

1. Introduction

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This book is about the issues, challenges and directions concerning water as an essential resource for mankind. The book aims to provide a finer understanding of the future regulation of water. It does so by inviting a number of leading experts to comment on the main problems confronting the actors of the water world such as governments, companies, international organizations, and citizens.

The world's water resources are sufficient to meet present requirements, from the simple mathematical point of view. However, this finding is not as reassuring as it may seem.¹ Most countries will encounter freshwater management issues because their water quality has been (or will be) degraded by pollution² and its per capita amount will decrease under pressure from population growth.³ Also, changes in the world's climate and the new regional imbalances they cause will further aggravate this situation. Water remains a vital resource and the way it is used evolves over time; it is also an indispensable engine for economic activities, and moreover it is one which some countries do not hesitate to turn into a weapon of war. It is an economic, strategic and geopolitical issue. While water consumption is stabilizing or even decreasing in Western European countries, demand is increasing both in developing and emerging countries, thereby

¹ See Elliot Curry, Water Scarcity and the Recognition of the Human Right to Safe Freshwater, *Northwestern University Journal of International Human Rights*, Vol. 9, Issue 1 (Fall 2010), pp. 103–122. See also, e.g., Raewyn Peart, Innovative Approaches to Water Resource Management: A Comparison of the New Zealand and South African Approaches (2001) 5 *NZJEL* 127.

² See Robin Kundis Craig, and Anna M. Roberts, When Will Governments Regulate Nonpoint Source Pollution: A Comparative Perspective, *Boston College Environmental Affairs Law Review*, Vol. 42, Issue 1 (2015).

³ Over the past 50 years, the earth's population has grown from 2.5 billion to over 6.5 billion. 9.2 billion of people are expected by 2050. See United Nations, Department Of Economic and Social Affairs, Population division, *World Population Prospect: The 2006 Revision, Highlights*, Working Papers ESA/P/WP 202 (2007) (for more estimation in numbers, statistics and more on the worldwide population).

demonstrating a positive progress in health. However, too many people in the world do not have access to running water.⁴

Water is becoming an economic, geostrategic and even a political weapon in many parts of the world, such as the Middle East, North Africa, Sub-Saharan Africa, North America, Central America, Southeast Asia, China, etc.⁵ The Aswan Dam gave flood management to the Nile thereby helping to ensure the water supply to a growing population. The dam was built by the Soviets, and it was also intended to affirm the identity of newly independent Egypt. However, several decades after its construction, the questions raised about the dam, intended to sustain the fertility of Egypt's Nile valley and Nile delta, remain.⁶ China has recently recognized the design errors of the Three Gorges Dam, the largest in the world. Beijing seems to be already anticipating the management of a dramatic national water shortage over the next decade. In these examples, national political ambitions primarily reflect the geostrategic positions worldwide.

CHANGING PATTERNS OF THE SUPPLY AND DEMAND

The global demand for water has increased considerably during the last three decades, while, at the same time, the world population has also significantly increased.⁷ This growth also reflects considerable progress

⁴ Between 1990 and 2010, over 2 billion people gained access to improved drinking water sources, such as piped supplies and protected wells. See UNICEF/WHO (2012) Millennium Development Goal drinking water target met – Sanitation target still lagging far behind, Joint news release: UNICEF/WHO 6 MARCH 2012 http://www.who.int/mediacentre/news/releases/2012/drinking_water_20120306/en/ See also Stephen Diamond, Water Ethics and Commodification of Freshwater Resources, 6(1) *Santa Clara J. Int'l L.* 15 (2008) pp. 15–32.

⁵ See, e.g., Scott C. Armstrong, Water Is for Fighting: Transnational Legal Disputes in the Mekong River Basin, *Vermont Journal of Environmental Law*, Vol. 17, Issue 1 (Fall 2015), pp. 1–26. See generally Christina Leb, and Mara Tignino, Freshwater and International Law, *Environmental Policy and Law*, Vol. 41, Issue 4–5 (October 2011), pp. 218–21.

⁶ See, e.g., Adel Darwish, Analysis: Middle East Water Wars, BBC News, Friday 30 May, 2003 at: http://news.bbc.co.uk/1/hi/world/middle_east/2949768.stm and Patrick McLoughlin, Scientists Say Risk of Water Wars Rising, *Planet Ark*, 23 August, 2004 at: <http://www.planetark.com/dailynewsstory.cfm/newsid/26728/story.htm> (all websites last accessed 31 January, 2016).

⁷ See Francois Bouguignon, Inequality and Globalization: How the Rich Get Richer as the Poor Catch Up, *Foreign Affairs*, Vol. 95, Issue 1 (January/February 2016), pp. 11–15.

for humanity, particularly in the fields of hygiene and economic activity. Ample population movements are compounding the consequences of the unequal distribution of water resources.

The growth of the urban population is a major factor. The rural exodus, a constant in Europe from the beginning of the Industrial Revolution to the end of the 1960s, has had a geometric growth in developing countries over the last 40 years.⁸ Capital cities and regional cities have seen their populations hypertrophy, often settling in highly precarious conditions in unserved slums, the incomers being, for example, the victims of landslides or floods. Cities are becoming larger and the need for water will begin to exceed the available supply so that these cities will have to invest not only in maintaining their water infrastructures but also in catering for increasing demands.

Many industries are also becoming less dependent on the use of water, but as they produce more, the total amounts of water needed are increasing. Companies which offer analysis and means of various measures should also benefit from the increase in the market valuation of water.⁹ Existing water distribution networks (often undersized), the depletion of groundwater, the introduction of precarious water supply systems (terminals, fountains), and the use of water carriers – some aspects of water supply are becoming unmanageable both for government and local authorities.

During the same period, the democratization of transport followed by the explosion of mass tourism has led to the construction of large resorts and recreation facilities incommensurate with the water resources in countries where water is a scarce commodity. Establishments with hundreds or thousands of rooms, and with swimming pools and golf courses, compete with local and more traditional consumption. Consequently, local people are deprived of significant amounts of water or are forced to pay for infrastructure investments from which they get little or no benefit. For instance, each year millions of tourists stay on the coast of Thailand, Indonesia, the Philippines or Malaysia and the resorts, swimming pools, watering recreational places (gardens, lawns) together with golf courses, consume huge volumes of water, and this is detrimental to the local native population. Although these centres generate jobs, it remains to precisely

⁸ See David R. Hansen, *et al.* Solving the Orphan Works Problem for the United States, *Columbia Journal of Law & the Arts*, Vol. 37, Issue 1 (2013), pp. 1–56 at 21.

⁹ Thus, in 20 years, Sao Paulo has doubled the number of its inhabitants and quadrupled its size. The city grew from 9.3 million in 1973 to over 17 million in 2003.

ascertain the social profit and loss on water quantity and quality and the number of real local jobs.

NEW PARAMETERS: FOOD AND ENERGY CRISIS

Recently, it has become necessary to consider two additional factors, namely, the food crisis and the energy sector.¹⁰ The expected growth of the world population confronts us with new challenges. This continuous and steady increase raises the question of people's livelihoods, especially when the extent of arable land is considered. The rapid expansion of cities and the multiplication of infrastructure correlation with economic development come at the expense of agricultural land, which is already known to be limited.

The availability of water essentially also influences world security, and this will be exacerbated by the expected climate changes.¹¹ By 2050, it is estimated that agricultural production will double.¹² The globalization of trade and production is not enough to ensure food security (given the cost of transport, climatic uncertainty, and speculation on food). The return to self-sufficiency for many countries, particularly in Africa, does not seem to be as easy as one would hope; this is because local agricultural produce, intended for local markets, has often been diverted towards lucrative exports.

THE ROLE OF RULES AND INSTITUTIONS

The recognition that when water supplies run out socio-economic disorders will develop, appeared for the first time at the conference of Mar del Plata in 1977.¹³ On that occasion, the states proclaimed water to be a "global resource".¹⁴ At the centre of the international debate is the major question

¹⁰ See Joanne Hawkins, Fracking: Minding the Gaps, *Environmental Law Review*, Vol. 17, Issue 1 (March 2015), pp. 8–21.

¹¹ See Noah D. Hall, Bret B. Stuntz, and Robert H. Abrams, Climate Change and Freshwater Resources, *Natural Resources & Environment*, Vol. 22, Issue 3 (Winter 2008), pp. 30–35.

¹² See Susan A. Schneider, Predicting the Future: Our Food System in 2025, *Journal of Food Law and Policy*, Vol. 11, Issue 1 (Spring 2015), pp. 21–30.

¹³ See, generally, Lilian Del Castillo LaBorde, Legal Regime of the Rio de la Plata, *Natural Resources Journal*, Vol. 36, Issue 2 (Spring 1996), pp. 251–96.

¹⁴ See Alexandre Kiss and Dinah Shelton, *International Environmental Law*, 2nd ed. (Transnational Publishers Inc, USA, 2000), 395.

of ensuring that people adapt to each river basin and participate in the resolution of water disputes between residents. The most significant result of these debates was the establishment of legal processes relating to watercourses and the management of potential conflicts, and also of the wider problems that may affect them. By legal processes regulating the water management we mean the set of rules established at the international level to overcome the difficulties related to the management of scarce water resources.

The concept expressed by water resources “international”, “shared” or “border” is synonymous. The term may refer to shared water, air, surface or ground between two or more states.¹⁵ Worldwide, there are more than 240 international river basins and an undetermined number of rivers which are shared between two or more sovereign states. Any significant interference in the rivers or lakes could have beneficial or harmful effects on the territory of another state upstream or downstream. The international law of water resources, as part of international law, regulates relations between states with regard to the use of water resources “shared”, “common” or “border”.¹⁶ Any of the world’s rivers can be considered from the geographical and the international legal perspective.

Sources of international river law, they being no exception to the conventional sources of international law in general, are determined by the charter establishing the International Court of Justice. Indeed, according to Article 38 of the Statute of the International Court of Justice, which settles disputes between sovereign states, sources of international law are: (1) the international treaty law or the law of treaties; (2) the international customary law or state practice; (3) the general principles of law recognized by civilized nations; and (4) judicial decisions or international law and the teachings of the most highly qualified publicists, as a subsidiary source.

These sources are in a certain reading of the charter, listed in order of precedence, and they are also the basic sources of international environmental law in general, and therefore of the specific duties which relate to watercourses. It must still be noted that the technical nature relating to the wider environment and to streams in particular, inevitably makes it very

¹⁵ See Jesse H. Hamner, Patterns in International Water Resource Treaties: The Transboundary Freshwater Dispute Database, *Colorado Journal of International Environmental Law and Policy*, Vol. 9, 1997 Yearbook (1997), pp. 157–77.

¹⁶ See Barry Sadler, Shared Resources, Common Future: Sustainable Management of Canada-United States Border Waters, *Natural Resources Journal*, Vol. 33, Issue 2 (Spring 1993), pp. 375–396. See also Kerstin Mechlem, Shared Resources: Transboundary Groundwaters, *Environmental Policy and Law*, Vol. 34, Issue 4–5 (July 2004), pp. 162–75.

technical, and therefore international law needs to continuously evolve in line with contemporary conditions, and this leads us to consider the history of international river law.¹⁷

More precisely, many different treaties may apply to water. Countries have begun to increasingly rely on private sector participation in the water supply sector and the provision of sanitation services. This is due to budget pressures, a drive for greater efficiency in service delivery, and because of the promotion by agency donors of greater private sector participation.¹⁸ A range of options for private sector participation in water supply and sanitation exists, ranging from the service contracts for functions such as billing and the concessions for complete operations for maintenance and network expansion.¹⁹ Investing in water services can be a very delicate, laborious and unpredictable task. While the definition of investment inevitably involves some risks, water services appear to be a singular type of investment. Indeed, they simultaneously involve technological methods and knowledge, financial funding, and a panoply of laws including investment law, international law, human rights standards, contractual rights and obligations, national laws, and others.²⁰

CHARTING THE WATER REGULATORY FUTURE

In this context, the access and management of water become a lever for sustainable development which are even more powerful. For these less developed countries (LDCs), to a lesser extent perhaps than for developed

¹⁷ Eyal Benvenisti, Collective Action in the Utilization of Shared Freshwater: The Challenges of International Water Resources Law, *American Journal of International Law*, Vol. 90, Issue 3 (July 1995), pp. 384–415.

¹⁸ See Julien Chaisse, Debashis Chakraborty and Jaydeep Mukherjee. 2013. Deconstructing Service and Investment Negotiating Stance. *Journal of World Investment & Trade*, 14, pp. 44–78.

¹⁹ Amy K. Miller, Blue Rush: is an International Privatization Agreement a Viable Solution for Developing Countries in the Face of an Impending World Water Crisis, 16 *Indiana International & Comparative Law Review* 227 (2005) at note 121.

²⁰ See Markus A. Goll, Desalination in Texas: Struggling to Cope, *Texas Environmental Law Journal*, Vol. 45, Issue 1 (February 2015), pp. 51–86. See also Rebecca Bates, The Trade in Water Services: How Does GATS Apply to the Water and Sanitation Service Sector, 31 *Sydney Law Review* 121 (2009) (exploring the stakes and impact of general investment agreement on water and sanitation services sector). See, generally, IWA Specialist Group on Statistics and Economics, *International Statistics for Water Services, Information every Water Management should know about*, International Water Association, 1 (2012).

countries, relocation of part of the national economies in which food production is essential. All these factors make it necessary to question the management of water and the ability of all actors to respond to new challenges.

We must re-examine the water management models. Can public or private management concepts even justify their specificity before such a huge issue? We must also ask ourselves about the problems of scales and jurisdictions between the public and the private, and between meeting a social need or a humanitarian one, and the profitability requirements inherent in a market economy; the choices may become conflictual.²¹ As for the management of energy, it is to initiate a change in global behaviour at all stages of the economic chain involving consumers, distributors and directors. This is part of the dynamics of sustainable development, initiated by the Millennium Development Goals (MDG), and we cannot afford the luxury of reflecting on new devices, new structures, and new businesses that should help to consolidate the necessary link between the small and the large water cycle, that is to say between the water management and the overall consideration of the resource that is essential to all players as the new paradigm for water management in the coming years.

The contributions in this book are grouped around specific themes. In the Part I, the contributions address the challenges which water poses to public international law. In the Part II, the authors explore the most pressing ethical, legal, and social issues. In the Part III, the discussion covers the economic drivers shaping the future of water.

PART I THE WATER CHALLENGE TO PUBLIC INTERNATIONAL LAW

Part I contains contributions that analyse the regulatory foundations of the global water and sanitation services. *Manzoor Ahmad* provides a comprehensive overview of the international trade rules that address global water services with a particular focus on the WTO. He critically reviews the relevant rules and disciplines and provides a number of recommendations concerning the way the regulatory framework thereof should be reformed with the goal of promoting global water-use efficiency. He further observes that there are provisions in the WTO rules for the

²¹ See Noah D. Hall, Protecting Freshwater Resources in the Era of Global Water Markets: Lessons Learned from Bottled Water, *University of Denver Water Law Review*, Vol. 13, Issue 1 (Fall 2009), pp. 1–54.

better management of water. However, they are not invoked and currently there is no transparency for peer-reviewing policies of member states in this important area. The WTO can play a more significant role in preventing wastages of water and in closing the gap between the quantities available and the quantities required. The WTO rules could provide incentives to member countries to adopt more environmental friendly ways of using water. Therefore, there may be a need to explore what further changes to the WTO rules and practices should be made so that trade rules can play their due role in overcoming the future water shortages.

Rebecca Bates further refines the legal analysis by focusing on the trade in water services. She answers the question of How Does GATS Apply to the Water and Sanitation Services Sector? The chapter explores the potential impact of the General Agreement on Trade in Services (GATS) on the water and sanitation services sector. She argues that water and sanitation require special consideration in the liberalization debate given their essential role in promoting human health and survival and their position as a human right. GATS has the potential to benefit the sector through creating increased efficiencies and encouraging additional funds to expand dilapidated infrastructures. Conversely, the sometimes punitive nature of trade laws risks undermining individual human rights and national legislation. At present there is some uncertainty as to how the GATs will apply to this sector because no WTO members have nominated their water sectors for liberalization. The recent *US — Gambling* decision demonstrates the power of the WTO to define and to potentially extend a member state's original commitment. Similarly, it has been argued that certain provisions have the scope to trigger a commitment without the consent of the member state. This chapter argues that given the essential role of water and sanitation, greater certainty must be provided to ensure the effective operation of trade laws, the validity of national legislation and the protection of water consumers.

Paolo Turrini extends the analysis by looking at Virtual Water and International Law. Water is a scarce resource and, at the same time, one of the most valuable and most necessary. Thus, according to the laws of economics, it should be a costly commodity. On the contrary, the price of water seems not to reflect adequately its limited availability. Moreover – and as a consequence – human behaviour quite often appears to be irrational, given that people who can count on a small amount of water sometimes use it to produce goods which end up being sold to people who are much richer in water. From the domestic standpoint of the former, this does not make sense, at least apparently. This is the reason why the notion of virtual water has been conceived. Its aim is to raise awareness of the scarcity of water resources globally, and of the need to exploit them

rationally. Virtual water is the water used in the process of growing or manufacturing a product. If this product is then sold abroad, we witness an international flow of virtual water from the seller to the buyer. And if the product is water-intensive (*i.e.*, its production required a significant amount of water), as many agricultural goods are, then the flow of water from one country to another can become politically and economically relevant, especially if the water assets of the state transferring a part of them are poorer than those of the state acquiring them (even if only in virtual form). As a consequence, the need might emerge to reshape the rules of the game in order to discourage this kind of transaction. Rules – international rules – are what will be addressed here.

Julien Chaisse engages the debate with regard to investment treaties and their application to cross-border water services. The world of water services has changed significantly over the last two decades, opening it up to new business possibilities, as promoted by different international financial institutions. Such prospects have arisen in the face of extraordinary population growth and intensified water expansion needs. Accordingly, a vast increase of water-services privatization contracts between foreign investors and states has ensued. Today, 10 per cent of global consumers receive water from private companies. Inevitably, disputes have emerged regarding these privatization contracts, with there being little indication of their subsiding in the near future. In the absence of a specialized international regime to regulate these fast-growing activities, both investors and host states have filed 21 investment claims to investment tribunals in less than two decades. These filings have invited tribunals to interpret foreign investments in the water industry. The tribunal interpretations have generated the embryonic international regulatory and jurisprudential regime on water services analysed in this chapter. Governments must design water-related policies that comply with investment treaties because failure to do so results in higher water costs and deters foreign investors from providing much-needed high-quality services to local populations and industries. Although the investment jurisprudence may be seen as progress towards the regulation of an important service, it also emphasizes the lack of a true global holistic approach to regulate water services.

Catharine Titi looks at the Right of the Host State to Regulate Water Services. Since the inception of the international investment law system, investment promotion and protection have been the international investment agreements' (IIAs) principal *raison d'être*. By concluding these agreements, states have offered investors safeguards such as fair and equitable treatment, full protection and security, protection in case of expropriation, most-favoured-nation treatment, and guarantees of free capital transfers, in tandem with the possibility of recourse to investor–state

dispute settlement, and in so doing they have confined their policy space and their capacity to adopt measures for the protection of the public interest. Against this background, the preoccupation with reserving the host state's right to regulate has gradually moved centre-stage with states starting to look at ways in which to safeguard their regulatory powers and to guide – and delimit – the interpretative freedom of arbitral tribunals by addressing their right to pursue specific public policy goals. A new generation of investment treaties, first launched with the US and Canadian model bilateral investment treaties (BITs) of 2004, have started to provide contracting parties with a modicum of flexibility, and the question is being asked for the first time of the pertinence of this right to regulate the state measures relating to water services. State regulation concerning water may adversely affect an investor not only where investment is made in water utilities, such as the supply of drinking water and sanitation services, but also where the investor is engaged in water-intensive activities, such as in the agricultural, industrial, energy, and in the mining and oil sectors. Water regulation may also become relevant where the investment pollutes or damages the water in the local environment. Environmental legislation and state measures for the protection of human, animal or plant life or health, are two fields of public policy-making that may have a direct impact on a foreign investment and they may overlay the investment protections afforded by the regulating state in an investment agreement. Given this potential for overlap between water, investment and state regulation, it is not surprising that several water-related claims have been initiated, against both developing and industrialized countries. Among the numerous examples, one may cite the famous *Agua del Tunari, S.A.* dispute against Bolivia and related events that became known as Bolivia's Water War as well as the first *Vattenfall* dispute against Germany, involving local authorities' measures relating to compliance with the cleanness of river water targets of EU legislation, earning Germany its first-ever investment arbitration. The present chapter will query the extent to which a host state is able to adopt measures relating to water services affecting, *inter alia*, the economic value of an investment without violating an IIA to which it is a party and, significantly, without incurring financial liability vis-à-vis the foreign investor. To do so, it will focus on the presence of the right of the host state to regulate water in conventional law and customary international law, and it will look further into the potential impact of soft law instruments, such as the OECD Guidelines of Multinational Enterprises.

Finally, in this Part I devoted to the challenge of water to public international law, *Virginie Tassin* completes the analysis of the regulatory landscape and analyses the Regulation and Protection of Water as a

Resource: Terrestrial and Maritime Perspectives. The present chapter will examine in detail the fragmentation of the regulation and protection of water as a resource and highlight the large ambivalence between the terrestrial and maritime regimes. This study will provide necessary tools to understand the benefits and challenges of an international fragmented water regime. It will also analyse the limits attached to the human rights to clean water and confront it to the emerging human rights to a safe environment. Recommendations will be given on the water status in international law.

PART II ETHICAL, LEGAL AND SOCIAL ISSUES

Part II goes beyond the law and the current regulatory framework to identify issues at the social, ethical and legal levels. This group of chapters seeks to present the Emerging Issues and Challenges for the Future of Water Governance.

Miharu Hirano and *Shotaro Hamamoto* explore the geography of investment disputes in water services. Recently a group of UN experts, including the Special Rapporteur on the human right to safe drinking water and sanitation, voiced concerns about the adverse impact of investment agreements on human rights.²² The issued statement draws attention to “the potential detrimental impact these treaties and agreements may have on the enjoyment of human rights”, including the human right to water. This statement goes one step further than the 2007 Report of the UNHCHR on equitable access to safe drinking water, which had simply noted that further analysis was needed in this field.²³ In fact, urban water utility has recently become rather a common sector in the list of publicly available investment arbitration proceedings. This chapter examines these awards to identify the standard which the tribunals have employed to strike an appropriate balance between the protection of investors/investments and domestic public interests. This study also compares the water-related awards with those dealing with other public interest issues, such as environmental protection, so as to identify the water-specific considerations paid by the tribunals. This chapter begins with the big

²² “UN experts voice concern over adverse impact of free trade and investment agreements on human rights” (2 June, 2015), <http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=16031&LangID=E>.

²³ “Report of the United Nations High Commissioner for Human Rights on the Scope and Content of the Relevant Human Rights Obligations related to Equitable Access to Safe Drinking Water and Sanitation under International Human Rights Instruments”, A/HRC/6/3 (2007), paras 63–64.

picture of arbitral cases on water service. It is now a widely shared view that treaty-based arbitration may have certain impacts on the domestic regulatory authority. The structure of the treaty-based arbitration allows a foreign private entity to bring a case on the conformity of governmental measures with the applicable investment treaty, which will be examined by arbitrators appointed by the disputing parties. Arbitral decisions are enforceable, including in third states. In case of water services, conflicts between the investor and the host state often centre on the unwillingness of the local authorities to increase tariffs despite inflation or on the validity of modifications to the original concession unilaterally introduced by the host state. In such cases, the tribunals have consistently rejected the arguments of the respondent state that its measures in question should be justified in the light of the human right to water. At the same time, they made it clear that obligations under the applicable investment treaty and the human rights norms were not inconsistent, contradictory, or mutually exclusive. They also accepted *amicus curiae* briefs. It is thus an overstatement to say that arbitral tribunals ignore the public interests of the host state. The tribunals find violations of the applicable treaty, when they detect disguised illegitimate motives in the host state's measures allegedly taken to protect public interests (water-related cases: *Azurix v. Argentina*, *Vivendi v. Argentina*, and *SAUR v. Argentina*; non-water cases: *S. D. Myers v. Canada* and *Tecmed v. Mexico*). The tribunals consider that the host state has a legitimate power to regulate water tariffs (*Biwater v. Tanzania*, *Aguas Argentinas/Suez v. Argentina*, *Aguas de Santa Fe/Suez v. Argentina*, and *Impregilo v. Argentina*), as well as environmental and health protection or archaeological preservation (*Chemtura v. Canada*, *Methanex v. USA*, and *Parkerings v. Lithuania*), and examine whether the host state exercised such powers in an appropriate or proportionate manner in the light of the legitimate policy goal. In this respect, the eventual question becomes the standards set by the tribunals to review domestic regulatory measures. Finally, this chapter gives some accounts of the water-specific reasoning of the tribunals. *Aguas Argentinas/Suez* and *Aguas de Santa Fe/Suez v. Argentina* explicitly stated and recognized the difficulties in striking the right balance between the financial viability and the consideration to the most vulnerable parts of society. The tribunal went on to point out alternative measures that Argentina could have taken during the economic crisis to safeguard the interests of investors and citizens. This argument by the tribunal may be considered as an incursion into the regulatory autonomy of the host state. In recent years, intensive exchanges of good practices have been witnessed, failed projects have been analysed in detail, and various policy guidelines have been proposed at a variety of fora with respect to water governance. As such, the research

continues; future tribunals will have access to materials on which they can rely when assessing the conformity of the measures in question with the applicable treaty. It is then not likely that the deference accorded to states would increase.

Sikander Ahmed Shah takes a human-rights-based approach to discuss the Provision and Violation of Water Rights in Pakistan. Water is not only a vital resource for development, but access to clean drinking water and sanitation has been recognized as essential to the realization of all human rights. This declaration accompanied the explicit recognition of water as a human right in the UN General Assembly Resolution 64/292. The scarcity of water, the exploitation of water resources, and the consequent lack of quality water supply in developing countries are barriers to the realization of this human right. With governments lacking the capacity to provide water services of a high quality, private players (mostly foreign investors) are playing an increasingly large role in the provision of such services. A concurrent narrative is of the increasing number of investment disputes filed against developing countries over the last decade. This study will document a subset of these disputes based on water services agreements between developing countries and foreign investors.

Cosmas Emeziem extends the analysis of the human right to water by looking at its implementation in Nigeria. This is an important contribution because there is still a gap between this perception and the reality of access to clean water and sanitation as a human right. The norms postulated do not yet translate into sustainable clean water access for many. Undoubtedly, the actualization of this premium right lies essentially at the local level, hence the need to act locally while thinking globally. This work – which is in four parts – explores the human right to clean water and sanitation by using Nigeria as the prism. It is aimed at ascertaining the extent of availability and enjoyment of this essential human right in Nigeria. Query: how do we move from slogans to real programmes on the human right to clean water and sanitation? Part I introduces the chapter. Part II looks at the legal regime on water and sanitation in Nigeria. Part III considers judicial enforcement and the challenges facing the right. Part IV argues and recommends that a social justice approach should be applied as a key tool towards realizing this human right. It is hoped that a study of the Nigerian situation will help towards formulating a sustainable human right to clean water and sanitation policy and also facilitating its full realization.

Preetha Mahadevan focuses her analysis on the impact of the private sector in implementing the right to water. Her chapter examines methods such as privatization, public–private partnerships, concession agreements, and international investment agreements with the support of international

organizations such as the World Bank, and the outcome of such efforts. Finally, the chapter explores how corporate entities – the private sector involved in the construction of facilities and providing water utilities to the public on behalf of the government and the entities involved in packaging/bottling of water for commercial sales – embrace the “right to water”, and the efforts in developing clear standards and metrics for what companies should or must do; ways to evaluate their compliance with these standards, and the consequences of failure to comply.

Ana Paula de Barcellos focuses on the interaction between Sanitation Rights, Public Law Litigation, and Inequality. She does so in A Case Study from Brazil. Public law litigation has been used to advance human rights for decades; in Brazil, it has also been employed since the 1990s in the advancement of rights related to health. Such bids are usually accomplished through requests that the government pay for pharmaceuticals and medical procedures to individuals. This kind of litigation ends up concentrating resources on pharmaceuticals, instead of on other public health needs. The literature has been pointing out the inequitable effect which litigation may produce by particularly benefiting successful plaintiffs, who will receive goods usually not available to the rest of the population. But could litigation play a role in shaping public health policies? To explore this question, the chapter focuses on lawsuits involving the determinants of health, namely, water and sanitation public policies. The chapter presents and analyses the results of an empirical study of 258 Brazilian court orders, issued between January 2003 and March 2013, that address requests for sewage collection and treatment. The data show that, on the one hand, the Brazilian judiciary is willing to improve access to sanitation services, but that, on the other hand, litigation has addressed fewer than 177 out of the 2,495 Brazilian municipalities that lack both sewage collection and treatment systems, and lawsuits are concentrated in the richer cities, not in the poorest ones. This chapter suggests that public law litigation can be used to foster public health policies similar to the way in which structural reform litigation and the experimentalist approach between courts and defendants have influenced public policies and achieved institutional reform in schools and prisons. However, greater effort is needed to target initiatives that would reach the most disenfranchised communities.

PART III ECONOMIC DRIVERS SHAPING THE FUTURE OF WATER

Part III offers a comprehensive analysis of the economic drivers and determinants of a global market for water services.

Sacchidananda Mukherjee and *Debashis Chakraborty* consider the demand for Infrastructure Investment for Water Services and the Key Features and Assessment Methods. Assessing the present state of water services (access to water supply and sanitation) is important when estimating the demand for infrastructure investment. Different countries and regions are generally in different stages of providing access to safe drinking water and sanitation. Unlike other infrastructure investment, investment in water services infrastructure however has direct (public health benefits) and indirect benefits, as access to safe water and sanitation is the key to achieving economic growth and human development. Hitherto, public investment is the dominant source of financing water services infrastructure, at least in developing countries and LDCs. Limited fiscal space of the governments, in most of the developing countries and the LDCs, and growing demands from other developmental sectors (*e.g.*, education, health), often lead to low investment in water services infrastructure. Inadequate access to safe drinking water and sanitation leads to various public health hazards and costs to the economy. Unless there are specific rules and regulations to charge the beneficiaries for water services, the revenue stream from investment in water services infrastructure will be uncertain. Unlike other infrastructure services, private participation in water services infrastructure investment is low and that is also restricted to a few regions in the world. The challenges to the provision of water services shift as a country climbs the development ladder. Growing competition across the sectoral usage pattern of water – *i.e.*, among agriculture, industry, ecology – also puts additional challenges of securing sustainable sources for the long-term sustainability of water infrastructure projects. Growing urbanization, industrialization and the intensification of agriculture and not having adequate wastewater treatment facilities – at least in developing countries and LDCs – impose additional demands for investment in the water treatment infrastructure in order to meet the requisite quality standards. Sustaining safe sources of drinking water is a challenge not only for developing but also for their developed counterparts. Investment in the collection, treatment and disposal of domestic wastewater (including sewage and sanitation) is an integral part of investment in the water supply infrastructure. Challenges in meeting the demand for water services infrastructure are many and this

chapter highlights the concern areas in a wider developmental context. The chapter explores various methods of estimating the demand for water services infrastructure and attempts to identify an appropriate one based on an extensive literature review. Investment in the maintenance of water services is as crucial as investment in greenfield projects, and therefore this chapter separately estimates the demand for investment in maintenance. Finally, the analysis also explores the possible sources of financing the infrastructure in water services with a special reference to developing countries and LDCs.

Thomas A. McDonnell analyses the residential Water Charges in Ireland: Policy Objectives and Funding Models. Water services provision is a natural monopoly. This drives a propensity to market failure and economic inefficiency in the absence of robust regulatory measures. In this context he discusses the appropriate role of the regulator and the advantages and disadvantages of pricing water usage. Beyond subsidies funded from general taxation there are potentially three main sources of revenue for a water utility. These are: connection fees; recurrent fixed charges; and volumetric charges based on usage. Water policy pursues multiple objectives, and a wide variety of pricing structures are employed within the OECD. These objectives can be structured around four sustainability dimensions: environmental sustainability; financial sustainability; economic efficiency; and social concerns, including affordability. There are trade-offs between each of these policy objectives. Full cost recovery through usage-based tariffs creates affordability and equity concerns, while the most efficient allocation of water may not be consistent with water saving and environmental concerns. This chapter considers the main trade-offs as a set of dilemmas and discusses the advantages and disadvantages of a variety of different water charging models. Water charges for domestic users were introduced in Ireland in 2014. In this context he considers various charging models. Water affordability and water poverty are important concerns. A universal free allowance was proposed as a means of protecting households from water poverty. However, a small free universal allowance will not address the affordability issue while a large free allowance undermines other policy objectives – notably, economic, financial, and ecological sustainability. Instead, a system of income-related water credits is described as a potential alternative. Combining a volume-based pricing structure with a system of income-related water credits may best reconcile the four main policy objectives, and it would also address the affordability issue at a much lower cost to the exchequer than a universal allowance; if properly designed, it would ensure that a combination of water charges and low income does not become a barrier to vulnerable households accessing water and wastewater services.

Tihomir Ancev, Samad Azad, and Francesc Hernandez-Sancho analyse the role of multinationals in providing water services. They answer the key questions of whether they are more efficient. Over the last two decades there has been a significant trend of multinational companies operating water provision services in many different countries, both developed and developing. One of the key arguments in favour of the participation of these foreign-owned corporations in the provision of water services in host countries is that they can lead the way in improving the efficiency and service quality of water utilities. It is commonly assumed that opening up the market for water services to foreign corporations will bring much-needed infrastructure investment as well as best international practice, and that this will ultimately result in an efficient water sector that will provide services to the public at acceptable cost. This chapter will empirically test the validity of this assumption. A key objective of the study is to measure the productivity and efficiency of water utilities in several countries, and to relate the observed differences in efficiency to the majority ownership of the analysed utilities, whether they be domestic or international. The standard productivity and efficiency measurement approach will be followed to measure the productivity and economic performance of water utilities. This will involve gathering data on output (*e.g.*, drinking water delivered, quantity of pollutants removed from wastewater) and input quantities (*e.g.*, labour, capital, energy) of the water utilities in several developed (*e.g.*, UK, Japan) and developing (*e.g.*, Kenya, Uganda) countries. The data will then be used to measure the efficiency of individual utilities in relation to an overall efficiency frontier for a particular country. The resulting efficiency scores will be related by applying econometric methods to the variable denoting the majority ownership of a given utility. Statistical tests will be run to determine whether foreign ownership is indeed related to increased efficiency scores, as hypothesized. These findings are subsequently related to the key motivations for the internationalization of water services, as well as to the issues around water pricing and water access, especially from the perspective of adaptation to climate change.

Allen Yu-Hung Lai and Jonatan A. Lassa complement the analysis by looking at the Microfinance in Water and Sanitation Services and they identify best practices. The existing literature on adaptation financing still lacks empirical evidence. This research contributes to the debate and literature of adaptation financing at the grassroots level in the urban context. This chapter presents good practice and lessons from a community-based sanitation micro-finance initiative that was recently adopted by Kemijen Village in the eastern part of Semarang City, Indonesia. The chapter argues that micro-finance can be used in the

community-based adaptation planning in Semarang City if the conditions for sustainability can be controlled by local actors at the village level. An adaptation fund through a community-based micro-finance mechanism is a possible adaptation and risk management path. The participatory design of a “sanitation credit” mechanism suggests promising results because such a mechanism not only allows the local community to find a “best fit” approach in solving immediate problems such as water access and community sanitation but it also opens up the possibility for community climate and disaster financing.

The globalization of water services illustrates the clash of foreign investors’ protection with human rights protection as being the state’s responsibility. This tension is only now emerging but it will intensify rapidly because more investors will seek access to fresh water in new countries. There is therefore an impending risk of the emergence of global monopolies in this scarce commodity, which would be detrimental to many people, especially under climate change. These risks and challenges demand a proper regulatory answer, which should include an economic, legal, and human rights perspective on water services.

This is the context in which The Chinese University of Hong Kong (CUHK) Faculty of Law and Centre for Financial Regulation and Economic Development (CFRED) decided to organize a conference “Managing the Globalization of Water Services in a World Affected by Climate Change: Regulatory and Economic Challenges” in March 2015. This conference brought together more than 40 experts from the five continents comprising academics, government officials, NGOs, business representatives, and lawyers specializing in water services.

The conference examined the international law that governs the globalization of water services, to identify gaps and the need for various changes, and to relate the legal framework to the economic issues surrounding water provision including the economic rationale for the protection of foreign investments. The project contrasts the economic–legal view on international investment to the nascent notion of water as a human right. The two aspects of water – investment protection and human rights – are increasingly contradictory. While the scarcity of water has intensified the movement towards a human right to water, private control over water utilities is increasing. In particular, the conference participants examined how arbitral tribunals have dealt with the failure of contracts to manage privatized water supplies by focusing on economic cases of water privatization.

We decided to publish a selection of the papers presented at the

conference as a way of contributing to the research and debate on the future of water. The CFRED would like to thank the team in the centre (Ms Susanna Leung, Ms Bonnie Leung and Mr Noel Chan) for organizing the conference and Ms Sammi Lee and Mr Keith Ji for their contributions in editing the volume.

