Chapter 23
The Challenges for the Twenty-First Century: A Critical Approach

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Abstract With a history of about 5,000 years, water law and water governance have only just arrived on the global agenda. During these centuries, there have been incremental developments in governance processes from the local to the global level. Unlike other fields of resource governance, water is a field with a rich density of governance efforts, closely linked to the evolution of religion, culture, history, geography, and economy in different parts of the world, often expressed in legal terms. Against this background, this chapter sums up the key historic trends that have influenced water law through history, identifies major present day characteristics and goes on to review challenges for the twenty-first century.

Keywords Codification • customary water law • water and religion • legal pluralism • globalisation

23.1 Introduction

The history of water law runs parallel to the history of civilizations. Water has been the subject of folklore, it has been personified as gods (e.g., Indra and Varuna in Vedic societies; Osiris in the Nile Valley; Enki or Ea in Mesopotamia; and Poseidon, Triton, and Pontus in Greek mythology), it has been made the subject of religious doctrine (e.g., in the Hindu, Islamic, Jewish, and Christian traditions), and

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it is now the object of economic ideology. Practices and customs relating to water have developed over centuries and the density of social norms and rules, as well as legal regulations, in water management is extremely high.

Since water governance is not normally taught in universities, most entering the field feel that it is a new and young subject. This is a naïve mistake for working in the field of water governance only serves to show how complex a field it is and how social practices are so entrenched that it is not easy to re-shape water policies and rights. This brings up the eternal challenge: How does one find one's way through this maze of dense rules to understand global water governance and to craft rules with respect to water that are likely to have a high compliance pull in each locality? Global water governance refers to governance from the local through to global levels.

This book aimed at addressing the following questions (Chapter 1, Dellapenna and Gupta, this book): How has water law and policy evolved through the centuries? What were the motivating factors that led to change in legal and social practices? Why is it that after 5,000 years of governing water resources, we still appear not much closer to understanding and addressing water resource issues? What can we learn from the history of water law and policy? To answer these questions, this chapter draws on the history explored in the chapters of this book to provide a brief global history of the cultural and religious matrix within which water governance has functioned and the national and regional water governance patterns that emerged from this milieu (see §23.2). Besides building on previous chapters, this chapter fills in the gaps through a literature review. This chapter then provides a state of the art assessment of water governance at the opening of the twenty-first century (see §23.3). Finally, it draws some conclusions about the challenges facing water law in the twenty-first century (see §23.4). This chapter provides a comprehensive, highly dense analysis of evolutionary processes worldwide.

23.2 The Evolution of Water Law and Policy

Over about 5 millennia differing systems of water law have emerged and evolved across the world. These have reflected differences in water supply and local hydropolitics, while other forces have led to a certain convergence among systems of water law. These different patterns are briefly summarised in this section.

23.2.1 Diverging Water Law Traditions Worldwide

Early hunter-gatherer societies worshipped the land, the water, and the forests. As they settled down to agriculture, they began to worship the sun, rain, and other natural forces. As they became more developed they turned to more abstract religions. With the rise of neoliberal thinking at the end of the twentieth century, many in numerous societies increasingly came to see water as an economic

commodity. This might suggest that history progresses in a linear way, but the reality is much more complex.

In different parts of the world, different water histories emerged. In early Mesopotamia (Chapter 2, Kornfeld, this book), the need to cooperate in an arid region in order to promote agriculture and development led to a system of customary rules of water management focusing on water as a communal good, the maintenance of water bodies, liability for damages, rules to prohibit diversion of waters at the cost of downstream owners, and peaceful resolution of disputes. These customary rules were subsequently embodied in legal codes, such as that of Hammurabi. The Islamic water law tradition (Chapter 3, Naff, this book) also developed in arid regions. Under Islam, water is seen as an indivisible, non-marketable gift of God for which humans are custodians who must share equitably according to principles of priority of use. Water rights were strictly limited and based upon the investment of money or labour in developing water for human use. Hindu water law also reflects institutionalised social customs. Water was seen as indivisible, to be used for the benefit of society, with a system of punishments for improper diversion, obstruction, and pollution of water. Later Indian societies developed systems of taxes and limited private ownership subject to maintenance of the water body (Chapter 10, Cullet & Gupta, this book).

National water law histories show how differently Brazilian water law (Chapter 5, Farias, this book) developed from Kenyan (Chapter 7, Nilsson & Nyanchage, this book), South African (Chapter 6, Kidd, this book), Indian (Chapter 10, Cullet & Gupta, this book), American (Chapter 12, Dellapenna; Chapter 13, Zellmer, this book), and Australian (Chapter 11, McKay & Marsden, this book) systems. While riparian systems may have worked in the UK, experiences in South and East Africa, Israel, and Australia show how inappropriate it was for arid regions. Four factors have influenced contextual variation in water law (see Table 23.1).

Table 23.1 Differential factors leading to different water laws

Factors	Description
Water geography	Civilizations (e.g., Egyptian, Mesopotamian, Indus) developed along river basins (e.g., Nile, Tigris & Mesopotamia, Indus). Arid regions developed water rules first and those rules shaped local culture (Islamic water law; Jewish water law); scarcity is the mother of invention
Economic dependence	Food gatherers did not need water rules. Agricultural societies were and are very water dependent and therefore need rules, so early civilizations developed water rules (e.g., the Indus Valley, Mesopotamia). Industrial and service oriented societies need less water
History and hydro-politics	Movements of people and conquests led to new water systems (e.g., Australia, Brazil, India, Kenya, South Africa); evolving hydropolitics shaped water law
Importance to ecosystems	Ecosystems compete with humans for water; while ignored in the past, societies give increasing importance to it (e.g., new laws in Australia, South Africa, and the United States)

23.2.2 Forces Leading to Convergence in Water Law

Building on earlier work (Gupta 2004; Gupta & Leenderste 2004; Dellapenna & Gupta 2008) and on the theory of how epistemic communities lead to converging state policy (Haas 1989), this section submits that despite contextual differences in water law, there have been eight forces through history that have promoted convergence in water law (see Table 23.2). First, early civilizations (about 5000 to 100 BCE) spread initial rules on water management throughout the reach of the civilizations. Examples include the Mesopotamian (Chapter 2, Kornfeld, this book) and the Indus Valley pre-Vedic societies (Chapter 10, Cullet & Gupta, this

Table 23.2 Forces leading to converging domestic water law and policy

Forces: The spread of	Example	Implication
Civilizations	Mesopotamia, Indus	Rules on ownership; water diversion; water pollution
Religion	Islamic, Jewish, Hindu	Religious character of water; punishments for misuse; priority of use principles
Conquests	Roman, Islamic, Colonialism	Roman ownership laws spread through the European continent and then to French, Italian, Belgian, Dutch, Spanish and Portuguese colonies; later codified under Napoleon. English riparian doctrine spread to English colonies. Islamic conquests carried *shari'a* to new regions
Communism	Soviet Union, satellite European states, Cuba, China, Angola, Mozambique	Water is owned by state; major restrictions on private ownership
International codification: Precedent, state practice, treaties	International Law Association (1966, 2004); 1997 UN Watercourses Convention; 1992 Helsinki Watercourses Convention; International Law Commission (2000)	Articulation of different principles of sovereignty; equity principles in sharing water; the no-harm principle; institutional development (the need for joint commissions, etc.) and options for peaceful resolution of disputes; the emerging idea of a human right to water
Environmentalism	Environmental laws and policies; Environmental NGOs	Articulation of environment impact assessments; environmental quality and emission standards for water bodies
Epistemic communities	International Water Association, International Water History Association, Global Water Partnership etc.	Dams as the solution to water shortage; articulation of integrated water resources management; water as an economic good
Globalisation	A common trade and investment framework; harmonisation of aid; global political meetings	Private sector participation in water; trade and investment rules affecting water

book). They developed along riverbanks, experienced a shift from hunter-gatherer communities to sedentary, agricultural communities and therefore needed reliable water rules to guarantee proper use. As they traded their agricultural surplus on water routes, this also needed greater regulation.

Second, as societies settled and evolved, religious development followed (500 BCE to 800 CE). Most early religions (Judaism, Islam, Hinduism) developed rules of water management and although these rules reflected local customs, they had an additional source of legitimacy (divine regulation). As these religions spread to different parts of the world either through conquest and enforced conversion or through adoption by personal conviction, the concepts spread (Chapter 4, Laster et al.; Chapter 3, Naff; Chapter 10, Cullet & Gupta, this book).

Third, conquests and colonization (100 to 1950 CE) spread the water law rules of the imperial country to different corners of the world. The military conquests in the wake of industrialisation were motivated by mercantilist/capitalist ideology. Foreign rulers brought their laws with them to the countries they occupied. Clear cases where foreign rulers have directly applied their own national laws and rules in the foreign country include the many English colonies that adopted riparianism—e.g., South Africa (Chapter 6, Kidd, this book); Australia (Chapter 11, McKay & Marsden, this book); and the United States (Chapter 12, Dellapenna, this book). Sometimes the foreign ruler decided to take control of the water but nonetheless largely left local customary systems of administration in place—e.g., India (Chapter 10, Cullet & Gupta, this book), Israel (Chapter 8, Laster & Livney, this book) and Kenya (Chapter 7, Nilsson & Nyanchage, this book).

Fourth, after 1917 CE, Communist ideas spread to the second world, including the former Soviet Union and its satellite states in Asia (e.g., China, Vietnam), in East Europe (e.g., Poland), and in Latin America (e.g., Cuba). With Communism, water became subject to state control and was generally nationalised. While Communist approaches to water law have now largely disappeared (Chapter 9, Kotov, this book), the concept of water as public property subject to state management continues to be important today.

Fifth, legal codification (from 1750 down to today) has had a key influence. Although codification is not new (e.g., the Code of Hammurabi; Ashoka's edicts; etc.), the codification of national legal systems in the nineteenth and twentieth centuries made water law more systematic and often more effective. In 1966, the International Law Association (ILA) prepared the first modern code of international water law. These *Helsinki Rules on the Uses of International Rivers* (ILA 1966) are cited as an influential reference work by many countries. The UN Watercourses Convention, approved by the General Assembly in 1997, also serves as a code and is highly influential, having inspired several treaties. The ILA *Berlin Rules on Water Resources* (ILA 2004) too may become influential over time (see Chapter 1, Dellapenna & Gupta, this book).

Sixth, the rise of epistemic and engineering communities (e.g., the International Water Resource Association, the International Water History Association, UNESCO-IHP, the World Water Assessment Programme, etc.) and their journals (e.g., Water Policy; Water Management; Water International; Journal of Water Law), confer-

ences, and publications have created a new literature on water, promoting, *inter alia*, the concept of integrated water resource management (IWRM). The resulting epistemic community is extremely influential in managerial circles (Conca 2005).

Seventh, with the rise of environmentalism, two types of consciousness have emerged. (a) The issue of environmental and water pollution and their impact on ecosystems has become urgent leading, *inter alia*, to the development of environmental impact assessments of water projects; and (b) the concept of sustainable development.

Eighth, with the rise of globalisation (Friedman 2005) and the domination of neo-liberalism (especially given the end of Communism in Russia and its former satellite states, in China and Vietnam [in fact, if not in name], and possibly in Cuba), globalisation is marketing neo-liberal capitalism and the idea that the private sector should be actively engaged in water governance. The initial results have not always been favourable because water services tend to be a natural monopoly and the private sector has no reason to be altruistic in providing water for the poorest. There are already rumours that Italy and Sweden have withdrawn their support for such private sector participation. Growing resistance in many communities has resulted in legal and practical barriers to privatisation of water services and even the recapture of privatised services by governmental authorities (Chapter 22, Dellapenna, this book). There is also a new legal undercurrent and that is the notion of the human right to water for which a small constituency is slowly growing.

This section has argued that although there are four composite differential factors (water geography, economic dependence on water, history and hydropolitics, and the importance given to ecosystems) that lead to different water laws in different parts of the world, there are eight forces that have led to converging trends in water law worldwide.

23.3 Current Global Trends

Water law has evolved slowly over time. That evolution has accelerated over the last century, without other water-centred professions paying much attention to the resulting changes. This section provides an overview of current global trends in water law. It looks at the trends at national, supranational and global level.

23.3.1 Trends at National Level

Significant and fairly consistent patterns in national water law can be summarized as: there is pluralism in the South, coherence in the North even though the degree of detail, resources, and implementation differ in each nation; and global trends introduce or preserve disharmony in an apparently stable system of converging policies. These apparent contradictions are hardly surprising given that change has been and continues to be constant in water law and policy. We have, in short,

not reached the end of history. These points deserve a brief explanation and are discussed below.

23.3.1.1 Pluralism in the South; Coherence in the North

The long and convoluted history of water law has meant that although in many developed countries there is a coherent system (e.g., The Netherlands), even if federally diverse (e.g., USA or Australia), most developing countries have pluralistic or fragmented water law systems (Chapter 7, Nilsson & Nyanchage; Chapter 10, Cullet & Gupta, this book) in which multiple legal traditions function simultaneously. The spread of water law rules through the eight converging forces delineated above did not automatically lead to *deep* convergence. While systems changed on paper, often they did not change in practice, either because of principles of dharma (Chapter 10, Cullet & Gupta, this book), different contextual circumstances, the desire to avoid rebellion or cope with rebellion (e.g., in colonial Brazil or Kenya), and possibly because the conqueror had no incentive to compel obedience to the new rules. With the industrial revolution, colonial conquerors took a more predatory approach to water in their colonies, often disregarding community and indigenous ownership (e.g., USA, Australia, Canada, or India). Examples of overlapping systems in India (Singh 1991), Africa (Ramazzotti 1996), and Kenya (Chapter 7, Nilsson & Nyanchage, this book), however, continue to exist. Thus, in many parts of the developing world, there exist overlapping systems of law (see Fig. 23.1). Table 23.3 shows

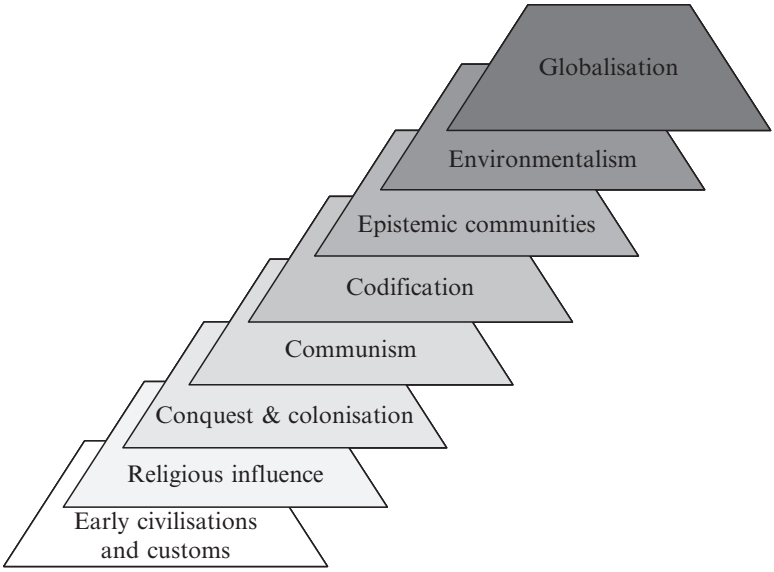

Fig. 23.1 The overlapping influences through history

Table 23.3 The influence of colonization and custom in African countries

	Precolonial system(s)			Colonial influences								
	African traditional	Islamic influence	Islamic derivation	BE	DE	F	IT	PG	SP	TK	UK	SA
Ghana, Kenya, Nigeria												
South Africa, Uganda											X	
Zambia, Zimbabwe												
Benin, Burkina Faso Ivory Coast	X					X						
Rwanda, Burundi	X			X							X	
Tanzania	X				X						X	
Angola, Botswana	X							X			X	
Cameroon	X				X	X			X		X	
Namibia	X				X			X			X	X
Togo	X				X	X						
Zaire	X			X				X				
Gambia		X				X					X	
Libya		X					X			X		
Egypt			X								X	
Tunisia			X			X						
Tanzania (Zanzibar)			X		X			X			X	
Malawi, Sierra Leone Sudan	X	X									X	
Madagascar, Mali Senegal	X	X				X						
Chad	X	X			X	X					X	
Niger	X	X				X					X	
Congo	X	X		X		X						
Somalia	X	X				X	X				X	
Ethiopia, Eritrea	X	X	X				X				X	
Mauritania	X	X	X			X						

Source: Based on data from Ramazzotti (1996); BE—Belgium; DE—Denmark; F—France; IT—Italy; PG—Portugal; SP—Spain; TK—Turkey; UK—United Kingdom; SA—South Africa.

that as many as 22 different legal systems operate in African countries, with several operating in most of those countries.

Despite these differences between North and South, water law and policy worldwide today cover similar issues. These include rules regarding water rights and ownership; sovereignty and equity; the no harm principle; integration of environmental issues in water management; integrated water resources management; strong roots in modern science; similar discussions with respect to the need for enhancing democracy through public participation, decentralization and management at the lowest possible level (subsidiarity); and discussions with respect to the role of the private sector (see Tables 23.4 and 23.5). Although similar, the differences tend to be in the degree of detail of regulation, the degree of resources allocated to the issue, and the depth of implementation of these provisions.

Table 23.4 Key water law principles

Principles		Types	Sources
Water law	Sovereignty	Claims of untrammelled sovereignty give way to recognition that states sharing water resources form a community that must collaborate or cooperate in managing the resource	Innumerable treaties
	Equity	General principle	Implicit in virtually all water agreements; explicit in 36% of agreements (1980–2000)[a]
		Specific criteria	ILA 1966; UN Watercourse Convention 1997; explicitly addressed in 26% of agreements (1980–2000)[a]
	Avoidance of harm	The 'no-harm' principle	27% of agreements (1980–2000)[a] recognize the duty to use due diligence to avoid unreasonable harm to another state
Human Rights	Participation	Of riparian states	UN Watercourses Convention 1997
		Of communities	EU 2000 WFD; UNECE 1992 Watercourses Convention; Aarhus Convention
	Conflict resolution	Negotiation, Fact Finding Commission, Arbitration, International Court of Justice	ILA 1966; UN watercourses Convention 1997; addressed explicitly in 55–63% of agreements (1980–2000)[a]
	Prior informed consent	From other nations about planned measures	UN Watercourses Convention 1997; some bilateral treaties
	Human rights	To water	MDG 2000; General Comment 15
		To sanitation	Johannesburg Declaration 2002
Environmental law	Environmental Impact Assessments	To test projects & programmes on environmental impacts	Rio Declaration 1992; Espoo Convention; UNECE Convention
	Sustainable development	To promote social, economic and ecological goals for current and future generations	Rio Declaration 1992 and many treaties
	Precautionary approach	To avoid irreversible damage even when science is uncertain	Rio Declaration 1992 and many treaties
	Polluter pays principle	Internationalisation of environmental costs	Rio Declaration 1992 UNECE 1992 Watercourses Convention
	Decentralisation	Subsidiarity; delegation to lowest appropriate governance level	Rio Declaration 1992 EU 2000 Water Framework Directive
	Open international economic system	Promotion of freer trade	World Trade Organisation; numerous regional free trade agreements
	Notification	Of accidents	Rio Declaration 1992; UN Watercourses Convention 1997

Table 23.5 Water principles from other sources of governance

Existing legal principle	New principle	Elaboration	Sources
Water rights based on ownership, appropriation, and licensing	Water as an economic good	The pricing of water and private sector participation	Structural adjustment (IMF), Dublin Principles 1992; World Water Forum; Aid agencies; trade liberalization in GATT
Sectoral approach to water; different laws relevant to water in different fields	Integrated Water Resource Management (IWRM)	A need to: set policies, the legislative framework, and incentives; create organization & capacity; adopt water resource assessments, plans for IWRM, demand management, social change instruments, conflict resolution, regulatory, economic and Information management instruments	Dublin Principles 1992; Agenda 21 1992; World Water Forum; Global Water Project 2004
Gender bias concerns: ownership & appropriation often only possible by males	Mainstreaming gender issues	Take women into account	Dublin Principles 1992
Contextual governance	Good governance	Public participation, transparency, equity, efficiency, rule of law, accountability, coherence, responsiveness, integration into account	World Bank; and aid agencies. UN World Water Development Report 2006
State regulation of contracts	International trade and investment law and arbitration	High level of protection to foreign investors	Investment treaties, World Trade Organization, and regional free trade agreements

23.3.1.2 Disharmony and On-Going Change

In addition to the foregoing patterns, two additional sources of disharmony have been introduced into contemporary policy processes. The first is the disharmony that results in decentralizing policy, leading to different policy conclusions within a single state or water basin. For example, do laws that aim at harmonising policies in different parts of the same river basin, and at the same time use catchment councils to develop contextually relevant policies, have irreconcilable goals because real community participation at the local level could lead to different policies and practices in different regions? The second is the disharmony that results from diverging pressures created by diverging actors. For example, Indonesian water law is extremely ambiguous about water privatisation and public sector participation, putting both concepts into one article. That law aims both to democratise policy processes and to allow for private commercial exploitation. Similarly, in the Philippines, the pressure to compensate indigenous people for the problems they have faced in the past has led to a new law that privileges indigenous people much more in comparison to the non-indigenous poor by guaranteeing the right of the former to access to water, but not that of the latter (Tenoria-Labang 2007).

The evolution of water law reveals that there is nothing constant in this area. As one delves into the pages of history, what becomes apparent is that ownership rules on water have gone back and forth. Through history, water ownership has been a critical legal issue. Water has been in community hands (in customary and religious legal systems) and then moved to private ownership (where human labour resulted in access to water—e.g., constructing a well in Islamic law), to state ownership (following conquests by foreigners or through the rise of Communism), and back to community systems (with the advent of the decentralization mantra), to private ownership (via the neo-liberal ideology), and to state control and the public trust given the growing political significance of water and the need to recognize that ecosystems need water (e.g., South Africa, Australia, European Union).

Along with the changing notions of ownership, there have been changing notions of the virtues of centralisation versus decentralisation. Early societies had decentralised water management systems. As agricultural systems developed in arid or semi-arid regions and economic surplus was created leading to trade, the need for water storage systems and centralised management of water became more important. This led, on the one hand, to the aqueducts of ancient Rome and the canals of Mohenjodaro and, on the other hand, to the development of social norms and rules as to who could access water, and how responsibilities would be allocated. For example, in some systems, notably the Islamic and Hindu systems, there were rules against the hoarding of water, about maintaining water harvesting systems, and for compensating those negatively affected. In the Islamic and traditional Kenyan systems, water access was encouraged and those who put in labour to build wells and water harvesting systems were rewarded with limited ownership rights. In the Hindu system, lack of maintenance of tanks and wells eventually even resulted in a suspension of ownership rights. And then, either because rulers wanted to consolidate control or because aridity made it imperative, water resources were nationalised and managed from the centre. When this proved difficult, they would

decentralise services such as water supply and sanitation. In order to deal with the cumulative water problems of the late twentieth century, a number of countries have once more centralised water ownership in the state. Yet a shortage of financial resources combined with the lack of legitimate power and under the influence of globalisation and epistemic communities, many countries are once more decentralising water management (e.g., Indonesia) or inviting private sector participation and public sector participation as well.

23.3.2 Trends at Supranational Level

The strong supranational tendencies within Europe deserve a few words (Kissling-Näf & Kuks 2004; Chapter 14, Canelas de Castro, this book). Key features of the supranational water law approach are: (a) the harmonization of goals, policy approaches and instruments in an already complex highly regulated area of water law; (b) a focus on basing decisions on science; (c) a constant struggle within the European Union between centralizing policies to ensure harmonization and minimize damage to others and subsidiarity and context relevant policies; and (d) a recent privatisation trend, with a resulting struggle between that trend and the vision of water as a 'common heritage'.

While the regional level is less well developed in other parts of the world compared to Europe, it is beginning to emerge in many different areas (Chapter 15, Van der Zaag; Chapter 16, Sabel; Chapter 18, Capaldo, this book). The century of cooperation over water between Canada and the United States is often referenced as a model that other nations could follow (Chapter 17, Hall, this book). The International Law Association has also provided something of a template that nations could use to design their own regional water management regime (ILA 2004: arts. 64–67).

23.3.3 Trends at Global Level

At global level, a number of principles have emerged as critical. The key variables include the emergence and harmonisation of sometimes disparate theories of international water law, the competition of other sources of global (or transnational) water governance, conflict between the impulse to universalise governance norms and the felt need to tailor norms to particular needs, and the rise of related areas of law that operate on at least somewhat different premises. Each point will be briefly addressed in this section.

23.3.3.1 The Elaboration of the Principles of International Water Law

Over the past 150 years, an elaborate body of international water law has emerged that provides workable guidance to nations in managing internationally shared water resources (ILA 1966, 2004; UN Watercourses Convention 1997; Dellapenna 2001).

This body of law includes a set of principles that have been widely recognized and implemented. These principles, which include the elaboration of the equity principle, the no-harm principle, dispute prevention via participation of key actors in the policy making process, and the peaceful resolution of disputes through the elaboration of dispute resolution measures, do not, by themselves, resolve disputes over internationally shared waters. That takes political will to translate these principles into concrete arrangements on the ground and to create the necessary bodies to enable and carry out on-going cooperation regarding those waters (Dellapenna 2006, §§49.05(b)(3), 49.05(c)). Some would go so far as to declare that the principles are too vague to be of any actual use (Upadhye 2000). Yet these principles do establish a baseline that precludes certain claims by nations, while the principles could and do serve to guide negotiations to resolve disputes and create cooperative relations regarding internationally shared waters (Dellapenna 1996). Table 23.4 lists the principles, their attributes, and their key sources.

23.3.3.2 Competition from Other Models of Governance

Public international law in the area of water increasingly faces competition from other sources of governance including commercial international law. As Chapter 1 (Dellapenna & Gupta) emphasised, non-UN governance forums are marketing a number of ideas globally via conferences, commissions and conditional aid. Pre-eminent ideas are those on integrated water resources management, water as an economic good, and the need for participatory water management. UN forums sometimes appear to be competing with the legal regime and sometimes to supplement or complement it. Many of these 'non-legal' approaches have set themselves up in competition with the legal approach, unlike in many other fields of governance (e.g., climate change). They have ranged from a broad ranging focus on 'integrated water resources management' to specific issues such as the role of gender in perpetuating water mismanagement (Marino & Simonovic 2001; Zwarteveen 2008). Table 23.5 summarizes these competing models.

23.3.3.3 Universalisation Versus Tailor-Made Solutions

While the harmonizing trends tend to promote common approaches (e.g., water as an economic good; good governance, etc.), these may conflict with local cultural approaches. Strong social values determine people's feelings towards water and these values need to be taken into account in developing policies. In most Islamic schools of law (except the Maliki school), water cannot be bought and sold. The pricing of water and the approach to rationalising and commodifying water is considered a sacrilege. In many civilizations, water is vested with sacred properties and the thought of harnessing the power of water for large-scale electricity production and irrigation facilities may be unacceptable, especially as such processes are more often than not accompanied by changing power structures and hence changing rules on

access and ownership. Similarly there may be conflict with indigenous law. As Solón (2006: 38) puts it: 'In summary, imposing laws, conditions on loans, and the inclusion of water in free trade treaties, not only endangers democratic management of this fundamental resource, but eliminates cultural diversity by imposing one model over the others. It standardizes water management, putting an end to centuries of social commnity water management, of which the indigenous peoples are living exponents.'

Where literacy levels are low, stakeholder participation that is not tailored to deal with these specific situations may fail (Ankersmit 1998). Where women and youth are usually not allowed to have a say in setting policy, stakeholder approaches may either be ineffective or compromise the safety of these people in other contexts (Cleaver 2000). Different stakeholders do not operate on a level playing field and those with more power may dominate in such sessions (Upadhyay 2000; Wester & Warner 2002). Implementing environmental impact assessments in poor countries has been very difficult because of problems in their legislative, organizational, procedural and administrative frameworks (Ebisemiju 1993; Bojórquez-Tapia & García 1998; Alshuwaikhat 2005). The assumption that there is linearity in history, that one phase necessarily follows another, is not true. Furthermore, universalisation presents a modern challenge to international law. Where law was based on state practice and international law merely harmonised existing systems, one could expect a high compliance pull. However, where international law is in advance of state practice, where it is based on some new scientific ideas and where the local context is ignored, the likelihood of compliance is at risk, especially in relation to developing countries (Gupta 2006).

23.3.3.4 The Rise of Complementary yet Differing Rules of International Law

While legal evolution would suggest that water law principles would spill over to other fields of law, this is not necessarily the case. Water law principles, especially those of equity and no-harm do not appear to have found their way into other environmental regimes in quite the same way. For example, in the area of climate change, the no-harm principle was relegated to a reference to the limited sovereignty principle in the preamble of the Climate Change Convention, and equity is seen in terms of common but differentiated responsibilities of rich and poor countries. The greater influence of ideas within the climate change regime on global policy is evident in the Rio Declaration of 1992, which did not adopt the equity principles from the water regime, but instead took over the equity principles from the climate change regime. The fact that the 1997 UN Watercourses Convention has not entered into force may be testimony to the unwillingness of governments to accept these equity principles in a global treaty, although there could be other reasons for that failure (Salman 2007). In other words, possibly new global trends in accepting legal principles may shape the future of water law principles more in favour of neo-liberal market approaches than equity approaches. The current discussions on the adoption of a human right to water and sanitation within the Human Rights Council, however, offers some balance.

23.3.4 Inferences

This section has argued that at national level three trends are visible (pluralism in the South, coherence in the North; similarity of legal approaches, yet continuing disharmony in policies; and constant policy change to cope with emerging and continuing challenges). At supranational level, four trends are visible (harmonization of policy; science based policy; struggle between centralisation and subsidiarity; struggle between common heritage of water and private sector participation). At the global level, four trends are also visible (emergence of common institutions; the conflict between harmonisation and tailor made approaches; conflict with other sources of governance; and threats to water law principles from other legal principles). These changes suggest that the field of water law at all levels is more complex than is commonly thought and poses significant and on-going challenges to those seeking to improve water governance across the globe.

23.4 Addressing the Challenges for the Twenty-First Century

A large number of challenges face humans in the twenty-first century, many of which centre on water. Water is closely associated with health, food and agriculture, industry and energy, and ecosystems. Furthermore, the availability and reliability of water resources will be dramatically altered by the emerging global climate disruption (IPCC 2007). Identifying and resolving these challenges is as much a problem for water lawyers as it is for hydrologists, engineers, and economists. This section provides a brief overview of the challenges and possible solutions.

23.4.1 The Water Challenges

With one-sixth of the global population without access to potable water and one-third without access to sanitation, it is no wonder that 5,000 children die daily from water related diseases, making water related disease the second largest killer of children after tuberculosis. Access to water and sanitation is a critical first step to break the poverty cycle. Reaching the Millennium Development Goals targets on water would require increasing services to 300,000 people per day and sanitation to 450,000 per day until 2015 (UNDP 2006); this would require a quantum leap in current efforts, and yet would be insufficient to meet any new human right to water and sanitation.

The demand for water for other economic needs is also growing, with agriculture continuing to use 80% of global water. In the rich countries, both direct and indirect water consumption is increasing rapidly. While individuals use between 200–400 l of water daily, increasingly bottled water (with a large environmental footprint) is being brought in from other countries. Water in agricultural products (e.g., coffee,

potatoes, rice, meat, etc.) and non-agricultural products (e.g., cars, clothing, computers, etc.) increases the virtual water consumption of the rich by many times (Allan 1998; Hoekstra & Chapagain 2007; Sealing 2007; Warner 2007). This leads to increasing depletion of water resources on the one hand and increasing pollution on the other. Pollutants include organic matter (depletion of oxygen causing ecosystem stress), pathogens and microbial contaminants (causing diseases), nutrients (causing eutrophication and oxygen depletion), salinisation (killing crops and reducing the potability of water), acidification (affecting aquatic life and the leaching of heavy metals into soil), heavy metals (toxic accumulations in fish), toxic organic compounds and micro-organic pollutants (causing poisoning and reproductive failure), thermal changes (changing species composition and the decomposition rate of organic matter), and silt (causing turbidity) (UNWWDR 2006: 141).

Added to the existing challenges of water access, water depletion, and water pollution are the new challenges of climate change, which may exacerbate the existing situation with respect to access, flooding, salt water intrusion, etc. (IPCC 2007), especially in tropical countries (UNWWDR 2006: 19). Global law has to be able to cope with these multiple challenges and develop new instruments to cope with these.

23.4.2 The Need for Law to Open Up to Other Disciplines

The water law community in the past has been a highly specialised disciplinary group; in contrast, for example, to the environmental law community that has increasingly attempted to understand the natural and social science issues surrounding environmental challenges. While the International Law Association in its *Berlin Rules* made an effort to open up to other key disciplines, legal scholars in the area of water need to engage more openly with other water scholars. Cross-disciplinary fertilization is necessary to make water governance a more successful area of governance. Non-lawyers have to understand that water law has a very long history that cannot be easily overturned to give way to new ideas; but lawyers may have to understand the scientific and social dimensions of the new environmental challenges in order to jointly search for new tools and mechanisms that can deal with the new issues of the twenty-first century.

23.4.3 The Need for Institutional Change

In 1970, the UN asked the International Law Commission to codify water law, a codification that still has to enter into force. Again in 1997, the UN asked the Commission to progressively develop ground water law. In other areas of governance, however, the UN General Assembly has set up an Inter-governmental Negotiating Committee to negotiate agreements. The latter approach calls for the joint development of a common problem frame and the use of all available knowledge to understand how best to resolve an issue. These multilateral negotiations help to further the

progressive development of international law. While such an approach was used in the climate change negotiations, the lack of International Law Commission work in this field meant that the regime was sometimes developed in ignorance of legal developments. On the other hand, the work of the Commission on water law seemed to progress in ignorance of other legal developments and non-legal developments! In order to enhance the legitimacy of any new water law, the UN General Assembly should both set up an Intergovernmental Negotiating Committee on water issues and request the International Law Commission to provide legal support to such a Committee.

Furthermore, many new environmental negotiations are set up in parallel to address various interrelated yet distinct problems. The Intergovernmental Panel on Climate Change, which shared the Nobel Prize for Peace with Al Gore in 2007, is an example of a body that attempts to assess the available scientific literature on climate change to come up with common policy proposals (IPCC 2007). Similar institutions have been developed for the negotiations on transboundary air pollution and the depletion of the ozone layer (Gupta 2001). Yet there is no common assessment of water issues, and although different bodies prepare different reports, these are in no way comparable. In recognition of the growing importance of water knowledge (both natural science and social science) to making successful water law and policy, such an integrated assessment panel could be one way forward.

23.4.4 Fairness in Water Law

Fairness in water law has grown out of the social realization that civilized societies must meet the needs of the poorest communities and marginalised ecosystems. These fairness principles have been up-scaled in bilateral and multilateral treaties. While most bilateral and regional treaties apply these principles requiring the equitable sharing of water resources, the global community has stopped short of adopting these in global multilateral treaties (Salman 2007). If such new treaties were designed in a different institutional setting, the results might be more readily and universally accepted in the global community. If that were the case, the greatest legacy of water law to other fields of law would undoubtedly be its contribution to fairness and equity in human society.

23.4.5 Inferences

This section has demonstrated that current global problems call for a quantum leap in political commitment, legal organization, and scientific collaboration. It recommends that the UN General Assembly should set up an Intergovernmental Negotiating Committee to deal with global water challenges, supported by the legal work of the International Law Commission. It recommends that an international multi-disciplinary assessment body be created to support this process. Finally, that legal

scholars should focus more concretely on developing instruments in collaboration with other scholars that would empower people and nations through strong support for the principles of human rights, no-harm, equity, prior informed consent, and a liability and compensation regime from the local to global levels. In doing so, a balance needs to be sought between the search for universal norms and recognition that communities may already have a satisfactory way of meeting their own goals.

23.5 A Few Final Words

Why is it that after 5,000 years of governing water resources, we appear to be not much closer to understanding and addressing water resource issues? The answer is probably that first, new problems have developed rapidly following the industrial revolution and traditional systems had no easy answers to those problems. Second, history has shown that apart from traditional community systems, most other systems were those of the conquerors or dictators, and conquerors and dictators seldom had the interest of the common people at heart. Many of these systems survived independence as regimes were taken over by domestic dictators or simply through inertia. Nilsson and Nyangana (Chapter 7, this book) show how post-colonial policy still included a permit application form that allowed water supply at 50 gallons/day for non-Africans and only 10 gallons/day for Africans in Kenya. As modern governments try to reflect the needs of their own pluralist societies, competition between different segments of society often stands in the way of sustainable, equitable, efficient, and democratic water policy.

The history of water law is the history of the struggle to control water and to manage the pollution associated with water. This struggle is manifest in rules of ownership and access, and whether power should be centralised or decentralised. To some of these questions there might well be no final answers, only arrangements that work well for a time and then need to be revised as needs and resources change.

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