



Water Resources Allocation

POLICY HIGHLIGHTS

Sharing risks and
opportunities

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Growing pressures are making existing inefficiencies in water allocation regimes increasingly costly: 19th century allocation arrangements are poorly equipped to serve a 21st century society and economy. Although reforming water allocation may appear daunting, an improved regime can greatly increase the value that individuals and society obtain from water resources today and in the future.

Angel Gurría, OECD Secretary-General

Water Resources Allocation: Sharing risks and opportunities

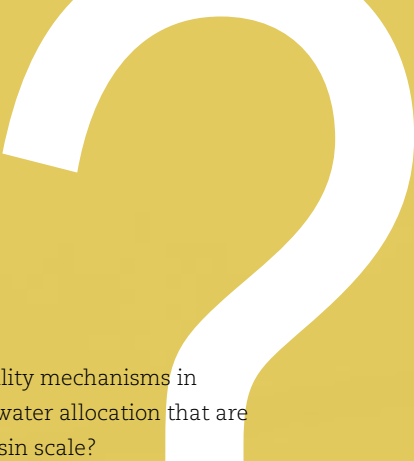
KEY MESSAGES

- Competition to access water resources is intensifying due to population growth, economic development, degraded water quality and climate change. As a result, the issue of how water is allocated among users is rising on the policy agenda. Growing pressures on water resources increase the value of allocation regimes that perform well across a range of conditions (both averages and extremes) and can adapt to changing conditions at least cost.
- Allocation regimes determine who is able to use water resources, how, when and where. They are strongly conditioned by historical preferences and usage patterns, often tracing their roots to previous decades or even centuries. They show a high degree of path dependency, which manifests in laws and policies, and even in the design and operational rules of long-lived infrastructures. As a result, water use is often locked-in to uses that are no longer as valuable today as they once were and the risk of shortage falls disproportionately on certain users. The challenges for allocation are aggravated by the entrenchment of weak water policies, such as under-pricing water or unregulated use.
- Well-designed allocation regimes contribute to multiple policy objectives: economic efficiency, by allocating resources to higher value uses as well as contributing to innovation and investment in water use efficiency; environmental performance by securing adequate flows to support ecosystems services; and equity by sharing the risks of shortage among water users fairly.
- The recent **OECD Survey of Water Resources Allocation**, a first of its kind, reviewed 37 allocation regimes in 27 OECD and key partner countries. It revealed that most allocation regimes have elements that can encourage a robust system, but operate with significant limitations. For example, many regimes suffer from legal ambiguities and unsustainable abstraction levels. Adequate flows to support ecosystem functioning are not secured in many basins. Many countries still apply very low or no charges at all for water abstraction, even as intensifying competition for the resources has increased its value.
- Recognising the potential for improving allocation, 75% of countries covered in the OECD survey have recently reformed their allocation regimes and 62% have reforms ongoing. Managing the transition from an existing regime to an improved one is often very contentious and can be costly, but brings multiple benefits. Lessons from reforms can help countries navigating this transition.
- A periodic “health check” of current allocation arrangements can help to identify opportunities for improving performance. The **OECD Health Check for Water Resources Allocation** is designed to review current arrangements and identify areas for potential improvement.

1 The OECD “Health Check” for Water Resources Allocation

A periodic “health check” of current allocation arrangements can help to identify opportunities for improving performance.

The OECD “**Health Check**” for Water Resources Allocation, presented here, can provide useful guidance for such a review. The OECD publication, Water Resources Allocation: Sharing Risks and Opportunities also provides examples of how various elements have been designed and implemented in specific contexts.

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- Check 1.** Are there accountability mechanisms in place for the management of water allocation that are effective at a catchment or basin scale?
 - Check 2.** Is there a clear legal status in place for all water resources (surface and ground water and alternative sources of supply)?
 - Check 3.** Is the availability of water resources (surface water, groundwater and alternative sources of supply) identified and possible scarcity well-understood?
 - Check 4.** Is there an abstraction limit (“cap”) that reflects *in situ* requirements and sustainable use?
 - Check 5.** Is there an effective approach to enable efficient and fair management of the risk of shortage that ensures water for essential uses?
 - Check 6.** Are adequate arrangements in place for dealing with exceptional circumstances (such as drought or severe pollution events)?
 - Check 7.** Is there a process for dealing with new entrants and for increasing or varying existing entitlements?
 - Check 8.** Are there effective mechanisms for monitoring and enforcement, with clear and legally robust sanctions?
 - Check 9.** Are water infrastructures in place to store, treat and deliver water in order to allow for the allocation regime to function effectively?
 - Check 10.** Is there policy coherence across sectors that affect water resources allocation?
 - Check 11.** Is there a clear legal definition of water entitlements?
 - Check 12.** Are appropriate abstraction charges in place for all users that reflect the impact of the abstraction on resource availability for other users and the environment?
 - Check 13.** Are obligations related to return flows and discharges properly specified and enforced?
 - Check 14.** Does the system allow water users to reallocate water among themselves to improve the allocative efficiency of the regime?

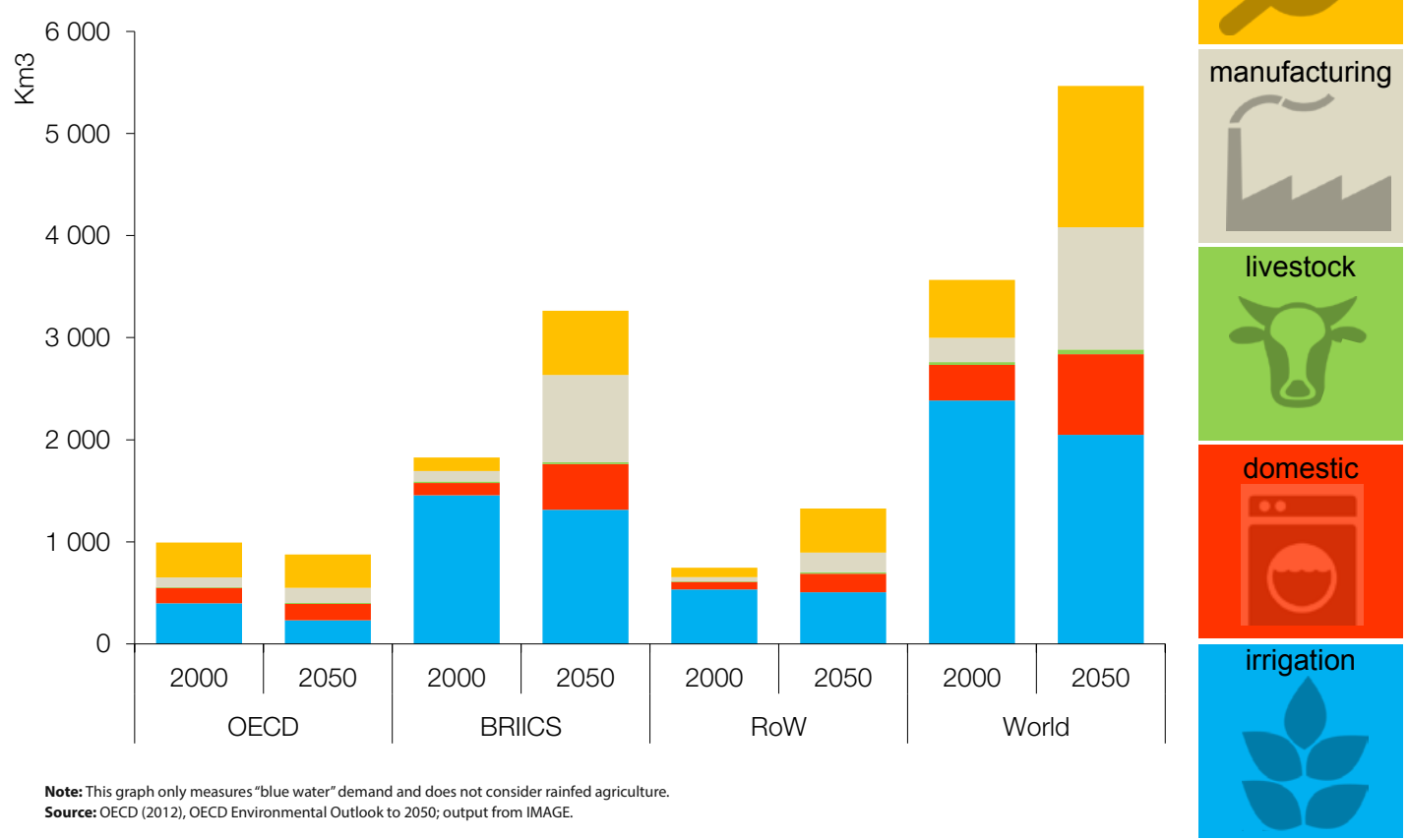
2 Re-allocating water in a water scarce world

Water resources provide value to individuals, ecosystems, farms, firms, and society in various ways – from the ecological value provided by supporting key species, to the economic value derived from productive uses, to the existence value of iconic lakes or rivers. How much water is left in water bodies to support ecosystem functioning, how much is diverted for various uses; who is able to use these resources, how, when and where are questions that directly affect the value obtained from water resources. These questions are determined by allocation regimes.

Current and growing pressures on water resources are making existing inefficiencies in water allocation regimes increasingly costly. Costs of poorly functioning allocation include degraded environmental performance (where adequate flows required to support ecosystem services are not secured), lost opportunities for economic development (when water use is locked into low value uses) and unbalanced management of the risk of shortage (when banning some types of uses in times of shortage places the risk disproportionately on certain groups of low priority users).

The OECD Environmental Outlook projects that global water demand will increase by around 55% between 2000 and 2050.

Figure 1. Global water demand: Baseline scenario, 2000 and 2050



Note: This graph only measures “blue water” demand and does not consider rainfed agriculture.
Source: OECD (2012), OECD Environmental Outlook to 2050; output from IMAGE.

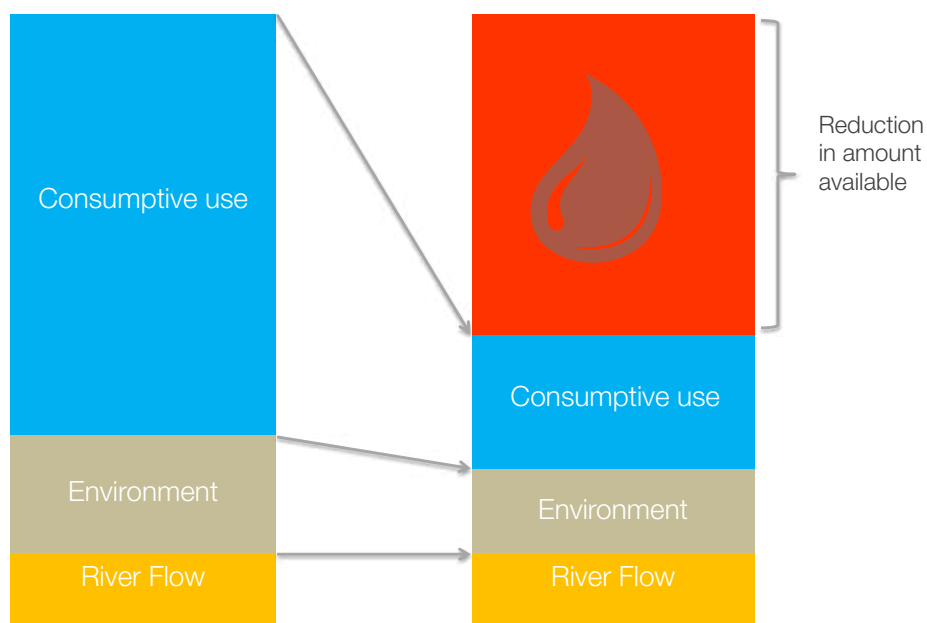


Effects of climate change

Climate change can provoke significant shifts in the timing, location, amount and form of precipitation (for instance from snowfall to rain). It also generates increased uncertainty about future water availability and makes historical climate a less reliable guide to current and future planning. One of the most common mistakes made when considering how best to manage water allocation is to assume that the impact of climate change on water supply will be gradual. Experience has shown that sudden climatic shifts can occur, which can

have important consequences on water available for consumptive use. Reductions in rainfall can produce an even more pronounced reduction in streamflow, which in turn can have an even greater impact on the amount of water available for consumptive use. This is because sufficient base flows are still required before water can be extracted. So, a relatively small reduction in mean rainfall can ultimately have a large and disproportionate impact on the volume of water available for use.

Figure 2. **Effect of reduction of stream inflow on the amount of water available for consumptive use**



3 OECD framework for water resources allocation

Water allocation regimes consist of a combination of policies, laws and mechanisms to manage the risk of shortage and to help allocate resources among competing uses. The OECD framework for water resources allocation details the various elements of an allocation regime and explains how they can help achieve policy objectives. To see how the various elements of an allocation regime fit together, the figure below provides an overview of the various elements.

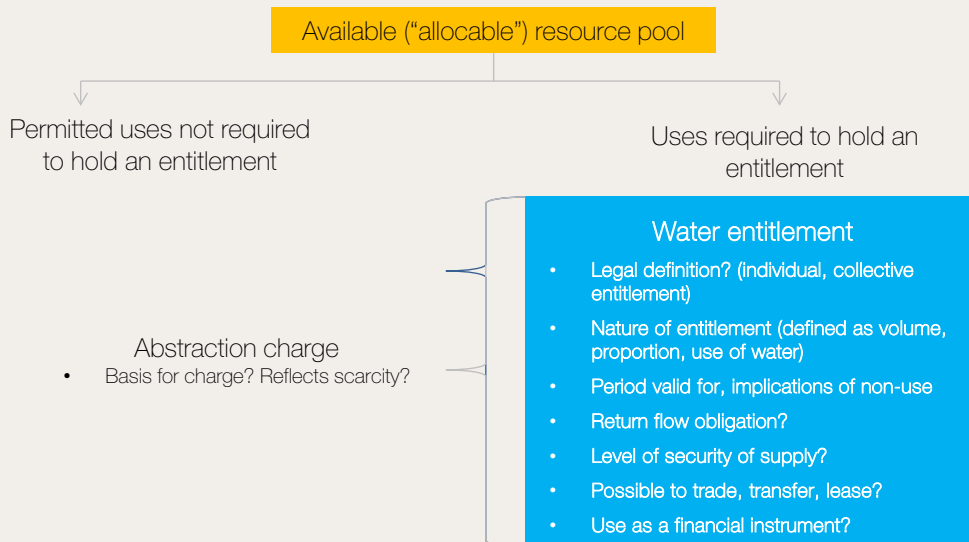
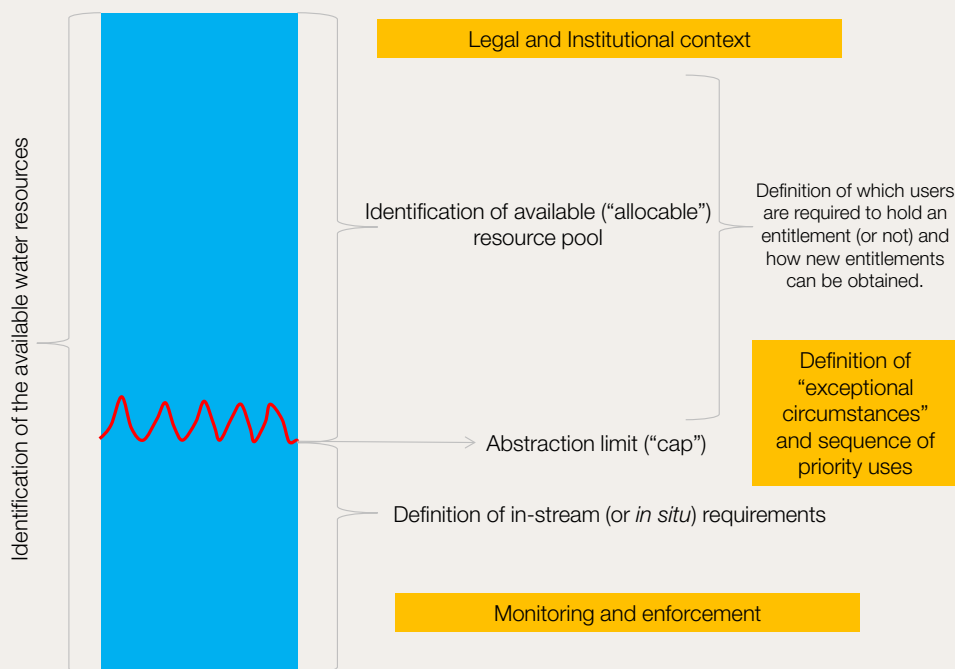
“water entitlements”), rather than outright ownership, with the exception of groundwater resources in certain countries.

A well-designed allocation regime should have two key characteristics: it should be robust by performing well under both average and extreme conditions and have the capacity to adjust to changing conditions at least cost over time.

Water is a complex resource, with distinctive features as an economic good and often with a unique legal status. Access to the resource is often subject to usage rights (or

Nested allocation arrangements can allow for tailoring the design of allocation arrangements to specific settings.

Figure 3. Key elements of a water allocation system



4 The current allocation landscape



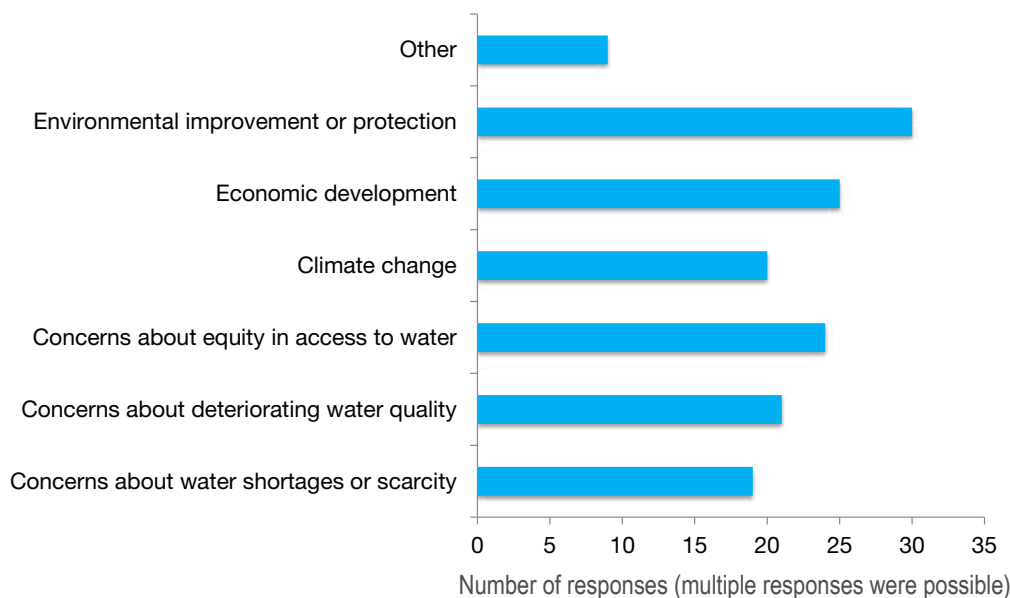
Despite its importance for water management and for reaping the benefits of water, a solid evidence base of how water allocation works across a range of contexts has been lacking. To fill this gap, the OECD *Survey of Water Resources Allocation* documented 37 examples of allocation regimes from 27 OECD and key partner countries. Some of the findings are presented here. Further details can be found in the country profiles associated with this publication at www.oecd.org/environment/water-resources-allocation-9789264229631-en.htm.

Table 1. Countries with recent or ongoing water allocation reforms

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

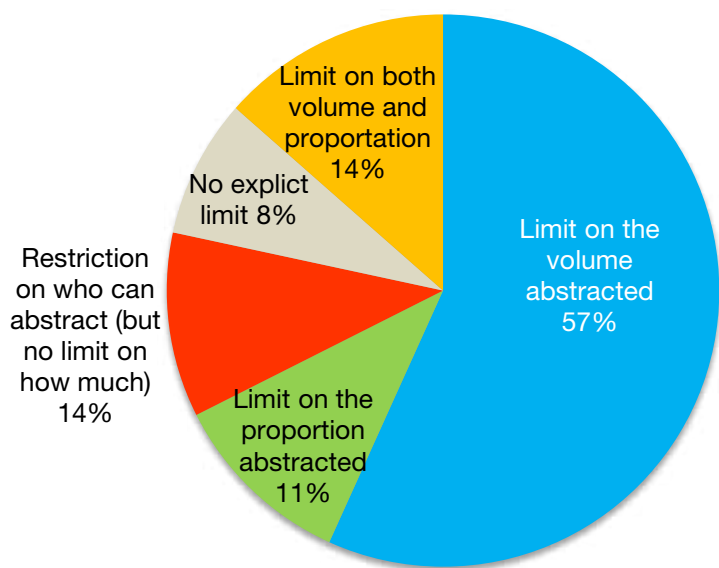
Note: For Canada: recent reforms were flagged by Manitoba while ongoing reforms were flagged by Alberta, Quebec and the Yukon Territory.

Figure 4. Drivers of recent and ongoing allocation reforms



The definition of an explicit and enforceable limit (or “cap”) on abstraction is a key element of a robust allocation regime. This “cap” may be defined in absolute, volumetric terms or as a proportion of available resources. The figure below presents the proportion of examples according to the type of “cap” in place, (if any).

Figure 5. Proportion of examples according to type of limit on water abstraction (if any)



The “cap” can be used to ensure water for environmental needs, so it should be designed to reflect natural flow regime dynamics. The figure below shows the proportion of examples that indicated that environmental flows are explicitly defined. A wide range of methodologies, from simple rules of thumb to more sophisticated approaches, was reported.

Figure 6. Proportion of examples that define minimum environmental flows

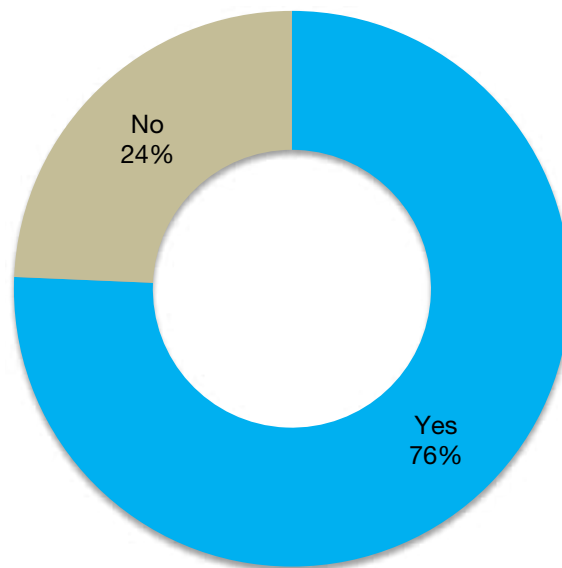


Figure 7. Sequence of priority uses in selected countries

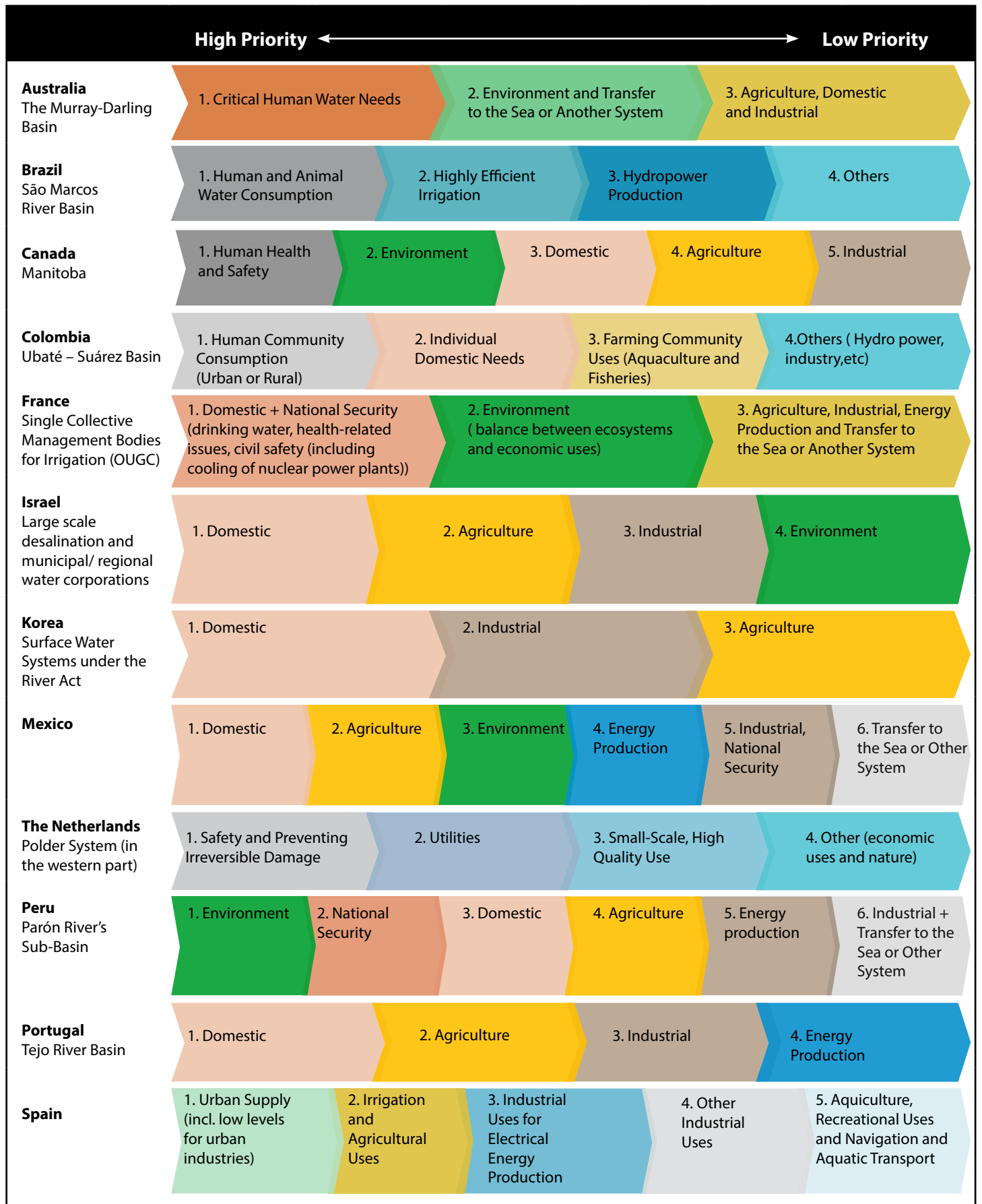


Table 2. Key findings from the OECD Survey of Water Resources Allocation

Element of the allocation regime	Main findings
Clear legal definition of the ownership of water resources	<ul style="list-style-type: none"> 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.
Abstraction limit (“cap”)	<ul style="list-style-type: none"> 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 be abstracted, instead of a fixed volume).
Adapting to climate change	<ul style="list-style-type: none"> Only 57% of allocation regimes report taking into account climate change, in the definition of the available resource pool.
Mechanisms for monitoring and enforcement	<ul style="list-style-type: none"> 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. 2/3 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.
Clear, legal definition of water entitlements	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.
Return flow obligations in water entitlements	<ul style="list-style-type: none"> Around half (52%) of allocation regimes do not specify return flow obligations of water entitlements.
Duration of water entitlements with expectations for renewal	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 2/3 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.

Reform of water allocation regimes in selected countries

In France, areas suffering from a structural water deficit have been identified. These zones are the target of recent reforms to restore sustainable abstractable volumes. France has also recently created Single Collective Management Bodies (Organismes Uniques de Gestion Collective, OUGC) to provide an institutional arrangement to allow irrigators to allocate a set volume of water among themselves at catchment level.

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In Alberta, Canada, there were already conflicts between farmers and environmentalists over low flows in the rivers in the 1990s. Concerns about meeting future water requirements arose with increasing urban development (notably in the southern half of the province) and a drought in 2001-02. At the time, there was little experience of monitoring actual water use and managing water shortages. The situation prompted a review and adjustment of allocation arrangements. An evolution of the system became inevitable as water demand exceeded available resources.

Chile faced challenges related to the over-allocation of water resources leaving insufficient water for the environment. Recent reforms in 2005 included amendments to the prevailing allocation regime that sought to address issues related to social equity and environmental sustainability that were not reflected in the Water Code of 1981.

Even when a case for allocation reform has long been recognised, a drought can provide the needed trigger to spur action. For example, in New Mexico, in the United States, the need for reform had built up over a period of several decades. The very severe drought of 2002 was a catalytic event that finally advanced reform. The entire state was considered a drought disaster area and all users suffered from shortage. Further, the state had difficulty complying with its obligation to deliver water to Texas, as agreed under the Pecos River Compact.

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ent system for managing water abstraction and was set up in the 1960s when water was perceived to be abundant. It was not originally designed to manage competing demands for water. Increasing pressures have led to many rivers being degraded or threatened by unsustainable abstraction. There is a clear case for change and ensure that shortcomings of the current system are widely understood, the UK's Environment Agency developed a "Case for Change" to spell out the future challenges and pressures on water resources, including potential impacts of climate change.

Even in a water abundant country like the Netherlands, periodic and localised scarcity can arise, resulting in costly impacts. Managing shortage incidents currently takes the form of priority regime banning, which means that there are few incentives for water users to proactively manage the risk of shortage. Recognition that water shortages are likely to become more frequent in the future is spurring reconsideration of the prevailing approach to allocation.



Over time, as the water market in Australia developed and water trading expanded, it became clear that not only was the system over-allocated, and the cost of not dealing with the issue would increase severely in the future. As a response, the Australian government introduced in 2007 the Buyback programme to purchase water entitlements for the Environmental Water Holder from voluntary sellers in the market.

Water allocation reform in South Africa was driven during the transition to democracy in 1994 propelled by the need to transform a society in which the black majority had been excluded from access to natural resources (including the benefits derived from such natural resources). The allocation reform proposed in the 1997 White Paper on National Water Policy for South Africa, and the National Water Act were aimed at addressing this historical injustice. A second key driver was the recognition of increasing water scarcity and pollution challenges arising from industrial expansion and population growth, and the need to protect the aquatic ecological base.

5 Lessons from allocation reform

Reforming water allocation arrangements can be a very difficult political challenge. Reforms can lower the volume of water some users will have access to, change the distribution of the risk of shortage across water users, and affect infrastructure and investment needs. Even incremental changes to an existing allocation regime can create opposition and require costly compensation to free up water by buying out existing water users.

Although water allocation reform is inherently a political process unique to its time and place, valuable insights can be drawn from the experience of other countries. The OECD report **Water Resources Allocation: Sharing Risks and Opportunities** draws lessons from case studies of water allocation reform of 10 OECD and key partner countries.

Key messages

- Engaging in an appropriate policy dialogue to support a water allocation reform can help to avoid adopting an overly technical and technocratic approach to reform. The OECD *“Health Check” for Water Resources Allocation* can provide useful guidance for such a dialogue.
- Concerns about water scarcity and insufficient water for ecosystems are often cited drivers of allocation reform, along with broader political or structural reforms. Droughts can provide a salient, visible event to trigger action.
- Water allocation reform is not a discrete, time bound process. It tends to be an iterative process, which extends over many years or even decades. Sequencing matters, to avoid lock-in suboptimal options and potentially expensive compensation measures. Institutional path dependency can raise the cost of improving the flexibility of allocation to respond to changing or novel conditions.
- Before introducing changes to an allocation regime, it is essential to determine a sustainable baseline (how much water is available for allocation once in situ requirements, including for the environment, have been satisfied) and consider possible unintended consequences.
- The reform process allows for ample opportunities for participation and negotiation. Willingness to engage stakeholders and appropriately compensate potential “losers” facilitates the process. Compensation can take various forms, such as financial transfers or permission to build storage structures.



Further reading

OECD (2015), **Water Resources Allocation: Sharing Risks and Opportunities**, OECD Studies on Water, OECD Publishing, Paris, DOI: <http://dx.doi.org/10.1787/9789264229631-en>.

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This Policy Highlights is based on the OECD publication,
Water Resources Allocation: Sharing Risks and Opportunities.

The OECD is working to help developed and developing countries meet the water challenge. With a multi-disciplinary team drawn from across the organisation, the OECD contributes analyses to improve the information base, identify good practice, and provide a forum for exchanging country experiences. Recent work has addressed issues of financing, governance, policy coherence, private sector participation, and water and agriculture. Ongoing work also covers the issues of water security, water and green growth, climate change adaptation, water allocation and urban water management.

In addition to analytical work, the OECD works with selected countries to facilitate the reform of water policies. This confirms our aspiration to make reform happen. The OECD has recently enhanced its convening power and capacity to structure discussion among stakeholders on water issues, by setting up the Water Governance Initiative.

FOR MORE INFORMATION

The publication and 27 country profiles are available at:
www.oecd.org/fr/publications/water-resources-allocation-9789264229631-en.htm
www.oecd.org/env/resources/water.htm

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