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Chapter 2

Legal and other institutional aspects of groundwater governance

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This chapter defines the linked concepts of groundwater governance and groundwater management, explaining how they differ from each other. Then, it describes the prevailing legal instruments for, and the institutional aspects of, groundwater management and governance.

2.1 Groundwater governance and management

Groundwater governance and management both address abstraction and allocation, use efficiency, and quality protection. While often used interchangeably, this report distinguishes between the two concepts (see Boxes 2.1 and 2.2, respectively). Groundwater *governance* processes set the conditions for and enable groundwater management, planning, and policy implementation. Principles for ‘good’ water governance include equitable access, accountability, transparency, stakeholder participation, inclusiveness, etc. Groundwater *management* is action-oriented: focusing on practical implementation activities and the ‘nitty-gritty’ of day-to-day operations, it emphasizes the results of decisions (Linton and Brooks, 2011).

Groundwater governance and management can be challenging because of the common-pool nature of most underground resources, along with information gaps and the diversity of stakeholders and their interests (Ross, 2016). Aquifer systems (the saturated rock or sediment medium, and the water contained in the saturated zone of the formation) act as ‘hosts’ of the resource, providing ecosystem services such as natural storage (green infrastructure) (United Nations, 2021; Puri and Villholth, 2018; UNGA, 2009). The hydrogeological, socio-economic, and politico-institutional realities of aquifer systems need to be considered alongside how they are used and managed. The time lag and invisibility of groundwater resources add to the complexity: negative impacts on groundwater may remain unseen for years, and physical limits of the aquifer are invisible to both users and decision-makers. As a result, the risks and problems associated with groundwater and aquifers are often not addressed proactively.

Box 2.1 Defining groundwater governance

Much effort has gone into identifying the core characteristics of groundwater governance. The most comprehensive effort has been carried out by the project ‘Groundwater Governance – A Global Framework for Action’ (Groundwater Governance Project, 2016a, 2016b, 2016c). It defined groundwater governance as follows:

“Groundwater governance comprises the promotion of responsible collective action to ensure control, protection and socially-sustainable utilization of groundwater resources and aquifer systems for the benefit of humankind and dependent ecosystems. This action is facilitated by an enabling framework and guiding principles” (Groundwater Governance Project, 2016c, p. 17).

Drawing on this definition, governance has a set of four essential *components* or provisions:

1. an **institutional framework** characterized by representation and leadership, organizations and capacity, and stakeholder engagement and participation;
2. a comprehensive **legal framework**;
3. **knowledge** systems and more generalized **awareness** about issues; and
4. **policies, incentive structures and plans** aligned with effective governance.

The *guiding principles* of groundwater governance are:

- conjunctive management of surface water and groundwater;
- co-management of both quantity and quality of groundwater resources;
- co-governance of subsurface space and subsurface resources, which comprises the regulation of all activities and functions located in the subsurface space to ensure harmonized use and avoid undesirable and irreversible damage;
- ‘vertical’ integration in planning and management between local, district/provincial, and federal-level authorities, as well as international levels, as applicable; and
- (horizontal) policy coordination of other sectors that affect, or are affected by, groundwater.

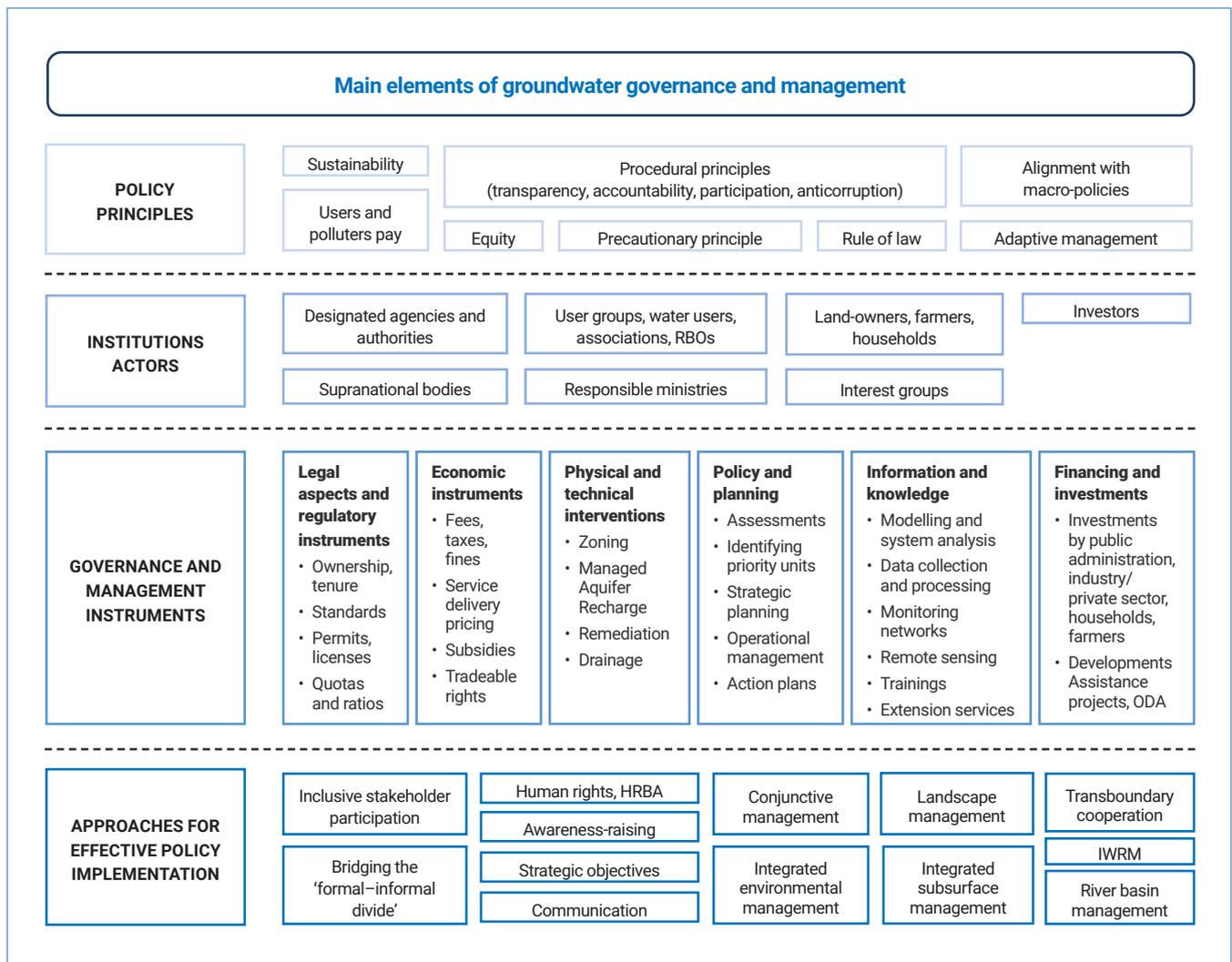
Box 2.2 Defining groundwater management

The Groundwater Governance Project (2016c, p. 17) defined groundwater management as “... the activities undertaken by mandated actors to sustainably develop, use and protect groundwater resources”.

Management comprises measures, interventions, actions and activities that can be practical, technical and tangible to varying degrees, and that aim to “control groundwater abstraction and to prevent the degradation of groundwater quality, typically with the objective of ensuring sustainable freshwater provision and preserving desired environmental and ecosystem conditions that depend on groundwater.” Technical management activities involve drilling and maintaining wells, installing water-saving technologies, etc. (see Chapter 11).

Groundwater governance and management occur within the broader policy environment of a country or basin, and are related to policy principles and planning, legal aspects, and implementation. Figure 2.1 suggests how overarching ideas and policy principles are translated, partially through laws and regulations, into management instruments. However, the methodologies and approaches for implementation are a critical filter or vehicle for the outcomes of the policy intentions.

Figure 2.1 Main elements of groundwater governance and management, from policy principles to implementation approaches



Source: Authors.

Because groundwater is often perceived as a private resource (that is, closely connected to land ownership, and in some jurisdictions treated as privately owned), regulation and top-down governance and management are difficult. In practice, decisions relating to individual wells are mainly exercised by (land-) owners, and it is often difficult for governments to quantify, allocate and regulate groundwater withdrawal and usage, particularly if their resources are limited. The corollary is that almost everywhere, groundwater governance and management must include public and private stakeholders, as well as local communities. At the same time, governments need to fully assume their role as resource custodians in view of the common/public good aspects of groundwater. Greater integrity and policies that enhance access for smallholders and women have a greater chance of contributing to the common good and achieving sustainable development.

2.2 Legal instruments

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Domestic laws and regulations dictate access to groundwater as well as human activities that impact the quality of groundwater

Legislation regarding groundwater resources defines binding and enforceable entitlements, and identifies rights and obligations that are subsequently operationalized through management decisions, including monitoring and enforcement. For instance, the European Union's Water Framework Directive (European Parliament/Council, 2000) and its Groundwater Directive (European Parliament/Council, 2006) have triggered a large number of management activities.

Laws and regulations that incorporate societal goals and policy objectives (see Chapter 10), and that set an enabling and regulatory framework for achieving those goals, are fundamental components of groundwater governance. They are also instrumental to the management of groundwater. Stable legal frameworks also enable governments and groundwater users to plan for resources management (see Chapter 10) over the long term and to deal with competing interests, including those of the environment and of future generations (Smith et al., 2016).

Legal frameworks need to include protection of discharge and recharge zones and of the area surrounding water supply wells, as well as sustainable yield norms and abstraction controls, and conjunctive use regulations. Such frameworks would require data sharing to facilitate important processes, among other things the balancing of competing or conflicting interests among stakeholders, the reduction/elimination of inequalities in accessing and benefiting from the resource, and coordination with urban and rural land uses for management of the entire subsurface space (Groundwater Governance Project, 2016c).

Domestic laws and regulations dictate access to groundwater as well as human activities that impact the quality of groundwater (see Section 2.2.2). Additional relevant legal instruments include those that:

- (a) Provide access to water for basic needs, as a matter of human rights. The human rights to water and sanitation, as well as the right to a safe, clean, healthy and sustainable environment, differ from water rights in that they are neither temporary nor subject to state approval, and in that they cannot be withdrawn. The General Assembly of the United Nations and the Human Rights Council recognize that equitable access to safe and clean drinking water and sanitation are human rights (UNGA, 2010; UNHRC, 2010). As such, groundwater resources need to be protected as part of the human right to a safe, clean, healthy and sustainable environment, which was recently recognized by the Human Rights Council (UNHRC, 2021). In places where water services are lacking or inadequate, households and communities' groundwater reliance is multiple times higher, with implications for states' duties to respect, protect and fulfil the right to safe drinking water in relation to resource protection. The role of the state ranges from advising end-users to protect 'their' groundwater resources, to supporting households whose wells have dried up due to recurrent drought (Grönwall and Danert, 2020).



In the majority of jurisdictions today, public or government ownership of groundwater is the norm

- (b) Afford access to groundwater for the livelihoods and small-scale productive uses of traditional communities, in fulfilment of customary law. Formal rules, however, may ignore customary law with the result that users are left without legal protection before formal water rights holders (Hodgson, 2016). Customary rules continue to play a significant role, for instance with respect to groundwater resources being perceived as belonging to the community, while rejecting the concept of individual rights. In much of Africa and Asia, customary water rights are intrinsically linked to land and embedded in land tenure systems (Mechlem, 2016; Meinzen-Dick and Nkonya, 2007). However, customary rules relating to water resources may be unfair or even discriminatory, and against the interests of women, children and minorities (Hodgson, 2016); where women and minority groups are denied formal land ownership, they may also be deprived of groundwater rights. The responsible governance of land tenure, fisheries and forests is inextricably linked with access to and management of other natural resources, such as groundwater (FAO, 2012).
- (c) Regulate land uses inimical to the natural groundwater recharge and discharge processes, and to the environment-support function of groundwater in relation to, in particular, wetlands and oases.
- (d) Regulate the formation and functioning of associations of groundwater users for allocation, monitoring and policing responsibilities at the common-pool groundwater level.

International water law identifies the rights and obligations of sovereign states in relation to rivers, lakes, basins and aquifers that are bisected by, form, or underlie (in the case of groundwater) an international boundary line. It has recently begun to specifically address aquifers and groundwater; a handful of treaties and agreements have been concluded by countries with specific regard to transboundary aquifers and groundwater (see Chapter 12).

2.2.1 Water rights – from private property rights to administrative entitlements

In the majority of jurisdictions today, public or government ownership of groundwater is the norm, and groundwater extraction and use are based on administrative entitlements such as individual permits, licenses or concessions that, in many jurisdictions, are time-bound and qualified as to volumes and rates of extraction (Salman and Bradlow, 2006; Nelson and Quevauviller, 2016; Groundwater Governance Project, 2016c; Burchi, 2018a). However, in some jurisdictions with sizeable populations, such as India, Pakistan, the Philippines and more than half of the states in the USA, groundwater rights are tied to land ownership and groundwater is regarded as private property (Closas and Molle, 2016; Tarlock and Robinson, 2019).

The Groundwater Governance Project has stressed the importance of bringing the resource into the public domain, despite the legal and practical challenges this may entail, thus enabling the state to assign use rights and to regulate extractions in line with the societal goals of sustainability, equity and efficiency (Groundwater Governance Project, 2016c). The transition of groundwater from the private to the public domain, however difficult in view of the political overtones, can be accomplished successfully (as has been the case in jurisdictions like Argentina, the Australian states of New South Wales and Victoria, Germany, Italy, Morocco, South Africa, Tanzania, Uganda and Zimbabwe) through legislation or through the pronouncements of the highest courts (Burchi, 1999, 2012, 2018a; Burchi and Nanni, 2003; Salman and Bradlow, 2006). In Spain, on the other hand, the attempt to switch from private to public groundwater ownership decreed by the 1985 Water Law stranded eventually, despite a favourable ruling of the Supreme Court, and the pre-1985 private owners can still enjoy usufructuary rights. New rights are, however, allocated under public property. This illustrates problems of gaining acceptance for such ownership transitions (Closas and Molle, 2016).

In some jurisdictions, groundwater is regulated in conjunction with surface water, including rivers. In others, it forms part of framework laws. More and more countries are strengthening their legal framework regarding groundwater, ranking it on a par with surface water regimes, protecting quantity as well as quality, and involving stakeholders to balance both private and public interests (Mechlem, 2016). Box 2.3 shows an example from Australia, where ‘share-based’ allocations and abstraction rights were introduced in order to manage groundwater withdrawals. The use of such resource extraction regulation can better balance the habitat and environment-support function of groundwater and aquifers with productive uses and other needs (Burchi, 2018a; Smith et al., 2016).

Box 2.3 Shifting from ‘volume-based’ to ‘share-based’ water abstraction rights in New South Wales (Australia)

The Australian state of New South Wales introduced a Bulk Access Regime by virtue of the Water Management Act (2000). The quantum of groundwater extracted from aquifers has shifted from a volumetric allocation to a variable share in the available groundwater from a given aquifer. Relevant extraction licences are made up of two parts: a ‘share component’, which entitles the licence holder to a share in the available groundwater from the aquifer; and an ‘extraction component’, which entitles the licence holder to take groundwater at specified times, rates and at specified locations from the given aquifer. The former is the linchpin of this sophisticated management and governance regime, and is determined on the basis of water sharing rules (including of surface water) and water sharing plans negotiated in a participatory manner in cyclical ten-year aquifer management plans (see Chapter 10) (Burchi, 2018a).

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Illegal emission and discharge of substances into water bodies or into the ground, or unlawful treatment of wastewater, in a way that cause major harm or risks to groundwater systems and/or human health, may be considered an offence or crime

It is worth noting that in some instances there are conflicts between groundwater rights and surface water rights, for instance in the case of a stream that is drying up due to intense groundwater pumping nearby, and vice versa. A conjunctive management approach holds promise to deal jointly with groundwater and surface water rights, as has been done in New South Wales, in Australia (Box 2.3).

2.2.2 Regulating pollution

Point sources of pollution – industrial discharge of wastewater (notably including injection wells), solid waste handling that can affect groundwater resources, and municipal sewers – can be regulated through permits as well as through general effluent and/or ambient water quality standards. Direct discharge of hazardous or toxic waste to groundwater has been outlawed in some jurisdictions (Burchi, 2018a). Non-point source pollution from diffuse or indistinct sources requires prevention measures: regulation of land uses and/or imposition of best agricultural and environmental practices. Just as for point-source pollution, these measures include: prohibiting or limiting certain polluting and water-using activities; limiting the use of pesticides, herbicides and fertilizers (especially to reduce nitrogen and phosphorus build-up); restricting certain cropping patterns; reducing animal grazing intensity; reclaiming land; and managing drainage (Mechlem, 2016).

Illegal emission and discharge of substances into water bodies or into the ground, or unlawful treatment of wastewater, in a way that cause major harm or risks to groundwater systems and/or human health, may be considered an offence or crime. Sanctions and penalties may be stipulated for discharges without a permit or in violation of one, under criminal, civil or administrative law. Enforcement efforts and the prosecution of polluters, however, are often challenging due to groundwater’s invisible nature.

2.3 Institutional aspects

Groundwater *governance* takes place at multiple scales and geographic levels, including at regional (such as the European Union) and transboundary scales. In contrast, groundwater *management* occurs more often at the micro- and meso-level. A variety of social/institutional, organizational, financial, and technical arrangements, as well as commonly accepted rules, practices and norms, shape access to groundwater. It is on the micro- and meso-level that attention should be focused to address the needs of the poor (Cleaver et al., 2005).

There is a diversity of stakeholders/actors in groundwater-related institutions, representing the public and private sectors, (regional) water authorities or committees, utilities, river basin organizations, communities, informal groups, and society at large. Part of the role of these institutions is to implement policy and law, to translate decisions into actions and ensure that regulations, governance procedures and mandated enforcement are carried out (Smith et al., 2016) on the basis of acquired information and knowledge about the groundwater systems. Government agencies commonly have the mandate for multilevel groundwater governance and management activities, but in practice their role may vary considerably from a top-down regulatory approach to a permissive, 'laissez-faire' position (Kemper, 2007). The assigned or allowed roles (or focus) of stakeholders can also be very different. For instance, local norms and institutions may influence divisions of labour and functions, which in turn shape the sourcing and allocation of water. Further, community organisations can be faction-ridden, gender-segregated and exclusionary (Cleaver et al., 2005). Where groundwater users operate as individuals or communities (including self-supply in urban areas, as well as farmer-led irrigation schemes), there may be few, if any, formal institutions through which governance can extend.

Performance of public agencies varies in practice from virtually inactive to proactive and effective, depending on the enabling framework (including regulations); the level of awareness of the importance of groundwater and of political commitment; budgetary allocation and, consequently, management capacity; leadership; and/or mandates. An additional factor is commercial and political pressures to over-exploit groundwater, alongside the overall political situation and the position of the government in the eyes of the local population (including mutual trust or the lack thereof).

A national government unit can ensure both vertical integration between the national and local level, and horizontal cooperation across different levels and at the interface with other sectors. At the river basin or aquifer system level, stakeholder organizations can play important roles in coordinating groundwater planning and management. Because groundwater is perceived (often incorrectly) as a local resource, decentralized organizations (including municipalities) have a critical role. However, an aquifer can extend beneath more than one river basin, which complicates river basin and aquifer governance and integrated water resources management. Governments should endeavour to seek the systematic engagement of stakeholders with the objective to create permanent mechanisms for stakeholder involvement. This can be in the form of water users associations and other fora (Groundwater Governance Project, 2016c).

According to the Groundwater Governance Project (2016c), the vision for a 'Global Framework for Action' involves effective institutions with the capacity to look ahead and plan, to be inclusive and legitimate in the eyes of the stakeholders, and to come to credible and verifiable commitments, with the following components:

- sound organizational design with adequate capacity for policy-making and public administration of resource use and pollution protection;
- mechanisms for permanent stakeholder engagement and participation to foster socially responsible attitudes and actions on groundwater as a common-pool resource;
- procedures for cross-sector coordination and co-management to allow groundwater issues to be adequately addressed in the policies and practices of linked sectors; and
- institutions for the management of groundwater resources that traverse intranational and international boundaries (where relevant).

Institutions, by themselves, are not enough to properly govern intra- and international groundwater/aquifers. They need to be accompanied by national (and sometimes subnational) policies (see Chapter 10) and laws to guide these institutions in their work.

River basin organizations seldom contemplate groundwater, partly due to a lack of knowledge and capacity in aquifer assessment and partly because of a historical institutional separation of surface water and groundwater. As a result, river basin planning becomes incomplete. In several parts of the world, though, cooperation has started and this suggests some emerging best practice, modelled on approaches used in transboundary river basin management (Groundwater Governance Project, 2016c).