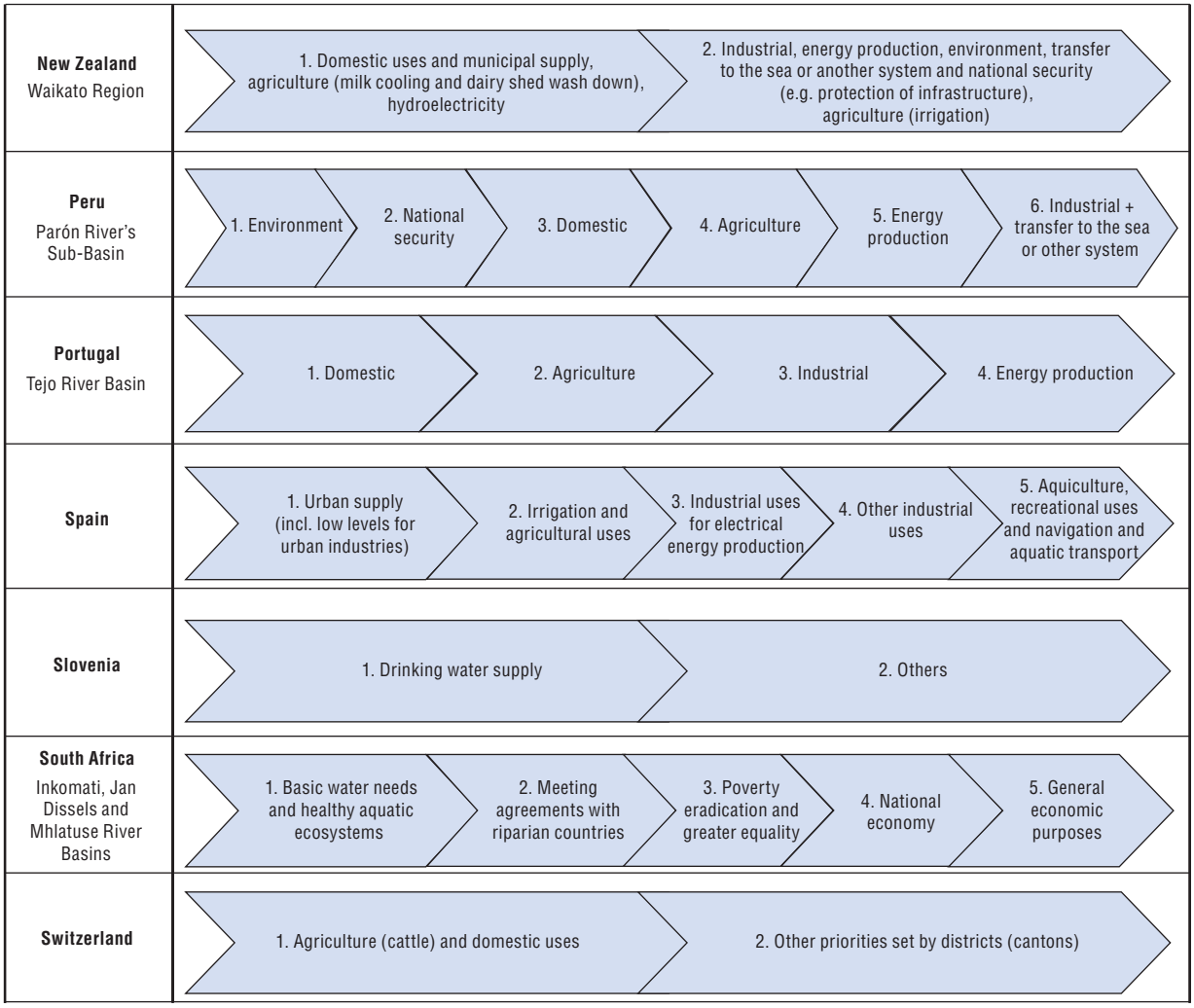


Figure 3.23. **Sequence of priority uses in water allocation** *(cont.)*



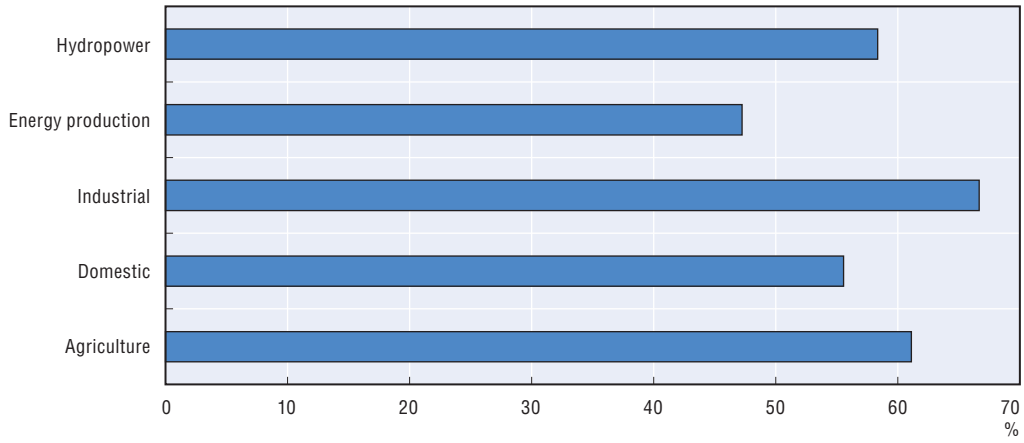
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Water abstraction charges

A majority of allocation regimes surveyed report that abstraction charges are in place. The proportion of allocation examples indicating that an abstraction charge is in place (breakdown by category of user) is summarised in Figure 3.24. Among categories of uses for which an abstraction charge is in place, industrial use is the most common. Nearly 70% of allocation regimes apply an abstraction charge to industrial users. Sixty-one per cent of allocation regimes apply a charge to agriculture, 58% to hydropower producers, 56% to domestic users, and 47% to energy production (other than hydropower). Examples of allocation regimes that do not have any abstraction charges include Austria,[8] Alberta and Prince Edward Island in Canada, the Limarí Basin and Maipo's River First Section in Chile, Denmark, and the Netherlands. In Spain, charges support cost recovery in the sense that the necessary infrastructure to meet water needs to charged to the users requesting such works. The two pricing instruments are the "regulation fee" and the "utilisation tariff".

Figure 3.24. **Proportion of water allocation examples with an abstraction charge**

Per category of use



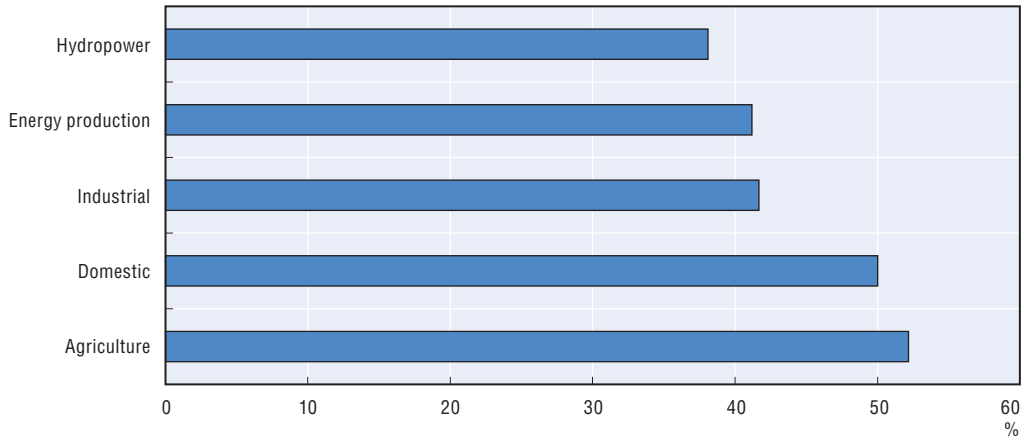
Note: Does not include Japan, where abstraction charges depend on each Prefecture.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Among the allocation regimes with abstraction charges, volumetric usage is the most common basis for the charge. Seventy per cent of the allocation regimes that have an abstraction charge for industrial and domestic water use volumetric usage as the basis for the charge.

Of the allocation regimes that indicated that abstraction charges were in place, for most categories of use, fewer than half of the examples indicated that water scarcity is reflected (in one way or another) in the charge. In the case of agricultural use, for those allocation examples with abstraction charges in place, just over half indicated that scarcity is reflected in the charge (in one way or another) (Figure 3.25).

Figure 3.25. **Proportion of water allocation examples reflecting water scarcity in abstraction charge**

Per category of use



Note: Does not include Japan, where abstraction charges depend on each Prefecture.
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Data from the OECD/EEA *Database on instruments used for environment policy and natural resources management* provide a view of the ranges of levels of abstraction charges and their respective tax-base. Table 3.8 summarises examples of water abstraction charges among the higher and lower bounds of charges reported for select countries, based on available data.

Table 3.8. **Examples of water abstraction charges in select OECD countries**

Country/region	Examples of higher-end charges reported		Examples of lower-end charges reported	
	Specific tax-base	Tax rate	Specific tax-base	Tax rate
British Columbia, **Canada**	Industrial purpose – pulp mills	EUR 277 for 1 cubic foot per second	Commercial power use – output General power use – output up to a total of 160 000 mWh	EUR 0.7871 per MWh
	Oil field injection	EUR 246 per cubic foot per second[1]	Residential law or gardening watering (area exceed 0.25 acres)	EUR 7.6 per 10 acre feet a year
	Washing coal	EUR 239 per cubic foot per second	Mineral water sold in bottles or other containers	EUR 8.70 per 1 000 gallons a day or less
Estonia	Mineral water – drinking or for therapeutic baths	EUR 2.11 per m^3	Abstraction of surface water for cooling	EUR 0.0016-0.0072 per m^3
	Abstraction from Cambrium-Vendian groundwater aquifer for technological purposes (except food production)	EUR 0.15 per m^3	Water pumped out of open mines	EUR 0.017 per m^3
Germany (various *Länder*)	(Berlin) Charge on abstraction of groundwater	EUR 0.31 per m^3	(Bremen, Lower Saxony) Charge on abstraction of groundwater for fish farming purposes	EUR 0.0025-0.0026 per m^3
	(Schleswig-Holstein) Charge on abstraction of groundwater of users other than for public water supply	EUR 0.11 per m^3	(Bremen) Charge on abstraction of surface water bodies if the abstracted amount is more than 500 million m^3	EUR 0.003 m^3
Hungary	Effective rate on water abstraction of EUR 0.016-0.103 per m^3; varies by water source and region			
Poland	Groundwater abstraction for purposes other than production in cases where the water is in direct contact with food or medicine	EUR 0.026 per m^3 multiplied by differentiation coefficients depending on water quality and region	Surface abstraction for supply of households	EUR 0.0093 per m^3 multiplied by differentiation coefficients depending on water quality and region
Slovenia	The use of sand	EUR 2.45 per m^3	Abstractions for irrigation of agricultural land; breeding fish cyprinids	EUR 0.0008 per m^3
	The use of water for the operation of swimming	EUR 0.83 per m^3	Breeding salmonid fish species	EUR 0.0029 per m^3
United Kingdom	Abstraction charges are EUR 0.005 per m^3 on average			

1. Total not to exceed EUR 3 093.

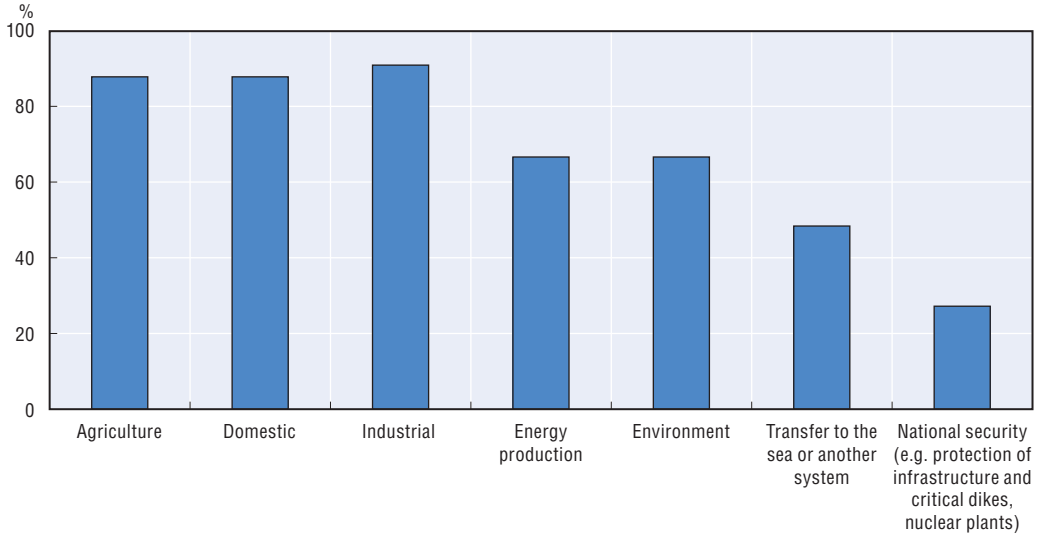
Source: OECD/EEA, *Database on instruments used for environmental policy and natural resources management*.

Monitoring and enforcement of water withdrawals and allocation rules

Most allocation regimes report that they monitor water withdrawals and enforce allocation rules. In the case of Costa Rica, even though the Ministry of Environment and Energy has the legal authority to monitor withdrawals, it does not exercise control over withdrawals, due to a lack of human resources. Figure 3.26 depicts the proportion of allocation regimes monitoring water withdrawals, per category of use.

Figure 3.26. **Proportion of allocation regimes monitoring water withdrawals**

Per category of use



Note: Does not include: Denmark, Japan (Tone-Gawa River System) or South Africa (Inkomati, Jan Dissels and Mhlatuse River Basins).
Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Industrial users are monitored in nearly all cases (91%) where monitoring occurs (except for the polder system in the western part of the Netherlands). Agriculture and domestic users are monitored in 88% of cases. Energy production and water for the environment are monitored to a lower extent (in 67% of cases). Transfers to the sea or another system as well as water for national security uses are monitored in 48% and 27% of cases, respectively.

Some type of sanction for transgression is in place in about two-thirds of allocation regimes surveyed. Sanctions are not in place in the following allocation regimes: Newfoundland and Labrador (Canada). Maipo River, 1st Section (Chile), Costa Rica, Tone-Gawa River System (Japan), Korea, Luxembourg, the polder system in the western part of the Netherlands, and in the Parón River's Sub-Basin (Peru). In cases where sanctions are applied, monetary fines are the most common type (reported in all regimes with sanctions, except for Portugal). Other types of sanctions include revocation of permits or other legal processes.

Summary of key findings from the Survey of Water Resources Allocation

The results of the survey provide a detailed view of the current allocation landscape. Findings indicate that most allocation regimes make use of elements of allocation design that encourage a robust system. However, the survey also reveals gaps in allocation regime design and identifies areas that could be adjusted to improve performance to reach the policy objectives of economic efficiency, environmental sustainability and social equity.

For example, at the system level, there are opportunities for improving the identification of the available resource pool to ensure hydrological integrity and a balanced repartition between *in situ* and diverted uses. Environmental flows are not secured in a number of allocation regimes. Systematically factoring in the potential impacts of climate change is also essential to ensure that allocation regimes can cope with shifting

conditions. The design of sequence of priority uses has an important impact on how the risk of shortage is distributed across users and the benefits of water use that will most likely be foregone in times of scarcity.

At the user level, the robust design of water entitlements is critical to provide incentives for innovation and efficient use, investment, and efficient management of risk of shortage. All allocation regimes report having legally defined entitlements to access water granted either to individuals, to collective bodies or both. The duration of entitlements varies significantly, and a "use it or lose it" policy often applies. There is certainly scope to broaden the application of abstraction charges. Given that abstraction charges tend to be low in most cases, increases in charges would make low value and inefficient water uses less attractive. Also, many allocation regimes permit some form of trading, leasing or transferring entitlements, although a range of conditions placed on such activities was reported. Table 3.9 captures the summary of main findings of the survey.

Table 3.9. **Summary of main findings of the Survey of Water Resources Allocation**

Elements of an allocation regime	Main findings from the survey
	System level elements
Clear legal definition of the ownership of water resources	• The large majority of countries indicate that water resources are publicly owned (or designated as "ownerless property"). Nearly all instances of privately owned water resources relate to ground water, which is owned by the owner of the land on which it resides. • There can be ambiguity between various legal regimes within a given jurisdiction (e.g. customary rights versus rights designated in different laws; see for example, Japan or Korea). This legal "pluralism" is a source of conflict among water users and increases the likelihood of litigation.
Institutional arrangements for allocation	• Slightly fewer than half (48%) of countries indicated a role for the Ministry of Environment in water allocation. Even fewer (30%) indicated a role for a basin authority.
Identification of available water resources	• A majority (73%) of allocation examples reported that they are neither over-allocated nor over-used, with 11% considered over-allocated, 11% over-used. In 2 countries (the Maipo River, 1st Section, Chile and various regions in Spain) the water resource is considered both over-allocated and over-used. • Most water systems in the examples surveyed are regulated to some extent (either partially or fully) so that there is some control over the flow rate. • Half of the examples surveyed reported agriculture as the dominant water user.
Identification of in situ requirements/definition of available ("allocable") resource pool	• Three quarters of countries report that environmental flows are defined, but there are considerable variations in the methodologies used to do so. • Only 57% of allocation regimes report taking into account climate change, in the definition of the available resource pool.
Abstraction limit ("cap")	• While a significant majority of allocation regimes (92%) have a clear definition on the limit on consumptive use, few rely on flexible limits (defined in terms of the proportion of the resource that can abstracted, instead of a fixed volume.
Definition of permitted uses not required to hold an entitlement	• Most allocation regimes allow certain users or water uses to access water without formal water entitlements. These exceptions are usually small scale uses relating to fulfilling basic human and animal needs, subsistence crop purposes or native people holding title rights. They usually do not pose an issue for the sustainable management of the resource, however there are some notable exceptions (see, for example, New Zealand).
Definition of "exceptional circumstances"/sequence of priority uses	• A sequence of priority uses is clearly established in nearly all allocation regimes. Most regimes define domestic and human needs as the highest priority use.
Requirements for new entrants	• Nearly all regimes impose conditions on granting new water entitlements or expanding existing ones. An assessment of third party impacts and an environmental impact assessment are the most frequently cited conditions.
Mechanisms for monitoring and enforcement	• Most allocation regimes (except Costa Rica) report that they monitor water withdrawals and enforce allocation rules. Industrial users are the most frequently monitored (91%) with agriculture and domestic users monitored in 88% of cases. • Two-thirds of regimes report that sanctions are in place for non-compliance with the rules and regulations of allocation regimes. Monetary fines are the most common type.

Table 3.9. **Summary of main findings of the Survey of Water Resources Allocation** *(cont.)*

Elements of an allocation regime	Main findings from the survey
	User level elements
Clear, legal definition of water entitlements	• Water users' entitlements are legally defined in all allocation regimes, with the exception of the Netherlands. The majority (88%) allow for private entitlements. Regimes that allow entitlements to be granted to either an individual or a collective organisation (e.g. water users association, municipality) were more common than those that allow for only individual entitlements.
Abstraction charges	• A majority of regimes charge for water abstraction. Industrial use is the most common type of use to have an abstraction charge (nearly 70% of regimes). Volumetric charges are the most common basis for the charge.
Specification of return flow obligations in water entitlements	• Around half (52%) of allocation regimes do not specify return flow obligations of water entitlements.
Duration of water entitlements with expectations for renewal	• In most cases, water entitlements are time bound, either with or without an expectation of renewal. In a few cases are water entitlements granted in perpetuity (Australia, Chile, Israel, and Peru), with or without requirements for beneficial use or continuity of use. • Slightly more allocation regimes reported using a "use it or lose it" system for un-used entitlements than regimes reporting that entitlements remain in place for the period they are issued for, despite going unused.
Possibility to trade, lease or transfer water entitlements	• Two-thirds of allocation regimes allow for some sort of trade, lease or transfer of water entitlements. Specific conditions to trade, lease or transfer usually apply and often require the review and approval of an authority.

Source: See country profiles associated with this publication at *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

Overall, the survey provides a solid basis on which to identify the policy levers available to improve the performance of allocation regimes. This empirical basis has been used to inform the development of policy guidance on allocation regimes in Chapter 5.

Notes

1. The questionnaire used for this survey has been included in the Annex A.
2. This analysis is based on country profiles prepared by the OECD Secretariat, based on the responses collected via the questionnaire. The country profiles are available on a dedicated website.
3. With the exception of Canada, which provided this information at the provincial/territorial level.
4. It is noted where certain examples are not included in the analysis because an answer was either not applicable or not provided.
5. The programmes include: purchasing entitlements from willing sellers at market prices and implementing infrastructure works (both on farm and in irrigation delivery systems) to reduce losses and improve water efficiency. State governments also undertake similar efforts.
6. It should be noted that some responses provided information with a different metric, depending on the information available. Detailed information for each specific allocation regime is reflected in the country profiles.
7. Although renewal is not expected for water consents granted in the Waikato Region (New Zealand), factors such as prior investment or existing infrastructure would be considered and may influence decisions about a request for renewal.
8. While users do not pay abstraction charges separately, users are required to pay the full cost of water services.

References

OECD (2015), *Survey of Water Resources Allocation: Country Profiles*, *www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm*.

OECD/EEA, *Database on instruments used for environment policy and natural resources management*, *www2.oecd.org/ecoinst/queries/* (accessed 17 April 2014).