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**Norms in multilevel groundwater governance and sustainable development**

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## **Chapter 5. Groundwater Governance at the Global Level**

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### **5.1 INTRODUCTION**

Much like other natural resources, groundwater requires carefully designed governance regimes that take into account complex hydrogeological conditions, drivers of anthropogenic use, ecosystems requirements, and misfits between political, administrative, and hydro(geological) boundaries. While groundwater is in many instances regarded as a local resource, taking a global perspective in this chapter has four key justifications: (a) understanding that the hydrological system, inclusive of recharging groundwater resources, is an integral part of other global resource systems (see 3.2); (b) acknowledging that global environmental and economic changes extend beyond national and regional geographic levels (see 3.3); (c) recognizing that local phenomena, such as overexploitation of groundwater resources can produce cumulative effects amounting to global-scale changes that require a global response (see 3.4); and (d) seeing that direct and indirect effects of (ground)water management decisions can have global consequences (see 3.4 and Vörösmarty et al. 2015).

This chapter analyses the normative architecture of global groundwater governance by analyzing law and policy documents. The contents of these texts reflect the formal outcomes of interactions between national governments, but also the inputs of non-state actors present as observers (Dellapenna and Gupta 2008). Hence, this chapter examines the current status of global groundwater governance and its related normative framework through the subsidiary questions: (1) How have groundwater governance frameworks evolved at the global level? (2) How are hydrogeology, ecosystems services and the drivers of groundwater problems taken into account at the global level? (3) Which groundwater governance principles have been included in these governance frameworks at the global level? (4) How does legal pluralism manifest at the global level? (5) How can current designs of the normative architecture become consistent with sustainable and inclusive development at the global level?

In response, this chapter first provides a brief account of the evolution of (ground)water governance at the global level, drawing on my previous work (Conti 2015), while assessing the evolution and current status of the global groundwater governance framework through a review of laws and policies (see 5.2). Next, using a legal pluralism approach it discusses the current state of groundwater governance by exploring the patterns in principles used (see 5.3). Then it analyses the potential for the framework to contribute to sustainable development in light of the drivers of groundwater problems and the patterns (see 5.4). And finally, the subsidiary questions for this chapter are answered and inferences are drawn (see 5.5).

### **5.2 EVOLUTION OF GLOBAL GROUNDWATER GOVERNANCE**

#### **5.2.1 Overview of the Global Governance Framework**

The codified norms of global groundwater governance stem from developments in treaties on rivers and aquifers, legal codes prepared by legal scholars, adjudication on water issues, as well as national and regional water laws. At present, the primary purpose of global groundwater governance is to ensure that transboundary groundwater resources are equitably and peacefully shared between states and that no significant transboundary harm to the resource or persons utilizing it occurs. There are 16 laws and policies related to groundwater. The agreements that were negotiated at the global level or are globally applicable are assessed here, notwithstanding that they would actually be applied to the governance of groundwater resources at the transboundary level. Some of them are binding global conventions; non-binding declarations or goals agreed upon by countries; or non-binding legal rules developed by scholarly communities; and documents with indeterminate legal status. Nevertheless, all have relevance to groundwater governance which is discussed in more detail in the following section.

The international codification of principles for governing international rivers began in the early 20th century. The non-governmental organization – the International Law Association (ILA) - developed the non-binding

Helsinki Rules on the Uses of the Waters of International Rivers [Helsinki Rules] (ILA 1966) as a first step towards codifying all customary international law on transboundary waters (Dellapenna 2011; Mechlem 2003). In 1971, the Convention on Wetlands of International Importance Especially as Waterfowl Habitat, [Ramsar Convention] (UNESCO 1971), was adopted, for the purpose of protecting highly-sensitive and important wetland ecosystems, many of which rely on groundwater discharge. One year later, the Declaration of the United Nations Conference on the Human Environment [Stockholm Declaration] (1972) launching global environmental governance by addressing human-environment interactions discussed water resources in the Preamble and Principle 2. The Mar del Plata Action Plan and Recommendations [Mar del Plata] (1977) emerged from the world's first water conference and encapsulated the existing normative framework for water resources management. It also mentioned groundwater in the sections on water supply for human consumption and agricultural use. The ILA's non-binding 1986 Seoul Rules on International Groundwaters [Seoul Rules] (1986) was the first text where aquifers – rather than groundwater – were the subject. Consequently, the Seoul Rules represent the first compilation of norms for all types of transboundary groundwater resources.

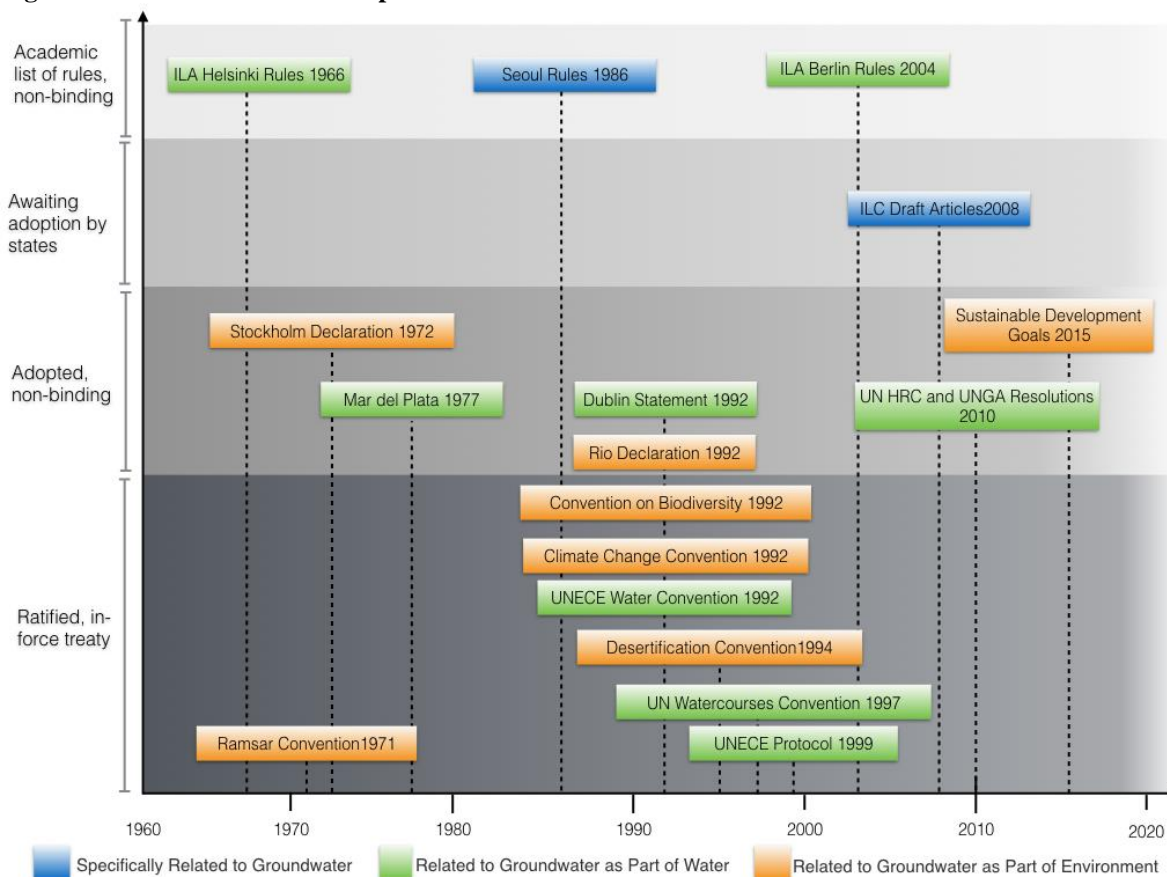
The 1992 UN Conference on Environment and Development yielded three key texts that have a notable contribution to the normative framework of groundwater governance: (1) the United Nations Declaration on Environment and Development [Rio Declaration] (UNCED 1992a), (2) the United Nations Framework Convention on Climate Change [UNFCCC] (UNFCCC 1992), and (3) the United Nations Convention on Biodiversity [UNCBD] (UNCED 1992b). The Rio Declaration further developed the Stockholm principles (Dellapenna and Gupta 2009) and provides authoritative global policy guidance on sustainable development relevant to all environmental resources, including groundwater. The UNFCCC was the first global convention seeking to mitigate the impacts of climate change, many of which are related to the hydrological cycle. Along a similar vein, the 1994 United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa [UNCCD] (UNGA 1994) was adopted to address the negative impacts of land use change and climate variability on food production, socio-economic opportunity and water resource sustainability.

In the 1990's there were also legal developments specifically related to water. In 1992, the regional legally-binding UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes was adopted. Although originally a regional Convention, it is discussed here because amendments to Articles 25 and 26 allow all UN member states to accede to this Convention (UNECE 2003) making it global in scope. Its Protocol on Water and Health (UNECE 1999) protects human health and well-being by improving water management. In February 2014, the UNECE adopted Model Provisions on Transboundary Groundwater Management (Model Provisions). They “provide practical guidance” and “offer assistance” to the parties so they can create agreements for groundwater sustainability, management and protection (UNECE 2014: 4). In 1997, the UN General Assembly (UNGA) adopted the UN Watercourses Convention. This closed the UN's International Law Commission's (ILC) 30-year process that was inspired by and built upon the Helsinki Rules. As of 2014, it is in force and binding upon all 35 ratifying parties. However, aquifers that lack hydrological connection to surface water remain outside of the scope of the UN Watercourses Convention.

In the 2000's, the international legal community started to include all types of groundwater in the scope of its texts. In 2004, the scholars in ILA adopted the non-binding Berlin Rules on Water Resources [Berlin Rules] to update the Helsinki Rules which includes codified and customary international law applicable to water resources and applied it to all international waters (Dellapenna 2011). It includes a unique dedicated chapter on groundwater and suggests the rules are applicable both to transboundary and national resources insofar as these are linked (ILA 2004b). Then in 2008, the UNGA adopted a Resolution on the ILC's Draft Articles on the Law of Transboundary Aquifers [Draft Articles] (ILC 2008). The contents of the Draft Articles are still being debated in the UN General Assembly and there has been no further development of the law of transboundary aquifers at the global level as of December 2016.

Most recently, there has been progress regarding the human right to water and sanitation and sustainable development. The UN Human Rights Commission and UNGA adopted two separate resolutions on the human right to water and sanitation in 2010 (UN HRC 2010; UNGA 2010), both recognizing the human right to water and sanitation as a composite right linked to other human rights, such as the right to life and human dignity. In September 2015, the UN member states adopted the SDGs (UN SDGs 2015). The SDGs build directly upon the structure of the 10 Millennium Development Goals (MDGs 2000) and expand to 17 Goals with 169 targets, many of which are directly related to water resources (see Figure 5.1).

**Figure 5.1 Timeline of the Development Global Governance Framework**



## 5.2.2 Current Status of the Global Groundwater Governance Framework<sup>9</sup>

This section elaborates on the current status of the groundwater governance framework. These laws and policies share certain attributes and differ in other characteristic, the analysis of which is the subject of the subsequent sections.

### *The Helsinki Rules on the Uses of the Waters of International Rivers (ILA Helsinki Rules), 1966*

In drafting the ILA Helsinki Rules, legal scholars made a first step towards the formal codification of rules for managing international fresh waters. The document defines its scope as ‘International Drainage Basins,’ namely a “geographical area extending over two or more States...including surface and underground waters flowing to a common terminus.” This includes groundwater that is hydrologically connected to a

<sup>9</sup> This section draws upon research presented in Conti, K. I. and J. Gupta (2016), “Global governance principles for the sustainable development of groundwater resources,” *International Environmental Agreements: Politics, Law and Economics*, Vol.16 (6), pp. 849-781.

transboundary surface water resources and flows into a common discharge area such as the ocean or a lake; but, it excludes several other forms of groundwater (see Table 5.1). It describes how states should interact regarding human uses, contamination, navigation, timber floating, dispute prevention and resolution, and information exchange. However, it does not set up an implementation process or body, a financing mechanism, nor strict guidelines for groundwater allocation. Although it is a non-binding text, it includes both substantive and procedural principles, focused on equitable utilization and dispute resolution and prevention in accordance with state practice of international law. States further developed and integrated these principles into the legally-binding 1997 UN Watercourses Convention (see below), thus increasing their legitimacy. Furthermore, a revised and more updated version of the Helsinki Rules was prepared in the 2004 Berlin Rules (see below).

### ***Convention on Wetlands of International Importance, especially as Waterfowl Habitat (UNESCO Ramsar Convention), 1971***

The Ramsar Convention is a legally binding international treaty that protects highly-sensitive and important wetland ecosystems, many of which rely on groundwater discharge (UNESCO Ramsar Convention 1971). It is designed to protect the ecological functions of wetlands as well as their economic, cultural, scientific, and recreational values. Ramsar has a relatively wide scope with regard to its definition of a wetland (see Table 5.1). Further, there are nine criteria which enable wetland sites to be placed on the Ramsar list including representativeness, uniqueness or rarity; species and ecological communities; presence of waterbirds; presence of fish; and presence of “other taxa” (The Secretariate of the Convention on Wetlands n.d.). The Ramsar List now includes over 2,186 sites covering 208,449,277 ha (The Secretariate of the Convention on Wetlands 2017). It includes both procedural and financing mechanisms establishing a secretariat, regular Conferences of the Parties (CoPs) and contributions by each contracting party. The main implementation requirements of the Ramsar Convention are procedural, ensuring that parties maintain a list of wetlands and document any changes to their condition, designation or delineation. Given that the Convention was created prior to the Stockholm and Rio Declarations, it does not contain many of the principles included in the contemporary global environmental governance regime. Since many wetlands depend either partially or completely on groundwater to sustain their freshwater flows, conservation and utilization of wetlands have indirect impacts on groundwater resources and vice versa.

### ***The Stockholm Declaration of the United Nations Conference on the Human Environment (UN Stockholm Declaration), 1972***

A primary outcome of the first world environmental conference was that the participating states adopted the non-binding Stockholm Declaration (UN Stockholm Declaration 1972). The Stockholm Declaration is one of the first governance texts addressing human relationships with the environment. It is thus considered an early international environmental law. Its scope includes environmental conservation and protection of wildlife, habitats, oceans, and various non-renewable resources. It also details policy approaches, urban planning, science and technology. The Declaration introduces key principles including the protection of ecosystems, sustainable development and pollution prevention. This political Declaration does not explicitly establish a process, financing mechanism or resource allocation. The Stockholm Declaration is a landmark environmental policy and its influence and applicability to groundwater is notable (Sands and Peel 2012). While groundwater is not specifically mentioned in the Declaration, water resources are generally discussed in the Preamble and Principle 2. Additionally, its principles also appear in future texts, which are directly applicable to groundwater resources. The contents of the Stockholm Declaration are further developed in, inter alia, the 1992 Rio Declaration.

### ***United Nations Mar del Plata Action Plan on Water Development and Management (UN Mar del Plata), 1977***

In Mar del Plata, Argentina, officials from all over the world met for the first time to discuss the state of water resources and how those resources should be appropriately utilized for human development. The outcomes of this meeting were the Mar del Plata Action Plan and Recommendations (UN Mar del Plata 1977). Neither the Action Plan nor the Recommendations contained therein are legally binding, but they are considered influential in the evolution of global water policy. At the time, they incorporated the contemporary wisdom on international and domestic legal principles applicable to water resources management. The recommendations cover topics including assessment of water resources; human access to potable water and sanitation; technology transfer for pollution prevention; public participation in water resources development; efficient water uses; and cost recovery mechanisms. It also recommends that international donors increase financial contributions and countries establish revolving funds for financing water management and service provision. Further it suggests that a clearing house for water project implementation be created to facilitate implementation. There are no explicit guidelines regarding allocation. Given the range of issues addressed, the Action Plan has clear implications regarding the management of groundwater resources. Groundwater is specifically mentioned in the Plan's sections on water supply for human consumption and agricultural use.

### ***The ILA Seoul Rules on International Groundwaters (ILA Seoul Rules), 1986***

The ILA Seoul Rules on International Groundwaters (ILA Seoul Rules 1986), although not legally binding, is the first text where international aquifers – rather than international groundwater – are the subject of the rules (see Table 5.1). The Seoul Rules went beyond the Helsinki Rules to include “the waters of an aquifer that is intersected by the boundary between two or more States [...] whether or not the aquifer and its waters form surface waters part of a hydraulic system flowing into a common terminus” (Article I, emphasis added). Overall, they call for the protection of the quality and quantity of groundwater and the integrated management of surface and groundwater. The Seoul Rules represent the first scholarly endeavor to design guidance for the sustainable use of transboundary groundwater. Consequently, management of non-recharging aquifers and consideration of conjunctive use of groundwater and surface water resources are taken into account for the first time here. However, like the Helsinki Rules, they do not put in place a process, financing mechanism, or resource allocation. The content of the Seoul Rules was incorporated in the future development of the 2004 ILA Berlin rules and to some extent by 2008 ILC Draft Articles.

### ***International Conference on Water and the Environment Dublin Statement on Water and Sustainable Development, 1992***

The International Conference on Water and the Environment (ICWE) took place in Dublin, Ireland where 100 countries and eighty international, intergovernmental and non-governmental organizations discussed water in the context of sustainable development. It adopted the Dublin Statement (ICWE Dublin Statement 1992) in preparation for the United Nations Conference on Environment and Development (UNCED) occurring later that year. The statement includes four guiding principles, which are often considered to be the foundation of IWRM: (1) water is a finite resource, (2) water policy development should be based on a participatory approach, (3) women play a central role in water provision and management, and (4) water has an inherent value and is an economic good. The Statement is non-binding and does not set up an implementation process, financing mechanism or address allocation in its text, although recommendations on these issues were detailed in the conference report.

### ***The Rio Declaration on Environment and Development (UN Rio Declaration), 1992***

In 1992, at the UNCED, all participating states negotiated and adopted the Rio Declaration on Environment and Development (UN Rio Declaration 1992b) and Agenda 21 as a non-binding action plan (Agenda 21 1992). Agenda 21 is referenced in this chapter's discussion where relevant. This conference, held twenty

years after Stockholm, developed the Stockholm Declaration further into the Rio Declaration (Dellapenna and Gupta 2009). It is considered the authoritative normative framework for addressing environmental and development issues and its scope includes all environmental resources, including groundwater. The Declaration includes 27 legal principles reflecting the emerging, progressive environmental and development principles of the time, such as public participation in environmental decision making, the precautionary approach, the polluter pays principle, Environmental Impact Assessment (EIA) and the rights of indigenous peoples (UN Rio Declaration 1992). Agenda 21, the related policy document, provides broad guidance regarding implementation processes (Chapter 38) and financing (Chapter 33). There is no explicit guidance for resource allocation regimes.

### ***United Nations Convention on Biological Diversity (UNCBD), 1992***

The legally-binding UNCBD was opened for signature at the 1992 Rio Earth Summit. It has nearly universal membership, with all countries as parties and only the United States not having ratified it. The objective of the treaty is “the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources” (UNCBD 1992: Article 1). The scope of its provisions includes all biological resources, particularly equitable sharing of benefits that are derived from their use. The 2000 Cartagena and 2010 Nagoya Protocols deal with protecting species from the effects of biotechnology (e.g. biosafety) and have elaborate provisions for fair and equitable sharing of benefits from biological resources, respectively.

UNCBD delineates an implementation process via a Secretariat and CoPs. It also establishes a funding mechanism with contributions from participating states, among others. The UNCBD is relevant for groundwater governance since the protection of, utilization of and trade in groundwater dependent species (e.g. plants in semi-arid and arid climates) can have a bearing on groundwater governance.

### ***United Nations Framework Convention on Climate Change (UNFCCC), 1992***

In 1992, the UNFCCC was also opened for signature at UNCED and is the only global environmental treaty dealing directly with climate change (IPCC 1992). It has universal membership having been ratified by 196 states. The treaty aims at “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC 1992: Article 2); and specified that developed countries (Annex I countries) were to stabilize or reduce greenhouse gas emissions to 1990 benchmark levels by the year 2000. Its Kyoto Protocol includes emissions limits (i.e. cap and trade) and enforcement mechanisms. The 2015 Paris Agreement updates these countries commitments to keep global temperature from rising beyond 1.5-2° Celsius with respect to pre-industrial levels and has entered into force. The ongoing REDD+ program also incentivizes GHG sequestration via forest and land conservation. In addition to GHG allocation/mitigation mechanisms, the UNFCCC includes an implementing secretariat, a scientific body, and financing mechanisms. There is a clear connection between climate change and groundwater resources both directly through salt water intrusion and indirectly through effects of groundwater recharge (see 3.5).

### ***United Nations Economic Commission for Europe Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Convention), 1992***

The UNECE Convention was one of the first water laws enacted at the regional level (UNECE Convention 1992). At the time of its adoption, the UNECE Convention was open only to countries from the UNECE Region. On February 6, 2013, an amendment, which allows all UN member states to accede to the Convention, gathered enough parties to enter into force. In 2015, all parties ratified the amendment and the UNECE Convention is now considered a ‘global’ water convention. If it is ratified by countries outside the UNECE region, it is likely to become more universal in its application (United Nations Economic Commission for Europe 2003), although the legitimacy of the Convention for non-UNECE states may be reduced considering that they did not participate in its negotiation. The Convention (1992: Art. 1) covers

“ground waters...which mark, cross or are located on boundaries between two or more States”. Therefore, it includes all groundwater regardless of the direction of flow or hydrological connection to surface waters. Its hallmark attribute is that its implementation requires all parties to the convention that share a transboundary water resource to form a joint body, such as a river basin organization, for the purpose of managing and protecting the resource. The Convention’s implementation is overseen by the secretariat and evaluated during the Convention’s Meeting of the Parties.

Since the adoption of the Convention, the parties have adopted a Protocol on Water and Health and Model Provisions on Transboundary Groundwater. The UNECE Protocol on Water and Health under the UNECE Convention entered into force on August 4, 2005 (United Nations Economic Commission for Europe 1999). The Protocol aims to protect human health and well-being through improved water management. It addresses issues related to water resources management and ecosystem health, but primarily focuses on disease prevention. Although the Protocol focuses on the prevention of water-borne disease via pollution prevention and control, its scope is transboundary surface water and groundwater like the UNECE Convention. Since it is a Protocol to the Convention, the same implementation processes, and financing mechanisms apply. In 2014, the UNECE adopted Model Provisions on Transboundary Groundwater, which incorporate the aquifer concept insofar as they apply both to the geologic formation and the groundwater contained therein.

### ***United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD), 1994***

The UNCCD is a legally-binding Convention that aims to combat desertification and mitigate the effects of drought (UNCCD 1994: Article 2), including negative impacts of land use change and climate variability on food production, socio-economic opportunity and water resource sustainability. While the Convention has 195 parties, making participation nearly universal, the geographical scope focuses on countries experiencing ‘serious drought and/or desertification, particularly in Africa.’ It is designed to achieve these goals through long-term strategies bolstered by international cooperation and emphasizes public participation, exchange of information, and cooperation. Overall implementation is coordinated via its secretariat but it also employs regional, sub-regional and national action programs to decentralize implementation (Danish 1995; Mwangi and Wagner 2010). Financing for implementation occurs through a “Global Mechanism” backed by the Global Environment Facility. Land degradation in arid, semi-arid, and dry sub-humid areas –where populations tend to have a high dependency on groundwater resources – has significant implications for sustainable groundwater development. Lack of sufficient rainfall, runoff and/or groundwater recharge to sustain populations in these locales is a significant challenge interfacing with groundwater governance.

### ***The United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UN Watercourses Convention), 1997***

About 30 years after the ILC was asked to draft a water law, they finalized the draft Convention on the Law of the Non-Navigational Uses of International Watercourses, which was adopted in 1997 (UN Watercourses Convention 1997). There were very few ratifications of this Convention till an NGO campaign began to promote its entry into force. In 2016, it had 35 ratifying countries and has entered into force. It is globally negotiated with signatories from every region of the world. The UN Watercourse Convention articulates substantive norms and procedural rules for countries sharing international watercourses. However, it does not explicitly require particular allocation regimes nor does it include an implementation process or financing mechanism.

This Convention’s scope includes international watercourses, which are defined as a “system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus [...] parts of which are situated in different States” (UN Watercourses Convention 1997: Article 2(a)). This Convention focuses on surface water resources and where appropriate hydrologically connected groundwater resources. There is debate as to whether the scope applies to (1) an aquifer hydrologically connecting two surface water resources with different termini and/or (2) where a



confined aquifer connects an unconfined aquifer or surface water resources but still constitute distinct systems as opposed to a ‘unitary whole’ (Mechlem 2003). Legal experts are gradually refining this debate including those in the ILA and ILC (for further information see the 2011 Special Issue from International Community Law Review on the Transboundary Aquifers as a Concern of the International Community, Cathrine Brölmann ed.).

### ***The International Law Association Berlin Rules on Water Resources (ILA Berlin Rules), 2004***

The ILA Berlin Rules on Water Resources were designed as an update to the Helsinki Rules of 1966 (ILA Berlin Rules 2004). Consequently, the rules are an extensive, scholarly text which gathers both codified and customary international law applicable to water resources. It includes 70 Articles, covering national and international waters, surface and ground water, water dependent ecosystems, and navigation. The provisions apply to groundwater that is connected to surface water and flowing into a common terminus as well as aquifers both hydraulically connected and disconnected from surface water. The Berlin Rules are also the second international legal text to give specific attention to groundwater. This chapter includes groundwater-specific principles such as conjunctive use and management (ILA Berlin Rules 2004: Chapter VIII). There is debate among legal scholars regarding the scope and legitimacy of the Berlin Rules (Bogdanovic et al. 2004; Dellapenna and Gupta 2008) because it suggests that states apply the provisions both to transboundary and national water resources “as appropriate” (ILA Berlin Rules 2004: Article 1.2). Chapter XI goes on to suggest mechanisms for implementation (including ‘joint management arrangements’) as well as provisions for sharing expenses. However, it does not set out an explicit allocation regime.

### ***The ILC Draft Articles on the Law of Transboundary Aquifers (ILC Draft Articles), 2008***

The Draft Articles (ILC 2008: Articles 2(a) and 2(c)) provide a legal definition of an aquifer as “a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation” and includes all aquifers where its “parts ... are situated in different States”. The Draft Articles have been reviewed thrice by UN member states, but are yet to be adopted, thus lacking a key element of legality. At the last UNGA discussion in 2013, delegates disagreed about whether the Draft Articles should be a declaration of principles, an international framework convention, or remain a non-binding text given the lack of scientific and technical knowledge on groundwater. Consequently, “the law of transboundary aquifers” was for the third time commended to the attention of governments in a resolution passed at the UNGA’s 71<sup>st</sup> session in November 2016. No final form was given to the Draft Articles and it is now a provisional agenda item for the 74<sup>th</sup> session of the UNGA.

Rooted in the approach of the 1986 ILA Seoul Rules, its designers also sought to shift the scope from groundwater to aquifers for the purpose of creating a more precise foundation for legal regimes for groundwater protection (Eckstein 2007). Consequently, the text of the Draft Articles reads similarly to the text of the UN Watercourses Convention, with a few notable differences. First, the subject of the Draft Articles is aquifers and aquifer systems rather than watercourses flowing into a common terminus. Second, new legal principles are introduced, for example, the protection of recharge zones (also included in Article III.2(a) of the 1986 Seoul Rules and Article 41 of the 2004 ILA Berlin Rules).<sup>10</sup> Third, existing legal principles are expanded and tailored to the needs of groundwater resources (e.g. a countries’ territory contributing ‘to the formation and recharge of the aquifer or aquifer system’). Lastly, issues of conjunctive uses of surface water and groundwater resources are explicitly addressed. However, like the UNWC, there are no implementation or financing mechanisms nor an explicit allocation regime.

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<sup>10</sup> Both the 2004 ILA Berlin Rules and the 2008 ILC Draft Articles include protection of discharge zones as well.

***The UN Human Rights Commission Resolution on Human Rights and Access to Safe Drinking Water and Sanitation and The UNGA Resolution on the Human Right to Water and Sanitation (UN HRC/UNGA), 2010***

The UNGA resolution calls upon countries and international organizations to bolster efforts to achieve the fulfillment of the human right to water and sanitation through increased financing, capacity-building, and technology transfer. Further, the UN HRC resolution calls for clarification of the right in international law and places the primary responsibility upon states to ensure its realization, even if engaging with third-party providers. It also links the fulfillment of these rights to specific principles including but not limited to developing legislation, plans and strategies for realizing the right; transparency in planning and implementation; respecting non-discrimination and gender equality; incorporating the right into EIAs; and accountability for human rights violations. While they were agreed to by states, they are not legally binding. Further, they do not include implementation processes or financing mechanisms. Nevertheless, taken together, these non-binding texts advance rights-based approaches (e.g. approaches that explicitly including the human right to water and sanitation and rights of marginalized groups in text, going beyond general equity principles) within the sphere of (ground)water governance— and thus have implications for groundwater use and development.

***UNGA Resolution on Transforming our World: the 2030 Agenda for Sustainable Development (UN SDGs), 2015***

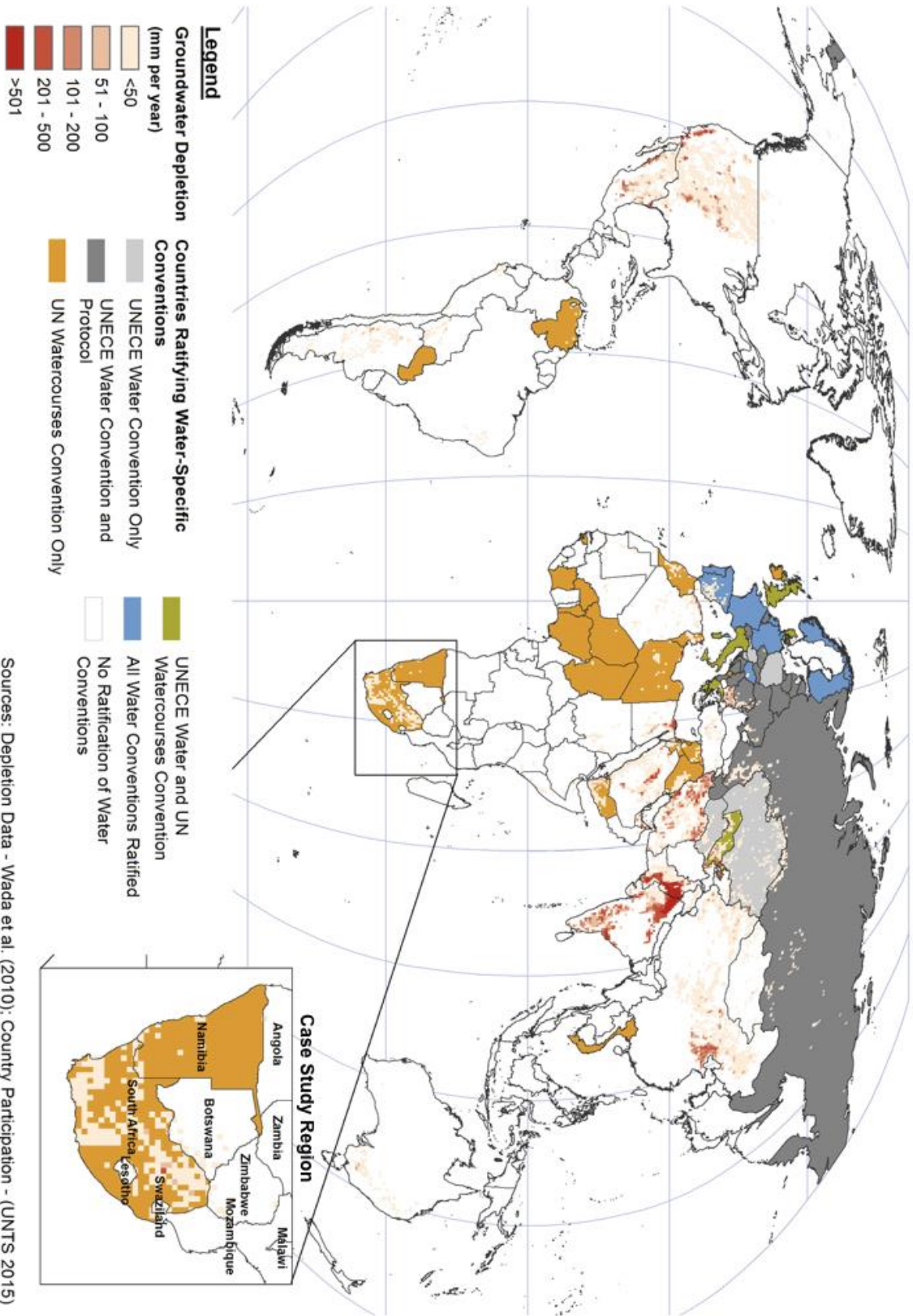
In 2015, the UNGA adopted the Sustainable Development Goals (SDGs). The SDGs and its targets provide a ‘plan of action’ that integrates the objectives of achieving environmental sustainability and poverty eradication and development by 2030. It envisions “a world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene.” This vision is elaborated specifically in Goal 6, which is to ensure the availability and sustainable management of water and sanitation for all. The protection and restoration of aquifers (Target 6.6) is the only specific mention of groundwater in the goals, but groundwater is included implicitly throughout as water. Further, a majority of the targets outside of Goal 6 have some linkage with water resources, examples of some of the most direct links being ending hunger (Target 2.1), doubling food production (Target 2.3), increasing substantially the share of renewable energy (Target 7.2), and coping with climate-related disasters (Target 13.1). Goal 17 explicitly addresses implementation via financing and multi-stakeholder partnerships among others. Monitoring of the goals is also overseen by the UN Statistics division. However, each country is responsible for advancement towards the goals and there is no centrally coordinated implementation mechanism, as such.

### **5.2.3 Implications of the Global Governance Framework’s Evolution**

Analyzing the evolution of global groundwater governance shows that although the relevant agreements were all concluded within a 50-year timeframe and in relatively quick succession, they were the outcomes of various types of actors and fora – ranging from international conferences convening UN member states for a specific purpose, ongoing deliberations of UN member states in the General Assembly, to epistemic communities of international lawyers. Thus, there are clear implications regarding (1) the speed of their development, (2) country participation, (3) purpose and principles, (4) and how they define and align with the groundwater resource scale. The latter two issues are analyzed using a legal pluralism lens (see 5.3.3).

This review shows that the evolution of global groundwater governance has been non-linear, influenced by developments in different fora, and the pace of developments is slowing. Figure 5.1 shows that groundwater-related laws and policies began about 50 years ago, progressing slowly for the first 25 years and developed along an accelerated trajectory between the years 1990 and 2000. Progress has since slowed down. This implies that the momentum for groundwater-related treaty-making at the global level may have passed, especially considering the stalled status of the 2008 ILC Draft Articles. This raises the question: Why have developments in global groundwater governance stalled? In light of the more developed state of

Map 5.1 Countries' Ratification of Water Specific Conventions and Groundwater Stress



**Table 5.1 Global governance texts related to groundwater and the units of groundwater addressed**

Text	SUBJECT(S)	SCOPE	TYPES(S) OF GROUNDWATER		
			Included	Excluded	Ambiguous
<b>ILA Helsinki Rules</b>	Underground water connected to an International Drainage Basin	Watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus	<ul style="list-style-type: none"> <li>• Groundwater from unconfined aquifers, recharging &amp; discharging in basin</li> <li>• Groundwater from unconfined aquifers, only discharging in basin</li> <li>• Groundwater in unconfined aquifers, which is the common terminus of a watercourse</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater in unconfined aquifers, only recharging in basin</li> <li>• Groundwater in confined, non-recharging aquifers</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater linking multiple surface water bodies with different termini</li> <li>• Distinct groundwater systems with links to surface water</li> <li>• Multilayer aquifer systems</li> </ul>
<b>UN Stockholm Declaration</b>	International Environmental Resources	Providing ‘a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment.’	Indirectly includes groundwater as part of the human environment		
<b>UNESCO Ramsar Convention</b>	Wetlands of International Importance	‘Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (i.e. wetlands) that have international significance in terms of ecology, botany, zoology, limnology or hydrology and/or have international importance to waterfowl at any season’	Indirectly includes groundwaters contributing to wetlands	-	-
<b>UN Mar del Plata</b>	International Water Resources	Groundwater implicitly included under all “shared waters”	All shared waters	National groundwater resources	-
<b>ILA Seoul Rules</b>	Transboundary Aquifer within an International Basin	<p>An aquifer that contributes water to, or receives water from, surface waters of an international basin that constitutes part of an international basin for the purposes of the Helsinki Rules</p> <p>An aquifer intersected by the boundary between two or more States that does not contribute water to, or receive water from, surface waters of an international drainage basin constitutes an international drainage basin for the purposes of the Helsinki Rules</p>	All transboundary aquifers	Groundwater outside an aquifer National groundwater resources	-
<b>UN Rio Declaration</b>	International Environmental Resources	Establishing a new and equitable global partnership through the creation of new levels of co-operation among States, key sectors of societies and people, working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system	Indirectly includes groundwater as part of the human environment	-	-

<b>UN Framework Convention on Climate Change</b>	Greenhouse Gas Stabilization	Climate system meaning the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions	Indirectly includes all groundwater active in hydrological cycle		
<b>UNECE Convention</b>	Transboundary Surface and Groundwater	Any surface or ground waters that mark, cross or are located on boundaries between two or more States	All transboundary groundwater*	National groundwater resources	-
<b>UN Desertification Convention</b>	Areas Potentially Experiencing Serious Drought and/or Desertification	Combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, using long-term integrated strategies that focus on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level	Indirectly includes groundwater resources as part of water resources	-	-
<b>UN Watercourses Convention</b>	International Watercourse (Surface Water and Connected Groundwater)	A system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus	<ul style="list-style-type: none"> <li>• Groundwater from unconfined aquifers, recharging &amp; discharging in basin</li> <li>• Groundwater from unconfined aquifers, only discharging in basin</li> <li>• Groundwater in unconfined aquifers, which is the common terminus of a watercourse</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater in unconfined aquifers, only recharging in basin</li> <li>• Groundwater in confined, non-recharging aquifers</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater linking multiple surface water bodies with different termini</li> <li>• Distinct groundwater systems with links to surface water</li> <li>• Multilayer aquifer systems</li> </ul>
<b>UNECE Protocol</b>	Transboundary Surface and Groundwater	Any surface or ground waters which mark, cross or are located on boundaries between two or more States	All transboundary groundwater*	-	-
<b>Berlin Rules on Water Resources</b>	International and National Water Resources	All aquifers, including aquifers that do not contribute water to, or receive water from, surface waters or receive no significant contemporary recharge from any source.	All transboundary aquifers and national aquifers connected to transboundary surface waters	-	-
<b>ILC Draft Articles</b>	Transboundary Aquifers	Transboundary aquifers and aquifer systems where: “Aquifer” means a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation; “Aquifer system” means a series of two or more aquifers that are hydraulically connected	All transboundary aquifers and aquifer systems	Groundwater outside an aquifer	

#### SUMMARY COUNT OF SUBJECTS/SCOPES

5	International or transboundary environment and/or non-water environmental resources
2	International or transboundary watercourses
3	All international or transboundary fresh water (either surface water “and groundwater” or “and aquifers”)
2	International or transboundary aquifers specifically

\*Note the UNECE Model Provisions also include geologic formation containing and allowing flow of groundwater  
Note: This table is an updated and expanded version of Table 2 in Conti and Gupta (2015:855).

environmental law, it also implies that groundwater governance at the global level may need to leverage issue linkages, such as those offered in the SDGs, in order to further develop and remain on the global policy agenda (see 10.5).

Map 5.1 shows the lack of country participation in direct water-related conventions, in contrast to the many global environmental conventions which have nearly universal ratification. Further, none of the top ten groundwater abstracting countries are party to any water conventions and very few countries with groundwater depletion greater than 200mm per annum (red and dark red areas) are party to water conventions. Thus, countries facing water shortages are not willing to be steered by global-level agreements. In the face of increasing (ground)water scarcity, this trend may become further exacerbated as countries are less willing to discuss direct water-related issues than broader environmental issues at the global level (cf. Gupta 2016).

### **5.3 PATTERNS AND LEGAL PLURALISM IN GLOBAL GROUNDWATER GOVERNANCE**

Using a legal pluralism lens, this section assesses the normative patterns in the global groundwater governance framework focusing on scope, content, procedures and actor participation. The additional characteristics of codification, legality, legitimacy and formality are discussed where relevant.

#### **5.3.1 Groundwater in the Scopes of Global Governance Texts**

Scopes vary within (ground)water texts and are still subject to interpretation and debate in the legal community (see Table 5.1). (Ground)water laws and policies define groundwater differently from each other and there is a clear distinction between the recommendations from legal academics and the final definition of the scope as determined by states. Academics recommend including all types of groundwater resources in treaty scopes (e.g. ILA Seoul and Berlin Rules), while countries opt to include specific types of groundwater resources and not necessarily include the geological formation - with the exception of the UNECE Water Convention and ILC Draft Articles, the latter of which has not yet been adopted. Environmental laws and policies primarily address resources or challenges affected by the global hydrologic cycle. Although groundwater resources implicitly fall under their scopes or objectives, they have not played a prominent role during the implementation and elaboration of these agreements.

These schisms imply that understanding of the hydrogeological component of groundwater governance is underdeveloped – perhaps due to lack of capacity or data availability within countries. It further indicates that most groundwater laws and policies do not define their scopes or relate their scopes to aquifers, nor do they take into consideration the key groundwater characteristics of storage, flow, pressure and quality (see 3.3).

#### **5.3.2 Patterns in Use of Principles**

This section builds upon the content analysis of the global groundwater governance framework in order to analyze the patterns therein. The outcomes of the content analysis are depicted in Table 5.2. Given that the SDGs do not contain principles as such, the SDGs are not included in the content analysis.

**Table 5.2 Inclusion of principles in the global groundwater governance framework**

	1966 ILA Helsinki Rules	1971 UNESCO Ramsar Convention	1972 UN Stockholm Declaration	1977 UN Mar del Plata Declaration	1986 ILA Seoul Rules	1992 ICWE Dublin Statement	1992 UN Rio Declaration	1992 UN CBD	1992 UNECE Convention	1992 UNFCCC	1994 UNCCD	1997 UN Watercourses Convention	2004 ILA Berlin Rules	2008 ILC Draft Articles	2010 UNHCR/UNGA	2015 UN SDGs
<b>POLITICAL PRINCIPLES</b>																
CBDR																
Exchange of Information																
Notification of Emergency Situations																
Notification of Planned Measures																
Obligation to Cooperate																
Peaceful Resolution of Disputes																
Sovereignty																
<b>ENVIRONMENTAL PRINCIPLES</b>																
Aquifer/basin as the Unit of Management																
BATT																
Conjunctive Use																
EIA																
Invasive Species																
Monitoring																
Pollution Prevention																
Precautionary Principle																
Protected Areas for (Ground)water																
Protected Recharge and Discharge Zones																
Protection and Preservation of Ecosystems																
Subsidiarity																
Water as a Finite Resource																
<b>SOCIAL PRINCIPLES</b>																
Capacity Building																
Equitable and Reasonable Use																
Human Right to Sanitation																
Human Right to Water																
Intergenerational Equity																
Poverty Eradication																
Prior Informed Consent																
Priority of Use																
Public Access to Information																
Public Awareness and Education																
Public Participation																
Rights of Women, Youth, and Indigenous Peoples																

## ECONOMIC PRINCIPLES

Open International Economic System														
Polluter Pays														
Water as an Economic Good														

**Bold/Dark = Legally Binding**

### Political Principles

The seven political principles (see 4.3) support the sustainable development of groundwater resources in that they provide a foundation for cooperative interaction between states. CBDR is the only political principle in fewer than 25% of the texts as it specifically applies to environmental treaties and curiously not in water treaties (see Table 5.3). Both, notification of emergencies and planned measures are found in 40% of texts, most of which are directly related to water and curiously not in environmental treaties. Peaceful resolution of disputes is in more than half of the texts overall, possibly because this is seen as a customary international law principle. Exchange of information, the obligation to cooperate and sovereignty are the most common principles, occurring in 10, 9, and 8 texts respectively. In the legally binding texts, information exchange, obligations to cooperate, dispute resolution and sovereignty are used in more than 70% of the texts.

Comparing how the texts included these principles before and after 1992 provides insights into how their content is linked to their evolution. Before 1992, political principles were hardly included in or after 1992 and thereafter are much more consistent. Exchange of information is included in all but three texts: the 1992 Dublin Statement, the 1992 Rio Declaration and the 2015 UN HCR/UNGA Resolutions. The principle of obligation to cooperate is included in seven out of ten texts. Peaceful resolution of disputes is included seven times and sovereignty five times. The notification of emergencies and planned measures are each included in all five laws and policies directly related to water. CBDR is the least included principle, only being included in the 1992 Rio Declaration and UNFCCC.

**Table 5.3 Patterns in political principles included in the global groundwater governance framework**

	All		Pre-1992		1992-present		(Ground)water-specific		Environmental	
	(n=15)		(n=5)		(n=10)		(n=9)		(n=6)	
	count	%	count	%	count	%	count	%	count	%
CBDR	2	13	0	0	2	20	0	0	2	33
Exchange of Information	10	67	3	60	7	70	6	67	4	67
Notification of Emergency Situations	6	40	0	0	6	60	4	44	2	33
Notification of Planned Measures	6	40	1	20	5	50	5	56	1	17
Obligation to Cooperate	9	60	2	40	7	70	5	56	4	67
Peaceful Resolution of Disputes	8	53	1	20	7	70	4	44	4	67
Sovereignty	8	53	3	60	5	50	4	44	4	67

### Environmental Principles

The thirteen environmental principles discussed in Section 4.4 contribute to sustainable development at the global level through the protection and preservation of natural resources. More than six of the thirteen environmental principles are used in less than 25% of texts (see Table 5.4). These includes BATT, conjunctive use, invasive species, protected areas for groundwater, subsidiarity and water as a finite resource. Using the aquifer/basin as the unit of management is included in six texts; the precautionary principle included in five texts; and EIA and monitoring in seven texts. Protection and preservation of ecosystems and



pollution prevention are used in over 50% of global texts. Protection and preservation of ecosystems is the most common, being included in eight texts. This seems to indicate only moderate evolving consensus regarding the inclusion of these principles in all the texts, whether binding or non-binding.

Looking at how the principles are included before and after 1992 can give additional insights into whether there is consensus building over time. Prior to 1992, nearly half of the environmental principles are included at the global level: aquifer/basin as a unit of management, conjunctive use, monitoring, pollution prevention, establishing protected areas for groundwater, and protection and preservation of ecosystems. Only monitoring and pollution prevention are included in more than two of the five texts created in this period.

From 1992 onwards, the protection and preservation of ecosystems continues to be common, being included in six of the ten texts in this time. EIA and the precautionary principles are also taken on board in seven and five texts, respectively - despite not having been present previously. Using the aquifer/basin as a unit of management, conjunctive use, monitoring and pollution prevention – are included in less than half of the texts created in this time period indicating no significant increase in uptake.

However, pollution prevention and using the aquifer/basin as the unit of management is included in most texts directly related to (ground)water (see also Table 5.2). There is also a shift from including protected areas generally, to the specific protection of groundwater recharge and discharge zones. The remaining principles - BATT, conjunctive use, invasive species, subsidiarity, and water as a finite resource are only taken up in two texts or less groundwater specific texts. This indicates some convergence around the principles of ecosystems protection, EIA, precautionary action, and using the aquifer/basin as the unit of management.

**Table 5.4 Patterns in environmental principles included in the global groundwater governance framework**

	All		Pre-1992		1992-present		(Ground)water-specific		Environmental	
	(n=15)		(n=5)		(n=10)		(n=9)		(n=6)	
	count	%	count	%	count	%	count	%	count	%
Aquifer/basin as the Unit of Management	6	40	2	40	4	40	6	67	0	0
BATT	2	13	0	0	2	20	2	22	0	0
Conjunctive Use	2	13	1	20	1	10	2	22	0	0
EIA	7	47	0	0	7	70	4	44	3	50
Invasive Species	1	7	0	0	1	10	1	11	0	0
Monitoring	7	47	3	60	4	40	5	56	2	33
Pollution Prevention	8	53	4	80	4	40	7	78	1	17
Precautionary Principle	5	33	0	0	5	50	3	33	2	33
Protected Areas for (Ground)water	1	7	1	20	0	0	0	0	1	17
Protected Recharge and Discharge Zones	2	13	0	0	2	20	2	22	0	0
Protection and Preservation of Ecosystems	8	53	2	40	6	60	4	44	4	67
Subsidiarity	0	0	0	0	0	0	0	0	0	0
Water as a Finite Resource	1	7	0	0	1	10	1	11	0	0

### **Social Principles**

The twelve social principles discussed in Section 4.5 contribute to sustainable development at the global level by integrating human rights, issues related to well-being and public involvement into groundwater governance. More than nine of the twelve social principles discussed in Section 4.5 are included in 30% or fewer global groundwater governance texts (see Table 5.5). These are the human rights to water and sanitation, intergenerational equity, poverty eradication, prior informed consent, priority of use, public

awareness and education, and the rights of marginalized groups. Public participation and capacity building is in one third of the texts. However, capacity building became part of the climate change regime by being adopted at one of the Conferences of the Parties (CoPs). Equitable and reasonable use and public access to information are in 40% of the texts. None of the social principles are used in more than half of the texts.

When focusing on the period prior to 1992, the absence of social principles is striking. Equitable and reasonable use is included once in the 1966 ILA Helsinki Rules; the human right to water and priority of use are included in the 1977 Mar del Plata Resolutions; and public access to information is one of the principles in the 1972 Stockholm Declaration. Consequently, 1992 clearly marked the emergence of social principles in text relevant to groundwater. Since social principles are included almost exclusively after 1992, the principles of capacity building, equitable and reasonable use, public access to information and public participation remain the most commonly included, but are still present in only half of the texts. The human right to water and sanitation is included in the 2010 UNHRC/UNGA Declarations and the human right to water is also in the 2004 ILA Berlin Rules. These documents are non-binding, but the literature tends to argue that this right is now part of customary law as this right has been included in human rights treaties applicable to women and children and flows out of other human rights agreements (Obani and Gupta 2015). The 1997 UNECE Protocol on Water and Health also includes the human right to water.

**Table 5.5 Patterns in social principles included in the global groundwater governance framework**

	All		Pre-1992		1992-present		(Ground)water-specific		Environmental	
	(n=15)		(n=5)		(n=10)		(n=9)		(n=6)	
	count	%	count	%	count	%	count	%	count	%
Capacity Building	5	33	0	0	5	50	2	22	3	50
Equitable and Reasonable Use	6	40	1	20	5	50	5	56	1	17
Human Right to Sanitation	1	7	0	0	1	10	1	11	0	0
Human Right to Water	3	20	1	20	2	20	3	33	0	0
Intergenerational Equity	2	13	0	0	2	20	0	0	2	33
Poverty Eradication	4	27	0	0	4	40	0	0	4	67
Prior Informed Consent	4	27	0	0	4	40	3	33	1	17
Priority of Use	3	20	1	20	2	20	3	33	0	0
Public Access to Information	6	40	1	20	5	50	2	22	4	67
Public Awareness and Education	3	20	0	0	3	30	2	22	1	17
Public Participation	5	33	0	0	5	50	2	22	3	50
Rights of Women, Youth, and Indigenous Peoples	4	27	0	0	4	40	2	22	2	33

### *Economic Principles*

There are three economic principles discussed in Section 4.6 and all are included in 20% of global texts or less (see Table 5.6). Prior to 1992, the 1972 Stockholm Declaration included the polluter pays principle making it the only economic principle included in this timeframe. From 1992 onwards, economic principles were excluded with the exception of treating water as an economic good, which was only included in the 1992 Dublin Statement.

Maintaining an open international economic system was included in three texts (the 1992 Rio Declaration, the 1992 UNCCD, and the 1992 UNFCCC), which are all indirectly relevant to (ground)water. The polluter

pays principle remained in the 1992 Rio Declaration and was also taken up by the UNECE in their Water Convention and Protocol. Although barely included, these economic principles can be misleading given that they operated within the de-facto neo-liberal context and do not necessarily counter economic drivers (see 1.3.5).

**Table 5.6 Patterns in economic principles included in the global groundwater governance framework**

	All		Pre-1992		1992-present		(Ground)water-specific		Environmental	
	(n=15)		(n=5)		(n=10)		(n=9)		(n=6)	
	count	%	count	%	count	%	count	%	count	%
Open International Economic System	3	20	0	0	3	30	0	0	3	50
Polluter Pays	3	20	1	20	2	20	2	22	1	17
Water as an Economic Good	1	7	0	0	1	10	1	11	0	0

### 5.3.3 Pluralism in Processes and Actor Participation

Most (ground)water laws and policymaking processes do not occur within a unified body that links the provisions to accountability and support mechanisms at lower geographic levels (i.e. secretariat). There is often no funding to support implementation; nor is there a single UN agency that can oversee these issues. UN-Water, a coordinating body at UN level attempts to do this, but has a very limited mandate and limited resources (Baumgartner and Pahl-Wostl 2013; Schubert and Gupta 2013).

While it is possible for the secretariat of the UNECE to assume this role, the UN Watercourses Convention and the Draft Articles do not set out provisions for implementing bodies. Unlike environmental conventions that have coordinating secretariats in place, there is no structured coordination between these texts with regard to (ground)water resources and the role they play in each of their regimes. To a limited extent, national-level planning for SDG implementation and monitoring may help provide an integrated approach to governing ground water, but such bodies may not be able to operate on longer-time horizons which correspond more closely with groundwater storage and flow dynamics. Further, the degree of influence the non-binding SDGs might have on water governance frameworks at any geographic level remains to be seen.

The absence of coordination mechanisms is also met with the challenge of variable actor participation. There are less than 40 countries participating in the binding laws directly and exclusively applicable to (ground)water. Despite both the UN Watercourses Convention and the UNECE Water Convention being contingent upon the participation of states sharing transboundary (ground)water resources, the number of geographically contiguous countries outside Europe that ratified these Conventions are few (see Map 5.1; Gupta 2016). Thus, not all countries sharing transboundary aquifers would be subject to all the obligations under these agreements. These gaps in scope and coverage of countries may lead to differing sets of principles being applied to individual countries, individual transboundary groundwater resources, or individual countries' portions of these transboundary resources. Both hydro-hegemony (e.g. Zeitoun and Warner 2006) and legal pluralism literature (e.g. Bavinck and Gupta 2014) indicate that such gaps make governance frameworks vulnerable to the most powerful actors/countries taking advantage of an incoherent framework and pushing their interests to the detriment of the others. Ideally, a robust institutional process would counter such hegemonic dynamics. However, both existing literature and the empirical data indicate that sufficiently robust global (ground)water governance framework has not yet emerged.

The level of participation is less problematic for environmental texts, since they have nearly universal ratification – the US being the most common abstainer. The wide level of participation indicates that environmental texts could provide essential support for the global groundwater governance framework as it develops by acknowledging the interconnectedness of the earth's ecosystems and bolstering the normative basis for sustainable development. The drawback is that environmental texts do not deal explicitly with the

task of equitable and sustainable governance of groundwater resources, leaving groundwater-specific issues prone to being subsumed by, or conflated with, concerns regarding surface water (see 3.3).

## **5.4 DISCUSSION: SUSTAINABLE AND INCLUSIVE DEVELOPMENT**

### **5.4.1 Principles' Relation to Drivers**

At the global level, the drivers of human-groundwater interactions are primarily indirect since there are no direct global groundwater uses (see 3.2 and Table 3.1). These indirect drivers include the global race for economic growth, trade in groundwater-intensive products, political dynamics between states, and climate change. Neither economic growth or political dynamics are currently being addressed by the global groundwater governance framework.

The ability of the global-level normative framework to cope with the trade in groundwater intensive products is limited at this level, given the tension between the principles of an open international economic system, water as an economic good and ecosystem protection. Implementing this combination of principles could raise production costs and perhaps reduce demand for groundwater-intensive products. Consequently, regions or countries with highly groundwater-dependent industries that rely on export of the resulting products for economic growth would face practical challenges. This challenge would be exacerbated if much of the groundwater resources are non-renewable and thus impossible to use sustainably on a human time scale – presenting the additional challenge of intergenerational equity. In these cases, externally imposed groundwater sustainability requirements could constitute an infringement upon trade. As such, countries would need to reconcile these challenges keeping in mind which ecosystems services should be preserved (e.g. spring flows supplying water to remote villages), in order to be considered sustainable, equitable, and inclusive.

Although, the UNFCCC has bearing on groundwater governance and the IPCC has explicitly acknowledged links between climate change and groundwater (Jiménez-Cisneros et al. 2014), none of the water-specific laws and policies include any principles directly addressing climate change adaptation or mitigation. Further, the UNFCCC has not created a working program or committee to specifically address this linkage. Climate change is already creating ‘climate refugees’ who are being displaced as a result of desertification (Doyle and Chaturvedi 2012). Further, relocation of large populations due to sea-level rise may become a reality in the coming decades. Other demographic shifts, such as urbanization, are also placing strains on local groundwater resources. However, the SDGs uses a more comprehensive approach to dealing with these issues and addresses them in a more integrated manner.

The global level principles do try to deal with the drivers at other levels of governance, for example, social principles addressing allocation of groundwater resources can, in part, combat over-pumping of resources from the transboundary through national levels. Additionally, principles related to pollution prevention can protect groundwater quality when drivers increase industrial and agricultural production. Environmental principles targeted at ecosystems protection can further support these principles by ensuring that neither over-pumping nor pollution harm groundwater-related ecosystems.

### **5.4.2 Incoherence and Contradictions in Principles**

There is a high level of pluralism with respect to how global-level laws and policies ensure coordination political interaction, protecting of groundwater resources, organizing and legitimizing rights, allocating groundwater resources, and governing within a neo-liberal paradigm. Examining the inclusion of the principles of sovereignty, EIA, conjunctive use, establishing protected areas for groundwater, protecting recharge and discharge zones, equitable and reasonable use, priority of use, the human right to water and sanitation, the rights of women, youth and indigenous peoples, and water as an economic good makes this apparent.

None of the global governance texts directly applicable to groundwater include all seven political principles. The 1992 Rio Declaration includes all the principles and the 1992 UNECE Convention and 2004 ILA Berlin Rules include all the principles except CBDR. The 1992 UN CBD, 1997 UN Watercourses Convention, and 2008 ILC Draft Articles use five of seven. The nine remaining texts include less than half of the political principles. Thus, there is still a notable level of incoherence among the texts with regard to political principles. Nevertheless, there is greater coherence with regard to the political principles than along the other dimensions.

Sovereignty is a potential area of contradiction that has received significant attention in scholarly literature. The 2008 ILC Draft Articles go against progressive developments in international law by explicitly including sovereignty in the text (McCaffrey 2011; McIntyre 2011; Tanzi 2011) as opposed to territorial integrity which empowers downstream states. The literature also discusses whether the inclusion of sovereignty is an underlying cause for the Draft Articles being 'stuck' in the UNGA, without being given a final legal form (Eckstein and Sindico 2014). However, reviews of statements by states made in the 2008, 2011, 2013, and 2016 UNGA sessions where the Draft Articles were discussed, indicates that a lack of scientific data and capacity for groundwater resources management is the primary reason behind countries' hesitance to give the Draft Articles a final form (Aureli and Eckstein 2011; Eckstein and Sindico 2014). Further, the empirical analysis indicates that the inclusion of limited sovereignty is common within legally-binding texts at the global level. The UNECE Water Convention, UN CCD, and UN Watercourses Convention do not include the sovereignty principle in their main texts. Yet the UNECE Water Convention includes it in its Protocol on Water and Health and the UN CCD and the UNFCCC reaffirm state sovereignty in their preamble. This may indicate that the inclusion of the sovereignty principles may be a less significant area of tension empirically than the international water law literature indicates.

The environmental principles do not present any explicit contradictions to each other. However, the analysis shows that there is limited coherence in the principles. Only the 1992 UNECE Water Convention, 2004 ILA Berlin Rules and 2008 ILC Draft Articles include more than half of the thirteen environmental principles. The 1985 ILA Seoul Rules and the 1997 UN Watercourses Convention include four and five principles, respectively. The remaining texts use 25% of the environmental principles or less. The pattern of (ground)water-specific texts containing a significant number of environmental principles, implies that their evolution especially via the ILA has led to increased inclusion of principles over time.

When focusing on principles related to gathering groundwater data (EIA, precautionary principle, monitoring) and groundwater-specific principles (conjunctive use, protected areas for groundwater, and protecting recharge and discharge zones), nearly all the legally-binding agreements include both the precautionary principle and EIA, except the UN Watercourses Convention and the UN CCD which do not include the precautionary principle. However, only the UNECE Convention includes monitoring. Further, groundwater specific principles are absent from all existing legally binding texts. These gaps imply that countries tend to be more reactive in assessing groundwater resources when an explicit threat is perceived rather than employing monitoring, resource protection or other precautionary measures in a proactive manner.

The 1984 ILA Seoul Rules, and the 1977 Ramsar Convention do not contain any social principles, probably because they were adopted prior to 1992. The 1977 Mar del Plata Resolutions and 1974 UN Stockholm Declaration include only one social principle and the 1992 ICWA Dublin Statement, 1997 UN Watercourses Convention, 1992 UNECE Water Convention and 2012 UNHRC/UNGA include two principles. There is nearly no overlap regarding which of the principles these texts include. Only the 2004 Berlin Rules include more than 50% of the social principles and the 1992 Rio Declaration includes exactly half. But these two soft law documents aimed at being more comprehensive in their scope. The remaining agreements include either four or five principles, mostly favoring capacity building, poverty eradication and information, education and participation of the public. Thus, the frameworks' inclusion of social principles is sporadic and incoherent,

but there are no areas of contradiction within this dimension; although the absence of specific principles can harm the achievement of sustainable and inclusive development.

Nine of the sixteen global laws and policies, most of which are (ground)water-specific, do not include any economic principles. The 1992 Rio Declaration includes two economic principles (open international economic system and polluter pays). The remaining texts contain only one economic principle (see Table 5.2). Thus, there is a clear lack of uptake regarding economic principles. However, this may have been overly compensated by the adoption of economic principles in other areas of trade and investment discourses and law. The literature points to these as a key area of contradiction with the social principles, in particular the human right to water (see 4.7)

Section 4.5, highlights the theoretical issues between the human right to water and sanitation and water as an economic good as well as those between sovereignty and equitable and reasonable use. These debates primarily play out within epistemic communities and social movements, who can exert significant influence on global (ground)water governance. Nevertheless, the legal pluralism analysis shows that (1) states and scholars are slightly more interested in institutionalizing the human right to water and sanitation than establishing water as an economic good in water laws and policies. This is particularly true of (ground)water texts adopted from 1992 onwards. However, these are only about one-quarter of texts, not all of which are legally binding. Nevertheless, countries are still ambivalent towards the rights of marginalized groups, with only the 2004 ILA Berlin Rules including both the human right to water and the rights of marginalized groups simultaneously. Further, the binding UN Watercourses Convention explicitly contravenes priority of use, instead including 'prioritization of vital human needs' when conflicts between uses arise. Such a prioritization does not explicitly acknowledge a human right to water.

Another area of potential contradiction across dimensions is with respect to the sovereignty debates discussed previously. Some water (law) scholars espouse equitable and reasonable use to counter hegemonic and absolute sovereignty approaches in water governance (see Box 4.1). However, the pattern analysis shows that five of the six texts include both the principle of equitable and reasonable use and also include sovereignty. The UN Watercourses Convention is the only legally-binding text that includes equitable and reasonable use, but not sovereignty in an effort to emphasize territorial integrity. But, it only has a limited number of parties.<sup>11</sup> The Draft Articles have yet to take a final form but also includes equitable and reasonable use as well as sovereignty. The analysis then implies that states are simultaneously interested in asserting their limited sovereignty (subject to not causing transboundary harm) as well as establishing allocation regimes premised on equitable and reasonable use.

### 5.4.3 Principles' Relationship to Sustainable and Inclusive Development

Principles addressing the key drivers of groundwater problems at the global level are either incoherent or absent. This may hamper their ability to contribute to sustainable or inclusive development. Furthermore, it is not as if the more recent legal texts are more comprehensive in their treatment of principles. The misalignment of principles and drivers at this level is further exacerbated by inclusion and distribution of the types of principles, especially when one takes into account that there is no legally binding agreement that specifically covers all groundwater today. Figure 5.2 shows that political principles make up more than 30% of the principles included in the various texts. Given that the political dimension creates a strong foundation for interactions between states regarding groundwater governance, particularly at the global level key principles such as exchange of information, obligation to cooperate and sovereignty are the most used principles and their use has grown more consistent over time. But a remaining challenge is the lack of the inclusion of CBDR and its implications for differentiation of responsibilities for sustainable development of

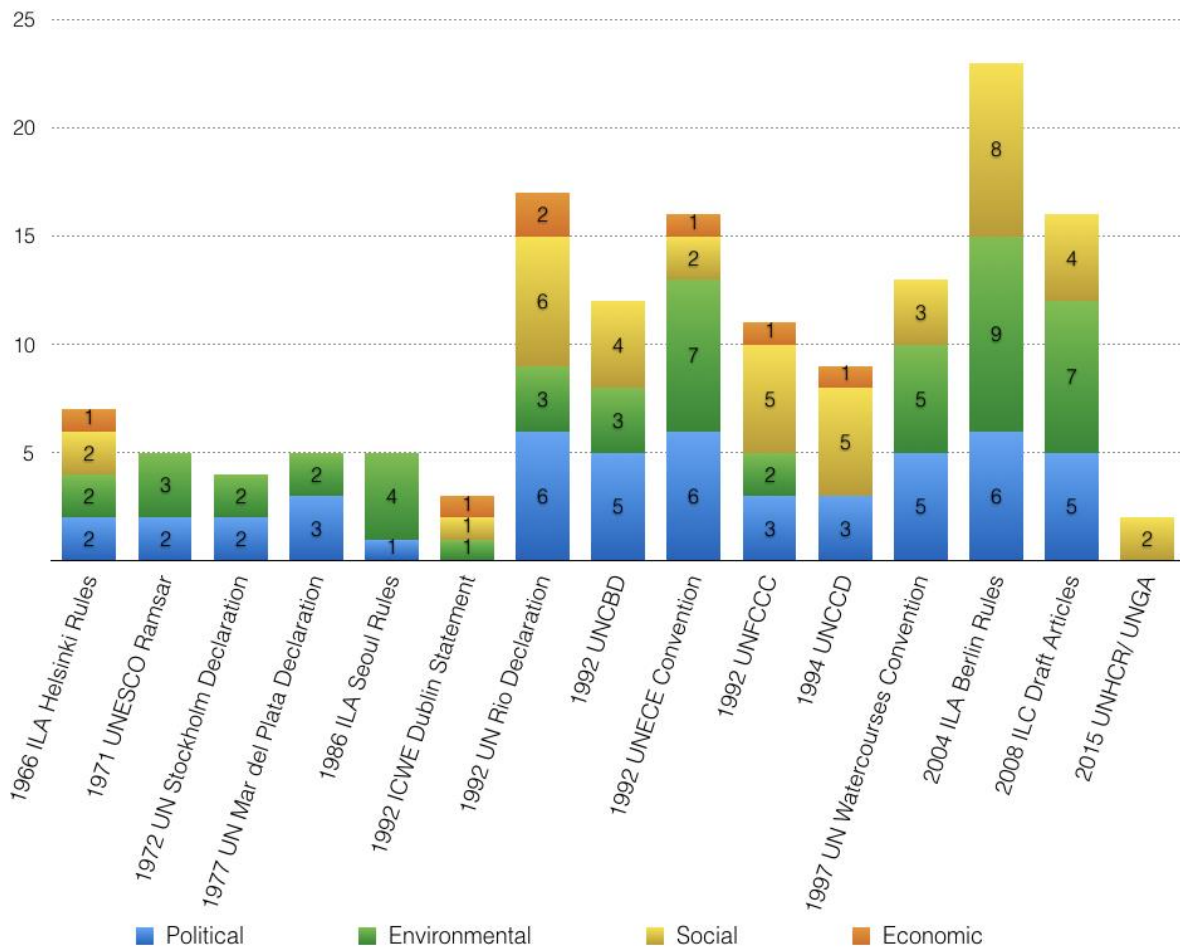
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<sup>11</sup> Over ten years later, the UNECE is globally open but initially was only open to and ratified by the countries in the UNECE region.

groundwater resources. In light of the drivers at this level, it is important for sustainable and inclusive development to distinguish between net groundwater importers or exporters as well as net GHG emitters, net carbon-sequesters, and countries not significantly contributing to either but nevertheless experiencing the detrimental effects of climate change.

With respect to environmental principles, there is moderate consensus regarding their inclusion with regard to ecosystems protection, EIA, precautionary action, and using the aquifer/basin as the unit of management. However, roughly the same number of environmental principles are included in the laws and policies over-time, despite the emergence of new environmental principles within the time period analyzed. This indicates that new principles, especially those related to groundwater have scarcely been incorporated into the laws and policies at this level. Further, the texts have not grappled with the relationships between principles, such as the potential for distribution of best available groundwater exploration technologies to result in unsustainable use. Thus, some key elements supporting the environmental dimension of sustainable development are available in the framework, but the ones directly addressing the groundwater problems are generally neglected.

**Figure 5.2 Distribution of Principles Included across the Global Governance Framework**



The social principles showed a dramatic increase in their inclusion over time, particularly those related to public participation, awareness/education, and access to information. Nevertheless, this occurred primarily outside (ground)water-specific texts. Further these principles primarily address society’s inclusion in ongoing or planned activities. They do not address issues linked to the state’s responsibilities towards provision of (ground)water related service to the public. As such, this dimension still needs additional support especially

with regard to intergenerational equity, poverty eradication, rights of women, youth, and indigenous peoples and the human right to water and sanitation.

The economic principles pose additional challenges because they are few, scarcely included, and present conflicts with each other as well as principles from other dimensions. As such, the economic dimension requires both clarification and bolstering to support sustainable development.

Overall, the analysis shows that the global groundwater governance framework is still incomplete with respect to the principles addressing the drivers and that there are potentially significant tradeoffs when implementing the existing principles. When assessing the principles along the sub-dimensions of inclusive development, there is some variation. The principles have the strongest possibility to contribute to relational inclusiveness given that political principles and the social principles addressing state interaction with the public are well included. Social inclusiveness, has slightly less potential since re-focusing from wealth creation to human and natural capital is somewhat accomplished through the principles of public education and awareness and capacity building. However, demographic drivers, such as population growth, are not countered by the existing principles. Similarly, environmental inclusiveness has limited potential because of a lack of groundwater-specific principles that would protect ecosystems services as well as unreconciled issues around intergenerational equity and economic growth. Consequently, the potential for the global framework to contribute to hard sustainability under the current conditions is limited.

## 5.5 INFERENCES

The above analysis leads to the following inferences. First, regarding the evolution of the global groundwater governance framework, there are currently 16 direct and indirect groundwater governance laws and policies, six of which are legally-binding. They include some of a total of 35 governance principles. Six of these laws and policies are environmental, eleven are focused directly on water of which only three are focused exclusively on groundwater. These laws and policies emerged roughly 50 years ago, evolved slowly at first and then experienced a period of rapid development between 1992 and 2010, with 10 of the 16 texts being adopted during this time (see Figure 5.2). However, within the last five years, progress has slowed. The only relevant text adopted since then is the 2015 UN SDGs. The 2008 ILC Draft Articles are stalled in the UNGA without having taken a final legal form. The deceleration in the adoption of groundwater-related laws and policies could be indicative of several issues: (i) countries are acknowledging the systemic nature of water, environment, and development issues and feel that there is no real justification for a groundwater-specific regime – this could also be explained by their adoption of the SDGs which sees the different goals and targets as indivisible, interrelated and interconnected; (ii) countries are focusing on the implementation of existing environmental and water agreements, with the intention of including groundwater in this process; (iii) water scarce countries are less willing to discuss groundwater challenges at the global level and are leaning back towards an absolute territorial sovereignty approach; Map 5.1 shows that most countries with groundwater depletion have not ratified any direct water related conventions; (iv) countries feel that they lack the necessary information and capacity to address groundwater problems (see 1.3, 8.2, 10.2); and (v) countries are experiencing treaty exhaustion within the area of global environmental governance (e.g. as interviewees in my case study stated, see 8.3.3).

Second, Table 5.1 indicates that all of the global governance texts define groundwater resources in a different manner. The 1985 ILA Seoul Rules, the 2004 ILA Berlin Rules and the 2008 Draft Articles identify the aquifer as the unit to be governed. The 1992 UNECE Water Convention has also produced guidance for states that further specifies that ‘groundwater’ shall be interpreted as the aquifer by countries, although this is not in the main text of the agreement. However, the remaining texts either address groundwater implicitly as part of the environment or in relation to surface water. The latter is particularly problematic in that it excludes several common types of groundwater resources from its scope. For example, groundwater not connected to surface water (non-recharge aquifers) is excluded (see 10.2).



Lastly, in analyzing whether the principles individually and jointly contribute to sustainable and inclusive development, I would argue that (a) the principles at global level do not address the key global driver of groundwater problems at global level, namely trade; in fact, some of these documents explicitly call for supporting an open economic system. While the Climate Agreement and the SDGs do address the climate change driver, the ten agreements directly applicable to water have not seriously taken this into account – noting that the 2004 Berlin Rules does require “promotion of appropriate climate responses by States involved to climate change” as part of compliance review (Article 66.c). This will affect the ability of the principles to counter the key causes of unsustainable water management. However, many of these principles do address drivers at other levels of governance, namely principles related to groundwater allocation and pollution prevention.

Furthermore, (b) in terms of addressing the political, environmental, social, and economic dimensions of sustainable and inclusive development, I find that in terms of political issues there is inconsistent treatment of sovereignty. While the Watercourses Convention emphasizes territorial integrity rather than sovereignty, the remaining five binding water-related agreements include sovereignty (see Table 5.2 and Table 5.3).

Sovereignty is becoming also more critical in relation to the Draft Articles on Transboundary Aquifers. This raises the question of whether states can and should have sovereign control over a resource that continuously circulates (see 1.2.3). While the texts focus on limited territorial sovereignty, the interpretation of this is still quite open. Furthermore, while almost all the seven environmental laws and policies are universally adopted, the UN Watercourses Convention and UNECE Water Convention have only been ratified by less than 40 countries.

In terms of environmental issues, groundwater specific principles (e.g. conjunctive use, establishing protected areas for groundwater, and protection of recharge and discharge areas) are included in less than 15% of the texts (see Table 5.4). Environmental aspects (e.g. EIA, BATT, monitoring) have been treated lightly in the Watercourses Convention, in comparison to the UNECE Water Convention. Two of these environmental principles have been included in the Draft Rules but these are yet to become legally binding. In fact, environmental principles scarcely address the regulating and supporting ecosystem services.

In terms of social principles, while the 1997 UN Watercourses Convention and 2008 ILC Draft Articles require states to equitably and reasonably distribute (ground)water resources in accordance with socio-economic and climatic factors (allocation), the UNECE Water Convention does not do so. None of the Water specific laws and policies included the human right to water and sanitation (access), while this has been adopted by the UNGA and UNHRC (see Table 5.5).

Very few policies and laws actually use economic principles (see Table 5.6): the Rio Declaration includes the polluter pays principle; the Dublin Principles includes water as an economic good; the UNFCCC, UNCCD and Rio Declaration include the need to protect an open economic system. Having said that, one should emphasize that the marketing of neo-liberal economic principles has taken place through other fora and pervade water policy in all countries, but has not been explicitly adopted in the water treaties.

The combination of political, environmental, social and economic principles also reveals a number of contradictions e.g. between equitable and reasonable use and sovereignty, because one can be achieved at the cost of the other; and between the emerging principles of water as an economic good and water as a human right although neither has been adopted in legally binding direct water related laws.

Hence, the inability of these global principles to structurally address the global drivers (except perhaps in the context of the SDGs), and to address political, environmental, social and economic aspects in a coherent manner creates room for states to engage in forum shopping and to select principles that suit their sovereign needs. This could hamper the ability of the global governance normative framework for water governance to achieve sustainable and inclusive development.