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**Governance of International Rivers:
Threats, Gaps and Challenges**

A thesis
submitted in fulfilment
of the requirements for the degree
of
Doctor of Philosophy in Law
at
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by
DURGESHREE DEVI RAMAN



THE UNIVERSITY OF
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Abstract

In light of the growing water shortages world-wide and concerns over freshwater disputes arising from essentially a growing world population, an increase in per-capita consumption and the limited supplies of freshwater resources, this thesis looks at issues of governance of international rivers in terms of threats to them, gaps in their governance regimes and challenges associated with closing those gaps.

International river basins globally are currently threatened with over-extraction, pollution, damming and infrastructural development as well as the impact of climate change. If left unaddressed, the pressure on the international river basins, as riparian States compete for its limited supplies, is only going to exacerbate any chances of freshwater disputes between them.

The United Nations Convention on the Non-Navigational Uses of International Watercourses offers a guidance framework to enable riparian States of international rivers to achieve 'equitable utilization' of water resources as well as management of the basin in order to avoid freshwater disputes. This thesis analyses the adequacy of the Convention to address the four main threats. The analysis is supplemented by the Berlin Rules, international cases and arbitral awards.

The thesis has also undertaken a study of the European regional framework as an example of best regional practice, given that it not only has a similar Convention to the UN Watercourses Convention being the United Nations Economic Commission for Europe's Convention on the Protection and Use of Transboundary Watercourses and International Lakes, but it also has other pieces of legislative and policy documents to guide the European Union States to achieve the paramount objective of the EU water policy, which is 'good ecological status' for all its water bodies by 2015. This is to ensure sustainable water supply for its current and future populations.

In order to test the viability of the UN Watercourses Convention against individual basin's legal regimes, the thesis has taken the Jordan, the Nile and the Indus River Basins as case studies as they are already considered to be 'hot spots' for freshwater disputes and the four main threats to them, which if not adequately addressed, will only aggravate the already existing tension. The analysis of the case studies' legal regimes involve an examination of the extent of the specific threats in each river basin and the strengths and weaknesses of each governance regime in order to ascertain where it is lacking.

In order to enable an international legal framework that is apt to guide riparian States to deal with any of the four main threats to any international river basin, this thesis proposes recommendations for changes to the UN Convention based on other sources of international law and policy, the EU framework as well as the strengths of the governance regimes of the case studies. In order to minimize any chances of freshwater disputes and increase water security in the case studies, the thesis also makes recommendations for improvement to each legal governance regime based on international law and policy, the EU framework as well as the strengths of the governance regime of the other case studies.

In doing so, this thesis provides a comprehensive overview of the current international law, policy, case law and arbitral awards relating to each major threat that has been identified. It also highlights the progress being made in addressing these threats in the European region through the practical application of the relevant treaties, directives and policy documents. Finally, it puts together the legal responses that are required to effectively address the four main threats in the Jordan, the Nile and the Indus River Basins.

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Dedication

I would like to dedicate this thesis to my beautiful daughter, Anushree.

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List of Abbreviations

BCM	Billion Cubic Metres
EC	European Commission
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FoEME	Friends of the Earth Middle East
FRMP	Flood Risks Management Plan
GA	General Assembly
GEP	Good Ecological Potential
GES	Good Ecological Status
GLOWA	Global Change and the Hydrological Cycle
HMWB	Heavily Modified Water Body
HRC	Human Rights Council
ICIMOD	International Centre for Integrated Mountain Development
ICJ	International Court of Justice
IPCC	Inter-governmental Panel on Climate Change

JWC	Joint Water Committee
MAF	Million Acre Feet
MCM	Million Cubic Metres
MEP	Maximum Ecological Potential
NBI	Nile Basin Initiative
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Cooperation and Development
PCA	Permanent Court of Arbitration
PJTC	Permanent Joint Technical Committee
RBMP	River Basin Management Plan
SEA	Strategic Environmental Assessment
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environmental Programme

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1 Global Water Security and Governance of International River Basins



“Of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet Earth ... No region will be spared from the impact of this crisis, which touches every facet of life, from the health of children to the ability of nations to secure food for their citizens.”²

1.1 Introduction

Freshwater availability and the quality thereof have been labelled as a security concern for the 21st century.³ This is because freshwater resources are not only limited but is also unevenly distributed around the world.⁴ The history of human population during the last century has been one of growth, at an accelerating rate. The same has been projected for this century with the current population of 7.2

¹ Permission sought and obtained from International Water Law Project. Confirmation email can be made available upon request.

² Statement made by UNESCO’s Director-General, Koichiro Matsuura “Political Inertia Exacerbates Water Crisis, says World Water Development Report First UN System-Wide Evaluation of Global Water Resources” (5 March 2003) http://portal.unesco.org/en/ev.php-URL_ID=10064&URL_DO=DO_TOPIC&URL_SECTION=201.html

³ See Council of Ministers *Ministerial Declaration of the Hague on Water Security in the 21st Century, Second World Water Forum, The Hague, 17-22 March 2000* (World Water Council, 2000) available at http://www.worldwatercouncil.org/fileadmin/world_water_council/documents/world_water_forum_2/The_Hague_Declaration.pdf and; UN-Water *Water Security & the Global Water Agenda: A UN-Water Analytical Brief* (United Nations University Press, 2013).

⁴ Robert J Naiman and others *The Freshwater Imperative: A Research Agenda* (Island Press, Washington, DC, 1995) at 16.

billion projected to reach 9.6 billion by 2050.⁵ Associated with population growth is an increase in per capita withdrawal and consumption of water, which is growing yet faster than the world population.⁶ Hence, water stress and scarcity, associated with decrease in availability of freshwater per capita, is also increasing and is thus creating a world water crisis. With increasing demands for freshwater by a growing world population, it is anticipated that riparian States sharing water resources of international river basins are going to compete for its limited supplies.⁷ To make it worse, as has been found by a number of studies conducted by the United Nations, Regional Organisations, environmental Non-Governmental Organisations as well as independent studies, rivers are already facing threats from:⁸ over-extraction,⁹ (2) pollution,¹⁰ (3) damming and infrastructural

⁵ United Nations, Department of Economic and Social Affairs, Population Division *World Population Prospects: The 2012 Revision, Key Findings and Advance Tables* Working Paper No. ESA/P/WP.227 (U N, New York, 2013) at 1.

⁶ Shimon C Anisfeld *Water Resources* (Island Press, Washington, DC, 2010) at 51; Constance Elizabeth Hunt *Thirsty Planet: Strategies for Sustainable Water Management* (Academic Foundation, New Delhi, 2007) at 48.

⁷ See Heather L Beach and others *Transboundary Freshwater Dispute Resolution: Theory, Practice and Annotated References* (United Nations University Press, Tokyo, 2000).

⁸ European Commission *Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans COM(2012) 670 Final Report* (EC, Brussels, 2012) at 6 available from http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm which has identified all except climate change as pressures on European rivers, and ; Charles J Vörösmarty and others “Global Threats to Human Water Security and River Biodiversity” (2010) 467 *Nature* 555.

⁹ Gabriel Eckstein “Water Scarcity, Conflict, and Security in a Climate Change World: Challenges and Opportunities for International Law and Policy” (2010) 27 *Wisconsin International Law Journal* 409; Edward H P Brans *The Scarcity of Water: Emerging Legal and Policy Responses* (Kluwer Law International, London, 1997).

¹⁰ Luis Santos Pereira, Ian Cordery and Iacovos Iacovides *Coping with Water Scarcity: Addressing the Challenges* (Springer, Dordrecht, 2009) at 51; Stephen E Draper *Sharing Water in Times of Scarcity: Guidelines and Procedures in the Development of Effective Agreements to Share Water Across Political Boundaries* (ASCE Publications, Virginia, 2006).

development¹¹ as well as (4) climate change.¹² These will only aggravate the chances of disputes over freshwater resources of international rivers.

Thus, in breaking down the concept of water security, this chapter looks at: (1) the state of freshwater resources in terms of its current and projected uses as well as changes which are affecting the supply of global freshwater resources, (2) the anticipated water crisis in terms of its availability and quality and water security issues on the global agenda, (3) a special focus on international river basins that identifies current threats to them which could potentially lead to disputes over its freshwater resources and (4) an explanation as to why this thesis has used the Jordan, the Nile and the Indus River basins as case studies. This chapter concludes with an overview of the rest of the thesis.

1.2 State of the Global Freshwater Resources

The total volume of water in the world is about 1.4 billion km³, of which only about 2.5 percent or approximately 35 million km³ is fresh water.¹³ In order to understand the issues related to freshwater, it is important to know how the hydrology or the water cycle functions. Driven by solar energy and gravity, the hydrologic cycle is the movement of water between the land, oceans and the

¹¹ Thayer Scudder *The Future of Large Dams: Dealing with Social, Environmental, Institutional and Political Costs* (Cromwell Press, London, 2005); Cecilia Tortajada, Asit K Biswas and Dogan Altinbilek (eds) *Impacts of Large Dams: A Global Assessment* (Springer, Verlag, Berlin, Heidelberg, 2012); Angela Z Cassar and Carl E Bruch "Transboundary Environmental Impact Assessment in International Watercourse Management" (2003) 12 NYU Env'tl LJ 169; Kees Bastmeijer and Timo Koivurova *Theory and Practice of Transboundary Environmental Impact Assessment* (Martinus Nijhoff Publishers, Leiden, 2008).

¹² Ashok Swain *Understanding Emerging Security Challenges: Threats and Opportunities* (Routledge, Oxon, New York, 2013) at 55; JAA Jones, Trahel G Vardanian and Christina Hakopian *Threats to Global Water Security* (Springer, Dordrecht, 2009).

¹³ United Nations Environment Programme and GRID--Arendal *Vital Water Graphics: An Overview of the State of the World's Fresh and Marine Waters* (2nd ed, United Nations Environment Programme, Nairobi, 2008) at 1.

atmosphere.¹⁴ It is the ecological process through which water is continuously collected, purified, recycled and distributed¹⁵ through five key components:¹⁶ (1) precipitation, (2) runoff, (3) surface and groundwater storage (4) evaporation/transpiration and (5) condensation. All of these hydrologic processes do not create or destroy water but distributes water in different locations and form.¹⁷

Due to uneven distribution, most of the freshwater resources (about 68.9 percent or 24 million km³) exist in the form of ice sheets and permanent snow cover, which are not accessible.¹⁸ Some 8 km³ or 30.8 percent is stored underground as groundwater in the globe's aquifers.¹⁹ This leaves just 0.3 percent of all the freshwater in streams, lakes, rivers and reservoirs (collectively referred to as surface water), which is the easiest to access and fastest to renew.²⁰ Water is available only if water sources are regenerated and used within the limit of

¹⁴ Ines Dombrowsky *Conflict, Cooperation and Institutions in International Water Management: An Economic Analysis* (Edward Elgar Publishing, Glos, 2007) at 38.

¹⁵ George Tyler Miller and Scott E Spoolman *Environmental Science* (Cengage Learning, Belmont, CA, 2010) at 240.

¹⁶ Thomas V Cech *Principles of Water Resources: History, Development, Management and Policy* (3rd ed, John Wiley & Sons, Hoboken, NJ, 2010) at 27.

¹⁷ Ibid.

¹⁸ United Nations Environmental Programme *Global Environment Outlook 3* (Earthscan, London, 2002); United Nations Environmental Programme *GEO Year Book 2003* (Earthprint, Nairobi, 2004) at 36; United Nations World Water Assessment Programme, *World Water Development Report 1: Water for People, Water for Life* (United Nations, New York, 2003) at 67.

¹⁹ United Nations Environmental Programme, above n 18; United Nations Environmental Programme, above n 18, at 36; United Nations World Water Assessment Programme, above n 18, at 67.

²⁰ Stella Thomas "Our Thirst for Water" (2003) 18 *World & I* 148 at 148. It takes 16 days for rivers to renew its water resources; United Nations World Water Assessment Programme, above n 18, at 68.

renewability.²¹ Yet if spoiled or over-abstracted, it effectively becomes non-renewable.²² Thus, freshwater is a finite resource and renewable within limits.

Also, freshwater is not a global resource but a regional one, available within specific watersheds.²³ The following table shows surface water distribution vis a vis population distribution around the five regions of the world.²⁴

Table 1: Regional Distribution of Water

Continent	Total Freshwater Resources (%)	Total Population (%)
Africa	24	14.8
Asia	33	60.4
Australia & Oceania	5	0.5
Europe	7	10.7
America	31	13.6
Total	100	100

Regional distribution of freshwater is uneven; surplus in some regions where precipitation is greater than evapotranspiration and deficit where the inverse is true. Given that population is also unevenly distributed, some regions have to accommodate a higher percentage of the world population in relation to their share of all the available freshwater resources. In addition, there are a number of changes which have or are taking place that is affecting the availability of freshwater. As identified in the United Nation's ('UN') first World Water

²¹ Vandana Shiva *Water Wars* (South End Press, Cambridge, MA, 2002) at 12.

²² Armen B Avagyan "New Design & Build Biological System Through the Use of Microalgae Addressed to Sustainable Development" (2010) 1 *Journal of Environmental Protection* 183 at 184.

²³ Donella Meadows, Jorgen Randers and Dennis Meadows *The Limits to Growth: The 30-Year Update* (Earthscan, London, 2004) at 67.

²⁴ United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section *World Population Prospects: The 2012 Revision* (26 November 2013) available at http://esa.un.org/wpp/Analytical-Figures/htm/fig_5.htm; United Nations Environment Programme and GRID--Arendal, above n 13.

Development Report, these are:²⁵ geographical changes, population growth, agricultural demand, energy requirements, impacts of demographic changes/urbanization, economic growth and industry, the effects of globalization, technological changes, lifestyle, recreation and tourism, and the recent manifestations of climate change. Of these, the three major factors to have influenced an increase in demand for water over the past century were: (1) population growth, (2) industrial development and (3) the expansion of agriculture. Projections show that they are going to continue to remain the main driving forces for an increase in demand for freshwater for this century as well.

(i) The Global Freshwater Consumption: Present and Projected

Freshwater is consumed by humans, animals and plants.²⁶ The principal sources of freshwater for human use are lakes, rivers, soil moisture and relatively shallow groundwater basins.²⁷ The usable portion of these sources is only about 200, 000 km³ of water, which is less than 1 percent of all freshwater and 0.01 percent of the total global water.²⁸ Globally, rivers account for some 21, 200 km³ of water, which is about 0.006 percent of the total freshwater or 0.0002 percent of the total (fresh and salt) water resources.²⁹ As already mentioned, freshwater resources remain constant and are limited. The world population on the other hand has been increasing quite steadily. The world population jumped from 3 billion in 1959 to 6

²⁵ United Nations World Water Assessment Programme, above n 18, at 12–17; United Nations World Water Assessment Programme, World Water Development Report 2: *Water: A Shared Responsibility* (United Nations, New York, 2006) at 6.

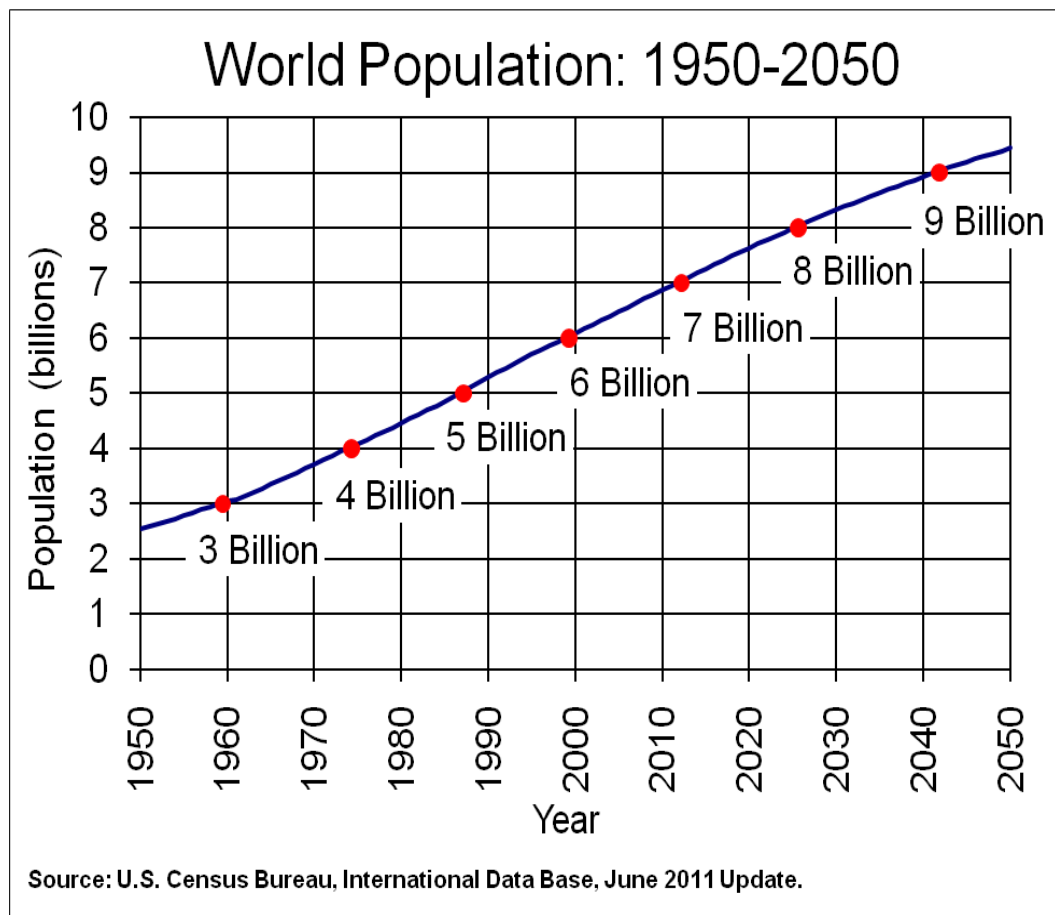
²⁶ United Nations World Water Assessment Programme, World Water Development Report 4: *Facing the Challenges* 3 (UNESCO, Paris, 2012) at 383.

²⁷ The World Bank *Atlas of Global Development: A Visual Guide to the World's Greatest Challenges* (3rd ed, Collins Geo, Washington, DC, 2011) at 108.

²⁸ United Nations Environmental Programme, above n 18, at 150.

²⁹ United Nations World Water Assessment Programme, above n 18, at 68.

billion in 1999 and is projected to reach 8.1 billion by 2025 and up to 9.6 billion by 2050.³⁰ See figure below.³¹



In keeping with the world population growth, increased industrialization and agricultural production, together with other changes already discussed above, brought about a transformation in the distribution and use of water “on an unprecedented scale,”³² that is six-fold between 1900 and 1995, more than twice

³⁰ United Nations Department of Economic and Social Affairs, Population Division, above n 24, at 1.

³¹ At 1. Permission for the graph obtained from the United States Census Bureau. Confirmation email will be made available upon request.

³² Hunt, above n 6, at 44.

the rate of population growth.³³ By 2008, the global consumption of freshwater was doubling every twenty years.³⁴ As consumption is increasing, per capita availability of freshwater is decreasing.

Human uses of freshwater can be divided into three main sectors: agriculture, industry and domestic. In the early 2000s, the total global withdrawal of freshwater was approximately 3,700 km³ per year.³⁵ In 2011, this figure increased to 3,893.8 km³. The following table shows global freshwater withdrawal by each sector for the year 2011.³⁶

Table 2: Global Freshwater Withdrawal

Global Freshwater Withdrawal by Sector	(km³)	Percentage
Agriculture	2,725.7	70.0
Industry	708.7	18.0
Domestic	455.6	12.0
Total Withdrawal	3,893.8	100.0

Clearly, agriculture is the main consumer of freshwater by far. This is also true at the regional level (except for Europe) as is evidenced by the following table.³⁷

³³ United Nations Environment Programme *Global Environment Outlook 2000* (Earthscan, London, 1999) at 41.

³⁴ United Nations Population Fund *Global Population and Water: Access and Sustainability* (UNPF, New York, 2003) at iii.

³⁵ Peter H Gleick *The World's Water, 2006-2007* (Island Press, Washington, DC, 2006) at 228–236.

³⁶ The World Bank “World Development Indicators: Annual Freshwater Withdrawals” (2013) available at <http://search.worldbank.org/data?qterm=freshwater%20withdrawal%20by%20sector&language=EN>

³⁷ Food and Agriculture Organisation of the United Nations *The State of the World's Land and Water Resources for Food and Agriculture* (Earthscan, London, 2011) at 27.

Table 3: Regional Freshwater Withdrawal

Region	Total Freshwater Withdrawal (km ³ /year)	Withdrawal as a % of Internal Renewable Resources	Domestic	Industry	Agriculture
Africa	215	5	10	4	86
Americas	790	4	16	35	49
Asia	2, 183	-	7.75	9.5	82.75
Europe	374	6	16	55	29
Middle East ³⁸	271	55	9	7	83
Oceania	26	3	17	10	73
World	3, 856	9	11	19	70

(a) Agriculture

Currently, agriculture worldwide uses 5 times more water than at the start of the last century.³⁹ About 250 million hectares are irrigated worldwide today, also nearly 5 times more than at the beginning of the 20th century.⁴⁰ While the agricultural sector currently accounts for around 70 percent of the total freshwater withdrawals,⁴¹ this percentage rises above 90 percent in some arid countries.⁴² According to a recent FAO study, annual world agricultural production would

³⁸ Karen Frenken (ed) *Irrigation in the Middle East Region in Figures: Aquastat Survey - 2008* FAO Water Reports 34 (FAO Land and Water Division, Rome, 2009) at 99. Available at http://www.unece.org/fileadmin/DAM/env/epr/experts/Azerbaijan/Other/fao_water_reports_no_34_eng.pdf.

³⁹ Don Hinrichsen “A Human Thirst” (2003) 16 *World Watch* 12 at 12; Fekri A Hassan “Water Management and Early Civilizations: From Cooperation to Conflict” in Fekri A Hassan and others *History and Future of Shared Water Resources* (United Nations Educational, Scientific and Cultural Organisation, Paris, 2003) at 12.

⁴⁰ M W Rosegrant, X Cai and S A Cline “Will the World Run Dry: Global Water and Food Security” (2003) 45 *Environment: Science and Policy for Sustainable Development* 24 at 27.

⁴¹ United Nations World Water Assessment Programme, above n 18, at 46.

⁴² Food and Agriculture Organisation of the United Nations, Agriculture and Consumer Protection Department “Water Use in Agriculture” (FAO, Rome, 2005) available from <http://www.fao.org/ag/magazine/0511sp2.htm>; The World Bank *World Development Indicators 2006* (WB Publications, Washington, DC, 2006).

need to increase by 70 percent over the period from 2005/2007 to 2050 to provide food security to the growing population.⁴³ Irrigated agriculture, which increases yields of most crops by 100 to 400 percent,⁴⁴ accounts for more than 40 percent of the world's food production⁴⁵ but roughly 15 to 35 percent of freshwater withdrawn for this purpose are estimated to be unsustainable (low to medium certainty).⁴⁶ As demand for food continues to grow, water withdrawal for irrigation is expected to grow by about 6 percent (166 km³) by 2050.⁴⁷

(b) *Industry*

The last century saw unprecedented economic growth. Much of this growth was due to increased industrialization, which was much dependent on freshwater resources.⁴⁸ Water use for the industrial sector has grown 26 times since the start of the last century.⁴⁹ Of the almost 20 percent of global freshwater withdrawals by the industrial sector, about 30 - 40 percent is used for industrial processes,⁵⁰ 57 - 69 percent for hydropower and nuclear power generation, and 0.5 to 3 percent for thermal power generation.⁵¹ Of late, a number of studies have been done on the

⁴³ Piero Conforti *Looking Ahead in the World Food and Agriculture* (FAO, Rome, 2011) at 235.

⁴⁴ Food and Agriculture Organisation of the United Nations *Water at a Glance: The Relationship between Water, Agriculture, Food Security and Poverty* (2007) at 8. Available at <http://www.fao.org/nr/water/docs/waterataglance.pdf>

⁴⁵ The World Bank (ed), *Agriculture Investment Sourcebook: Agriculture and Rural Development* (The International Bank for Reconstruction and Development/The World Bank, Washington, DC, 2005) at 346.

⁴⁶ Millennium Ecosystem Assessment *Ecosystems and Human Well-being: Biodiversity Synthesis* (World Resources Institute, Washington DC, 2005) at 8. Available from <http://www.millenniumassessment.org/documents/document.354.aspx.pdf>

⁴⁷ Nikos Alexandratos and Jelle Bruinsma *World Agriculture Towards 2030/2050: The 2012 Revision* (FAO, Rome, 2012) at 117.

⁴⁸ United Nations World Water Assessment Programme, above n 18, at 15.

⁴⁹ Hinrichsen, above n 39, at 12; Hassan, above n 39, at 12.

⁵⁰ United Nations Environmental Programme, above n 18, at 41.

⁵¹ At 36.

nexus between water and energy.⁵² Recent projections by the International Energy Agency show that the global energy consumption will increase by another 56 percent over the 30 year period from 2010-2040.⁵³ Thus far, while industry has not been a major consumer of water, but often the major polluter,⁵⁴ it will start consuming more water as it moves towards more water-intensive energy production.⁵⁵

(c) *Domestic*

Domestic water consumption has grown 18 times since the start of the last century.⁵⁶ The UN has stated that the absolute minimum water needs of a single person are 50 litres per day; 5 litres for drinking, 20 litres for sanitation and hygiene, 15 litres for bathing and 10 litres for food preparation. Presently people living in 40 of the world's most water-scarce countries must survive on 7.5 litres per day for their basic water needs. The following table shows projected population growth and freshwater withdrawal and consumption.

⁵² United Nations Educational, Scientific and Cultural Organisation *The United Nations World Water Development Report 2014: Water and Energy* 1 (UNESCO, Paris, 2014); Dominic Waughray (ed) *Water Security: The Water-Food-Energy-Climate Nexus* The World Economic Forum Water Initiative (Island Press, Washington, DC, 2011); International Energy Outlook *World Energy Outlook 2012: Executive Summary* (IEA Publications, Paris, 2012).

⁵³ United States Energy Information Administration *International Energy Outlook 2013: With Projections to 2040* (Energy Information Administration, 2013) at 9.

⁵⁴ Netherlands Ministry of Housing, Spatial Planning and the Environment *Water and Sanitation for All: A World Priority* (Netherlands Ministry of Housing, 1994) at vii.

⁵⁵ United Nations Environmental Programme, above n 18, at 36.

⁵⁶ Hinrichsen, above n 39, at 12; Hassan, above n 39, at 12.

Table 4: Projected Growth, Withdrawal and Consumption

	1995	2010	2025	2050
Population Growth (in millions)	5.7	6.9	8.1	9.6
Freshwater Availability per capita (m ³) ⁵⁷	7, 500	-	5, 100 ⁵⁸	-
Freshwater Withdrawal (km ³)	3, 765 ⁵⁹	3, 893.8	5, 240	10, 200 ⁶⁰
Withdrawal as a Percentage ⁶¹	8	8.6	11.6	22.7
Freshwater Consumption (km ³)	2, 074 ⁶²	2, 323 ⁶³	-	6000 ⁶⁴

As of 2009, around 700 million people in 43 countries suffered from water scarcity.⁶⁵ This number could increase to more than 3 billion by 2025.⁶⁶ A recent OECD Environmental Outlook to 2050 has reported that with global water demand projected to increase by 55 percent between 2000 and 2050, more than 40 percent of the global population may be under severe water stress.⁶⁷ The definition of water scarcity as employed by the United Nations is:⁶⁸ “the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements to the extent that the demand by all

⁵⁷ The yearly per capita availability of renewable freshwater was 17, 000 m³ in 1950.

⁵⁸ Hassan, above n 39, at 12.

⁵⁹ Rattan Lal and B A Stewart *Soil Water and Agronomic Productivity* (CRC Press, Boca Raton, FL, 2012) at 45.

⁶⁰ Roberto De Vogli *Progress Or Collapse: The Crises of Market Greed* (Routledge, Oxon, New York, 2013) at 16.

⁶¹ Taking an average of 45, 000 km³ of total renewable freshwater resources per year.

⁶² Lal, above n 59, at 45.

⁶³ At 45.

⁶⁴ Nigel W Arnell “Climate Change and Global Water Resources” (1999) 9 *Global Environmental Change* S31 at S34.

⁶⁵ The World Bank, above n 27, at 104.

⁶⁶ UN-Water, above n 3.

⁶⁷ Organisation for Economic Cooperation and Development *OECD Environmental Outlook to 2050: The Consequences of Inaction* (OECD Publishing, Paris, 2012) at 24.

⁶⁸ UN-Water *Coping With Water Scarcity: A Strategic Issue and Priority for System-Wide Action* (UN-Water Thematic Initiatives, 2006) at 2.

sectors, including the environment, cannot be satisfied fully.” An area is experiencing water scarcity when annual water supplies drop below 1,000 m³ per person.⁶⁹ Hence water scarcity is a relative concept and can occur at any level of supply or demand. Water scarcity can be physical, economic or institutional and can fluctuate over time and space.⁷⁰ There are four causes of water scarcity:⁷¹ dry climate, drought, desiccation⁷² and water stress. Symptoms of water scarcity include severe environmental degradation (including river desiccation and pollution).⁷³ An area is experiencing water stress when annual water supplies drop below 1,700 meters³ per person.⁷⁴ This usually occurs when water withdrawal is more than 20 percent higher than the reliable supply.⁷⁵ The World Bank has relabelled these definitions with a minimum threshold for water security at 1700 m³ per person, 500-1000 m³ per person as water stress and less than 500m³ per person as absolute water scarcity.⁷⁶ The following graph shows global water scarcity, stress and vulnerability per capita.⁷⁷

⁶⁹ United Nations World Water Assessment Programme, above n 18, at 124.

⁷⁰ United Nations Secretary-General “Secretary-General, In Message for World Water Day, Stresses Importance of Integrated, Sustainable Approach to Managing Fragile Resource” (Press Release, 12 March 2007). Available at <http://www.un.org/press/en/2007/sgsm10906.doc.htm>

⁷¹ George Tyler Miller *Living in the Environment: Principles, Connections, and Solutions* (14th ed, Thompson Brooks/Cole, Pacific Grove, CA, 2005) at 311.

⁷² Drying of exposed soil because of activities such as deforestation and overgrazing by livestock. At 311.

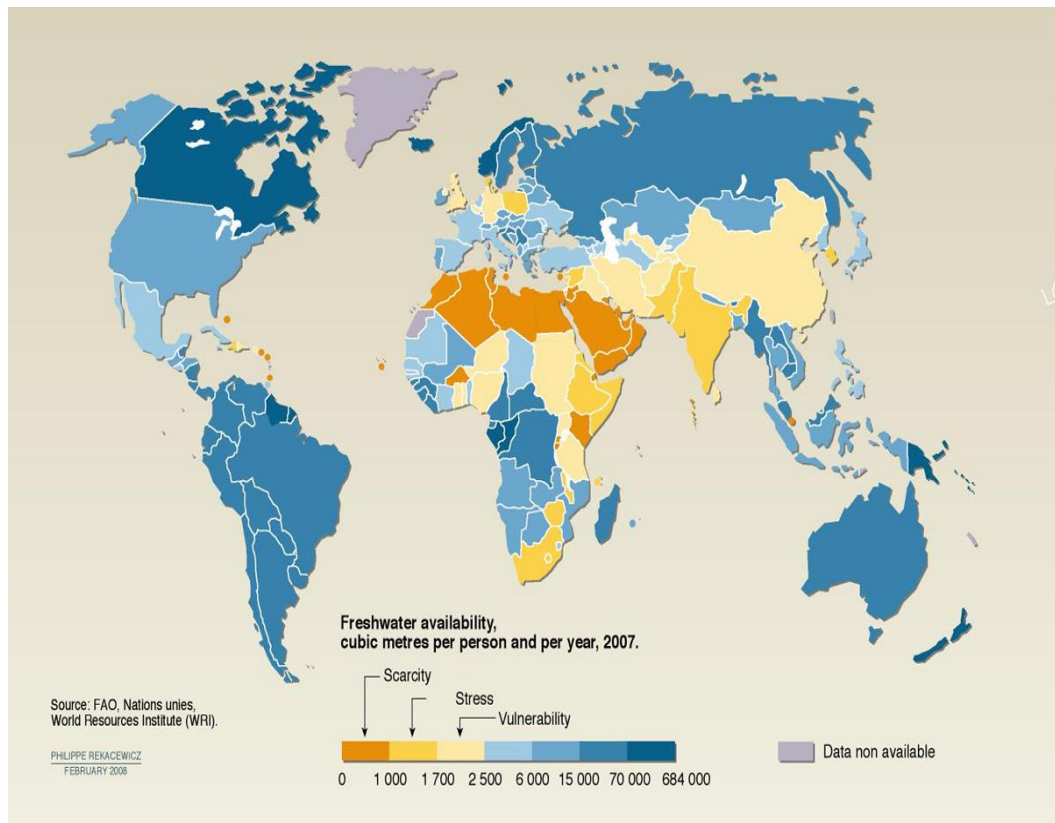
⁷³ UN-Water *Coping With Water Scarcity: Challenge of the Twenty-First Century* (World Water Day, 22 March 2007) (UN-Water Thematic Initiatives, 2007) at 4.

⁷⁴ United Nations World Water Assessment Programme, above n 18, at 124.

⁷⁵ Miller, above n 71, at 311.

⁷⁶ Brian Finlay, Johan Bergenas and Veronica Tessler *Beyond Boundaries in the Middle East: Leveraging Non-Proliferation Assistance to Address Security/Development Needs with Resolution 1540* (The Stimson Centre and the Stanley Foundation, 2010) at 32.

⁷⁷ Taken from the United Nations Environment Programme and GRID--Arendal, above n 13.



Water quality degradation can be a major source of water scarcity.⁷⁸ Generally, water use (especially industrial water use) has more implications for water quality than quantity.⁷⁹ Water “quality” is a function of chemical, physical, and biological characteristics but is a value-laden term because it implies quality in relation to some standard and different uses of water have different standards.⁸⁰ Freshwater quality changes at the global, continental and drainage basin levels.⁸¹ Aspects of water quality, in terms of pollution of international rivers, are covered in Chapter 3.

⁷⁸ UN-Water, above n 68, at 2.

⁷⁹ Hunt, above n 6, at 46.

⁸⁰ James J McCarthy and others *Climate Change 2001: Impacts, Adaptation and Vulnerability* Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, Cambridge, 2001); Chapter 4.3.10.

⁸¹ United Nations Environment Programme *Geo Year Book: An Overview of Our Changing Environment, 2004/5* (UNEP/Earthprint, Geneva, 2005) at 90.

1.3 From Global Water Crisis to Global Water Security

According to the latest World Economic Forum's *Global Risks 2014 Report*, the water supply crisis has ranked as a top three global risk, in terms of the level of concern (highest), its likelihood to happen (high) and its impact (also high).⁸² The 2015 Report put water crisis at the very top of the list for the top 5 global risks of 2015 in terms of its impact⁸³ and reclassified it from an environmental risk in 2014 to a societal risk but with an environmental dimension in 2015.⁸⁴ Phrases such as "water crisis", "water wars", "water conflict", "water scarcity", "water stress" and the question "are we running dry?"⁸⁵ were all becoming common in the 1990s and the early 2000s. During the Second World Water Forum themed 'Water Security in the 21st Century in 2000,' its Ministerial Declaration stated that to achieve water security, some of the main challenges include: protecting ecosystems, sharing water resources and managing risks.⁸⁶ Thus, the concept of 'water security' has been around for more than a decade now. Its definitions are highly diverse and vary according to context and across disciplines.⁸⁷ This is because water security lies at the centre of many security issues or as Mark Zeitoun has called it, "web" of securities, but each of which is intricately linked to water.⁸⁸ Addressing water security as a whole would, therefore, require interdisciplinary collaboration across sectors, communities and political borders so that the potential for disputes over water resources can be adequately managed.

⁸² World Economic Forum *Global Risks 2014* (9th ed, World Economic Forum, Geneva, 2014) at 9. Available at http://www3.weforum.org/docs/WEF_Global_Risks_2015_Report15.pdf

⁸³ World Economic Forum *Global Risks 2015* (10th ed, World Economic Forum, Geneva, 2015) at 14. Available at http://www3.weforum.org/docs/WEF_Global_Risks_2015_Report15.pdf

⁸⁴ At 24, footnote 25.

⁸⁵ Fred Pearce *When the Rivers Run Dry: Journeys Into the Heart of the World's Water Crisis* (Key Porter Books, Toronto, 2006); Mark W Rosegrant, Ximing Cai and Sarah A Cline, above n 40, at 24.

⁸⁶ "Ministerial Declaration of the Hague on Water Security in the 21st Century", above n 3; para 3.

⁸⁷ Bruce Lankford and others *Water Security: Principles, Perspectives and Practices* (Routledge, Oxon, New York, 2013) at 55.

⁸⁸ See Mark Zeitoun "The Global Web of National Water Security" (2011) 2 Global Policy 286.

The European Union ('EU') water governance framework covered in the thematic chapters of this thesis is illustrative of such a multi-stakeholder collaboration. In order to provide a common framework for collaboration across the UN system, in 2013 the UN adopted a working definition of water security in the following terms:

“the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.”

Encapsulated within this broad definition, water security comprises of three core human and ecological needs and are those with which this thesis is concerned with:⁸⁹ availability of and access to good quality water and addressing disputes over freshwater resources.⁹⁰ However, post the Second World Water Forum of 2000, the Global Water Partnership introduced an integrated definition of water security touching upon: (1) water availability (in terms of both quantity and quality); (2) human vulnerability to water-related hazards (such as floods and droughts); (3) human needs (cuts across a broad range of matters including development-related); and (4) sustainability (for both humans and the environment). As will be seen later, this definition sits squarely with the themes of the four main chapters of this thesis, which ties water security with transboundary freshwater governance, or more specifically, with the governance of international river basins.

⁸⁹ Patricia Wouters, Sergei Vinogradov and Bjørn-Oliver Magsig “Water Security, Hydrosolidarity, and International Law: A River Runs Through It ...” in Ole Kristian Fauchald, David Hunter and Wang Xi *Yearbook of International Environmental Law 2008* (Oxford University Press, Oxford, 2009) at 126–127.

⁹⁰ Patricia Wouters and Ruby Moynihan “Water Security - Legal Frameworks and the UN Watercourses Convention” in Flavia Rocha Loures and Alistair Rieu-Clarke (eds) *The UN Watercourses Convention in Force: Strengthening International Law for Transboundary Water Management* (Routledge, Oxon, New York, 2013) at 343.

Global Water Security is a global movement aimed at “water for all.”⁹¹ It is a water justice movement, the argument of which is that water should not be owned by anyone – it belongs to the earth, all species and future generations, and demands that water be kept public, clean and accessible to all.⁹² ‘Water for all’ seeks to foster the realization of the UN’s Millennium Development goal of access to water and sanitation.⁹³ Given that securing sustainable water for all is challenging, it is emerging as a top human development priority in the UN’s Post-2015 Development Agenda for a dedicated global goal for freshwater.⁹⁴ One of the ways this Agenda seeks to achieve water governance is through implementation of integrated approaches to water resources management at the river basin level.⁹⁵

(i) Water as a Human Right

Although the objective of the international community to provide everyone with access to clean water started with the UN Water Conference in 1977,⁹⁶ the international campaign for a human right to water has grown enormously since the beginning of this century. This was counter to water being treated as an economic

⁹¹ See UN-Water, above n 3.

⁹² Maude Barlow *Our Water Commons: Toward a Freshwater Narrative* (October 2008) at 13. Available at <http://www.ourwatercommons.org/sites/default/files/Our-Water-Commons-Oct-2008.pdf>

⁹³ See “Target 7.C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation” of the United Nations Millennium Development Goals available at <http://www.un.org/millenniumgoals/enviro.html>

⁹⁴ UN-Water *A Post-2015 Global Goal for Water: Synthesis of key Findings and Recommendations from UN-Water* (January 2014) available at http://www.un.org/waterforlifedecade/pdf/27_01_2014_un-water_paper_on_a_post2015_global_goal_for_water.pdf

⁹⁵ At 18.

⁹⁶ Asit K Biswas “Water as a Human Right in the MENA Region: Challenges and Opportunities” in Asit K Biswas, Eglal Rached and Cecilia Tortajada (eds) *Water as a Human Right for the Middle East and North Africa* (Routledge, Oxon, New York, 2008) at 13.

good.⁹⁷ The principle recognizes that denying anyone access to water is a violation of their human rights.⁹⁸ The UN Committee on Economic, Social and Cultural Rights in 2002 defined the right to water as the right of everyone to “sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses.”⁹⁹ Even though the right to water has been enshrined in international treaties, declarations and instruments for many years, it was not until 2010 that it gained full political recognition through resolutions adopted by international bodies.

In 2010, the United Nations General Assembly recognized the right to safe and clean drinking water as a human right that is essential for the full enjoyment of life and the realization of all human rights.¹⁰⁰ The same year, the Human Rights Council Resolution affirmed that the human right to safe drinking water is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human dignity.¹⁰¹ The HRC Resolution, adopted by consensus, went further than the GA Resolution and affirmed that the right to

⁹⁷ Karen J Bakker *Privatising Water: Governance Failure and the World’s Urban Water Crisis* (Cornell University Press, New York, 2010) at 146.

⁹⁸ Maude Barlow *Blue Future: Protecting Water for People and the Planet Forever* (The New Press, New York, 2014) at 7.

⁹⁹ *The Right to Water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights)* General Comment No. 15 E/C.12/2002/11 (2002); para 2.

¹⁰⁰ *The Human Right to Water and Sanitation* GA Res 64/292, LXIV A/Res/64/292 (2010); para 1.

¹⁰¹ *Human Rights and Access to Safe Drinking Water and Sanitation* HRC Res 15/9, A/HRC/RES/15/9 (2010). These are largely based upon Articles 11 and 12 of the International Covenant on Economic, Social and Cultural Rights. The right to water should also be seen in conjunction with other rights enshrined in the International Bill of Human Rights, foremost amongst them the right to life and human dignity. See The UN Committee on Economic, Social and Cultural Rights, General Comment No. 15 E/C.12/2002/11 (2002) on The Right to Water (Arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights) available from

http://tbinternet.ohchr.org/_layouts/treatybodyexternal/Download.aspx?symbolno=E%2fC.12%2f2002%2f11&Lang=en

water is part of existing international law and is thus legally binding upon States. This means that States party to the International Covenant on Economic, Social and Cultural Rights can no longer deny their responsibility to provide safe water for all individual citizens, “without discrimination.” The UN Committee, the General Assembly and the Human Rights Council have reminded States that it is their responsibility to, directly or through third parties, ensure the human right to water.

Whilst the human right to water is now undoubtedly part of international law, the right to water points to significant conceptual and practical limitations. These are centred around:¹⁰² (1) quantification and adjudication between competing uses; (2) government accountability and enforcement of this right; (3) pricing, as free provision is not implied; (4) environmental issues especially as it could lead to over-extraction of water resources (leading to further degradation of hydrological systems on which ecosystems and humans depend); and (5) conflict with existing systems of water rights, for example with traditional (communal) water rights particularly with indigenous populations.

As already stated, one of the challenges of global water security is governance of the resource base. Being anthropocentric, the right to water fails to recognize the rights of non-humans, that is, ecological rights comprising of rights for plants and animals. Additionally, the equitable provision of water necessarily implies a degree of solidarity, such that being undertaken at the European Union level that human rights alone cannot provide as it cannot address the often complex, collective and challenging governance issues constrain access to water, such that those concerned by this thesis. This is not to say that the human right to water is not warranted but as has been suggested, the human right to water is not the solution but rather a strategy for creating the context in which claims for water justice can be pursued as it is potentially useful as a strategy for solving the world’s water crisis in aspirational terms by putting focus on those most vulnerable to the water crisis and by imposing a higher burden on governments to

¹⁰² Bakker, above n 97, at 148-149, 158-159.

regulate the private water service providers but it is unlikely to create, in isolation, conditions for achieving the goal of “water for all.”¹⁰³ This is because it is an “overly restrictive framework” (being essentially individualistic, anthropocentric, state-centric and not incompatible with private property rights and with privatisation of water) through which to deal with broader issues of collective rights and ecological sustainability.¹⁰⁴

(ii) Water as a Common Heritage of Humanity

As with any kind of heritage, defining something as a heritage of mankind implies a need for its protection in relation to its fragile state.¹⁰⁵ In terms of the global freshwater resources, this is related to its overuse and the quality thereof. As for international river basins, it comprises of the four major threats highlighted in this thesis. The principle of common heritage of mankind (or humankind)¹⁰⁶ is thus built around the idea of the global commons (discussed next) in reflection of its special position, management of which requires that global interests in it to be taken into account. While the principle of water as a common heritage recognizes that water is a common heritage of humanity to be preserved and used for the benefit of all,¹⁰⁷ the principle has not been incorporated into more recent international environmental treaties such as on international watercourses.

Notions of territorial sovereignty and integrity, albeit limited, could still continue to block viewing freshwater as a common heritage under international law as this would require individual State cooperation. Water moves through a hydrological

¹⁰³ At 13, 137 and 159.

¹⁰⁴ At 137, 151-152.

¹⁰⁵ Henri Claude de Bettignies, François Lépineux (eds) *Business, Globalization and the Common Good* (International Academic Publishers, Bern, 2009) at 321.

¹⁰⁶ This is found in two international environmental treaties; the United Nations Convention on the Law of the Sea 1833 UNTS 397 (opened for signature 10 December 1982, entered into force 16 November 1994) and the Agreement Governing the Activities on the Moon and other Celestial Bodies 1363 UNTS 3 (opened for signature 18 December 1979, entered into force 11 July 1984).

¹⁰⁷ Philippe Cullet *Water Law, Poverty, and Development: Water Sector Reforms in India* (Oxford University Press, Oxford, 2009) at 187.

cycle passing many State borders by means of international rivers that includes other surface and groundwaters. This presents problems as issues pertaining to governance cannot be unilaterally managed by individual States, and while collective governance allows for the sharing of the burdens as well as benefits, there are also inherent uncertainties when it comes to issues such as water allocation from international rivers as is covered in Chapter 2. Hence, even though “access to all” is the objective and a common heritage regime would strictly regulate exploration and exploitation of international rivers,¹⁰⁸ current State practice is leaning more towards the principle of common concern rather than common heritage.¹⁰⁹

Commons, or shared ownership of resources, is an ancient concept, management of which is usually governed by rules and social relations that control access with the goal of limiting overuse.¹¹⁰ There are two types of commons, global and community and fall into three categories the first of which basically comprises of natural resources which life depends upon.¹¹¹ This includes water.

Traditionally, water being a natural resource, was treated as a common property and, as rooted in Roman law principle of *res communes*, incapable of legal ownership¹¹² but which allowed freedom of access, exploration and exploitation.¹¹³ It was a “usufruct right” – the right to an equitable use so long as

¹⁰⁸ Malcolm N Shaw *International Law* (7th ed, Cambridge University Press, Cambridge, 2014) at 385.

¹⁰⁹ See Antoinette Hilderling “The Right of Access to Freshwater Resources” in Nico J. Schrijver, Friedl Weiss (eds) *International Law and Sustainable Development: Principles and Practice* (Martinus Nijhoff Publishers, Leiden, 2004) at 423-426.

¹¹⁰ Bakker, above n 97, at 171.

¹¹¹ Barlow, above n 92, at 2.

¹¹² Claude de Bettignies, above n 105, at 318.

¹¹³ Shaw, above n 108, at 385.

the commons were not damaged or altered.¹¹⁴ It thus took a holistic view of water for all of nature and all humans.¹¹⁵

The idea of commons evolved into the current State ownership of water resources¹¹⁶ through the doctrine of public trust. This doctrine obliges a State government to manage water resources so as not to deprive individuals and groups access to them and prevents monopolizing on the resource by the private sector unless necessary and for the public interest and good.¹¹⁷ This doctrine also translated into State ownership of international rivers within its borders. The responsibility for the actual allocation of the water resources from international rivers falls under the jurisdiction of each government.¹¹⁸ However, State ownership of water resources led to water being treated as a commodity, to be bought and sold, rather than as a global commons.

Although the doctrine of public trust is the vehicle by which the commons is protected (which requires continuous State supervision to strike the right balance between public interest and private development rights¹¹⁹), the integrity and health of the commons started becoming compromised post economic neo-liberalism, which has resulted in a lot of damage to our water commons, including rivers.¹²⁰ This is due to increased privatisation (essential for the industrial revolution) as

¹¹⁴ Sharad K Jain, Pushpendra K Agarwal and Vijay P Singh *Hydrology and Water Resources of India* (Springer, Dordrecht, 2007) at 1100.

¹¹⁵ Barlow, above n 92, at 1.

¹¹⁶ Stefano Burchi and Ariella D'Andrea *Preparing National Regulations for Water Resources Management: Principles and Practice* FAO Legislative Study 80 (FAO, Rome, 2003) at 4.

¹¹⁷ Vandana Asthana and A C Shukla *Water Security in India: Hope, Despair, and the Challenges of Human Development* (Bloomsbury Publishing Inc, New York, London, 2014) at 159.

¹¹⁸ Jain, above n 114, at 1100.

¹¹⁹ Barlow, above n 98, at 69-70.

¹²⁰ Klaus Bosselmann "Maori. We Should Not Treat Water as a Commodity" on "Debate: Who owns the water?" *New Zealand Herald* (Auckland, 26 September 2012) http://www.nzherald.co.nz/mighty-river-power/news/article.cfm?o_id=361&objectid=10836420

well as lack of effective regulation of the market forces (and thus a lack of protection of the Commons) by the State on behalf of its citizens.¹²¹ This lack of constraint started replacing the Commons' values of inclusion, collective ownership and community assets with private values of exclusion, possession, monopoly and personal or corporate gain.¹²² Privatisation, which does not support conservation and water justice, has effectively created an enclosure of the commons.¹²³ Worldwide, water commons are being raced for in order to capture and profit from as well as to use it as a dumpsite for wastes (passing the problems created by enclosure of the commons back to the public).¹²⁴ The result is that there are few protections in place to stop the destruction of watershed and ecosystems. While there is now an economic dimension to water, the private sector must be made to operate within the public trust framework in its dealings with the water commons. It is believed by some that the current water security concerns for the entire world population can be addressed through the revival of the Commons approach.

The water Commons framework, in essence, seeks to assert that: water is not owned by anyone; citizens and governments acting on their behalf can operate to address issues of conservation, justice and democracy; and the role of the private sector be restricted to provision of water operating under strict public oversight and government accountability and operate within a mandate where the goals are twofold: conservation and water justice. The aim of the water Commons sustainability is to protect, through conservation and law, source water at every level, reclaiming polluted water and conserving water for the future.¹²⁵

¹²¹ Barlow, above n 92, at 3 and 4.

¹²² At 3.

¹²³ Barlow, above n 98, at 75 and 118.

¹²⁴ Barlow, above n 92, at 3, 4 and 14.

¹²⁵ At 23.

In terms of treating watersheds as a Commons, the goal is to live within and adapt to the ecological constraints of a watershed, consistent with the narrative that water Commons is not only for humans but also for nature and other species.¹²⁶ Among other initiatives, the water Commons framework seeks to protect watersheds and the sustainability of its waters by, including but not limited to, governance of the river basin as a whole rather than along the lines of political boundaries and by having every human activity assessed for its impact on the water Commons and its natural habitat.¹²⁷ It views such aspects of governance as a global responsibility.

The Commons approach, however, is also not without limitations. As academic evidence indicates, the Commons approach function well only in a small, well defined set of cases usually in rural settings but tend to perform poorly where for example there are a large number of users and/or a mismatch of jurisdictional and hydrological boundaries.¹²⁸ As Bruce Hooper points out, that river basin organisations can play a crucial role in the Commons dilemma.¹²⁹ In fact, river basin organisations have evolved to provide the collective action that is warranted to effectively deal with the shortcomings of the State.¹³⁰ However, while the right to water and a Commons approach are viable options, it cannot achieve governance of the scale required at international river basin levels. For that we need States to take responsibility based on human rights (not incompatible with privatisation) and the Commons approach. Through institutional organisations guided by the principle of sustainable water use and taking an ecosystem approach we can achieve water security in the truly social justice sense. As Karen Bakker points out, the human right to water and water Commons address redistributive

¹²⁶ At 24.

¹²⁷ At 24-25.

¹²⁸ Bakker, above n 97, at 172.

¹²⁹ Bruce Hooper *Integrated River Basin Governance: Learning from International Experiences* (IWA Publishing, London, 2005) at 26-27.

¹³⁰ See Elinor Ostrom *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, Cambridge; New York, 1990).

concerns in economic and social terms but have the potential to overlook important environmental concerns such as water scarcity, threats to water quality and ecological sustainability.¹³¹ With both these strategies, there is a risk of committing social and ecological injustices if they are not situated in a broader framework of ecological governance. For Commons like water, which has a physical threshold, what it needs is a governance regime comprising of strictly enforceable (ideally) sustainable-use limits dictated by the principles of sustainable use and ecological integrity, both in terms of quantity and quality.

(iii) Sustainable Use and Ecological Governance of Freshwater Resources

Currently, humans are consuming more than half of the earth's accessible runoff water, leaving little for nature and other species.¹³² As Karen Bakker explains, ecological governance places human activity within and as an integral part of an ecological system and recognizing the relationship between humans and the environment requires ecologically sensitive systems of governance.¹³³ At an international river basin level, this requires State involvement and an institutional set-up, that is, a political-ecological approach to oversee that social and environmental justices are achieved. As the EU governance framework in this thesis illustrates, solidarity can be employed as a grounding principle for collective action, incorporating environmental concerns. Community actions, guided through the principle of subsidiary can also help achieve specific aspects of river basin management and governance as evidenced in the Nile Basin case study. Hence, what is required is governance at multi-stakeholder level that works with the flow regime of the hydrological cycle and with States enabling coordination that is required at the entire basin level through the basin whole.

¹³¹ Bakker, above n 97, at 193.

¹³² Barlow, above n 92, at 16.

¹³³ Bakker, above n 97, at 194.

1.4 Transboundary Water Governance vs National Water (In)Security

Transboundary water governance has a different focus compared to national water security concerns. As the thematic chapters of this thesis illustrate, for individual riparian¹³⁴ States, water issue is a part of their national security interests. As States try to secure water for their citizens, tendencies of minimal cooperation and maximum use of water result in unsustainable patterns of use. Water security is, as a recent OECD Report put it, “a major policy challenge confronting governments around the world.”¹³⁵ These constitute managing risks of water shortages, water excesses, inadequate water quality as well as the risk of undermining the resilience of freshwater systems such as rivers. By taking a long-term vision with emphasis on sustainable use and management, governments are more likely to meet their water-related economic, environmental and social objectives.¹³⁶

Unmanaged risks in one river basin can pose enormous challenges not just for the individual riparian States but for other vested national security interests as well. For example, a resolution of the water issues between Israel and the Palestinians is the key to the settle of the Palestine Question. Also, a study undertaken by the United States, the *Global Water Security*, launched at the 2012 World Water Day, has presented concerns regarding water availability in certain transboundary rivers including the Jordan, the Nile and the Indus as something that will impact national security interests for the US.¹³⁷ The report has also indicated that North Africa,

¹³⁴ ‘Riparian’ comes from the Latin word *ripa* meaning “the bank of a stream.” The law of riparian rights confers proprietary water rights on the owner of the land contiguous to the river, here the State. Brahma Chellaney *Water: Asia's New Battleground* (Georgetown University Press, Washington, DC, 2011) at 186. For the purpose of this thesis, the legal aspects of riparian rights covered focus only those related to international watercourses.

¹³⁵ Organisation for Economic Cooperation and Development *Water Security for Better Lives* OECD Studies on Water (OECD Publishing, 2013) at 11.

¹³⁶ Ibid.

¹³⁷ Intelligence Community Assessment *Global Water Security* (ICA 2012-08, 2 February 2012) at v. Available at <https://www.fas.org/irp/nic/water.pdf>

the Middle East, and South Asia “will face major challenges coping with water problems” due to “demographic and economic development pressures.”¹³⁸ Then Secretary of State, Hillary Clinton, proclaimed that, “This assessment is a landmark document that puts water security in its rightful place as part of national security,”¹³⁹ thereby linking water security, both national and global, with transboundary water governance.

1.5 Focus: International River Basins

From an international point of view, rivers are important because they are not only a major source of freshwater which is used for domestic, industrial and agricultural purposes but they also have economic, social and ecological values.¹⁴⁰ A river basin is “the area which contributes hydrologically (including both surface and groundwater) to a first-order stream, which in turn is defined by its outlet to the ocean or to a terminal (closed) lake or inland sea.”¹⁴¹ International rivers are defined as ‘international’ “if any perennial tributary crosses the political boundaries of two or more nations.”¹⁴²

The first legal definition of international rivers has been found in the Final Act of the Congress of Vienna of 1815 (‘the Final Act’)¹⁴³ as those that separate or

¹³⁸ At iii.

¹³⁹ United States Department of State, *Remarks in Honor of World Water Day* Hillary Rodham Clinton, Secretary of State, George C. Marshall Auditorium, Washington, DC (22 March 2012) available at <http://m.state.gov/md186640.htm>

¹⁴⁰ See *Ministerial Declaration, Conference Report: Water – A key to Sustainable Development. International Conference on Freshwater, Bonn, 3-7 December 2001* (2001) at 20. Available at <http://www.un.org/esa/sustdev/sdissues/water/BonnConferenceReport.pdf>

¹⁴¹ Aaron T Wolf and others “International River Basins of the World” (1999) 15 *International Journal of Water Resources Development* 387 at 389.

¹⁴² At 389.

¹⁴³ Final Act of the Congress of Vienna. Translation of the General Treaty Signed in Congress at Vienna, 9 June 1815 with the Acts Thereto Annexed, London Gazette Office, 1816. See Stephen M Schwebel “The Thirty-First Session of the International Law Commission” (1979) 73 *American Journal of International Law* 706 at 711.

traverse two or more States, from the point where they become navigable to its mouth.¹⁴⁴ International rivers were previously referred to as ‘International Drainage Basins.’¹⁴⁵ Contemporary international law calls them international watercourses. ‘International watercourse’ means “a watercourse, parts of which are situated in different States.”¹⁴⁶ Thus, hereafter the terms ‘international rivers’ and ‘international watercourses’ are used interchangeably where terminology is not important. A compilation of international river basins by the UN since 1978¹⁴⁷ currently lists 263 international river basins altogether.¹⁴⁸ The following table shows regional distribution of international river basins.

Table 5: Regional Distribution of International Rivers

Region	Number of International Rivers	As a %
Africa	59	22.4
Asia	57	21.7
Europe	69	26.2
North & Central America	40	15.2
South America	38	14.4
Total	263	100

These international river basins cover some 45.3 percent (231 million km²) of the world’s land surface (excluding the Polar Regions), 40 percent of the world’s population, and 60 percent of the earth’s freshwater volume.¹⁴⁹ A total of 145

¹⁴⁴ Final Act; Articles CVIII and CIX.

¹⁴⁵ Helsinki Rules on the Uses of the Waters of International Rivers of 1966 in International Law Association *Report of the Fifty-Second Conference of the International Law Association held in Helsinki, 14-20 August 1966* (1967) at 486. Hereafter Helsinki Rules; Articles I & II.

¹⁴⁶ UN Watercourses Convention; Article 2(b). See footnote 165 and accompanying text.

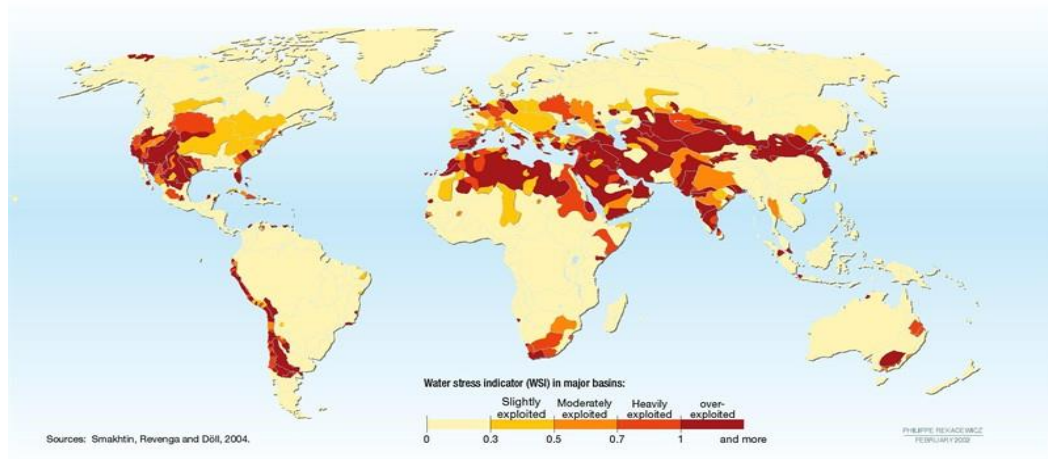
¹⁴⁷ Wolf and others, above n 141, at 390–391.

¹⁴⁸ Transboundary Freshwater Disputes Database “International River Basins of the World” (January 2003)

<http://www.transboundarywaters.orst.edu/database/register/internationalriverbasinregister.html>

¹⁴⁹ Stevens Barrie “Assessing the Risks” in *The OECD Observer No 254* OECD International Futures Programme (Paris, March 2006) at 26. Available at <https://oecd.org/sti/futures/globalprospects/36674533.pdf>

States include territory within international basins, and 21 States lie entirely within international basins.¹⁵⁰ Today, 41 percent of the world's population live in river basins located in 20 countries that suffer from water stress or water scarcity.¹⁵¹ See map below.¹⁵²



This number could grow to 40 countries by 2020 and 60 countries by 2050,¹⁵³ that will be more than 40 percent of the number of riparian States worldwide. Thus, international rivers are particularly vulnerable to freshwater disputes if they are already identified as being “at risk.”¹⁵⁴ Today the world's rivers are put at risk

¹⁵⁰ United Nations *International Year of Freshwater 2003: Water Without Borders* (UN Department of Public Information, DPI/2293 G, February 2003) available at <http://www.un.org/events/water/WaterWithoutBorders.pdf>

¹⁵¹ Miller, above n 71, at 311.

¹⁵² Taken from United Nations Environment Programme and GRID--Arendal, above n 13.

¹⁵³ Miller, above n 71, at 311.

¹⁵⁴ See for example Alex Kirby “Half of World's Rivers at Risk” *BBC* (29 November 1999) <http://news.bbc.co.uk/2/hi/science/nature/538457.stm>; Aaron T Wolf, Shira B Yoffe and Mark Giordano “International Waters: Identifying Basins at Risk” (2003) 5 *Water Policy* 29; Jacques Ganoulis *Risk Analysis of Water Pollution* (2nd ed, John Wiley & Sons, Weinheim, 2009); Jürgen Scheffran and Antonella Battaglini “Climate and Conflicts: The Security Risks of Global Warming” (2011) 11 *Reg Environ Change* S27; C M Wong and others *World's Top Ten Rivers at Risk* (WWF, 2007); Heather Cooley and others *Understanding and Reducing the Risks of Climate*

mainly due to the following anthropogenic (human) impacts:¹⁵⁵ (1) Water extraction; (2) Pollution; (3) Damming and Infrastructural Development; and (4) Climate change. These threaten both the quantity and quality of river waters. In addition to the increasing demand of its limited supplies, thus each river basin is a scene for a potential water dispute.

Interestingly, the word “rivals” has its roots in fights over water, coming from the Latin *rivalis*, for “one taking from the same stream as another.”¹⁵⁶ A ‘water dispute’ is a “disagreement between two [S]tates ... over the utilization of the water resources”¹⁵⁷ of a river basin (or an aquifer). While chances of ‘serious conflict’ (meaning “war, tense diplomatic standoffs, insurgencies and openly hostile diplomatic relations”¹⁵⁸) and “water wars” have been ruled out by studies undertaken by Professor Wolf which shows that riparian States are likely to cooperate over international river water resources than to go to war,¹⁵⁹ consistent with this, in the past 50 years, while 37 acute disputes have also been reported involving violence during this period, 150 treaties were signed.¹⁶⁰ Therefore, if water resources of international river basins are to be shared, then the risk factors

Change for Transboundary Waters (Pacific Institute, Oakley, CA, 2009); Food and Agriculture Organisation of the United Nations, above n 44.

¹⁵⁵ The extent of such threats on international river basins and sources of information for these are provided for in the individual thematic chapters, namely chapters 2-5 respectively.

¹⁵⁶ Michael Specter “The Last Drop; A Reporter at Large: Confronting the Possibility of a Global Catastrophe” *The New Yorker* (New York, 23 October 2006)
<http://www.newyorker.com/magazine/2006/10/23/the-last-drop-2>

¹⁵⁷ Jack Kalpakian *Identity, Conflict and Cooperation in International River Systems* (Ashgate Publishing Ltd, Aldershot, Burlington VT, 2004) at 2.

¹⁵⁸ Ibid.

¹⁵⁹ See Aaron T Wolf “Conflict and Cooperation along International Waterways” (1998) 1 *Water Policy* 251; See Aaron T Wolf “‘Water Wars’ and Water Reality: Conflict and Cooperation Along International Waterways” in S C Lonergan (ed) *Environmental Change, Adaptation, and Security* (Kluwer Academic Publishers, Dordrecht, 1999) at 251.

¹⁶⁰ Future Directions International *Strategic Analysis Paper: Water Crises - International Areas at Risk* (FDI, West Perth, WA, 2010) at 2.

have to be taken seriously and dealt with through legal measures by agreement amongst riparian States, in order to reduce further chances of acute disputes.

1.6 Objectives of the Thesis

The aim of this thesis is two-fold: (1) to analyse the relevant provisions of the United Nations Convention on the Non-Navigational Uses of International Watercourses of 1997 ('the UN Watercourses Convention'),¹⁶¹ against the four main threats to international river basins (over-extraction, pollution, damming and infrastructural development as well as climate change) in order to identify weakness for the purpose of making recommendations for strengthening international water law governing international river basins. This is based upon comparative analysis of other legal instruments examined in the thesis (see next section for what these are); and (2) to study the governance regime in each of the three river basin case studies (the Jordan, the Nile and the Indus River Basins, respectively) so that the gaps identified in each governance regime can also be filled-in using international law and policy, examples from the European regional framework as well as successes in other river basins.

1.7 Framework of Legal Instruments

The thesis gives an overview of the governance regime of international rivers at the international, the European regional and individual basin case study levels namely the Jordan, the Nile and the Indus River Basins, respectively. Each thematic chapter (based upon over-extraction, pollution, damming and infrastructural development as well as climate change) starts with an overview of the nature of threat to large river systems, followed by the international governing regime, the European regional governing regime and concluded with individual governance regime in each case study.

The current international law and policy framework for the governance of international rivers comprises of the UN Watercourses Convention, the Berlin

¹⁶¹ United Nations Convention on the Non-Navigational Uses of International Watercourses 36 ILM 700 (opened for signature 21 May 1997, entered into force 17 August 2014).

Rules on Water Resources of 2004 ('the Berlin Rules'),¹⁶² international cases especially the *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)* of 1997¹⁶³ and the *Pulp Mills on the River Uruguay (Argentina v Uruguay)* of 2010¹⁶⁴ and arbitration decisions particularly focusing on the recent *Indus Waters Kishenganga Arbitration (India/Pakistan)* both the Partial¹⁶⁵ and Final Awards of 2013.¹⁶⁶

Although the Convention on the Protection and Use of Transboundary Watercourses and International Lakes of 1992 ('the UNECE Water Convention')¹⁶⁷ of the United Nations Economic Commission for Europe is also now an international treaty, this has been covered in the sections on the European region given that it was originally negotiated as a treaty of regional application and only gained status as an international instrument in July 2014.

The European governance framework explored in this thesis comprises of both the UNECE treaties as well as the European Union's legislations and the European Commission's policy and guidelines documents: the UNECE Water Convention, the Convention on Environmental Impact Assessment in a Transboundary Context of 1991 ('the Espoo (EIA) Convention'),¹⁶⁸ the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact

¹⁶² Berlin Rules on Water Resources ('Helsinki Revision') in International Law Association *International Law Association Rules on Water Resources* Final Conference Report Berlin (2004). Available from <http://www.ila-hq.org/en/committees/index.cfm/cid/32>

¹⁶³ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)* [1997] ICJ Rep 7.

¹⁶⁴ *Pulp Mills on the River Uruguay (Argentina v Uruguay)* [2010] ICJ Rep 14.

¹⁶⁵ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)* PCA 18 February 2013.

¹⁶⁶ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)* PCA 20 December 2013.

¹⁶⁷ Convention on the Protection and Use of Transboundary Watercourses and International Lakes 1936 UNTS 269 (adopted 17 March 1992, entered into force 6 October 1996).

¹⁶⁸ Convention on Environmental Impact Assessment in a Transboundary Context 30 ILM 800 (opened for signature 25 February 1991, entered into force 10 September 1997).

Assessment in a Transboundary Context of 2003 ('the SEA Protocol'),¹⁶⁹ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy ('the Water Framework Directive'),¹⁷⁰ Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on Environmental Quality Standards in the Field of Water Policy, Amending and Subsequently Repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and Amending Directive 2000/60/EC of the European Parliament and of the Council ('the Environmental Quality Standards Directive'),¹⁷¹ Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment ('the SEA Directive'),¹⁷² the Council Directive of 27 June 1985 on the Assessment of the Effects of Certain Public and Private Projects on the Environment (85/337/EEC) ('the EIA Directive'),¹⁷³ Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks ('the Flood Risks Directive'),¹⁷⁴ its policy on Water Scarcity and Drought¹⁷⁵ as well as the European Commission's guideline documents.

¹⁶⁹ Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context available from the UNECE website <http://www.unece.org/fileadmin/DAM/env/eia/documents/legaltexts/protocolenglish.pdf> (adopted 21 May 2003, entered into force 11 July 2010).

¹⁷⁰ OJ L327/1, 22 December 2000.

¹⁷¹ OJ L 348/84, 24 December 2008.

¹⁷² OJ L197/30, 21 July 2001.

¹⁷³ OJ L175/40, 5 July 1985 and subsequent amendments. See Section 4.4.5.

¹⁷⁴ OJ L288/27, 6 November 2007.

¹⁷⁵ European Commission *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Report on the Review of the European Water Scarcity and Droughts Policy* (Office for Official Publications of the European Communities, 2012). Available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0672&from=EN>

The individual river basin governance instruments covered in this thesis comprise of: for the Jordan River Basin - the Treaty of Peace Between the State of Israel and the Hashemite Kingdom of Jordan of 1994,¹⁷⁶ the Agreement between the Syrian Arab Republic and the Hashemite Kingdom of Jordan Concerning the Utilization of the Yarmuk Waters of 1987¹⁷⁷ and the Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip of 1995,¹⁷⁸ for the Nile River Basin - the Agreement between the Republic of the Sudan and the United Arab Republic for the Full Utilization of the Nile Waters of 1959¹⁷⁹ and the Nile River Basin Cooperative Framework Agreement of 2010¹⁸⁰ and for the Indus River Basin - Indus Waters Treaty of 1960.¹⁸¹

Where relevant, other legal instruments have also been referred to in order to supplement discussions for the purpose of analysis of all of these legal texts.

1.8 The UN Watercourses Convention and the Case Studies

So far, the UN Watercourses Convention has served as a model framework to a number of subsequent regional treaties as well as bilateral and multilateral treaties in different regions, including the Revised Protocol on Shared Watercourses in the

¹⁷⁶ Treaty of Peace Between the State of Israel and the Hashemite Kingdom of Jordan 2042 UNTS 351 (signed 26 October 1994, entered into force 27 November 1995).

¹⁷⁷ 1870 UNTS 279.

¹⁷⁸ Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip 36 ILM 557 (28 September 1995).

¹⁷⁹ Agreement between the Republic of the Sudan and the United Arab Republic for the Full Utilization of the Nile Waters 453 UNTS 63 (signed 8 November 1959, entered into force 12 December 12 1959).

¹⁸⁰ Nile River Basin Cooperative Framework Agreement available from International Water Law Project http://www.internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf (opened for signature 14 May 2010, not yet in force)

¹⁸¹ Indus Waters Treaty, India - Pakistan 419 UNTS 126 (adopted 19 September 1960, entered into force 12 January 1961).

Southern African Development Community of 2000,¹⁸² the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin of 1995 ('Mekong River Basin Agreement')¹⁸³ as well as the Agreement on the Nile River Basin Cooperative Framework of 2010. While it has taken the Convention a long time to enter into force, in August 2014 having gained the requisite number of signatures in May 2014, strengthening the provisions of the UN Watercourses Convention through amendments would mean that future freshwater agreements based on this framework are even better formulated especially if the major threats to international rivers are addressed adequately.¹⁸⁴

As for the chosen case studies, two thirds of the world's river basins have no treaties for sharing their waters.¹⁸⁵ In the early 1950s, after the United Nations was formed, there were several international river disputes particularly in the Jordan, the Nile, the Indus and the Columbia.¹⁸⁶ At this time there were no accepted rules of international law applicable to these disputes. This led to the International Law Association to study legal aspects of the use of freshwater resources of international river basins.¹⁸⁷ Except for the Columbia waters dispute, which got settled early on with a treaty between the United States and Canada,¹⁸⁸ while there are some agreements on the use of the waters of the Jordan, the Nile

¹⁸² Revised Protocol on Shared Watercourses in the Southern African Development Community 40 ILM 321 (adopted 7 August 2000, entered into force 22 September 2003).

¹⁸³ Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin 2069 UNTS 3 (5 April 1995).

¹⁸⁴ See J Dellapenna, W J Gupta, W Li and F Schmidt "Thinking about the Future of Global Water Governance" in (2013) 18 Ecology and Society 28 at 31-32.

¹⁸⁵ Fred Pearce *When the Rivers Run Dry: Water, The Defining Crisis of the Twenty-First Century* (Beacon Press, Boston, 2006) at 177.

¹⁸⁶ Slavko Bogdanović *International Law of Water Resources: Contribution of the International Law Association (1954-2000)* (Kluwer Law International, The Hague, 2001) at 3.

¹⁸⁷ Ibid.

¹⁸⁸ Treaty between Canada and the United States of America Relating to Co-operative Development of the Water Resources of the Columbia River Basin 542 UNTS 246 (signed 17 January 1961, entered into force 16 September 1964). Hereafter Columbia River Basin Treaty.

and the Indus River Basins, there still lacks a comprehensive treaty governing these basins in entirety. The Jordan River Basin has already experienced a war over its water resources in 1964 which was fought between Israel and its Arab neighbours.¹⁸⁹ The Nile Waters Agreement of 1959 was concluded after Sudan refused to be bound by a preceding agreement concluded without its “consent.”¹⁹⁰ The Indus Waters Treaty of 1960 has survived three wars fought in 1965, 1971 and 1999 between India and Pakistan. Moreover, the Jordan and the Nile have already been identified as two of the five principal hot spots for freshwater disputes.¹⁹¹ The Indus also has a long inventory of disputes, especially those pertaining to damming and infrastructural development.¹⁹² Hence, these river basins have been chosen as case studies to examine water sharing therein to decipher to what extent the agreements constituting the governing regime in these basins are apt to deal with the identified threats in these basins given that they already have a history of water-related disputes.

1.9 Methodology for Answering the Research Questions

The research questions which this thesis seeks to answer are: (1) is the current framework for the governance of international watercourses adequate for

¹⁸⁹ See Hal Kosut *Israel and the Arabs: The June 1967 War* (Facts on File, New York, 1968); Aaron T Wolf *Hydropolitics Along the Jordan River: Scarce Water and Its Impact on the Arab-Israeli Conflict* (United Nations University Press, Tokyo, New York, Paris, 1995); Moshe Shemesh “Prelude to the Six-Day War: The Arab-Israeli Struggle Over Water Resources” (2004) 9 *Israel Studies* 1.

¹⁹⁰ Daniel Patrick O’Connell *State Succession in Municipal Law and International Law: Internal Relations II* (Cambridge University Press, Cambridge, 1967); See Korwa G Adar and Nicasius A Check *Cooperative Diplomacy, Regional Stability and National Interests: The Nile River and Riparian States* (African Institute of South Africa, Pretoria, 2011) at 48–50.

¹⁹¹ Sandra L Postel “Entering an Era of Water Scarcity: The Challenges Ahead” (2000) 10 *Ecological Applications* 941 at 941–948.

¹⁹² See Shaista Tabassum *River Water Sharing Problem Between India and Pakistan: Case Study of the Indus Waters Treaty* (Regional Centre for Strategic Studies, Colombo, 2004); Shaheen Akhtar *Emerging Challenges to Indus Waters Treaty: Issues of Compliance and Transboundary Impacts of Indian Hydropower Projects on the Western Rivers* (Institute of Regional Studies, 2010).

addressing the four major threats to international watercourses addressed in this thesis and thus highlighting weaknesses; and (2) are the legal governing regime in each river basin used as a case study, because they have been identified as a hotspot for freshwater dispute, apt to deal with the four major threats in their respective basins and where are the gaps in the governance framework.

The way that this thesis seeks to answer the first question is by outlining the relevant provisions of the UN Watercourses Convention together with other international law and policy focusing on the Berlin Rules and international case law and arbitration decisions to highlight the weaknesses in the Convention using comparative analysis.

The international law and policy section is always followed by a study of the European regional framework for the governance of the particular threat addressed in that chapter. The framework comprises of the UNECE treaties, the European Union legislations and the European Commission's policy documents. This is primarily to highlight the practical application of international law and policy in the world-leading regional setting.

Then using international law and policy and the European regional framework for the governance of the particular threat for comparison, each thematic chapter outlines the governance regime in each case study identifying the challenges in the respective river basin.

Each chapter concludes with recommendations for: (1) strengthening the UN Watercourses Convention based on other international law and policy, the European regional framework as well as the strengthens of the legal governance regimes in the case studies; and (2) filling-in the gaps in each of the governance regime for all the case studies based on international law and policy, the European regional framework as well as strengthens of the legal governance regimes in the other two case studies.

1.10 Structure of the Thematic Chapters

Chapters 2 to 5 are four thematic chapters based on the four identified threats to international rivers namely: (1) Water extraction; (2) Pollution; (3) Damming and Infrastructural Development; and (4) Climate change, respectively. All chapters follow the same structure. Each chapter identifies the extent of the specific threat to international rivers generally, followed by the related international law and policy and international case-law and arbitration decisions (if any). This is followed by a study of the relevant European regional framework for the governance of that particular threat in European rivers.

The European river governance framework not only has a parallel Convention¹⁹³ to the UN Watercourses Convention, but more importantly, it is complemented by other binding treaties and policy documents. In 2000, the European Commission of the EU launched the Water Framework Initiative, a European-wide initiative for water conservation, clean-up and administration based on the collective management of river basins and the Commons values of cross-border cooperation of watersheds and the right of all citizens to clean drinking water.¹⁹⁴ Europe is also looking to adopt “best practice” examples including integrated river basin management through the principle of solidarity. Given that it uses rivers as a focal point, its governance framework offers a good guide to transboundary freshwater governance by illustrating how the principles, and the substantive rights and obligations prescribed by the international law and policy work on a practical level. This is through a *results-based approach* namely prescribed by Directives and supplemented by guideline documents. The EU section is then followed by the case studies on the Jordan, the Nile and the Indus River Basins, respectively.

In each case study, the extent of the specific threat to the particular river basin is explored followed by the governing legal regime pertaining to that particular threat. In doing so, using comparative analysis of international law and policy as

¹⁹³ The UNECE Water Convention, which is now also an international treaty of international application as opposed to of regional application.

¹⁹⁴ Barlow, above n 92, at 15.

well as the European regional framework, gaps in the governing regime of the case study are identified. Each chapter concludes by filling-in the gaps identified in the UN Watercourses Convention as well as in the governing regime of each case study.

The final chapter concludes with a summary of recommendations for amendments to the UN Watercourses Convention in order to adequately address the four major threats to international rivers. This is followed by a summary of all the points that have been put forward in order to improvise the governance regime in each case study.

1.11 Conclusion

Many writers have labelled the 20th century as the century of water resources development and over-exploitation.¹⁹⁵ Changes pertaining to how we are consuming water are affecting the availability and the quality of freshwater, which are inter alia creating freshwater stress and scarcity. Hence the water security concern for the 21st century. As the global community works towards ‘water for all,’ reviving to some extent the Commons approach to water resources management, how the water resources of international river basins and threats to them are governed will become important if we are to achieve water security at least the river basin level. The following chapters seek to offer remedies based on the selected case studies.

¹⁹⁵ Jessica Vapnek, Bruce Aylward, Christie Popp and Jamie Bartram *Law for Water Management: A Guide to Concepts and Effective Approaches* (FAO, Rome, 2009) at 339.

2 Over-Extraction



“One day every last drop of water which drains into the whole valley of the Nile...shall be equally and amicably divided between the river people, and the Nile...shall perish gloriously and never reach the sea.”

- Winston Churchill, 1908¹⁹⁶

2.1 Introduction

Given that freshwater is limited and one of our main sources of freshwater supply is rivers, this chapter looks at the threat of over-extraction on international rivers generally and the governance regime for the management of this threat at various levels. For this purpose, it looks at the relevant international law and policy namely the relevant provisions of the UN Watercourses Convention such as those supporting sustainable water use, environmental protection, monitoring and assessment as well as management. This is supplemented by the Berlin Rules and international case-law and arbitration decisions. The international law and policy section is followed by the European regional framework for the governance of water scarcity issues.

The European framework not only prescribe rights and obligations of Member States with regards to the sharing of common resources of international river basins (similar to the UN Watercourses Convention) but it also guides Member States in how to realize those rights and obligations by prescribing a framework for the monitoring, assessment and reporting of pressures of over-extraction against their environmental objective of good ecological status. This example of regional practice is followed by the case studies namely the Jordan, the Nile and the Indus River Basins.

¹⁹⁶ Eric Strobl and Robert O Strobl “The Distributional Impact of Large Dams: Evidence from Cropland Productivity in Africa” (2011) 96 Journal of Development Economics 432 at 432.

All of the three case studies highlight the extent to which over-extraction is a problem in these Basins. This then leads to an analysis of the respective governing regime in each Basin dealing with the issue of over-extraction. The aim is to identify the gaps in the governance regime and to fill them using international law and policy and the European regional framework.

This chapter concludes with an overview of the issues covered in the foregoing paragraphs, including recommended amendments to the UN Watercourses Convention with the aim to strengthen international law in this area as well.

2.2 Over-Extraction in International Rivers

Increasing water withdrawals for domestic, industrial and agricultural uses have profoundly altered the hydrology of many major rivers globally. The overuse and misuse of freshwater is now so severe that more than half of the world's major rivers are now at risk.¹⁹⁷ Of the top 10 rivers identified to be at risk by the World Wildlife Fund, two of them are at risk due to water over-extraction; Rio Grande - Rio Bravo and the Ganges.¹⁹⁸ Four of the world's greatest rivers; the Ganges, the Yellow River, the Nile, and the Colorado River, routinely dry up before reaching the ocean.¹⁹⁹ Over-abstraction by way of withdrawal not only threatens the sustainability of the overall hydrologic cycle but also increases the chances of disputes of freshwater if left to aggravate. The following explains how and why.

Environmental Flows

A river should have sufficient environmental flow to sustain biodiversity, provide the ecosystem service of “open space” and allow for economic development along

¹⁹⁷ Kirby, above n 154.

¹⁹⁸ Wong, above n 154, at 4.

¹⁹⁹ The World Bank *Sustainable Land Management Sourcebook* (World Bank Publications, Washington, DC, 2008) at 8; See Donald C Lord *Dubya: The Toxic Texan. George W. Bush and Environmental Degradation* (iUniverse, Lincoln, NE, 2005).

the river course.²⁰⁰ In order to maintain the aquatic and riparian biodiversity, 30 percent of the natural base flow is the minimal sustained average.²⁰¹ At less than 10 percent (excluding storm water), the river ceases to function as a river.²⁰² River flows out to the marine environment have several, often overlooked, functions: flushing out sediments, diluting polluted water, controlling salinity intrusion and sustaining estuarine and coastal ecosystems.²⁰³ Only one-third of the world's 177 large rivers²⁰⁴ remain free-flowing from source to mouth, with only 21 such rivers retaining a direct connection to the sea.²⁰⁵

Physical Water Scarcity and Basin Closure

Physical water scarcity in a river basin is measured by the 'degree of development'; the ratio of primary withdrawals to the potentially utilizable water resources.²⁰⁶ When the degree of development exceeds 60 percent, the basins are classified as physically water-scarce²⁰⁷ because it generally means the drying up

²⁰⁰ Committee on Sustainable Water Supplies in the Middle East and others *Water for the Future* (National Academies Press, Washington, DC, 1999) at 203.

²⁰¹ Ibid.

²⁰² Ibid.

²⁰³ François Molle, Philippus Wester and Philip Hirsch "River Basin Closure: Processes, Implications and Responses" (2010) 97 *Agricultural Water Management* 569-577 at 569.

²⁰⁴ Those over 1,000 km in length.

²⁰⁵ World Wildlife Fund *Free-Flowing Rivers: Economic Luxury or Ecological Necessity?* (WWF, 2006) at 1. Available at <http://www.wwf.se/source.php/1120326/free>

²⁰⁶ Upali A Amarasinghe, Tushaar Shah and BK Anand *India's Water Supply and Demand from 2025-2050: Business-As-Usual Scenario and Issues* (International Water Management Institute, 2008) at 31.

²⁰⁷ At 31-32.

of a river.²⁰⁸ This leads to basin closure, which has been defined as “no utilizable outflow of water.”²⁰⁹

A basin is said to be facing closure when all of the available water has been allocated for some use or activity and almost all or no water is left for further allocation.²¹⁰ This results in inadequate or no environmental flows, which is an unsustainable situation in the long-run.²¹¹ Currently, basin closure is quite prevalent with 1.4 billion people living in areas that have to deal with the situation.²¹² Water scarcity associated with basin closure produces numerous implications for water management including increased competition between human and environmental uses.²¹³ This creates heavy competition leading to reallocation of supplies - often unplanned with unforeseen consequences²¹⁴ such as severe pollution, as increasing effluent and declining flows outstrip the dilution

²⁰⁸ Kai Wegerich and Jeroen Warner *Politics of Water: A Survey* (Routledge, London, 2010) at 221.

²⁰⁹ Chennat Gopalakrishnan, Cecilia Tortajada and Asit K Biswas *Water Institutions: Policies, Performance and Prospects* (Springer, Berlin, Heidelberg, New York, 2005) at 156; Also see David William Seckler *The New Era of Water Resources Management: From “Dry” to “Wet” Water Savings 1* (International Irrigation Management Institute, 1996) at 7–8 for a general discussion of basin closure.

²¹⁰ M Svendsen and others “Governing Closing Basins: The Case of the Gediz River in Turkey” in Charles L Abernethy (ed) *Intersectoral Management of River Basins: Proceedings of an International Workshop on “Integrated Water Management in Water-Stressed River Basins in Developing Countries: Strategies for Poverty Alleviation and Agricultural Growth,” Loskop Dam, South Africa, 16-21 October 2000* (International Water Management Institute, Colombo, 2001) at 184.

²¹¹ Malin Falkenmark and David Molden “Wake Up to Realities of River Basin Closure” (2008) 24 *International Journal of Water Resources Development* 201 at 214.

²¹² At 201.

²¹³ Trent W Biggs and others *Closing of the Krishna Basin: Irrigation, Streamflow Depletion and Macroscale Hydrology* International Water Management Institute Research Report 111 (IWMI, Colombo, 2007) at 1.

²¹⁴ Falkenmark, above n 211, at 214.

capacity of many rivers and lead to wider ecosystem degradation.²¹⁵ Basin closure is thus a key threat in this study of basins at risk because once that threshold is reached, water scarcity can become a trigger for a dispute (if not a conflict).²¹⁶

As recently documented, “new conflicts are likely to emerge as more of the world’s rivers become further heavily abstracted so that they no longer make it to the sea.”²¹⁷ All of the three river basins covered in the Case Studies section are now ‘closed.’ In terms of an international river basin, the issue in particular is one of allocation. Thus, any legal framework which deals with the issue of basin closure, and inter alia with over-extraction, has to acknowledge and work around issues of allocation, river flows and integrated river basin management, all from an ecological perspective with sustainability in mind.

2.3 International Law and Policy

The main international instrument dealing with governance of international rivers is the UN Watercourses Convention. Also, whilst initially negotiated as a regional instrument in the EU, the UNECE Water Convention was amended in 2003 to allow accession by all the UN Member States. The amendments entered into force on 6 February 2013, turning the Convention into the first international legal framework governing the management of transboundary surface and ground water resources.²¹⁸ Subsequently, the UN Watercourses Convention also gained the requisite number of signatures in May 2014 and entered into force in August 2014.²¹⁹ However, given that the UNECE Water Convention is still a regional

²¹⁵ Molle, Wester and Hirsch, above n 203, at 569.

²¹⁶ Katri Mehtonen, Marko Keskinen and Olli Varis “The Mekong: IWRM and Institutions” in Olli Varis, Cecilia Tortajada and Asit K Biswas *Management of Transboundary Rivers and Lakes* (Springer, Verlag, Berlin, Heidelberg, 2008) at 38.

²¹⁷ Harriet Bigas *The Global Water Crisis: Addressing an Urgent Security Issue* (UNU-INWEH, Hamilton, ON, 2012) at 15.

²¹⁸ United Nations Economic Commission for Europe “UNECE Water Convention Goes Global” (6 February 2013). Available at <http://www.unece.org/index.php?id=32154>

²¹⁹ United Nations Treaty Collection “Status: Convention on the Law of the Non-Navigational Uses of International Watercourses” available at

instrument in its application, it is covered in the section on the EU Water Governance Framework. The UN Watercourses Convention, which is also a framework convention, is the focus of this part of the chapter and discussions of it is supplemented by the Berlin Rules²²⁰ and International Case-law as they are important for pronouncements of customary international law.

UN Watercourses Convention

The UN Watercourses Convention strives to deal with all matters pertaining to the Watercourse States' sharing of the water resources of international watercourses²²¹ as well as matters of governance of the river basin. It's Preamble expresses "the conviction that a framework convention will ensure the utilization, development, conservation, management and protection of international watercourses and the promotion of the optimal and sustainable utilization thereof

https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII12&chapter=27&lang=en

²²⁰ "These Rules set about to provide a clear, cogent, and coherent statement of the customary international law that applies to waters of international drainage basins ...[They] also undertake the progressive development of the law needed to cope with emerging problems of international or global water management for the twenty-first century"; Berlin Rules on Water Resources and Sources in International Law Association *Sources of the International Law Association Rules on Water Resources* Final Conference Report (Sources) Berlin (2004). Available from <http://www.ila-hq.org/en/committees/index.cfm/cid/32>; Preface; Para 3. The sources for the Berlin Rules have been compiled from "soft law" instruments, which are not binding as well as hard law legal instruments that are binding on States party to them, creating legal rights and duties (as well as for individuals); Preamble; para 1. They are thus an important source of guidance and reference for watercourse States.

²²¹ 'Watercourse' means "a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus", 'international watercourse' means "a watercourse, parts of which are situated in different States" and 'Watercourse State' means a State Party to the present Convention in whose territory part of an international watercourse is situated, or a Party that is a regional economic integration organization, in the territory of one or more of whose Member States part of an international watercourse is situated." UN Watercourses Convention; Articles 2(a)-(c), respectively.

for present and future generations.”²²² Its importance stems from the hope that new and existing freshwater agreements will be revised drawing heavily on its provisions in order to enable riparian States to come to cooperative arrangements regarding the use and management of international watercourses. The way it deals with the issue of allocation and over-extraction of the water resources of international watercourses is through: the principle of sustainable utilization, the right to equitable and reasonable utilization and the obligation to cooperate. This is in conjunction with duties: not to cause significant harm, to protect and preserve the ecosystem, to protect and preserve the marine environment and to manage. These are discussed in turn.

Sustainable Utilization

The UN Watercourses Convention mentions the problems affecting many international watercourses including the “increasing demands” on its water resources.²²³ Hence, the Convention has acknowledged the concept of sustainable development by incorporating and giving importance to the principle of “sustainable utilization.”²²⁴ While ‘sustainable use’ has not been defined under the Convention, it has been defined under the Berlin Rules²²⁵ as “the integrated

²²² UN Watercourses Convention; Preamble, Para 5.

²²³ UN Watercourses Convention; Preamble, Para 4.

²²⁴ “UN Watercourses Convention”; Article 5(1). Most authors in the field of environmental law agree that the concept of sustainable development includes the principle of sustainable use of natural resources. See Panos Merkouris “Sustainable Development and Best Available Techniques in International and European Law” in Karen E Makuch and Ricardo Pereira (eds) *Environmental and Energy Law* (Wiley-Blackwell, West Sussex, 2012).

²²⁵ Berlin Rules on Water Resources (‘Helsinki Revision’) in International Law Association *International Law Association Rules on Water Resources* Final Conference Report Berlin (2004). Available from <http://www.ila-hq.org/en/committees/index.cfm/cid/32>. The Rules deal not only with waters of international drainage basins but also with waters entirely within a State. They include principles of international law applicable to the management of all waters, internationally shared waters, the rights of persons, protection of the aquatic environments, groundwater, navigation, protection of waters, water installations during war/armed conflict and State responsibility. See Antoinette Hilderling *International Law, Sustainable Development and Water*

management of resources to assure efficient use of and equitable access to waters for the benefit of current and future generations while preserving renewable resources and maintaining non-renewable resources to the maximum extent reasonably possible.”²²⁶ The concept of ‘sustainable utilization’ under the UN Watercourses Convention has effectively limited the principle of equitable utilization.²²⁷ This is because it is only with sustainable utilization that the present framework under the Convention can ensure that water resources of international watercourses are available for present as well as future use.²²⁸

However, the UN Watercourses Convention has failed to give paramount importance by not emphasizing that it is the principle of sustainable utilization which shall be the guiding principle of the framework of the Convention, unlike the Berlin Rules (or as will be highlighted later in the chapter, the Water Framework Directive) which has covered ‘sustainability’ under a separate Article.²²⁹ The Convention provides that, “Watercourse States shall in their respective territories utili[z]e an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and

Management (Eburon Academic Publishers, Delft, 2004) at 47. The Rules are non-binding and are intended to be a guidance framework in this area. It is noted that 4 out of the 22 members of the ILA dissented from the Rules arguing that the Rules mark a radical and unwarranted departure from existing customary law. Onita Das *Environmental Protection, Security and Armed Conflict: A Sustainable Development Perspective* (Edward Elgar Publishing, Glos, Northampton, MA, 2013) at 128.

²²⁶ Berlin Rules; Article 3(19). “Sustainable utilization” is defined as “human use of a wetland [including rivers] so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.” Ramsar Convention on Wetlands *Guidelines for the Implementation of the Wise Use Concept* (1996). First adopted as an annex to Recommendation 4.10 of the 4th Meeting of the Conference of the Contracting Parties (Montreux, Switzerland, 1990).

²²⁷ UN Watercourses Convention; Article 5(1); Berlin Rules; Commentary to Article 7.

²²⁸ See UN Watercourses Convention; Preamble, para 5.

²²⁹ See Commentary to Article 7 which states that: “This Article sets forth the basic rule now part of customary international law that States must strive to achieve the sustainable use of waters.”

developed by Watercourse States with a view to attaining optimal and sustainable utilization...”²³⁰ Whilst the principle of sustainable utilization has limited the right to an equitable use, the emphasis of the Convention is on the latter.

The Berlin Rules’ predecessor, the Helsinki Rules of 1966, provided that “the avoidance of unnecessary waste in the utilization of waters of the basin”²³¹ is one of the factors which should be taken into account in the equitable utilization of international river basins. The present Convention goes beyond this requirement by stating that States have to be mindful of the “... economy of use of the water resources of the [international] watercourse...”²³² Thus, while water has to be utilized sparingly, that does not equate to the sustainability principle as sustainable use goes beyond current uses.

Equitable and Reasonable Use

Current uses are restricted through the principle of equitable and reasonable use. The term ‘equitable’ has not been defined under the Convention. It does not simply mean equal²³³ but the concept is built upon the principle of ‘community of interest.’²³⁴ The International Law Commission’s comment on equitable utilization states that:

²³⁰ UN Watercourses Convention; Article 5(1).

²³¹ Helsinki Rules; Article V(2)(i).

²³² UN Watercourses Convention; Article 6(f).

²³³ Peter H Gleick “Water and Conflict: Fresh Water Resources and International Security” (1993) 18 International Security 79 at 107.

²³⁴ *Territorial Jurisdiction of the International Commission of the River Oder (“Six Governments”) v Poland* [1929] PCIJ (Series A) No 23, 27 and 28; Adopted by the International Court of Justice in the *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 85.

“Indeed, the principle of sovereign equality of States results in every Watercourse State having rights to the use of the watercourse that are qualitatively equal to, and correlative with, those of other Watercourse States. This fundamental principle of “equality of right” does not, however, mean that each Watercourse State is entitled to an equal share of the uses and benefits of the watercourse. Nor does it mean that the water itself is divided into identical portions. Rather, each Watercourse State is entitled to use and benefit from the watercourse in an equitable manner. The scope of a State’s rights of equitable utilisation depends on the facts and circumstances of each individual case, and specifically on a weighing of all relevant factors
 ...”²³⁵

Where the quantity or quality of the water is such that all the reasonable and beneficial uses of all Watercourse States cannot be fully realized, international practice recognizes that the rights of States must be adjusted in order to preserve each State’s equality of rights²³⁶ - a right to make use of the waters of an international watercourse within its territory.²³⁷ These adjustments are to be arrived at on the basis of equity.²³⁸ However, equity alone cannot achieve that.

The UN Watercourses Convention has prescribed an inexhaustive list of factors and circumstances, relevant to equitable and reasonable utilization, which the Watercourse States must take into account in order to determine what their equitable proportion of the shared water resources of the international river in question is. These include, but are not limited to:²³⁹ the population dependent on the watercourse in each Watercourse State, the effects of the use(s) of the watercourses in one Watercourse State on other Watercourse States, existing and potential uses of the watercourse, conservation, protection, development and economy of use of the water resources of the watercourse and the availability of

²³⁵ Arthur Watts *The International Law Commission 1949-1998. Volume II: The Treaties* (Oxford University Press, Oxford, 1999) at 1354–1355.

²³⁶ Owen McIntyre *Environmental Protection of International Watercourses under International Law: Substantive Rules of Customary and General International Law* (Ashgate Publishing Ltd, Hampshire, Burlington, 2007) at 74.

²³⁷ See International Law Commission *Report of the International Law Commission on the Work of its Forty-Sixth Session* [1994] vol 2, pt 2 YILC 88 at 96 for commentary on draft Article 5.

²³⁸ McIntyre, above n 236, at 74.

²³⁹ UN Watercourses Convention; Article 6(1)(c) to (g), respectively.

alternatives to a particular planned or existing use. In order to invoke the right to equitable and reasonable utilization of water resources of an international watercourse and the factors and circumstances relevant to it, the Watercourse States have an obligation to “enter into consultation in a spirit of cooperation”²⁴⁰ where such a need arises. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what constitutes reasonable and equitable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.²⁴¹ As the International Court of Justice (‘ICJ’) has pronounced:²⁴²

“[t]he principle of equitable and reasonable utilization has to be applied with all the relevant factors and circumstances pertaining to the international watercourse in question as well as to the needs and uses of the Watercourse States concerned. Whether the use of the waters of a watercourse by a Watercourse State is reasonable or equitable and therefore lawful must be determined in the light of all the circumstances”

Hence, neither of these factors nor any particular use of an international watercourse²⁴³ is to enjoy inherent priority over any other in the process of “equitable balancing”, which lies at the heart of the principle of equitable utilization.²⁴⁴ In practice, what constitutes a State’s equitable share is what Watercourse States ultimately decide amongst themselves what it ought to be. The notion of equitable utilization is one of distributive justice.²⁴⁵ It is therefore a mutual recognition of each Party’s rights to equitably share in beneficial use of

²⁴⁰ UN Watercourses Convention; Article 6(2).

²⁴¹ UN Watercourses Convention; Article 6(3).

²⁴² *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 234, Separate Opinion of Judge Koroma, at 150.

²⁴³ UN Watercourses Convention; Article 10(1).

²⁴⁴ Owen McIntyre “International Water Resources Law: Relative Priority Accorded to Environmental Protection” (2008) 38 *Environmental Policy and Law* 131-140 at 131.

²⁴⁵ Dinah Shelton “Describing the Elephant: International Justice and Environmental Law” in Jonas Ebbesson and Phoebe N Okowa (eds) *Environmental Law and Justice in Context* (Cambridge University Press, New York, 2009) at 66.

the common waters.²⁴⁶ This is based on the doctrine of equitable use which not only assures equity for all riparian States but that the use of the shared water resources is in a manner that is reasonable as well.²⁴⁷ Although the Convention has clubbed them together, they are in reality divisible.

Reasonable Use

The right to an equitable use is constrained by the obligation that it be reasonable. The notion of reasonable use enjoys a well-established tradition in law as an objective standard, which is flexible enough to be applied consistently in differing situations.²⁴⁸ Unlike equitable use, determining what might be considered reasonable is not dependent on how an international watercourse is utilized by other States but rather on a contemporary conception of rationality, which both takes into account the special needs of States and the need to protect the long-term viability of international watercourses.²⁴⁹ In the *Pulp Mills* case, the ICJ held that:

“the attainment of optimum and rational utilization [under the 1975 Statute] requires a balance between the Parties’ rights and needs to use the river for economic and commercial activities on the one hand, and the obligation to protect it from any damage to the environment that may be caused by such activities, on the other.”²⁵⁰

The ICJ has referred to the requirement of respecting a certain level of “proportionality”²⁵¹ which is required of riparian States by international law. Therefore, in the *Case Concerning the Gabčíkovo-Nagymaros Project*, Czechoslovakia “by unilaterally assuming control of a shared resource, and thereby depriving Hungary [a Watercourse State] of its right to an equitable and

²⁴⁶ Draper, above n 10, at 16.

²⁴⁷ Ibid.

²⁴⁸ Alistair Rieu-Clarke *International Law and Sustainable Development* (IWA Publishing, London, 2005) at 131.

²⁴⁹ Ibid.

²⁵⁰ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 175.

²⁵¹ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 234; para 85.

reasonable share of the natural resources of the Danube [an international watercourse] ... [the Watercourse State taking unilateral control] failed to respect the proportionality which is required by international law.”²⁵² The ICJ referred to the “equitable and reasonable sharing of the resources of an international watercourse” as a Watercourse State’s “basic right,”²⁵³ which exists under general international law.”²⁵⁴ Equitable and reasonable uses are to be “consistent with adequate protection of the watercourse.”²⁵⁵ For example, the concept of reasonable use in relation to fishing was considered in the *Fisheries Jurisdiction* case, which took into account the needs of conservation and the interests of all the exploiters of the resource in the following terms:²⁵⁶

“the exercise of preferential rights of the coastal State as well as the historic rights of other States dependent on the same fishing grounds, have all to be subject to the over-riding consideration of proper conservation of the fishery resources for the benefit of all concerned. This conclusion would appear warranted if this vital source of man’s nutrition is to be preserved and developed for the community.”

The phrase suggests that any uses that would substantially harm the watercourse would be inherently inequitable.²⁵⁷ Likewise, in cases of basin closure, reasonableness would require that equitable sharing takes place after environmental flows have been taken into consideration and accounted for. This would require cooperation throughout the basin.

²⁵² Ibid.

²⁵³ At para 78.

²⁵⁴ At para 78; Separate Opinion of Judge Fleischhauer, at 216.

²⁵⁵ UN Watercourses Convention; Article 5.

²⁵⁶ *Fisheries Jurisdiction (United Kingdom of Great Britain and Northern Ireland v Iceland)* [1972] ICJ Rep 12; Declaration by Judge Nagendra Singh, at 40.

²⁵⁷ Alexandre Charles Kiss and Dinah Shelton *A Guide to International Environmental Law* (Koninklijke Brill, Leiden, 2007) at 109.

Obligation to Cooperate

The UN Watercourses Convention provides that International Watercourse States have a general obligation to co-operate “on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.”²⁵⁸ While States are driven by their vested interests in the water resources, what would achieve other matters ancillary to optimal utilization and adequate protection is cooperative efforts as a collective whole. To this end, the Convention further provides that: “In determining the manner of such cooperation, watercourse States *may* consider the establishment of joint mechanisms or commissions” [emphasis added]. It is noted that the Berlin Rules have just focused on the idea of “good faith in the management of waters of an international ... basin for the mutual benefit of the participating States.”²⁵⁹ As will be illustrated in the later part of this thesis, the ICJ has also emphasised on the obligation of riparian States to cooperate in good faith when it comes to settling disputes over the use and share of freshwater resources of international river basins.

Duty not to Cause Significant Harm

The obligation not to cause significant harm is the other fundamental principle upon which the UN Watercourses Convention is based upon. Before this, the ‘no harm’ principle had not emerged in international water law.²⁶⁰ Now the Watercourse States have an obligation to, “in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other Watercourse States.”²⁶¹ It relates to the right to an equitable and reasonable use by requiring that water use by one Watercourse State does not significantly harm allocation and use of the common waters by

²⁵⁸ UN Watercourses Convention; Article 8(1).

²⁵⁹ Berlin Rules; Article 11.

²⁶⁰ The Helsinki Rules only talked about the obligation not to cause pollution.

²⁶¹ UN Watercourses Convention; Article 7(1).

other Watercourse States.²⁶² The main qualifier in this rule is the term ‘significant’ and it is not just harm to an international watercourse but it must extend to other Watercourse State(s). ‘Significant harm’ has not been defined by the UN Watercourses Convention but has been defined elsewhere. ‘Significant Harm’ means “non-trivial harm capable of being established by objective evidence without necessarily rising to the level of being substantial.”²⁶³ The notion of ‘significant harm’, according to Sreenivasa Rao, a member of the Drafting Committee on the Law of the Non-Navigational Uses of International Watercourses, “[i]s not a fixed one and ha[s] to be assessed according to the circumstances of each case.”²⁶⁴ ‘Significant harm’ has a higher threshold than the standard established by ‘significant adverse effect’ under the UN Watercourses Convention.²⁶⁵ The aim of the provision is to avoid significant harm as far as possible but at the same time achieve a result that is equitable.²⁶⁶ Hence equity seeks to create a balance between optimal use and significant harm where competing interests are at stake.²⁶⁷

Watercourse States are required to exercise due diligence when utilizing the waters of international watercourses so as not to cause significant harm.²⁶⁸ ‘Due diligence’ has been defined to mean “a diligence proportioned to the magnitude of the subject and to the dignity and strength of the power which is to exercise it [and] such care as governments ordinarily employ in their domestic concerns.”²⁶⁹

²⁶² Draper, above n 10, at 16.

²⁶³ See Revised Protocol on Shared Watercourse in the Southern African Development Community; Article 1(1). Above n 182.

²⁶⁴ International Law Commission 2355th Meeting - *The law of the non-navigational uses of international watercourses* [1994] vol 1 YILC 179 at 180.

²⁶⁵ At 111.

²⁶⁶ At 103.

²⁶⁷ Ibid.

²⁶⁸ Ibid.

²⁶⁹ See *Alabama Claims of the United States of America v Great Britain*, XXIX Reports of International Arbitral Awards 125 (Tribunal of Arbitration, 1872) and; John Bassett Moore *United*

It is thus an obligation of conduct²⁷⁰ rather than an absolute obligation as to result.²⁷¹ Hence a Watercourse State whose use of an international watercourse causes significant harm can be deemed to have conducted itself in such manner as having breached its obligation to exercise due diligence so as not to cause significant harm only when it has “intentionally or negligently caused the event which had to be prevented or has intentionally or negligently not prevented others in its territory from causing that event or has abstained from abating it.”²⁷² Not only should Watercourse States not allow transboundary harm but according to the ICJ, “the principle of prevention, as a customary rule, has its origins in the due diligence that is required of a State in its territory.”²⁷³ It is “the obligation of every [S]tate not to allow its territory to be used for acts contrary to the rights of other [S]tates.”²⁷⁴

The Berlin Rules, on the other hand, does not provide for the obligation not to cause “significant harm” but rather the obligation to “take all appropriate measures to prevent or minimize environmental harm.”²⁷⁵ Not only it is not qualified by significant harm but unlike the Convention, it is strengthened with the duty to apply the precautionary approach: “States shall take all appropriate

States History and Digest of the International Arbitrations to which the United States has been a Party, together with Appendices containing the Treaties Relating to Such Arbitrations, and Historical Legal Notes (Government Printing Office, Washington, DC, 1898) at 572–573, 612.

²⁷⁰ International Law Commission, above n 264, at 103.

²⁷¹ Alan E Boyle “State Responsibility and International Liability for Injurious Consequences of Acts Not Prohibited by International Law: A Necessary Distinction?” (1990) 39 *International & Comparative Law Quarterly* 1 at 14–15; R Pisillo-Mazzeschi “Forms of International Responsibility for Environmental Harm” in Tullio Scovazzi and Francesco Francioni (eds) *International Responsibility for Environmental Harm* (Graham & Trotman, London, Dordrecht, Boston, 1991) at 24; Gunther Handl “National Uses of Transboundary Air Resources: The International Entitlement Issue Reconsidered” (1986) 26 *Nat Resources J* 405 at 429.

²⁷² International Law Commission, above n 264, at 103.

²⁷³ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 101.

²⁷⁴ *Corfu Channel (Merits) (United Kingdom v Albania)* [1949] ICJ Rep 4 at 22.

²⁷⁵ Berlin Rules; Article 8.

measures to prevent, eliminate, reduce, or control harm to the aquatic environment when there is a serious risk of significant adverse effect on or to the sustainable use of waters even without conclusive proof of a causal relation between an act or omission and its expected effects.”²⁷⁶ Note that unlike the Convention, the Berlin Rules do not restrict that the harm be suffered by another Watercourse State but the “aquatic environment.” The ICJ has gone even further than the precautionary principle by iterating that “vigilance and prevention are required on account of the often irreversible character of damage to the environment and of the limitations inherent in the very mechanism of reparation...”²⁷⁷ To this end, the UN Watercourses Convention provides that: “Where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall [...] take all appropriate measures [...] to eliminate or mitigate such harm,” having due regard for the principle of reasonable and equitable use.²⁷⁸ Thus, whilst fundamental, the obligation not to cause significant harm is subordinate to the principle of equitable and reasonable utilization.

On the issue of over-extraction, the Watercourse States can fulfil their obligation not to cause significant harm by regularly exchanging data and information regarding withdrawals.

Obligation to Exchange of Data and Information

The UN Watercourses Convention additionally provides that Watercourse States are under an obligation to regularly “exchange *readily available* data and information on the condition of the watercourse”²⁷⁹ [emphasis added]. In particular, if the condition is of a “hydrological, meteorological, hydrogeological and ecological nature ... as well as related forecasts.”²⁸⁰ The Berlin Rules are

²⁷⁶ Berlin Rules; Article 23(2).

²⁷⁷ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 234, at 78; para 140.

²⁷⁸ UN Watercourses Convention; Article 7(2).

²⁷⁹ UN Watercourses Convention; Article 9(1).

²⁸⁰ UN Watercourses Convention; Article 9(1).

more demanding by requiring that a list of “all known water withdrawals” also be included.²⁸¹ If such information, requested by another Watercourse State, is not readily available, then best efforts are to be made to comply with the request.²⁸² In addition, Watercourse States have an obligation to employ their best efforts to collect and process data and information in a manner which *facilitates its utilization* by the other Watercourse States to which it is communicated.²⁸³

Given that over-extraction is a threat to the general health of a river system, this is protected under the Convention through duties to protect and preserve the ecosystem and management of the entire basin.

Duty to Protect and Preserve the Ecosystem

In terms of the duty to protect and preserve the ecosystem, the Convention provides that: “Watercourse States shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses.” This has been stated to be “a blanket and unqualified obligation” of riparian States.²⁸⁴ The Berlin Rules however takes it a bit further by providing for ‘ecological integrity’ by requiring that States “take all appropriate measures to protect the ecological integrity necessary to sustain ecosystems dependent on particular waters.”²⁸⁵ It was in acknowledgement that “without a commitment to ecological integrity, sustainability is impossible.” Although both the Convention and the Berlin Rules have not defined the ecosystem approach, it has been defined under

²⁸¹ Berlin Rules; Article 56(1).

²⁸² UN Watercourses Convention; Article 9(2).

²⁸³ UN Watercourses Convention; Article 9(3).

²⁸⁴ Salman M A Salman *Groundwater: Legal and Policy Perspectives. Proceedings of a World Bank Seminar* (World Bank Publications, Washington, DC, 1999) at 195. Available from <http://documents.worldbank.org/curated/en/1999/01/3162188/groundwater-legal-policy-perspectives-proceedings-world-bank-seminar>

²⁸⁵ Berlin Rules; Article 22.

the Convention on Biological Diversity of 1992²⁸⁶ which makes the above-stated connection explicit in the following terms:

“... a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, provides an analytical framework to examine trade-offs between water development and ecological integrity. It conceives of a river basin as a continuum of nested ecosystems and provides the foundation for new approaches to river basin management, such as: [among other matters] ... Environmental flows: the notion of environmental flow, defined as the flow regime required to ensure the maintenance of particular environmental functions in a river ecosystem, is an attempt to find a compromise with productive uses, while establishing a protection threshold. ...”²⁸⁷

Thus, the essence of an ecosystem approach is integrated water resources management, which at the basin level seeks to, among other matters, maintain ecological flows. The Berlin Rules provides for States to “take all appropriate measures to ensure flows adequate to protect the ecological integrity of the waters of a drainage basin, including estuarine waters.”²⁸⁸ Including “estuarine waters” seeks to ensure that the drainage basin does in fact flow out into the marine waters, thus addressing the issue of basin closure. While the UN Watercourses Convention does not talk about “ecological integrity” it does provide that “States shall, individually and, where appropriate, in cooperation with other States, take all measures with respect to an international watercourse that are necessary to protect and preserve the marine environment, including estuaries ...”²⁸⁹ Thus it is under the provision that deals with the duty of watercourse States to protect and preserve the marine environment that the UN Watercourses Convention deals with the issue of basin closure. The Commentary to this states that “together, protection

²⁸⁶ Convention on Biological Diversity 1760 UNTS 79 (adopted 5 June 1992, entered into force 29 December 1993).

²⁸⁷ Note that Decisions adopted by the Conferences of the Parties to the Convention are not binding. For the text of COP 5 Decision V/6: Ecosystem Approach see *Annex III: Decisions Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Fifth Meeting, Nairobi, 15-26 May 2000* (UNEP/CBD/COP5/23, 66, 2000) at 103; Molle, Wester and Hirsch, above n 203.

²⁸⁸ Berlin Rules; Article 24.

²⁸⁹ UN Watercourses Convention; Article 23.

and preservation of aquatic ecosystems help to ensure their continued viability as life support systems, thus providing an essential basis for sustainable development.”²⁹⁰

The obligation to Protect

The obligation to protect is a specific application of the requirement contained under Article 5 of the Convention which states that: “Watercourse States shall participate in the use, development and protection of an international watercourse ... Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof ...”²⁹¹ This is further enforced by the general obligation to cooperate: “Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.”²⁹² Further to this, the Watercourse States are also under an obligation to regularly exchange readily available data and information on the condition of the watercourse, in particular that of (including but not limited to) a hydrological and ecological nature.²⁹³ In essence, the obligation to protect requires that Watercourse States shield the ecosystems of international watercourses from harm or damage.²⁹⁴

The obligation to Preserve

The obligation to preserve can be seen as subordinate to the obligation to protect.²⁹⁵ It “applies in particular to freshwater ecosystems that are in pristine or

²⁹⁰ International Law Commission, above n 237, at 119.

²⁹¹ UN Watercourses Convention; Article 5(2).

²⁹² UN Watercourses Convention; Article 8(1).

²⁹³ UN Watercourses Convention; Article 9(1).

²⁹⁴ International Law Commission, above n 237, at 282.

²⁹⁵ Alistair Rieu-Clarke, Ruby Moynihan and Bjørn-Oliver Magsig *UN Watercourses Convention: User’s Guide* (IHP-HELP Centre for Water Law, 2012) at 166.

unspoiled condition ... [and] requires that these ecosystems be protected in such a way as to maintain them as much as possible in their natural state.”²⁹⁶ Sometimes the preservation of watercourse ecosystems involves setting aside of a portion or the entirety of a river flow based on its condition or beauty.²⁹⁷ Such decisions must be weighed against all relevant factors applicable to the principle of equitable and reasonable utilization, as well as the duty of no significant harm.²⁹⁸ This is to strike a balance between human (that is its social and economic) and ecological needs.

Obligation to Restore

While the Convention codifies an obligation to protect and preserve ecosystems, it does not contain an explicit requirement for Watercourse States to restore aquatic ecosystems that are already degraded.²⁹⁹ Nevertheless, it seems that “restoration” would not be completely beyond the Convention’s scope.³⁰⁰ The Convention already states that equitable and reasonable participation in the use, development, and protection of an international watercourse “includes both the right to utilize the watercourse and the duty to cooperate in the protection [...] thereof.”³⁰¹ In this sense, in terms of over-extraction, Watercourse States would be under an obligation to maintain the level of water flow required to protect it and where degraded, to restore it.

²⁹⁶ International Law Commission, above n 237, at 282.

²⁹⁷ Rieu-Clarke, Moynihan and Magsig, above n 295, at 166.

²⁹⁸ Ibid.

²⁹⁹ Sabine Brels, David Coates and Flavia Loures *Transboundary Water Resources Management: The Role of International Watercourse Agreements in Implementation of the CBD*. CBD Technical Series No. 40 (Secretariat of the CBD, 2008) at 23.

³⁰⁰ At 23.

³⁰¹ UN Watercourses Convention; Article 5(2).

Duty to Manage

Finally, the Convention provides for the management of international watercourses by “promoting the rational and optimal utilization, protection and control of the watercourse.” As has been provided for by the Commentary on the Article, ‘sustainable development’ and ‘rational and optimal utilization’ are ‘relevant to the process of management’ and of ‘fundamental importance’ to present and future generations.³⁰² In other words, this provision seeks to manage water utilization by ensuring that it is sustainable. The Berlin Rules are more explicit in its provision which provides that not only should States “take all appropriate measures to manage waters sustainably”³⁰³ but also integrated “with the management of other resources”³⁰⁴ as well as conjunctive with other connecting water bodies; “surface waters, groundwater, and other pertinent waters in a unified and comprehensive manner.”³⁰⁵ Although the Convention is silent about management of the watercourse as an integrated whole, this can be read in as the Convention envisages: the creation of a joint management mechanism,³⁰⁶ through which Member States can collaborate in formulating and implementing policies for the use, development and management of an international watercourse.³⁰⁷ While individually States can monitor unilateral water extraction, through joint body they can collectively monitor and maintain the minimum flow required (based on joint study and assessment) in order to keep the river flowing into the marine environment thereby averting the issue of basin closure. For this purpose, the UN Watercourses Convention also needs to mandate establishment of governance mechanisms, which can ensure implementation of collective objectives for the basin whole.

³⁰² International Law Commission, above n 237, at 301.

³⁰³ Berlin Rules; Article 7.

³⁰⁴ Berlin Rules; Article 6.

³⁰⁵ Berlin Rules; Article 5.

³⁰⁶ UN Watercourses Convention; Article 24(1).

³⁰⁷ United Nations Environment Programme *Development and Harmonization of Environmental Laws* (UNEP/Earthprint, Nairobi, 1999) at 26.

As far as the issue of over-extraction is concerned, what can be taken from the UN Watercourses Convention and the supplementary Berlin Rules and international cases is that although paramount, the right to an equitable use has to be not only reasonable but balanced against environmental protection as well. Environmental protection means ensuring that the level of ecological flow that is required for the Basin's health is observed. This would ensure that situations like basin closures are avoided and protected against. Thus, providing for ecological flows would *inter alia* satisfy the principle of sustainable utilization, which is the key to securing freshwater resources of international watercourses for not only the present but future generations as well. Supplementary to these are the obligations to cooperate and manage the river basin as an integrated whole. Although the principle of integrated river basin management is absent under the UN Watercourses Convention, it is recommended that principles of ecological integrity and integrated river basin management be incorporated in order to ensure that management of basins happen at the basin level through collective governance mechanisms given that such threats do not respect territorial boundaries.

2.4 The European Regional Framework

This issue of over-extraction (or over-abstraction as it is called in the EU documents) in the international rivers of the EU is dealt with under the UNECE Water Convention and the Water Framework Directive. These are used as an example of best practice in the practicable application of the principles, rights and obligations that have been prescribed under the UN Watercourses Convention.

2.4.1 The UNECE Water Convention

The UNECE Water Convention³⁰⁸ contains a general principle that Parties should take “all appropriate measures to prevent, control and reduce any transboundary impact.”³⁰⁹ While it specifically provides that Parties must ensure that

³⁰⁸ Above n 167. Entered into force in 1996.

³⁰⁹ UNECE Water Convention; Article 2(1). For a definition of ‘transboundary impact,’ see below n 691.

“transboundary waters are used in a reasonable and equitable way, taking into particular account their transboundary character, in the case of activities which cause or are likely to cause transboundary impact”³¹⁰ as a matter of conflict prevention, it is noted that unlike the UN Watercourses Convention, the UNECE Water Convention does not mention relevant factors for quantifying equitable and reasonable utilization of transboundary waters. This was in fact raised by Bangladesh in the last Meeting of the Parties to the Convention held in 2012.³¹¹ In addition to equitable and reasonable utilization, the Convention requires the Parties to ensure that transboundary waters are used with the aim of ecologically sound and rational water management, conservation of water resources and environmental protection,³¹² to conserve and where necessary restore ecosystems.³¹³ The Convention also supports the application of the ecosystem approach in promoting sustainable management of water resources.³¹⁴

As per transboundary cooperation, the Riparian Parties are under an obligation to “cooperate on the basis of equality and reciprocity ... aimed at the prevention, control and reduction of transboundary impact and ... the protection of the environment of transboundary waters or the environment influenced by such waters, including the marine environment.” This, in terms of dealing with the issue of over-extraction, not only deals with significant harm (though not

³¹⁰ UNECE Water Convention; Article 2(2)(c).

³¹¹ See United Nations Economic Commission for Europe “Statement of Mr. Ramesh Chandra Sen, Honorable Minister of Water Resources, Government of Bangladesh at Sixth Session of the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes” (High-level Segment Part-2: 28 November 2012).

Available at

http://www.unece.org/fileadmin/DAM/env/water/mop_6_Rome/Statements/Bangladesh.pdf

³¹² UNECE Water Convention; Article 2(2)(b).

³¹³ UNECE Water Convention; Article 2(2)(d).

³¹⁴ UNECE Water Convention; Article 3(1)(i).

expressly provided for)³¹⁵ but basin closure as well by making specific reference to the “marine environment.” Whilst the UNECE Water Convention deals with water quantity issues through these provisions by providing for rights and obligations for the use of water resources,³¹⁶ the WFD oversees the practical application of aspects of sustainable use.

2.4.2 The Water Framework Directive

The purpose of the Water Framework Directive is to establish a comprehensive water management framework³¹⁷ for the protection of Europe’s waters, which would not only prevent further deterioration and protect and enhance the water environment³¹⁸ but also promote “sustainable water use based on a long-term protection of available water resources.”³¹⁹ In doing so, it uses the river basin as the focal point.³²⁰ The Water Framework Directive strives to achieve the above-stated objective through: (1) taking an ecological approach to water protection³²¹ and (2) setting environmental objectives for all water bodies to achieve the desired ecological status.³²² Thus, the framework is based on an integrated approach to

³¹⁵ See Leo Santbergen *Ambiguous Ambitions in the Meuse Theatre: The Impact of the Water Framework Directive on Collective-Choice Rules for Integrated River Basin Management* (Eburon, Delft, 2013) at 186.

³¹⁶ See Attila Tanzi *The Relationship Between the 1992 UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses* (UN/ECE Task Force on Legal and Administrative Aspects, Geneva, 2000).

³¹⁷ Herwig Unnerstall “Editoriale” (2012) 17 *Economia e Diritto Agroalimentare* 343-350 at 343.

³¹⁸ Water Framework Directive; Article 1(a).

³¹⁹ Water Framework Directive; Article 1(b).

³²⁰ Erik Querner and Henry Mulder “Hydrological Analysis for Meeting Climate Change Effects and European Water Framework Directive Targets” (2007) 11 *Journal of Water and Land Development* 59 at 60.

³²¹ Water Framework Directive; Article 2(22).

³²² Water Framework Directive; Article 4. Areas from which water is abstracted for human consumption is afforded protection to higher standards through the designation and registration of

not only protecting common waters but an integrated approach to the sustainable use of the water and its environment.³²³ Although it is a European wide regulatory framework, it does make allowances for the significant variations in water systems across the European region.³²⁴ This enables Member States to adopt different types of mitigation measures reflecting variations in practices, systems and biophysical characteristics of each water catchment.³²⁵ Hence, it is through the sustainable water use and related principles that the Water Framework Directive tackles the problem of over-extraction.³²⁶

Environmental Objectives

The Water Framework Directive has set the desired environmental status of river basins as far as quantity of water is concerned with regards to not only maintaining the minimum river flow but by taking an ecosystem approach. It provides that the status of surface water in terms of "... where relevant for the purpose of the environmental protection, quantity should be established."³²⁷ The environmental objective for each river basin is "good ecological status."³²⁸ This is in furtherance of "achieving good water status ... so that measures in respect of surface water and groundwaters belonging to the same ecological, hydrological and hydrogeological system are coordinated."³²⁹ The Water Framework Directive

"protected areas."; Articles 4(1)(c) and 6 and Annex IV(1)(i) and all bodies of water used for the abstraction of drinking water are dealt with separately; Article 7.

³²³ Elizabeth Wilson and Jake Piper *Spatial Planning and Climate Change* (Routledge, Oxon, New York, 2010) at 260.

³²⁴ Organisation for Economic Cooperation and Development *Water Quality and Agriculture: Meeting the Policy Challenge* OECD Studies on Water (OECD Publishing, 2012) at 106.

³²⁵ Ibid.

³²⁶ Jens Horbach (ed) *Indicator Systems for Sustainable Innovation* (Springer, Verlag, Heidelberg, 2005) at 182.

³²⁷ Water Framework Directive; Preamble, para 25.

³²⁸ Water Framework Directive; Article 2(22).

³²⁹ Water Framework Directive; Preamble, para 33.

also provides that “for the purposes of environmental protection there is a need for a greater integration of qualitative and quantitative aspects of both surface waters and groundwaters, taking into account the natural flow conditions of water within the hydrological cycle.”³³⁰ However, for the purpose of this chapter, only quantitative aspects of surface waters are examined.

The status of surface water bodies is determined by the poorer of its chemical or ecological status.³³¹ Chemical status, covered in-depth in the chapter on Pollution, describes whether or not the concentration of any pollutant exceeds standards that have been set at the EU level.³³² Ecological status, on the other hand, is principally a measure of the effects of human activities on water.³³³

River Basin Districts and Characterization of River Basins

In 2003, the European maps were redrawn with the old black lines showing international and sub-national borders and the new blue lines representing the boundaries of the newly established River Basin Districts (‘RBDs’) in accordance with the Water Framework Directive.³³⁴ For characterization of an international river basin, as a starting point each Member State is required to undertake: (1) an analysis of the characteristics of the portion of an international river within its territory; (2) a review of the impact of human activity on the status of its waters; and (3) an economic analysis of water use.³³⁵ This process is supposed to enable

³³⁰ Water Framework Directive; Preamble, para 34.

³³¹ European Communities *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 11 on Planning Processes* (Produced by Working Group 2.9) (Office for Official Publications of the European Communities, Luxembourg, 2003) at 34. Available at [https://circabc.europa.eu/sd/a/4de11d70-5ce1-48f7-994d-65017a862218/Guidance%20No%2011%20-%20Planning%20Process%20\(WG%202.9\).pdf](https://circabc.europa.eu/sd/a/4de11d70-5ce1-48f7-994d-65017a862218/Guidance%20No%2011%20-%20Planning%20Process%20(WG%202.9).pdf)

³³² Ibid.

³³³ Ibid.

³³⁴ Jos G Timmerman and Sindre Langaas (eds) *Environmental Information in European Transboundary Water Management* (IWA Publishing, London, 2004) at 1.

³³⁵ Water Framework Directive; Article 5(1).

Member States to identify portion(s) of an international river basin that is threatened by over-extraction, against the objective of good ecological status.³³⁶ Such development in water status has to be monitored by Member States on a systematic and comparable basis throughout the EU.³³⁷ This enables Member States to acquire information that is necessary in order to provide a sound basis to develop programmes of measures aimed at achieving the objectives established under the Directive.³³⁸

Programme of Measures

Although the Water Framework Directive does not specifically highlight over-extraction as one of the principal environmental objectives for surface water bodies, it is captured by the objective to “prevent deterioration in their status.”³³⁹ In order to achieve the environmental objective for a river basin, based on its characterization as mentioned above, Member States are required to establish a programme of measures.³⁴⁰ Each programmes of measures are to comprise of basic measures (prescribed under the Water Framework Directive) and where necessary, supplementary measures.³⁴¹ Basic measures are the minimum requirements in respect of abstraction of fresh surface water to be complied with, which has four parts to it:³⁴² (1) there must be controls over abstraction of fresh surface water; (2) a register of abstractions must be maintained; (3) abstraction must have prior authorization; and (4) controls must be periodically reviewed and, where necessary, updated. For water quantity specifically, the Water Framework Directive provides that “overall principles should be laid down for control on

³³⁶ David Butler and Fayyaz Ali Memon *Water Demand Management* (IWA Publishing, London, 2006) at 295.

³³⁷ Water Framework Directive; Preamble, para 36.

³³⁸ Water Framework Directive; Preamble, para 36.

³³⁹ European Communities, above n 331, at 33.

³⁴⁰ Water Framework Directive; Article 11(1).

³⁴¹ Water Framework Directive; Article 11(2).

³⁴² Water Framework Directive; Article 11(3)(e).

abstraction (and impoundment) in order to ensure the environmental sustainability of the affected water systems.”³⁴³

The philosophy of the approach in Water Framework Directive to regulating abstraction is “risk-based.”³⁴⁴ This means that the threat to the environment is balanced against the benefits of abstraction.³⁴⁵ Consequently, the Directive does not provide for generic exemptions from controls on the basis of purpose, location, source or size of the abstraction.³⁴⁶ Rather, following the “risk-based” principle and in accordance with Article 11(3)(e), abstractions that have “no significant impact on water status” can be exempted from control.³⁴⁷ In order to establish a coherent and comprehensive overview of water status within each river basin district, the Water Framework Directive obliges Member States to establish programmes for the purpose of monitoring water status.³⁴⁸

Monitoring

Based on the classification criteria mentioned earlier, the monitoring programmes for surface water cover:³⁴⁹ (i) the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential³⁵⁰ and (ii) the ecological and chemical status and ecological potential. Currently the Water

³⁴³ Water Framework Directive; Preamble, 41.

³⁴⁴ European Communities, above n 331, at 41.

³⁴⁵ M I Whiteman and others “Start, Development and Status of the Regulator-Led National Groundwater Resources Modelling Programme in England and Wales” in M G Shepley and others (eds) *Groundwater Resources Modelling: A Case Study from the UK* (Geological Society, London, 2012) at 20.

³⁴⁶ European Communities, above n 331, at 41.

³⁴⁷ Ibid.

³⁴⁸ Water Framework Directive; Article 8(1).

³⁴⁹ Water Framework Directive; Article 8(1).

³⁵⁰ See Section 4.4.6 ‘Reference Condition for a HMWB’ for a discussion of what ‘ecological potential means.

Framework Directive has not expressly employed the term ‘ecological flows’ which is the key to monitor the level of abstractions. However, the European Commission is in the process of developing guidelines on water accounts/ecological flows namely to come up with a common definition thereof and a methodology for its calculation.³⁵¹

Monitoring programmes cover three types of monitoring; surveillance, operational and investigative.³⁵² The surveillance monitoring is intended for assessing the long-term changes in the natural conditions and those resulting from widespread anthropogenic activity.³⁵³ The operational monitoring is conceived as an additional measure undertaken by those water bodies identified as being at risk of failing to meet their environmental objectives.³⁵⁴ Investigative monitoring is to be performed in individual cases when reasons for exceeding environmental quality standards are unknown or where surveillance monitoring indicates that the environmental objectives set for a body of water³⁵⁵ are not likely to be achieved.³⁵⁶

Whereas the plan of objectives for a river basin will require ecological and chemical protection everywhere as a minimum, where more stringent requirements are needed for particular uses, zones will be established as

³⁵¹ European Commission *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Blueprint to Safeguard Europe’s Water Resources* COM(2012) 673 Final Report (EC, Brussels, 2012) at 6. Available from http://ec.europa.eu/environment/water/blueprint/index_en.htm

³⁵² Water Framework Directive; Article 8.

³⁵³ Water Framework Directive; Annex V, para 1.3.1.

³⁵⁴ Water Framework Directive; Annex V, para 1.3.2.

³⁵⁵ Water Framework Directive; As per Article 4.

³⁵⁶ Water Framework Directive; Annex V, para 1.3.3; Andrea Barbanti “Water Quality Control” in Corrado Clini, Ignazio Musu and Maria Lodovica Gullino (eds) *Sustainable Development and Environmental Management: Experiences and Case Studies* (Springer, Dordrecht, 2008) 83 at 86.

‘protected areas.’³⁵⁷ For these, stricter objectives and specific monitoring are to be employed and implemented supplementary to the other three types of monitoring.³⁵⁸

Reporting Abstractions: RBMPs

Annex VII of the Water Framework Directive specifies the information that should be included in a River Basin Management Plan (‘RBMP’). For surface waters, RBMPs should include information regarding reference conditions,³⁵⁹ a summary of significant pressures and impact of human activity on the status of surface water³⁶⁰ including pressures on the quantitative status of water such as abstractions,³⁶¹ the results of the monitoring programmes carried out for ecological and chemical status,³⁶² a list of the environmental objectives,³⁶³ a summary of programme(s) of measure(s)³⁶⁴ and a register of any more detailed programmes and management plans.³⁶⁵ Updated versions of the river basin management plan should include:³⁶⁶ a summary of the reviews, an assessment of the progress made towards the achievement of the environmental objectives, including presentation of the monitoring results and an explanation for any environmental objectives which have not been reached, a summary of, and an explanation for, any measures foreseen in the earlier version of the river basin management plan which have not been undertaken and a summary of any additional interim measures adopted since the publication of the previous version

³⁵⁷ Water Framework Directive; See Article 6 and Annex IV.

³⁵⁸ Water Framework Directive; Annex V, para 1.3.5. .

³⁵⁹ Water Framework Directive; Annex VII, Para A(1.1).

³⁶⁰ Water Framework Directive; Annex VII, Para A(2).

³⁶¹ European Communities, above n 331, at 43.

³⁶² Water Framework Directive; Annex VII, Para A(4.1).

³⁶³ Water Framework Directive; Annex VII, Para A(5).

³⁶⁴ Water Framework Directive; Annex VII, Para A(7).

³⁶⁵ Water Framework Directive; Annex VII, Para A(8).

³⁶⁶ Water Framework Directive; Annex VII, Para B(1)-(4).

of the river basin management plan. For international rivers, the Water Framework Directive requires that Member States: (1) produce a single RBMP;³⁶⁷ (2) coordinate the requirements for the achievement of the environmental objectives.³⁶⁸ RBMPs are required to be reviewed and updated every six years.³⁶⁹ These are then submitted to the European Commission ('the EC') for a comparative assessment against the environmental objective. The next set is due in 2015.³⁷⁰

European Commission's Implementation Report

The EC's report on the implementation of the Water Framework Directive is based upon the Commission's assessment of the RBMPs.³⁷¹ In 2012, the Commission reported that it received 124 out of expected 174 RBMPs in 2009, 75 percent of which concerned transboundary river basins.³⁷² Assessing these, the Commission concluded that progress towards the objective of good status by 2015 will not be reached for a "significant proportion of water bodies" as only 53 percent of the 82, 684 water bodies were in good ecological status or had the potential to be in by 2015.³⁷³ The Commission found that over-abstraction was one of the three main pressures on the water environment.³⁷⁴ In international basins, the Commission found that there was still "a major gap in dealing with water quantity in a way that *reduces conflict risks* and contributes to the Water Framework Directive's objectives."³⁷⁵ [Emphasis added] It also found that even

³⁶⁷ Water Framework Directive; Article 13(3).

³⁶⁸ Water Framework Directive; Article 3(4).

³⁶⁹ Water Framework Directive; Article 4(7)(b).

³⁷⁰ Water Framework Directive; Article 13(7).

³⁷¹ Water Framework Directive; Article 18.

³⁷² European Commission, above n 8, at 4.

³⁷³ At 6.

³⁷⁴ Ibid.

³⁷⁵ European Commission, above n 175, at 7.

though water scarcity issues are recognized as relevant by many RBMPs across Europe, only 5 percent of the screened international RBMPs included co-ordinated measures for the entire international RBD to deal with water scarcity (and drought) issues.³⁷⁶ For those not able to achieve their environmental objective by 2015, the new deadline will be 2027.

Therefore, in the European region, the issue of over-extraction is dealt with under the UNECE Water Convention primarily through the principle of sustainable water use (just as the UN Watercourses Convention) but with a focus on transboundary impact. This is supplemented by the EU's Water Framework Directive, which states the water policy for all the water bodies in Europe. It is through this policy legislation that the EC seeks to govern the issue of over-extraction by overseeing the implementation of the Water Framework Directive which sets environmental objectives, characterization of river basins, monitoring through programme of measures and comparative analysis of RBMPs against the environmental objectives and reporting the results of thereof. Where required, the EC makes recommendations or produces new guideline so that the governance regime can be strengthened in light of emerging compliance issues. The expected guidelines on ecological flows due to come out this year is just one example.

2.5 Case Studies

As mentioned earlier, the issue of over-extraction in international river basins is intrinsically tied with the sustainability of the use of shared water resources, be it through cooperative agreements or taken without consent from other riparians. This section looks at the extent of the issue of over-extraction in the Jordan, the Nile and the Indus River Basins, respectively. In each case study, this is followed by an analysis of the governance regime in place to deal with the issue of over-extraction, including basin closure.

³⁷⁶ Ibid.

2.5.1 The Jordan River Basin: An Overview

The Jordan River Basin is located in the Middle East, waters of which are one of the five main issues in the Middle East Peace process.³⁷⁷ The Jordan Basin system comprises of two rivers: the Yarmouk River (or Upper Jordan) and the Jordan River (called the Lower/Main Jordan). The Yarmouk River arises in Syria and borders Jordan and later, Israel. It is fed by:³⁷⁸ the Hasbani; originating in Lebanon, the Baniyas; which begins in Syria, and the Dan, which now comes from Israel.³⁷⁹ These 3 tributaries combine in Israel's Huleh Valley and flows into Lake Kinneret (or Lake Tiberias/Sea of Galilee).³⁸⁰ The Jordan River, which begins from Lake Kinneret, borders Jordan and Israel, and later Jordan and the West Bank before emptying into the Dead Sea. See map below.³⁸¹

³⁷⁷ See Ilan Peleg *The Middle East Peace Process: Interdisciplinary Perspectives* (State University of New York Press, Albany, 1998).

³⁷⁸ Markus Aufleger and Michael Mett *Handshake Across the Jordan: Water and Understanding* (Innsbruck University Press, Norderstedt, 2011) at 29.

³⁷⁹ Samer A Talazi "Water and Security in Jordan" in Clive Lipchin and others (eds) *Integrated Water Resources Management and Security in the Middle East* (Springer, Dordrecht, 2006) at 77. Originally it came from Syria until the capture of the Golan Heights by Israel in 1964.

³⁸⁰ Jon Martin Trondalen (ed) *Climate Changes, Water Security and Possible Remedies for the Middle East* Scientific Paper (UNESCO, Paris, 2009) at 15.

³⁸¹ Downloaded from Wikimedia Commons from where everyone is allowed to use images so long as the source and authors (if any) are acknowledged. See <http://commons.wikimedia.org/wiki/Welcome>



Thus, the riparians to the Jordan River Basin are: Israel, Jordan, the Palestinian people of the West Bank, Lebanon and Syria. The following table shows the riparians' current and projected population growth in millions.³⁸²

Table 6: Projected Population Growth in the Jordan River Basin

Riparian	Population		
	Mid-2010	2025	2050
Israel	7.6	9.4	11.4
Jordan	6.5	8.5	11.8
Lebanon	4.3	4.7	5.0
West Bank ³⁸³	2.5	3.3-3.6	4.4
Syria (Yarmouk Basin) ³⁸⁴	1.4	2.2 (2030)	3.4

³⁸² Population Reference Bureau 2010 World Population Data Sheet (PRB, Washington, DC, 2010). Available from http://www.prb.org/pdf10/10wpds_eng.pdf

³⁸³ Amnesty International *Troubled Waters - Palestinians Denied Fair Access to Water: Israel-Occupied Palestinian Territories* (Amnesty International Publications, London, 2009) at 80 and; United States Department of Commerce, Census Bureau "International Data Base" <http://www.census.gov/population/international/data/idb/region.php?N=%20Results%20&T=13&A=separate&RT=0&Y=2050&R=-1&C=WE>

Therefore, the total population of the Jordan River Basin's riparian States in mid-2010 was 22.3 million, which is projected to increase to just over 28 million by 2025 and about 36 million by 2050. Surface water is very limited in the Middle East region because of the generally low rainfall and high evapotranspiration but accounts for 48 percent of total water withdrawal.³⁸⁵ The following table shows water availability and consumption for the Jordan River Basin's riparian States.

Table 7: Water Availability and Consumption in the Jordan River Basin

Country	Water Availability (MCM)³⁸⁶	Water Consumption (MCM)	Deficit/Surplus (MCM)
Israel	1, 780	1, 954 (2004)	- 174
Jordan	937	941 (2005)	- 4
Lebanon	4, 503	1, 310 (2005)	2, 193
Palestine ³⁸⁷	837	418 (2005)	419
- West Bank	766	157 (2000)	609
- Gaza Strip ³⁸⁸	50-60	160 (2010)	- 100 to 110
Syria (Yarmouk Basin)	276 ³⁸⁹	355 (2008)	-79

Therefore, (apart from Lebanon and Palestine's West Bank) Israel, Jordan, Gaza Strip and Syria are withdrawing more than 100 percent of their renewable freshwater supply. According to data that is available on per capita water

³⁸⁴ Khaldoun A Mourad and Ronny Berndtsson "Water Status in the Syrian Water Basins" (2012) 2 Open Journal of Modern Hydrology 15 at 16 and 18.

³⁸⁵ Frenken, above n 38, at 38.

³⁸⁶ Million cubic metres.

³⁸⁷ Frenken, above n 38, at 284–285.

³⁸⁸ Omer Karasapan and Roby Fields *Stagnation or Revival? Palestinian Economic Prospects* (World Bank Publications, Washington, DC, 2012) at 24. Available at <http://documents.worldbank.org/curated/en/2012/03/15987169/stagnation-or-revival-palestinian-economic-prospects>

³⁸⁹ Mourad, above n 384, at 16.

availability³⁹⁰ (with the exception of Lebanon which is already water stressed and is on the border-line to experience some water scarcity) all the other riparian States are already facing some levels of water scarcity, with Syria is facing water scarcity and Israel, Jordan and the Palestinian people of the West Bank facing ‘absolute water scarcity.’³⁹¹ The following table shows the likely deficits the riparian States are going to experience with an increase in their respective population in the future.

Table 8: Projected Water Demand and Supply in the Jordan River Basin

Country	Projected Water Demand (MCM/Year)	Projected Water Supply (MCM/Year)	Deficit/Surplus (MCM)
Israel ³⁹²	2, 680 (2010) 2, 680 (2020)	2, 430 2, 680	- 250 0
Jordan (2022) ³⁹³	1, 632 (2022)	1, 916	- 284
Lebanon	1, 800 (2035) ³⁹⁴	-	-
Palestine -West Bank	1, 682.8 (2040) -	250 -	- 1, 435.8 -
Syria (Yarmouk Basin) ³⁹⁵	409 (2030) 506 (2050)	300 (2030) 339 (2050)	-109 -167

³⁹⁰ Elizabeth G Matthews *The Israel-Palestine Conflict: Parallel Discourses* (Routledge, Oxon, 2011) at 98 and 99.

³⁹¹ See footnote 76 and accompanying text for definitions of water security, water stress and absolute water scarcity.

³⁹² See Israel Ministry of Foreign Affairs “Israel’s Chronic Water Problem” (24 June 2012) <http://mfa.gov.il/MFA/IsraelExperience/AboutIsrael/Spotlight/Pages/Israel-s%20Chronic%20Water%20Problem.aspx>

³⁹³ Jordan Ministry of Water and Irrigation *Water for Life: Jordan’s Water Strategy 2008-2022* (Jordan Ministry of Water and Irrigation, 2009) at 1 and 2.

³⁹⁴ Karim Makdisi “Towards a Human Rights Approach to Water in Lebanon: Implementation Beyond ‘Reform’” in Asit K Biswas, Eglal Rached and Cecilia Tortajada (eds) *Water as a Human Right for the Middle East and North Africa* (Routledge, London, New York, 2008) at 164.

³⁹⁵ Mourad, above n 384, at 18.

While Israel is currently not able to meet its freshwater needs, it does predict that it will be able to by 2020 when it will be able to produce more freshwater primarily through desalination. With replenishable quantities of freshwater resources remaining constant, water availability is likely to decrease per capita unless the growing needs are met with over-exploitation of existing resources or more water is created by other means, or both.

2.5.2 Over-Extraction in the Jordan River Basin

The issue of over-extraction in the Jordan River Basin has a lot to do with diversions mainly by Israel, Jordan and Syria. Prior to water resources development in the region, which is before 1950, the original outflow of the Jordan River into the Dead Sea averaged 1, 250 MCM per year.³⁹⁶ Half of this volume was coming from the upper Jordan River through Lake Tiberias but which has been since 1964 diverted by Israel (with the construction of its National Water Carrier system).³⁹⁷ Since then the lower Jordan River chiefly receives water from its main tributary; the Yarmouk River.³⁹⁸ In addition, diversions of the upper Yarmouk River by Syria (with multiple projects since 1967)³⁹⁹ and of the lower Yarmouk by Jordan (with the construction of the East Ghor Main Canal since 1962 - renamed King Abdullah Canal in 1987)⁴⁰⁰ and with the recently constructed (Maqarin Dam (also known as Al-Wehda/Unity Dam) by Jordan and

³⁹⁶ Tennessee Valley Authority, Charles T Main and The United Nations *The Unified Development of the Water Resources of the Jordan Valley Region* (Boston, MA, 1953) at 24.

³⁹⁷ Jean-Philippe Venot, Francois Molle and Remy Courcier “Dealing with Closed Basins: The Case of the Lower Jordan River Basin” (2008) 24 *International Journal of Water Resources Development* 247 at 249.

³⁹⁸ At 248.

³⁹⁹ Clive Lipchin, Deborah Sandler and Emily Cushman *The Jordan River and Dead Sea Basin: Cooperation Amid Conflict* (Springer, Dordrecht, 2009) at 54.

⁴⁰⁰ Dharendra K Vajpeyi *Water Resource Conflicts and International Security: A Global Perspective* (Lexington Books, Lanham, MD, 2012) at 87.

Syria⁴⁰¹ has further reduced water flows. The following table shows total diversions of the Jordan waters by Israel, Jordan, Syria and the West Bank.⁴⁰²

Table 9: Diversions in the Jordan River Basin

	Israel	Jordan	Syria	West Bank
Diversions (MCM)	605	265	315	63
Transfers specified as per 1994 Peace Treaty	- 50	50		
Transfers specified as per 1994 Peace Treaty	25	- 25		
Total	1248	580	315	63
Total as a Percentage	100	46.47	23.24	5.05

Altogether, 98 percent of the historical flows are being diverted by Israel, Jordan and Syria for domestic and agricultural purposes.⁴⁰³ Due to diversions, the outflow rate is now reduced to 2 percent of the 1950 levels, which is about 25-30 MCM.⁴⁰⁴ This means that the Jordan River Basin is now effectively a closed basin, where water resources are overcommitted and no resources are left to be mobilized and used.⁴⁰⁵ Due to reduced outflows, the level of the Dead Sea⁴⁰⁶ is

⁴⁰¹ Aysegul Kibaroglu and others *Water Law and Cooperation in the Euphrates-Tigris Region: A Comparative and Interdisciplinary Approach* (Martinus Nijhoff Publishers, Leiden, 2013) at 314–315.

⁴⁰² Sarig Gafny, Samer Talazi and Banan Al Sheikh *Towards a Living Jordan River: An Environmental Flows Report on the Rehabilitation of the Lower Jordan River* (2010) at 24.

⁴⁰³ At 13.

⁴⁰⁴ Global Nature Fund “Israeli Knesset Committee Calls for the Jordan River’s Rehabilitation to be a Project of National Priority” (Friends of the Earth Middle East, Tel Aviv, 15 December 2010) http://www.globalnature.org/32184/PROJECTS/Nature-Conservation-Biodiversity/Rehabilitation-Jordan/PR-Knesset/02_vorlage.asp

⁴⁰⁵ Venot, above n 397, at 261.

⁴⁰⁶ For more on the Dead Sea and its status see Lipchin, above n 399.

dropping at an alarming rate of 1 to 1.2 meters per year and the Sea's surface area is shrinking accordingly.⁴⁰⁷

A recent EcoPeace Middle East (formerly Friends of the Earth Middle East; a non-governmental organisation – 'NGO') Report has concluded that the lower Jordan River requires 400 MCM annually, for flow enhancement and for the river to function as a healthy ecosystem.⁴⁰⁸ This, however, needs to be expanded to 600 MCM over time for full restoration.⁴⁰⁹ In 2012, the Israeli Energy and Water Minister, Uzi Landau, announced that an average of 150 MCM of desalinated water will be returned each year for the next 10 years to the Jordan River as part of its efforts to rehabilitate the river.⁴¹⁰

In May 2013, the Jordan Rehabilitation Administration announced that the Israeli Water Authority would allow the discharge of 1,000 m³ of water per hour from the Kinneret basin into the Jordan River, with the ultimate goal of letting in 30 MCM of water flow past the Deganiya Dam annually.⁴¹¹ Although in favour of recharging the Jordan River with a clean and stable water supply, EcoPeace Middle East has repeatedly stated that the 30 MCM promised by Israel will not be

⁴⁰⁷ TAHAL Group and Geological Survey of Israel and Associates *Red Sea Dead Sea Conveyance Study Programme - Dead Sea Study* Final Report (GSI Report No: GSI/10/2011; TAHAL Report No: IL-201280-R11-218, August 2011) at 4. Available at http://siteresources.worldbank.org/INTREDSEADEADSEA/Resources/Dead_Sea_Study_Final_August_2011.pdf

⁴⁰⁸ Gafny, above n 402, at 56; E Friedler and M Juanico "Treatment and Storage of Wastewater for Agricultural Irrigation" (1996) 16 *International Water and Irrigation Review* 26 regarding proposed guidelines for water allocation for the rehabilitation of rivers in Israel but the biophysical principles of which are also applicable to the Jordan River as well.

⁴⁰⁹ Gafny, above n 402, at 58.

⁴¹⁰ Ari Rabinovitch "Israel Plans to Revive Ailing Jordan River" *Reuters* (Israel, 19 July 2012) <http://www.reuters.com/article/2012/07/19/us-israel-environment-jordanriver-idUSBRE86I0KA20120719>

⁴¹¹ Sharon Udasin "Kinneret Water to be Released into Jordan River" *wwwJPost.com* (Israel, 17 May 2013) <http://www.jpost.com/Enviro-Tech/Kinneret-water-to-be-released-into-Jordan-River-313441>

sufficient and that Israel should be allocating at least 220 MCM,⁴¹² being the main diverter of the Jordan waters. Although this is an effort pushed through by an NGO, the governance of the Jordan waters is covered under agreements between Israel and Jordan and Jordan and Syria. An Agreement between Israel and the Palestinians is also covered for completeness.

2.5.3 Sustainable Utilization in the Jordan River Basin?

Although there are five riparians of the Jordan River Basin, only Jordan, Lebanon and Syria are Parties to the UN Watercourses Convention.⁴¹³ The legal regime governing the issue of over-extraction in the Jordan Basin comprises of the Peace Treaty between Israel and Jordan, the Yarmuk Waters Agreement between Jordan and Syria and the Interim Agreement between Israel and the Palestinian People. Their relevant provisions pertaining to equitable utilization and the issue of over-extraction are explored respectively.

Peace Treaty 1994

Under the Treaty of Peace Between the State of Israel and the Hashemite Kingdom of Jordan ('the Peace Treaty'),⁴¹⁴ Israel and Jordan have mutually agreed to recognize the "rightful allocations" to both of them of these waters "in accordance with the agreed acceptable principles, quantities and quality as set out in Annex II."⁴¹⁵ The following table sets out "rightful allocations" as per the Peace Treaty⁴¹⁶ as well as the Johnston's Unified Plan of 1955⁴¹⁷ to put allocations into perspective. The figures shown are in MCM.

⁴¹² Anonymous "Jordanian - Israeli - Palestinian Rehabilitation of Jordan River Crucial for Water Security in the Middle East" *Friends of the Earth Middle East* (3 September 2013) http://foeme.org/www/?module=media_releases&record_id=117

⁴¹³ United Nations Treaty Collection, above n 219.

⁴¹⁴ Above n 176.

⁴¹⁵ Peace Treaty; Article 6(1).

⁴¹⁶ Peace Treaty; Article I.

Table 10: Water Allocations under the Johnston Plan v the Peace Treaty

River/Plan	Johnston Plan		Peace Treaty	
Yarmouk River	Israel – 25	Jordan – remainder of the flow	Israel - 25 ⁴¹⁸ (+ excess flood water)	Jordan – remainder + excess flood water)
Jordan River	Not considered		Israel – current uses	Jordan - equivalent of Israel’s uses ⁴¹⁹
Additional Sources	Not considered		Israel – 0	Jordan - 50

While the Parties have not adopted the term ‘equitable’ to describe their shares, they have adopted the historical term; “rightful allocations” to describe what they consider to be their rightful share in the Jordan waters as was calculated under the Johnston Plan. Put simply, Israel now has a fixed share in the outflow of the Yarmouk River with Jordan getting the residue and the Jordan River outflow is shared equally between the Parties based on Israel’s “current uses” that is at 1994 levels “provided however, that Jordan’s use will not harm the quantity or quality of the above Israeli uses.”⁴²⁰ “Current uses” equated to 80 MCM.⁴²¹

⁴¹⁷ See David J H Phillips and others “The Jordan River Basin: 1 Clarification of the Allocations in the Johnston Plan” (2007) 32 Water International 16; Initially known as the Unified Plan for the Development of the Jordan Valley, it was the only regional plan during the final negotiations for which all the riparian States had agreed in principle on the need for a regional approach to the sharing of the Jordan waters. Subsequent water sharing agreements have tried to keep to it as much as possible. Aaron T Wolf *Middle East Water Conflicts and Directions for Conflict Resolution* (International Food Policy Research Institute, Washington, DC, 1996) at 6.

⁴¹⁸ 12 in summer and 13 in winter.

⁴¹⁹ While Israel is entitled to its current uses of the Jordan River, Jordan is entitled to an annual quantity equivalent to that of Israel with a proviso that Jordan’s use does not harm the quantity or quality of the Israeli uses. Peace Treaty; Article 1(2)(c).

⁴²⁰ Peace Treaty; Annex II, Article 1(2)(c). They have also agreed to prevent any unauthorized withdrawals of each other’s allocations. Annex II, Article III(1) and (6).

⁴²¹ Antonio Marquina (ed) *Environmental Challenges in the Mediterranean 2000-2050* (Kluwer Academic Publishers, Dordrecht, 2004) at 218.

In addition to sharing the waters of the Jordan Basin, Israel and Jordan also agreed to “cooperate in finding sources for the supply to Jordan an additional quantity of 50 MCM per year of water of drinkable standards.”⁴²² Indication of what these “sources” might be was not given. To this end, the Joint Water Committee (established under the Treaty)⁴²³ was given the task to develop, within one year of the entry into force of the treaty, a plan for the supply of such water to Jordan but which was not achieved within the timeframe. This led to a disagreement over the interpretation of this provision. It was resolved in 1997 in a meeting between King Hussein and Prime Minister Benjamin Netanyahu that until a desalination plant had been constructed and is operational for supplying the additional water, that Israel, as “an interim measure,” would supply Jordan with an additional 25 to 30 MCM a year from Lake Kinneret.⁴²⁴ Overall, Jordan’s entitlement under the Peace Treaty equates to 215 MCM of water per year (26 percent of Jordan’s 1994 total water consumption)⁴²⁵ through new dams, diversion structures, pipelines and a desalination/purification plant.⁴²⁶ As of March 2010, it was confirmed by Jordan’s Minister of Water and Irrigation, Mohammad Najjar, that “Jordan receives its allocated water shares in full under the Jordan-Israel Peace [Treaty] ...”⁴²⁷

⁴²² Peace Treaty; Annex II, Article I(3).

⁴²³ Peace Treaty; Annex II, Article VII.

⁴²⁴ Exchange of Letters between Crown Prince el Hassan bin Talal of the Kingdom of Jordan and Ariel Sharon, Israeli Minister of National Infrastructures of 20 May 1997 mentioned in Eliabu Rosenthal and Robbie Sabel “Water and Diplomacy in the Jordan River Basin” (2009) III Israel Journal of Foreign Affairs 95-115 at 104.

⁴²⁵ Jeffrey K Sosland *Cooperating Rivals: The Riparian Politics of the Jordan River Basin* (SUNY Press, Albany, 2007) at 175.

⁴²⁶ Stephen Nortcliff, Emily Black and Robert Potter “Current Water Demands and Future Strategies under Changing Climatic Conditions” in Steven Mithen and Emily Black (eds) *Water, Life and Civilisation: Climate, Environment and Society in the Jordan Valley* (Cambridge University Press, Cambridge, 2011) at 411.

⁴²⁷ Hana Namrouqa “Jordan Does Not Owe Israel a Drop of Water” *The Jordan Times* (Jordan, 14 February 2012) <http://jordantimes.com/jordan-does-not-owe-israel-a-drop-of-water>

Under the Peace Treaty, even though the Parties have addressed hydrological feasibility of groundwater extraction and harm by Israel to Jordan's existing uses,⁴²⁸ they do not have similar provisions for the extraction of the Jordan or the Yarmouk waters. Moreover, they have recognized that their water resources are not sufficient to meet their needs.⁴²⁹ To this end, the Parties have agreed generally to (among other matters): (1) the development of existing and new water resources, (2) increasing the water availability including co-operation on a regional basis and (3) minimizing wastage.⁴³⁰ In terms of dealing with water issues pertaining to the Jordan and the Yarmouk Rivers, Israel and Jordan have also agreed to co-operate in developing plans for the purposes of increasing water supplies and improving water use efficiency within the context of bilateral, regional and international cooperation.⁴³¹ They have also undertaken to exchange relevant data on water resources through the Joint Water Committee.⁴³²

On the topic of environment generally, Israel and Jordan have acknowledged the importance of the ecology of the region, the need to protect the environment and prevent danger and risks, the need for conservation of natural resources, protection of biodiversity and the imperative of attaining economic growth based on sustainable development principles.⁴³³ For Jordan River specifically, the Parties have agreed to cooperate in the ecological rehabilitation of the lower Jordan River.⁴³⁴ How they are going to go about managing that or the timeframe has not been indicated under the Treaty. Nevertheless, together whilst these will help alleviate the issue of over-extraction of the Basin waters, without setting a

⁴²⁸ Peace Treaty; Annex II, Article IV(3).

⁴²⁹ Peace Treaty; Article 6(3).

⁴³⁰ Peace Treaty; Article 6(4)(1).

⁴³¹ Peace Treaty; Annex II, Article VI(2).

⁴³² Peace Treaty; Annex II, Article VI(1).

⁴³³ Peace Treaty; Annex IV, Preamble, para (1).

⁴³⁴ Peace Treaty; Annex IV(4)(2)(II.1).

minimum flow and entrusting this task to its Joint Water Committee might prove difficult to overcome this problem in entirety.

Yarmuk Waters Agreements

The Agreement between the Republic of Syria and the Hashemite Kingdom of Jordan Concerning the Utilization of the Yarmuk Waters of 1953) ('the Yarmuk Waters Agreement 1953')⁴³⁵ defined Syria's and Jordan's water rights from the Yarmuk River in the following terms:⁴³⁶

“(a) Syria shall retain the right to the use of the waters of all springs welling up within its territory in the basin of the Yarmuk and its tributaries, with the exception of the waters welling up above the dam below the 250-metre level and shall retain the right to use water from the river and its tributaries below the dam for the irrigation of Syrian land in the lower Yarmuk basin and eastward of Lake Tiberias or for other Syrian schemes.

(b) Jordan shall have the right to use the overflow from the reservoir and joint generating station at Maqarin for the generation of electric power at the Adasiya station, the irrigation of the Jordanian lands and other Jordanian schemes; it shall similarly have the right to use water superfluous to Syrian needs for its own purposes within Jordanian frontiers.”

Thus their water rights were not defined in volumetric terms. The revised Agreement between the Syrian Arab Republic and the Hashemite Kingdom of Jordan Concerning the Utilization of the Yarmuk Waters of 1987 ('the Yarmuk Waters Agreement 1987')⁴³⁷ reaffirmed Syria's and Jordan's water rights on exactly the same terms.⁴³⁸ Once again it did not provide for a fixed quantitative allocation of the Yarmouk waters between them. However, their shares together

⁴³⁵ Agreement between the Republic of Syria and the Hashemite Kingdom of Jordan Concerning the Utilization of the Yarmuk Waters 184 UNTS 15 (signed 4 June 1953, entered into force 8 July 1953).

⁴³⁶ Yarmuk Waters Agreement 1953; Article 8(a) and (b).

⁴³⁷ Agreement between the Syrian Arab Republic and the Hashemite Kingdom of Jordan Concerning the Utilization of the Yarmuk Waters 1870 UNTS 279 (signed 3 September 1984, entered into force 25 November 1987).

⁴³⁸ Yarmuk Waters Agreement 1987; Article VII.

with Israel's works out as presented in the following table (in MCM) against the Johnston Plan 1955 for comparison.⁴³⁹

Table 11: Water Allocations under the Johnston Plan v Yarmuk Rivers Agreement

Riparian:	Johnston Plan (1955)	Yarmuk Rivers Agreement 1987
Syria's Shares ⁴⁴⁰	90	220-230 ⁴⁴¹
Jordan's Shares	377	150
Israel's Shares	25-40	70-100

While Israel and Syria have increased their shares in the Yarmouk River as a result of this Agreement, Jordan has taken a cut by some 60 percent. In addition to that, Jordan has accused Syria of excessive withdrawal from its catchment thereby diminishing its share of the Yarmouk waters even more.⁴⁴² Apart from the unspecified volume of the allocation of the Yarmouk's water resources, the Agreement does not touch upon the issue of over-extraction of the Jordan waters or its management by the Joint Syria-Jordan Commission, established (first under the 1953 Agreement and re-established under the 1987 Agreement) to oversee the implementation of the Agreement and the rights and obligations specified by it.⁴⁴³

⁴³⁹ Aaron T Wolf and Joshua T Newton *Case Study of Transboundary Dispute Resolution: The Jordan River Johnston Negotiations 1953-1955; Yarmuk Mediations 1980s* (Oregon State University, 2008).

⁴⁴⁰ Kathrin Stärk "Water Using Conflicts in the Lower Jordan River Basin: Optimal Water Allocation with a Special Reference to the Agricultural Sector" (Diploma, GRIN Verlag, 2007) at 54.

⁴⁴¹ Munther J Haddadin "Compliance with and Violations of the Unified/Johnston Plan for the Jordan Valley" in K David Hambright, F Jamil Ragep and Joseph Ginat (eds) *Water in the Middle East: Cooperation and Technological Solutions in the Jordan Valley* (University of Oklahoma Press, Brighton, 2006) at 42.

⁴⁴² Katja Hübschen *Integrated Water Resources Management as a Governance Challenge for Countries of the Middle East with Special Focus on Yemen, Jordan and Syria* (Logos Verlag Berlin GmbH, Berlin, 2011) at 126.

⁴⁴³ Yarmuk Waters Agreement 1987; Article IX.

As of 2012, there were still extractions by Syria exceeding its allocated shares to which Jordan is of the opinion that the solution to this is not technical but political, which would require the Syrian government to put a stop to the violation of the terms of the 1987 Agreement⁴⁴⁴ (in doing so highlighting the limitations of the Joint Syria-Jordan Commission). In other words, the Yarmuk Waters Agreement is purely a water sharing agreement which does not consider any other matter ancillary to that which is prescribed under the UN Watercourses Convention though both Jordan and Syria are Parties to the Convention.⁴⁴⁵

Interim Agreement 1995

Under the Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip of 28 September 1995 ('the Interim Agreement 1995'),⁴⁴⁶ "Israel recognizes the Palestinian water rights in the West Bank."⁴⁴⁷ This is because the West Bank lies on the western bank of the lower Jordan River and therefore the Palestinians living in the area have riparian rights. Unfortunately, these water rights are not defined under the Interim Agreement 1995, but will be negotiated and settled in the Permanent Status Agreement relating to the various water resources, which is yet to take place.

In the interim, both Parties have agreed to provide for the "future needs" of the Palestinians in the West Bank, which are estimated to be between 70 to 80 MCM per year.⁴⁴⁸ In this framework and in order to meet the immediate needs of the Palestinians for freshwater for domestic use, it also recognized the necessity to

⁴⁴⁴ Hana Namrouqa "Yarmouk Water Sharing Violations Require Political Solution" *The Jordan Times* (Jordan, 28 April 2012) <http://jordantimes.com/yarmouk-water-sharing-violations-require-political-solution>

⁴⁴⁵ United Nations Treaty Collection, above n 219.

⁴⁴⁶ Above n 178.

⁴⁴⁷ Interim Agreement 1995; Annex III, Article 40(1).

⁴⁴⁸ Interim Agreement 1995; Annex III, Article 40(6).

develop additional water.⁴⁴⁹ To this end, it was decided that Palestine would be supplied with an additional 28.6 MCM of water per year⁴⁵⁰ of which 23.6 MCM was to be made available to the West Bank.⁴⁵¹ Of the 28.6 MCM, the Palestinian Authority was responsible for making available 19.1 MCM.⁴⁵² It has been reported that 15.2 MCM had been made available by 2009.⁴⁵³ Israel was responsible for supplying 9.5 MCM.⁴⁵⁴ It was emphasized that these additional quantities would be supplied principally from the unused eastern aquifer (much of the water from which is brackish/saline as pointed out by Amnesty International)⁴⁵⁵ but also from the recycling of sewage effluent and desalination.⁴⁵⁶

In making these allocations, the Interim Agreement 1995 provides for one of two principles, which is that the Parties: “[will use] the water resources in a manner which will ensure sustainable use in the future, in quantity ...”⁴⁵⁷ This principle in effect addresses the issue of over-extraction (though not of the Jordan waters). In order to implement their undertakings, the Parties have established a permanent

⁴⁴⁹ Interim Agreement 1995; Annex III, Article 40(7).

⁴⁵⁰ Interim Agreement 1995; Annex III, Article 40(7).

⁴⁵¹ 5 MCM was to be made available to Gaza. Interim Agreement 1995; Annex III, Article 40(7)(a)(6).

⁴⁵² Interim Agreement 1995; Annex III, Article 40(7)(b).

⁴⁵³ The World Bank *West Bank and Gaza: Assessment of Restrictions on Palestinian Water Sector Development* Report no. 47657-GZ (WB Publications, April 2009) at 37. Available at <http://siteresources.worldbank.org/INTWESTBANKGAZA/Resources/WaterRestrictionsReport18Apr2009.pdf>

⁴⁵⁴ Interim Agreement 1995; Annex III, Article 40(7)(a). This includes 5 MCM to Gaza, which it does through its National Water Company, Mekorot; Karasapan, above n 388, at 24.

⁴⁵⁵ Amnesty International, above n 383, at 10.

⁴⁵⁶ Israel Water Authority *The Issue of Water between Israel and the Palestinians* (March 2009) at 3
<http://siteresources.worldbank.org/INTWESTBANKGAZA/Resources/IsraelWaterAuthorityresponse.pdf>

⁴⁵⁷ Interim Agreement 1995; Article 40(3)(c).

Joint Water Committee (JWC)⁴⁵⁸ with the function to deal with all water-related issues in the West Bank including, inter alia:⁴⁵⁹ coordinated management and protection of water resources, exchange of information, overseeing the operation of joint supervision and enforcement mechanism, resolution of water-related disputes, cooperation in the field of water and working with existing regulations concerning measurement and monitoring.

Given that these do not apply to the Jordan waters (and hence there is no equitable sharing of the Jordan waters between Israel and the Palestinians as yet either), the issue of over-extraction of the Jordan waters is not addressed through this Agreement as well. Nevertheless, it gives an indication of the type of governance arrangement Israel and the Palestinians can be expected to arrive at if and when the Jordan waters are addressed in the permanent status talks.

Lebanon's Equitable Shares?

Equitable sharing is also absent in the Hasbani River and the Wazzani Springs, water from which flows from southern Lebanon into Israel. During the occupation of southern Lebanon by Israel from 1978 to 2000, Israel strictly controlled Lebanon's access to the Hasbani River and the Wazzani Springs.⁴⁶⁰ Under the Johnston Plan, Lebanon's shares in these water sources equated to 35 MCM. After its Liberation in May 2000,⁴⁶¹ southern Lebanon began pumping 9 MCM per year from the Wazzani Springs.⁴⁶²

⁴⁵⁸ Interim Agreement 1995; Article 40(11).

⁴⁵⁹ Interim Agreement 1995; Article 40(12)(a),(c)-(g) & (i).

⁴⁶⁰ Gail Holst-Warhaft and Tammo Steenhuis *Losing Paradise: The Water Crisis in the Mediterranean* (Ashgate Publishing Ltd, Surrey, Burlington, VT, 2010) at 114.

⁴⁶¹ Israel Ministry of Foreign Affairs "The Israeli Withdrawal from Southern Lebanon- Special Update" (24 May 2000) [http://mfa.gov.il/MFA/AboutIsrael/HistoryPages/The Israeli Withdrawal from Southern Lebanon- Spec.aspx](http://mfa.gov.il/MFA/AboutIsrael/HistoryPages/The%20Israeli%20Withdrawal%20from%20Southern%20Lebanon-Spec.aspx)

⁴⁶² Jon Martin Trondalen (ed) *Water and Peace for the People: Possible Solutions to Water Disputes in the Middle East* (UNESCO, Paris, 2008) at 103.

Currently, Israel gets 160 MCM from Lebanon (138 MCM is from the Hasbani River and this includes 30 MCM from the Wazzani Springs) which is not submitted through a treaty.⁴⁶³ Any attempt by Lebanon to pump the Wazzani Springs (because of its higher quality of water resources)⁴⁶⁴ remains a source of contention between the two States. Therefore, unless equitable rights to these waters are negotiated between them, Lebanon would most likely continue to have its equitable rights to these waters unrealized and thus remain uninvolved in dealing with the issue of over-extraction and rightly so as it is not contributing to the problem either.

Therefore, under the Peace Treaty, Israel and Jordan have allocated to themselves what they consider to be their equitable share of the Jordan waters. Jordan and Syria, both Parties to the UN Watercourses Convention, have also divided the waters of the Yarmouk River between them, though not in volumetric terms and to the exclusion of other rights and obligations prescribed by the UN Watercourses Convention.⁴⁶⁵ Specifying each Party's share in volumetric terms after working out utilizable quantity of river flows would ensure that the Jordan waters are not over-extracted provided that the allocated shares are not exceeded.

However, given that the Jordan River Basin is a closed basin, it is apparent that there is over-extraction of the Jordan waters, mainly through diversions by Israel, Jordan and Syria. It is noted that none of the agreements addresses the issue of over-extraction or mentions the concept of "sustainable use" except the Interim Agreement 1995, though which does not extend to the waters of the Jordan River.

⁴⁶³ Food and Agriculture Organisation of the United Nations - Aquastat "Country Fact Sheet: Lebanon" (15 November 2013). Available at http://www.fao.org/nr/water/aquastat/data/cf/readPdf.html?f=CF_LBN_en.pdf

⁴⁶⁴ See Munther J Haddadin "Water Conflicts: Issues in International Water, Water Allocation and Water Pricing with Focus on Jordan" in Ariel Dinar and José Albiac (eds) *Policy and Strategic Behaviour in Water Resource Management* (Earthscan, London, 2009).

⁴⁶⁵ It is noted that the UN Watercourses Convention does not affect the rights and obligations of Parties to existing Treaties. It also does not require that Parties harmonize the provisions of the existing Treaties with the basic principles of the Convention either. See Article 3(1) and (2).

While Israel and Jordan are working together to rehabilitate the lower Jordan River, unless the utilizable portion of the river flow is equitably allocated in volumetric terms to all the co-riparians and monitored by a proper enforcement mechanism established to ensure compliance, the risk of over-extraction will remain given the increasing pressure on the Jordan Basin's water resources.

2.5.4 The Nile River Basin: An Overview

The Nile River Basin is located in Africa; the second driest continent in the world.⁴⁶⁶ The Basin lies in the North-East of Africa bordering 11 riparian States;⁴⁶⁷ Burundi, Democratic Republic of the Congo ("DR Congo"), Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan (formerly Sudan but now northern "Sudan"), the newly independent South Sudan,⁴⁶⁸ Tanzania and Uganda.

The two main tributaries of the Nile River Basin system are the White Nile and the Blue Nile. From its major source, Lake Victoria in east central Africa, the White Nile flows north through Uganda into Sudan where it meets the Blue Nile at Khartoum, which rises in the Ethiopian highlands.⁴⁶⁹ The major source of the Nile are the Blue Nile and the Atbara, which though highly seasonal in flow, contribute about 85 percent of the total discharge of the main Nile as measured at Aswan in Egypt.⁴⁷⁰ From the confluence of the White and Blue Nile, the river

⁴⁶⁶ United Nations Environment Programme *Africa: Atlas of Our Changing Environment* (UNEP/Earthprint, Nairobi, 2008) at 6.

⁴⁶⁷ United Nations Environment Programme *Africa Water Atlas* (UNEP/Earthprint, Nairobi, 2010) at 190, 196, 202, 206, 208, 210, 212, 216, 228 and 288.

⁴⁶⁸ As of 2011. See Janot Mendler de Suarez "Achieving Equitable Water Use in the Nile Basin: Time to Refocus the Discourse on Collective Human Security?" (2011) 38 *Review of African Political Economy* 455 at 464.

⁴⁶⁹ Nile Basin Initiative "Understanding the Nile Basin" (2014) available at <http://nilebasin.org/index.php/about-us/the-river-nile>

⁴⁷⁰ John Waterbury "Is the Status Quo in the Nile Basin Viable?" (1997) 4 *Brown Journal of World Affairs* 287 at 288.

continues to flow northwards into Egypt and on to the Mediterranean Sea. See the map below.⁴⁷¹



⁴⁷¹ Downloaded from Wikimedia Commons from where anyone is allowed to use images so long as the source and authors (if any) are acknowledged. Uploaded on to <http://commons.wikimedia.org/wiki/Commons:Welcome> by Hel-hama.

Although the Nile River Basin accounts for only 10 percent of the continental landmass, it is the most densely populated river basin in all of Africa with 160 million people living in the Nile Basin.⁴⁷² The population is projected to at least double by 2025.⁴⁷³ The following table sums up water resources availability and consumption (in km³) by the Nile Basin States.

Table 12: Water Availability and Consumption in the Nile River Basin

Riparian	Total Renewable Water Resources (TRWR) (2008)⁴⁷⁴	Total Freshwater Withdrawal⁴⁷⁵	Total Withdrawal as % of TRWR⁴⁷⁶
Burundi	12.6	0.3	2.3
DR Congo	1, 283	0.4	0.03
Egypt	57.3	54.3	94.7
Eritrea	6.3	0.6	9.2
Ethiopia	122	5.6	4.6
Kenya	30.7	2.7	8.9
Rwanda	9.5	0.2	1.6
Sudan	64.5	37.32	57.9
Tanzania	96.3	5.2	5.4
Uganda	66	0.3	0.5

⁴⁷² That is 40 percent of Africa's total population. See Seleshi Bekele Awulachew and others "Improved Water and Land Management in the Ethiopian Highlands: Its Impact on Downstream Stakeholders Dependent on the Blue Nile" (International Water Management Institute, paper presented to Intermediate Results Dissemination Workshop held at the International Livestock Research Institute, Addis Ababa, 5 February 2009) at 240.

⁴⁷³ M El-Fadel and others "The Nile River Basin: A Case Study in Surface Water Conflict Resolution" (2003) 32 Journal of Natural Resources and Life Sciences Education 107 at 108.

⁴⁷⁴ United Nations Environment Programme, above n 467, at 190, 196, 202, 206, 208, 210, 212, 216, 228 and 288.

⁴⁷⁵ These data were collected between 2000 to 2004. For actual year see United Nations Environment Programme, above n 467, at 190, 196, 202, 206, 208, 210, 212, 216, 228 and 288.

⁴⁷⁶ These data were collated in 2002 except for Eritrea and Kenya which were taken in 2007. United Nations Environment Programme, above n 467, at 190, 196, 202, 206, 208, 210, 212, 216, 228 and 288.

While the table indicates that only Egypt is close to fully utilizing its total renewable water resources, the following table shows how per capita water availability for 2007⁴⁷⁷ will decline for most of the Nile Basin States by 2025 (in m³).⁴⁷⁸

Table 13: Projected Water Availability in the Nile River Basin

Riparian	Per Capita Water Availability	
	2007	2025
Burundi	442	269
DR Congo	20, 973	10, 500
Egypt	759	630
Eritrea	1, 338	851
Ethiopia	1, 355	842
Kenya	839	235
Rwanda	551	351
Sudan	1, 707	1, 213
Tanzania	2, 291	1, 554
Uganda	2, 133	1, 087

In terms of water stress and scarcity, in 2007 only Burundi could be classified as a State experiencing absolute water scarcity with Rwanda not too far off from becoming one. Egypt and Kenya can already be classified as countries experiencing water scarcity albeit at varying degrees while Eritrea and Ethiopia are water stressed countries with Sudan not too far off from becoming one. Future projections to the year 2025 indicates that Burundi will be joined by Kenya and Rwanda as countries experiencing absolute water scarcity with Egypt, Eritrea and Ethiopia experiencing water scarcity while Sudan, Tanzania and Uganda are anticipated to experience water stress. Overall, by the year 2025, all the Nile Basin States except DR Congo will experience either water stress or scarcity.

⁴⁷⁷ Nile Basin Initiative “Water Resources Planning and Management” (Waterware Water Resources Management Information System, 2014) available at <http://www.ess.co.at/WATERWARE/NILE/background.html>

⁴⁷⁸ Nile Basin Initiative, above n 477.

2.5.5 Over-Extraction of the Nile River Basin

Up until the Nile River Basin Cooperative Framework Agreement of 2010 ('the Cooperative Framework Agreement'),⁴⁷⁹ the Nile Basin waters were not being equitably apportioned to all the Nile Basin States but utilized almost exclusively by Egypt, with Sudan getting a small percentage of its waters in accordance with the Agreement between the Republic of the Sudan and the United Arab Republic for the Full Utilization of the Nile Waters of 1959 ('the Nile Waters Agreement 1959').⁴⁸⁰ The Nile Basin has provided the basis of agricultural development in Egypt and Sudan since the start of agriculture some 7, 000 years ago and the major determinant of the Nile Basin water balance continues to be the agricultural sector.⁴⁸¹

Currently, agriculture accounts for at least 80 percent of all water consumption in the Nile Basin⁴⁸² with agriculture consuming 86.3 percent and 96.7 percent in Egypt and Sudan respectively, of total water withdrawals in these two countries.⁴⁸³ The rate of water utilization has already reached its maximum for Egypt,⁴⁸⁴ the most downstream State. By the time the Nile River reaches the Mediterranean Sea, much of its water has been diverted for irrigation purposes.⁴⁸⁵ About 98 percent of the Nile waters are being depleted with only 25 km³ of

⁴⁷⁹ Available from International Water Law at

http://www.internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf

⁴⁸⁰ Above n 179.

⁴⁸¹ Diana Rizzolio Karyabwite *Water Sharing in the Nile River Valley* (Project GNV011: Using GIS/Remote Sensing for the Sustainable Use of Natural Resources, 2000) at 34.

⁴⁸² Ibid.

⁴⁸³ United Nations Environment Programme, above n 467, at 190 & 196.

⁴⁸⁴ M L Parry and others *Climate Change 2007: Impacts, Adaptation and Vulnerability* Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, Cambridge, 2007) at 445.

⁴⁸⁵ United Nations Environment Programme, above n 467, at 72.

utilizable but untapped water going as outflow. Thus the Nile Basin is another closed basin.

2.5.6 Sustainable Utilization in the Nile River Basin?

In order to analyse the governing regime in the Nile Basin regarding the issue of over-extraction, the following looks at the relevant provisions of the Nile Waters Agreement 1959 and the Cooperative Framework Agreement, respectively.

Nile Waters Agreement 1959

Currently there are two competing formal agreements dealing with the allocation of the Nile waters; the Nile Waters Agreement 1959 and the Cooperative Framework Agreement. The Nile Waters Agreement 1959 allocates the whole of the Nile waters to Egypt and Sudan by allocating to them their “acquired rights” to the Nile waters, having been established under the Exchange of Notes between His Majesty’s Government in the United Kingdom and the Egyptian Government in regard to the Use of the Waters of the River Nile for Irrigation Purposes of 1929 (‘the Nile Waters Agreement 1929’).⁴⁸⁶

The Nile Waters Agreement 1959 aimed at full but not equitable utilization of the waters of the Nile River Basin by excluding all the other riparian States from this Agreement. These “acquired rights” were calculated based on “current uses”; with Egypt’s at 48 billion cubic metres (‘BCM’) and Sudan’s at 4 BCM.⁴⁸⁷ It was decided that the Parties’ acquired rights would have precedence and therefore would be deducted from the net average natural flow of the river. The remainder would then be divided between the two countries.⁴⁸⁸ This was calculated as

⁴⁸⁶ Exchange of Notes between His Majesty’s Government in the United Kingdom and the Egyptian Government in regard to the Use of the Waters of the River Nile for Irrigation Purposes 93 LNTS 43 (7 May 1929).

⁴⁸⁷ Nile Waters Agreement 1959; First Article, paras 1 and 2, respectively.

⁴⁸⁸ Nile Waters Agreement 1959; Para 3.

follows:⁴⁸⁹ the average natural flow of the river was considered to be 84 BCM with a 10 BCM loss per year, leaving 74 BCM per year to be divided. Of this total, acquired rights specified above leave 22 BCM to be divided at a ratio of 7.5 BCM per year for Egypt and 14.5 BCM per year for Sudan. Accordingly, it works out that allocations under this Agreement total 55.5 BCM per year for Egypt and 18.5 BCM per year for Sudan.

The Agreement further provided that if the average yield increases, then the net increase would be divided equally.⁴⁹⁰ However, in case of exceptional low flows, the Parties' shares would be determined based on recommendation from the Permanent Joint Technical Commission, established essentially for the sole purpose of enhancing "technical cooperation" between them.⁴⁹¹ Hence, whilst the Agreement divided existing flows and specified the mode of distribution of the surplus resulting from the construction of the river works⁴⁹² as well as provided for adjustments during low flows, it has generally overlooked environmental considerations especially the issue of maintaining and overseeing minimum environmental flows, which has now led to basin closure.

Future Claims?

Given that the principle of equitable utilization had been largely ignored,⁴⁹³ the Nile Waters Agreement 1959 does have a provision regarding possible future claims by other riparian(s) of the Nile River Basin to its shares in the water resources. The 'General Provision' of the Agreement provides that if it becomes necessary to hold any negotiations concerning the waters of the Nile with any riparian State, then it is stipulated that Egypt and Sudan will jointly consider and

⁴⁸⁹ Nile Waters Agreement 1959; Para 4.

⁴⁹⁰ Nile Waters Agreement 1959; Para 4.

⁴⁹¹ Nile Waters Agreement 1959; Fourth Article, para 1 and 1(e).

⁴⁹² O'Connell, above n 190, at 246.

⁴⁹³ Trilochan Upreti *International Watercourses Law and Its Application in South Asia* (Pairavi Prakashan, Kathmandu, 2006) at 61.

reach a unified view regarding the claim.⁴⁹⁴ If the consideration results in the acceptance of allotting an amount of the Nile waters to the claimant, the accepted amount will be deducted from the shares of Egypt and Sudan in equal parts.⁴⁹⁵ Given that such claims have never been entertained under the Agreement, it became imperative that another agreement be formulated which was inclusive of the other riparian States.

Cooperative Framework Agreement

As of 15 December 2014, none of the Nile Basin States were Party to the UN Watercourses Convention. Regardless of that, the Cooperative Framework Agreement, which is largely based on the UN Convention, is an attempt to give effect to the principle of equitable utilization for the benefit of all the riparian States of the Nile River Basin. As a result a lot of importance has been attributed to the principle of equitable and reasonable utilization under the Cooperative Framework Agreement 2010 given that this was the foremost important in what the riparian States (other than Egypt and Sudan) wanted to achieve from this Agreement. The Agreement provides that the “Nile Basin States shall in their respective territories utilize the water resources of the Nile River system and the Nile River Basin in an equitable and reasonable manner.”⁴⁹⁶ In addition, that “[ea]ch Basin State is entitled to an equitable and reasonable share in the beneficial uses of the water resources of the Nile River system and the Nile River Basin.”⁴⁹⁷ To this end, it is provided that all the water resources are to be “used and developed ... with a view to attaining optimal and sustainable utilization ... taking into account the interests of the Basin States concerned, consistent with adequate protection of those water resources”⁴⁹⁸ just like the UN Watercourses Convention.

⁴⁹⁴ Nile Waters Agreement 1959; Fifth Article, Para 1.

⁴⁹⁵ Nile Waters Agreement 1959; Fifth Article, Para 2.

⁴⁹⁶ Cooperative Framework Agreement; Article 4(1).

⁴⁹⁷ Cooperative Framework Agreement; Article 4(1).

⁴⁹⁸ Cooperative Framework Agreement; Article 4(1).

In order to ensure that such water resources are utilized in an equitable and reasonable manner, the Nile Basin States are under an obligation to take into account *all* the “relevant factors and circumstances”, an inexhaustive list of which has been provided for under the Agreement,⁴⁹⁹ which is exactly the same as that provided for under the UN Watercourses Convention. This includes ecological factors. In the application of the principle of equitable and reasonable utilization taking into account the relevant factors and circumstances, the Nile Basin States have an obligation to enter into consultation when such a need arises.⁵⁰⁰ The weight to be given to each factor is to be determined by its importance and in determining what is a reasonable and equitable use, all the relevant factors are to be considered together and a conclusion reached on the basis of the whole just as under the UN Watercourses Convention.⁵⁰¹

Furthermore, the Nile Basin States are under an obligation to “in their respective territories, according to their national laws and regulations, *keep the status of their water utilization under review* in light of substantial changes in relevant factors and circumstances”⁵⁰² [emphasis added]; a requirement which is over and above that which is prescribed by the UN Watercourses Convention. The Cooperative Framework Agreement also provides that the Nile Basin States are under an obligation to “observe the rules and procedures established by the Nile River Basin Commission [⁵⁰³] for the effective implementation of equitable and reasonable utilization.”

⁴⁹⁹ Cooperative Framework Agreement; Article 4(2) and (4).

⁵⁰⁰ Cooperative Framework Agreement; Article 4(3).

⁵⁰¹ Cooperative Framework Agreement; Article 4(4).

⁵⁰² Cooperative Framework Agreement; Article 4(5).

⁵⁰³ Yet to be established.

In terms of the governance aspects for the issue of over-extraction in the Nile Basin, the Cooperative Framework Agreement also provides for the principles of sustainable development, cooperation and water security,⁵⁰⁴ the duty not to cause significant harm,⁵⁰⁵ the obligation to regularly exchange data and information including “on the condition of water resources of the Basin”,⁵⁰⁶ the duty to protect and conserve the Basin and its ecosystems, including “where necessary, rehabilitate the Nile River Basin and its ecosystems, in particular, by: ... restoring and rehabilitating the degraded natural resource base”⁵⁰⁷ and the duty to manage.⁵⁰⁸ It also provides for the establishment of the Nile River Basin Commission with the purpose to:⁵⁰⁹ “promote and facilitate the implementation of the principles, rights and obligations”; “serve as an institutional framework for cooperation among Nile Basin States in the use, development, protection, conservation and management of the Nile River Basin and its waters”; and “facilitate closer cooperation among the States and peoples of the Nile River Basin in the social, economic and cultural fields.” The Agreement also provides for dispute resolution via peaceful means.⁵¹⁰

Therefore, while the Cooperative Framework Agreement does address “sustainable utilization” (even though it has not specified each Party’s equitable shares in the Nile waters) and governance aspects of the issue of over-extraction, it has not specified the requirement for maintaining a minimum ecological flow. Having achieved the minimum of 6 signatures required to enter into force

⁵⁰⁴ Cooperative Framework Agreement; Articles 3(2), (1) and (15), respectively. See Dereje Zeleke Mekonnen “The Nile Basin Cooperative Framework Agreement Negotiations and the Adoption of a ‘Water Security’ Paradigm: Flight into Obscurity or a Logical Cul-de-sac?” (2010) 21 *European Journal of International Law* 421.

⁵⁰⁵ Cooperative Framework Agreement; Article 5.

⁵⁰⁶ Cooperative Framework Agreement; Article (7)(1).

⁵⁰⁷ Cooperative Framework Agreement; Article 6(1)(e).

⁵⁰⁸ Through the Commission; Cooperative Framework Agreement; Article 16(b).

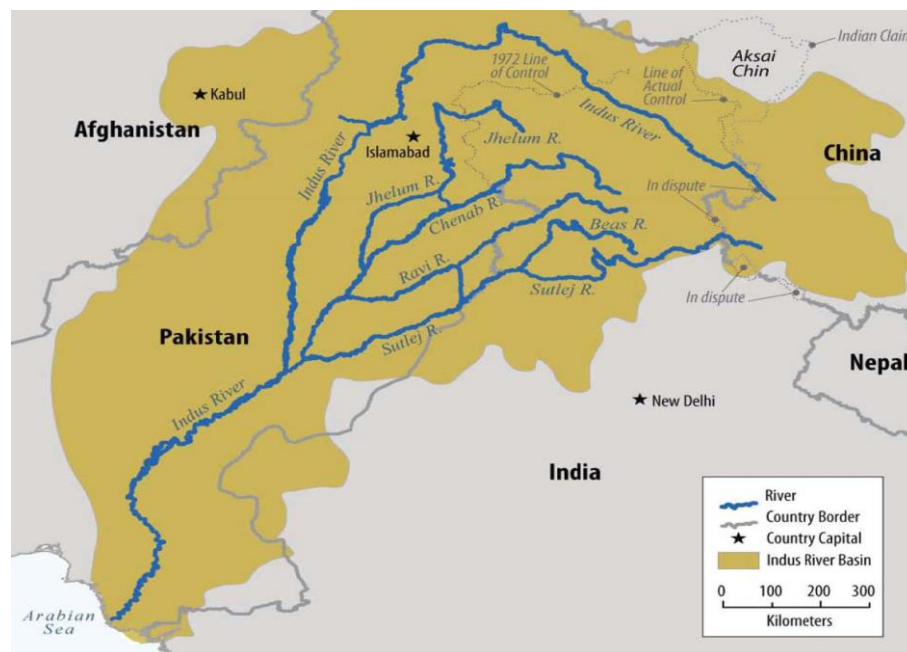
⁵⁰⁹ Cooperative Framework Agreement; Article 16.

⁵¹⁰ Cooperative Framework Agreement; Article 33.

(without Egypt's and Sudan's approval), how the signatories will exercise their entitlement to an equitable share of the Nile waters, against Egypt's and Sudan's competing interests, remains to be seen. In light of this, unless the Nile Basin States work out their respective equitable share after accounting for ecological flows, and ensuring that that is adhered to through monitoring, assessments and reporting, the Basin closure will most likely remain a recurring problem.

2.5.7 The Indus River Basin: An Overview

The Indus River Basin is located in South Asia. It originates in Tibetan China and borders India, Pakistan and Afghanistan.⁵¹¹ The Basin has many tributaries including: the Jhelum, Chenab, Ravi, Sutlej, Beas and the Kabul Rivers.⁵¹² See map below.⁵¹³



⁵¹¹ Vajpeyi, above n 400, at 116.

⁵¹² See Books LLC (ed) *Tributaries of the Indus River: Jhelum River, Sutlej, Chenab River, Beas River, Uhl River, Kabul River, Ravi River, Gomol River, Kunar River* (General Books LLC, 2010).

⁵¹³ Available from United States Government Committee on Foreign Relations *Avoiding Water Wars: Water Scarcity and Central Asia's Growing Importance for Stability in Afghanistan and Pakistan* (2011) at 6.

The population of the Indus Basin was 273.8 million people in 2010. The following table shows a breakdown of the Basin's current population (in millions) with future projects to 2025 and 2050.⁵¹⁴

Table 14: Current and Projected Population Growth in the Indus River Basin

Riparian	Population		
	Mid-2010	2025	2050
Indian Part of the Indus Basin ⁵¹⁵	50	61	56
Pakistan	184.8	246.3	335.2
Afghanistan	29	45	74
Afghani part of the Indus Basin	10	-	-

Apart from the population of the Indian part of the Basin, which is projected to have declining trends in the 2030s and 2040s,⁵¹⁶ the population growth estimates for the rest of the Basin shows that the overall population is going to continue to increase. This will place greater demand on the water resources of the Basin. The following table shows freshwater availability and consumption in the Indus Basin for India and Pakistan (as the case study focuses on these two States) in km³.⁵¹⁷

⁵¹⁴ Population Reference Bureau, above n 382 and; A N Laghari, D Vanham and W Rauch "The Indus Basin in the Framework of Current and Future Water Resources Management" (2012) 16 Hydrology and Earth System Sciences 1063 at 2269.

⁵¹⁵ B R Sharma, U A Amarasinghe and A Sikka "Indo-Gangetic River Basins: Summary Situation Analysis" (International Water Management Institute, Delhi, 2008) at 3.

⁵¹⁶ Upali A Amarasinghe and others *India's Water Future to 2025-2050: Business-as-Usual Scenario and Deviations* International Water Management Institute Research Report 123 (IWMI, Colombo, 2007) at 6.

⁵¹⁷ Sharma, above n 515, at 4.

Table 15: Water Availability and Consumption in the Indus River Basin

	Total Renewable Water Availability	Total Consumption (TC) - (as a % of TRWA)	Agricultural Use (as a % of TC)	Domestic and Industrial Use (as a % of TC)	Surplus/ Deficit (as a % of TRWA)
India	97	98 (38)	94 (96)	4 ⁵¹⁸ (4)	-1
Pakistan	190	154 (60)	143.2 (93) ⁵¹⁹	10.8 (7)	36
Total	287	257 (89.5)	248 (96.6)	8.7 (3.4)	30 (10.5)

Currently, almost 90 percent of the Basin's available water resources are being utilized. Pakistan is the largest water user, accounting for about 60 per cent of the total water use, followed by India at 38 percent. While water use for the domestic and industrial sectors is relatively small, being only 3.4 per cent of the total use, the remaining water resources utilized by the agriculture sector highlights the extent of agricultural activities in the Basin. Also, it is interesting to note that while Pakistan has surplus waters, India is over-exploiting its shares, albeit marginally. Although the Basin has an annual available water resources of 287 km³, its population of 273.8 million makes the annual per capita water availability of only 1, 048 m³ classifying this as a water-stress region but not too far off from being classified as a water-scarce region. The following table shows trends for per capita water resources availability (in m³) in the Indus River Basin in the years 2000, 2025 and 2050.⁵²⁰

⁵¹⁸ Domestic 1.6, industry 2.4.

⁵¹⁹ Pongsak Suttinon, Asif M Bhatti and Seigo Nasu *Industrial and Household Water Demand Management: A Case Study of Pakistan* (Kochi University of Technology, 2009) at 1.

⁵²⁰ Sharma, above n 515, at 4.

Table 16: Current and Projected Water Availability in the Indus River Basin

State	Per Capita Water Resources Availability (m ³)		
	2000	2025	2050
India	2, 109	1, 590	1, 732
Pakistan	1, 332	761	545

Pakistan slipped below the limit of 1000 cubic meters of water per capita per year in the year 2010⁵²¹ and as the table projects, this will only aggravate in the coming decades and could get worse in areas situated outside the Indus Basin where the annual average is below the average water availability per capita.⁵²² Thus, while India will remain outside the danger of being water stressed, given the rate of population growth and the limited available freshwater resources, Pakistan would really need to manage the demand for freshwater in the coming decades if it is to avoid being in absolute water scarcity.⁵²³

2.5.8 Over-Extraction in the Indus River Basin

The Indus River Basin is already physically water scarce.⁵²⁴ In fact, it is one of the most depleted river basins in the world “with near zero environmental flows in most years.”⁵²⁵ This is mainly due to over-extraction for agriculture⁵²⁶ but water

⁵²¹ World Wildlife Fund-Pakistan *Freshwater, and Toxics Programme Pakistan’s Waters at Risk: Water and Health Related Issues in Pakistan and Key Recommendations: A Special Report* (WWF, 2007) at 1.

⁵²² M M Anwar and J Bureste “Water Management and Conservation Practices in Arid Zone: A Case Study of Bahawalpur, Pakistan” (2011) 43 Sindh University Resources Journal 169 at 169.

⁵²³ Some of the ways to do this has been listed by Simi Sadaf Kamal *Use of Water for Agriculture in Pakistan: Experiences and Challenges* Paper 12 (Office of Research and Economic Development-Publications, 2009) at 44.

⁵²⁴ Amarasinghe, above n 206, at 31–32.

⁵²⁵ Bharat Sharma and others “The Indus and the Ganges: River Basins under Extreme Pressure” (2010) 35 Water International 493 at 494.

⁵²⁶ World Wildlife Fund “The Threat of Climate Change to the Indus” (no date given). Available at http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_problems/river_decline/10_rivers_risk/indus/indus_threats/

demands for domestic and industrial purposes are increasing because of population growth, increased urbanization and industrialization and the general rise in living standards.⁵²⁷ Water demands for food production and energy will also rise.⁵²⁸

Other challenges include the unregulated utilization of resources and a shift from surface water to groundwater use resulting in rapid depletion of groundwater resources,⁵²⁹ which the Indus River Basin depends heavily on.⁵³⁰ Since 1960, during the draught years, there is almost no water downstream of Kotri (Pakistan), causing immense damage to the Indus Delta.⁵³¹ A recent study into this has suggested that at least Pakistan should look into using only three-quarters of its waters for irrigation during periods of drought in order to sustain the Indus River.⁵³² However, since India also has shares in these waters, it too ought to make concessions from its shares thereby taking joint responsibility for an issue which is basin-wide though the results are only present downstream, being an issue pertaining to minimum ecological flows.

So far the development strategy of the Indus River system has emphasized multipurpose development.⁵³³ One of the two major purposes has been supplying water for irrigation in the Indus Basin, which is leading to over-extraction (the other is storage and hydropower generation).⁵³⁴

⁵²⁷ Laghari, above n 514, at 1069.

⁵²⁸ Ibid.

⁵²⁹ At 1068.

⁵³⁰ Sharma and others, above n 525, at 506.

⁵³¹ Shahid Amjad Chaudhry “Pakistan: Indus Basin Water Strategy - Past, Present and Future” (2010) 15 *The Lahore Journal of Economics* 187-211 at 207.

⁵³² At 206.

⁵³³ Samia Altaf, Michael Kugelman and Robert M Hathaway *Running on Empty: Pakistan's Water Crisis* (Woodrow Wilson International Center for Scholars, Washington, DC, 2009) at 66.

⁵³⁴ Ibid.

2.5.9 Sustainable Utilization in the Indus River Basin?

In order to decipher to what extent the issue of over-extraction is being addressed in the Indus Basin, the following looks at the relevant provisions of the Indus Waters Treaty being the only governing legal instrument in the Basin.

Indus Waters Treaty

The Indus Waters Treaty of 1960 ('Indus Waters Treaty'),⁵³⁵ the only legal water sharing agreement in the Basin, is between India and Pakistan. The objective of the Indus Waters Treaty is that both India and Pakistan "being equally desirous of attaining the most complete and satisfactory utilization" of the Indus waters, recognized the need for "fixing and delimiting, in a spirit of goodwill and friendship, the rights and obligations of each in relation to the other concerning the use of these waters."⁵³⁶ Thus, the Indus Waters Treaty is purely a water allocation agreement and only deals with matters ancillary to it.

It is said to be complex and unique in its basic approach of segregating and allocating the Basin according to the geography of the tributaries⁵³⁷ by dividing the watershed between its 3 Eastern Rivers and 3 Western Rivers. The Treaty provides that: "All the waters of the Eastern Rivers shall be available for the unrestricted use of India."⁵³⁸ The term 'Eastern Rivers' means "The Sutlej, The Beas and The Ravi taken together."⁵³⁹ The Treaty also provides that: "Pakistan shall receive for unrestricted use all those waters of the Western Rivers."⁵⁴⁰ The term 'Western Rivers' means "The Indus, The Jhelum and The Chenab taken

⁵³⁵ Above n 181.

⁵³⁶ Indus Waters Treaty; Preamble.

⁵³⁷ Matthew Zentner *Design and Impact of Water Treaties: Managing Climate Change* (Springer, Verlag, Berlin, Heidelberg, 2012) at 130.

⁵³⁸ Indus Waters Treaty; Article II(1).

⁵³⁹ Indus Waters Treaty; Article I(5).

⁵⁴⁰ Indus Waters Treaty; Article III(1).

together.”⁵⁴¹ These allocations are not absolute as both Parties have been allowed certain uses in the rivers allocated to the other, subject to certain qualifications.

The Treaty obliges Pakistan to let flow and not permit any “interference with the waters”⁵⁴² except for domestic use,⁵⁴³ non-consumptive use⁵⁴⁴ and agricultural use.⁵⁴⁵ India is also under an obligation to let flow and not to permit any interference with these waters except for: domestic use, non-consumptive use, agricultural use, generation of hydro-electric power through “run-of-river plant” and storages of water.⁵⁴⁶ These exceptional uses are detailed in separate annexures to the Treaty. Annexure B deals with agricultural use by Pakistan from certain tributaries of the Ravi River which has been allocated to India, while Annexure C deals with agricultural use by India from the Western rivers allocated to Pakistan. Moreover, Annexure D deals with generation of hydro-electric power by India from the Western rivers, while Annexure E deals with storage of waters by India on the Western rivers.⁵⁴⁷ Thus, with specified exceptions relating to some

⁵⁴¹ Indus Waters Treaty; Article I(6).

⁵⁴² The term “interference with the waters” means any act of withdrawal or any man-made obstruction to the flow which cause a change in the volume of the daily flow of the waters excluding any insignificant and incidental change in the volume of the daily flow. Indus Waters Treaty; Article 1(15).

⁵⁴³ Defined under Indus Waters Treaty; Article 1(10) and which includes household, municipal and industrial purposes.

⁵⁴⁴ Defined under Indus Waters Treaty; Article 1(11) and which includes navigation, flood control, fishing and wildlife protection.

⁵⁴⁵ Indus Waters Treaty; Article II(2) and (3).

⁵⁴⁶ Indus Waters Treaty; Article III(2).

⁵⁴⁷ India’s use of the waters of the Western rivers, which have been allocated to Pakistan, was one of the major issues raised during the negotiations of the Treaty. India felt that, as the upper riparian of the Indus river system, which runs for large stretches in its territory before entering Pakistan, there would have to be some uses allowed for it. See Salman M A Salman “The Baglihar Difference and Its Resolution Process - A Triumph for the Indus Waters Treaty?” (2008) 10 Water Policy 105 at 106.

qualified uses for agriculture, hydropower and storage, the Treaty prohibits each party from interfering in any way with the rivers allocated to the other.

The exclusive use of the waters of the river system so far as it is located within India and Pakistan was granted in accordance with historic and planned use (for Pakistan)⁵⁴⁸ and the actual location of the waters of the river, irrespective of whether the river flowed within the territory of one or the other. The allocations have been described as: “The fact that there were six rivers in the system offered the simple solution of the three Western Rivers ... being reserved for consumptive use by Pakistan, and the three Eastern Rivers ... being reserved for consumptive use by India.”⁵⁴⁹ The “usufructuary entitlements” were thus based upon physical location and not volumetric quantity.⁵⁵⁰ While 79 percent of the total volume of waters (the statistical average of the three Western Rivers) was made available to Pakistan, the Eastern Rivers earmarked for India equalled only the balance of 21 percent.⁵⁵¹

However, the principle of “equitable utilization”, as determined by the Parties, are reflected in both the equitable allocation of Indus tributaries to the two sides (three each) and the fact that either Party can equitably use rivers allocated to the

⁵⁴⁸ Jerome Delli Priscoli and Aaron T Wolf *Managing and Transforming Water Conflicts* (Cambridge University Press, Cambridge, 2009) at 190. Thus while India’s claim to absolute territorial sovereignty was dismissed, Pakistan’s prior appropriation was taken into account in working out equitable distribution of the Indus waters. See Aloys Arthur Michel *The Indus Rivers: A Study of the Effects of Partition* (Yale University Press, New Haven, CT, 1967) at 198–199 for a discussion of these principles.

⁵⁴⁹ Salman M A Salman and Kishor Uprety *Conflict and Cooperation on South Asia’s International Rivers: A Legal Perspective* (World Bank Publications, Washington, DC, 2002) at 57.

⁵⁵⁰ D E Fisher *The Law and Governance of Water Resources: The Challenge of Sustainability* (Edward Elgar, London, 2009) at 216.

⁵⁵¹ Jagat S Mehta “The Indus Water Treaty: A Case Study in the Resolution of an International River Basin Conflict” (1988) 12 *Natural Resources Forum* 69 at 73.

other Party for domestic, non-consumptive and agricultural use.⁵⁵² The fact that the Treaty actually effected the equitable apportionment/utilization of the Indus waters is a conclusion that has been reached by many commentators.⁵⁵³ In juridical terms, it is the nature of the entitlement to the waters of the river system that is significant: namely, an entitlement to the exclusive use of waters in a specified location.⁵⁵⁴ While equitable use has been achieved by the Indus Waters Treaty by allocating the waters through separation of the rivers between India and Pakistan, the Treaty has not qualified that use by obliging both Parties to use it reasonably or sustainably.

Additionally, the Indus Waters Treaty has provided for the monthly exchange of data (or 3-monthly at the latest)⁵⁵⁵ “with respect to the flow in, and utilization of the waters” between the Parties on including, but not limited to, the daily discharge data relating to the flow of the Rivers at all observation sites and daily withdrawals at the heads of all canals.⁵⁵⁶ The Parties are also entitled to request for the supply of any additional data relating to the hydrology of the Rivers.⁵⁵⁷ Furthermore, the Indus Waters Treaty has also created the Permanent Indus Commission to “establish and maintain co-operative arrangements for the implementation of th[e] Treaty ... ”⁵⁵⁸ In particular, it provides that the Commission will furnish or exchange information or data provided for under the Treaty.⁵⁵⁹ The Treaty also provides that “The Commission shall determine its own

⁵⁵² Mary Miner and others “Water Sharing between India and Pakistan: A Critical Evaluation of the Indus Water Treaty” (2009) 34 *Water International* 204-216 at 206.

⁵⁵³ See Stephen C McCaffrey, Special Rapporteur *Second Report on the Law of the Non-Navigational Uses of International Watercourses* (International Law Commission, 1986) at 109.

⁵⁵⁴ Fisher, above n 550, at 217.

⁵⁵⁵ Indus Waters Treaty; Article VI(1).

⁵⁵⁶ Indus Waters Treaty Article VI(1)(a) and (c).

⁵⁵⁷ Indus Waters Treaty; Article VI(2).

⁵⁵⁸ Indus Waters Treaty; Article VIII(4).

⁵⁵⁹ Indus Waters Treaty; Article VIII(1)(a).

procedures,”⁵⁶⁰ allowing the Commissioners to jointly adopt means to consider issues of mutual interest.⁵⁶¹ Even though the Treaty has not factored in ecological flows into its provisions, through the Commission, the Parties can cooperate to ensure that their use is ecologically sound. However, given the state of the lower Basin, it is apparent that while the Parties are engaging in some monitoring and data exchange, they are not undertaking any ecological assessments to specifically address the issue of over-extraction in the Basin. There is also no specific obligation to protect and preserve the ecosystem or to manage the Basin as an integrated whole.

There is said to be enough water in the Indus Basin to serve its population provided that the water is managed efficiently and equitably and that additional water is made available through the review of the Treaty.⁵⁶² The Indus Waters Treaty does allow that its provisions “may from time to time be modified by a duly ratified treaty concluded for that purpose between the two Governments.”⁵⁶³

Both India and Pakistan are not Party to the UN Watercourses Convention but given that the Indus is yet another closed basin, it is time to revise this more than half a century old Treaty. This would involve including all the substantial and procedural rights and obligations prescribed by the UN Convention including ecological considerations which are absent. More specifically, the concept of ‘ecological flows’⁵⁶⁴ and the set-up of more hydrological observation stations should be factored into the Treaty. Whilst the Commission is empowered to

⁵⁶⁰ Indus Waters Treaty; Article VIII(10).

⁵⁶¹ Miner, above n 552, at 204.

⁵⁶² Daanish Mustafa and United States Institute of Peace *Hydropolitics in Pakistan’s Indus Basin* (US Institute of Peace, Washington, DC, 2010) at 3.

⁵⁶³ Indus Waters Treaty; Article XII(3).

⁵⁶⁴ Rizwan Ullah Kokab and Adnan Nawaz “Indus Water Treaty: Need for Review” (2013) 2 Asian Journal of Social Sciences & Humanities 210 at 216; Ramaswamy R Iyer “Dealing with Pakistan’s Fears on Water” *The Hindu* (India, 28 January 2012) <http://www.thehindu.com/opinion/lead/dealing-with-pakistans-fears-on-water/article2837619.ece>

determine its own procedures and adopt means to consider issues of mutual interest, in order to deal with the issue of over-extraction effectively, the Treaty would need to factor in ecological considerations, spelling out how monitoring, assessments and reporting will take place, whether they be undertaken unilaterally but coordinated or jointly.

Moreover, India and especially Pakistan should consider including at least Afghanistan as they deal with the issue of over-extraction given that Afghanistan's use of the Kabul River, a tributary of the Indus Basin, is also increasing and which is in turn affecting Pakistan's use downstream.⁵⁶⁵

Therefore, in none of the River Basins do all the co-riparians enjoy equitable utilization of its common waters as that has only been achieved between 3 out of 5 riparians in the Jordan Basin, only 2 out of 11 States in the Nile Basin and between 2 out of 4 States in the Indus Basin. However, what is clear from these case studies is that equitable use can be achieved in a number of ways including in specified and unspecified volumetric quantities. It is ultimately what States decide is their equitable share, which in all cases has been achieved through consultative agreement.

Although over-extraction is a threat to all the three basin's which are experiencing closure, none of the legal instruments currently governing its waters are equipped to deal with this threat as they all essentially do not provide for accounting for ecological flows. This is even though the principle of sustainable use exists in international water law and has been around for almost half a century now through the concept of sustainable development. However, the obligation to maintain a minimum flow does not exist alone. It has to be complimented by the obligation not to cause significant harm, the obligation to regularly exchange data and information, the obligation to protect and preserve the ecosystem and the duty to manage the river basin as an integrated whole.

⁵⁶⁵ See US Government Committee on Foreign Relations, above n 513.

2.6 Conclusion

The issue of over-extraction is one of the four main threats to international rivers which must be addressed if water security is to be achieved. The UN Watercourses Convention deals with this by prescribing certain principles, rights and obligations, namely: the principle of sustainable development, the right to an equitable share and reasonable use of freshwater resources, the obligation not only not to cause significant harm to other watercourse States but the obligation to prevent and mitigate harm to the river basin in general, to regularly exchange data and information including those relating to the hydrology of the river basin and withdrawals and the obligation to protect and preserve the ecosystem.

While the obligation to maintain minimum flows can be read into the provision dealing with the duty to protect and preserve the ecosystem, this has to be amended to have it expressly stated given that ecological flows is absolutely crucial to deal with the threat of over-extraction at the basin level. Also, it is important is to prescribe or offer guidance as to how ecological flows can be calculated, especially the sort of factors that need to be taken into account, just like for the exercise of the right to an equitable share in the Basin waters. These would include quantity, quality and timing for sustaining the health of the river and its aquatic ecosystems and balancing that against economic and social values of maintaining what would be an appropriate ecological flow.⁵⁶⁶ Furthermore, it is recommended that the provision dealing with the right to an equitable share be calculated as a percent and not as a fixed quantitative figure given that the calculation of ecological flows will vary over time as ecological factors change in light of including, climate change.

⁵⁶⁶ See Megan Dyson, Ger Bergkamp and John Scanlon (eds) *Flow: The Essentials of Environmental Flows* International Union for Conservation of Nature Water and Nature Initiative (IUCN, Gland, 2003) at 19.

It is important for the UN Watercourses Convention to extend the obligation to cooperate to also make it obligatory to establish joint institutions (given that such joint efforts are only promoted at the moment).⁵⁶⁷ This will enable the principle of integrated water resources management to be incorporated as well. To this end, it is also recommended that the UN Watercourses Convention be amended to incorporate the principle of integrated river basin management. The obligation to establish a river basin institute that is mandated to guide itself by the principle of integrated river basin management will enable it to oversee compliance of the relevant principles, rights and obligations prescribed by the UN Watercourses Convention effectively as is being undertaken at the EU level.

Over-abstraction, as it is called in the European regional documents, is dealt with under the UNECE Water Convention (primarily through the principle of sustainable water use) and the Water Framework Directive. The Water Framework Directive offers a practicable example of how over-extraction can be monitored through prescribed parameters, assessed and reported. These are done against the set environmental objective of good ecological objective. For international river basins, not only does this promote an integrated monitoring, assessment and reporting but information exchange as well. The most important aspect of this framework is that implementation of the Water Framework Directive objective of good status is assessed by the EC monitor Member States compliance.

In the Jordan River Basin, both Israel and Jordan (through the Peace Treaty) and Jordan and Syria (through the Yarmuk Waters Agreement 1987) have allocated the Jordan waters but without accounting for ecological flows first (and this too, to the exclusion of Lebanon and the Palestinian people). Hence the resultant basin closure. Although the Peace Treaty has taken ecological factors into consideration and is supposed to rehabilitate the Lower Jordan River, given that it is a 20 year old Treaty and the issue persists, it is apparent that more needs to be done. To this

⁵⁶⁷ See K N Scott "International Environmental Governance: Managing Fragmentation through Institutional Coordination" (2011) 12 Melbourne J Intl L 1.

end, it is recommended that the Parties have to guide themselves by the obligation to maintain ecological flows. For this purpose, they may need to revise their “rightful allocations” as well as keep them flexible in light of previous episodes of severe droughts.

Given that flows in the Yarmouk is also gradually receding, Jordan and Syria would also have to take an ecological approach to their unspecified rights to the Yarmouk Waters and use the already established Joint Syria-Jordan Commission to monitor, assess and report the quantitative condition of the Yarmouk River and promote exchange of information for the purpose of managing as an integrated whole. Otherwise, the reducing Yarmouk will only exacerbate basin closure in the Lower Jordan.

In the Nile Basin, there are competing Agreements for water utilization for the whole of the Nile – that between Egypt and Sudan under the Nile Waters Agreement 1959 and for all the Nile Basin States under the Cooperative Framework Agreement 2010. Under both Agreements, ecological flows have not expressly been provided for. While under the Cooperative Framework Agreement, the right to an equitable share will be calculated taking into account including but not limited to, ecological factors, under the Nile Waters Agreement 1959, Egypt and Sudan’s fixed quantified shares are based on what is considered to be the utilizable portion of the total mean flow, which as already stated, varies as ecological conditions change.

As the Basin States move towards implementing the Cooperative Framework Agreement, the Nile Basin States would need to ensure that ecological flows are calculated before their equitable shares are determined. This will prove problematic if Egypt and Sudan continue to utilize the Nile waters outside the Cooperative Framework Agreement. However, the rest of the Nile Basin States have the advantage of being the upper riparians who can pressure Egypt and Sudan to work within the new framework which serves the interests of all the riparian States in the Nile Basin. This will not only ensure that ecological flows

are accounted for but that the Parties also get to realise their equitable share in the Nile waters, which is recommended be flexible.

In the Indus Basin, only India and Pakistan are Parties to the only governing legal instrument – the Indus Waters Treaty. The Treaty does not take ecological factors into consideration, including the most important aspect; ecological flows. Simply allocating both Parties 3 each of the 6 tributaries means that being the lower riparian, any disruptions to the ecological flows upstream is going to directly impact Pakistan. The fact that the Basin is experiencing closure is indicative that there is over-extraction of the Indus waters. In addition to introducing the concept of ecological flows, the Parties should make use of the Permanent Indus Commission to not only collect data and information for the purpose of making optimum use of the Indus waters but also ensuring that their use is ecologically sound if they are to continue to enjoy the use of the Basin waters.

Also, if Pakistan is successful in negotiating a Kabul Waters Treaty, then at least that will ensure that Afghanistan's use also takes an ecological approach and incorporates the good practices of the EU in terms of incorporating ecological objectives, monitoring parameters, assessments and reporting as well as data and information sharing to ensure compliance with the overall governance regime.

3 Pollution



In June 2012, the international community at the Rio+20 Conference committed themselves to address water pollution in the following terms:

“We stress the need to adopt measures to significantly reduce water pollution and increase water quality, significantly improve wastewater treatment and water efficiency and reduce water losses. In order to achieve this, we stress the need for international assistance and cooperation.”⁵⁶⁸

3.1 Introduction

This chapter looks at the threat from pollution to international river basins. In order to deal with, it looks at the relevant provisions of the UN Watercourses Convention through which it seeks to prevent, reduce and control pollution, both through unilateral actions and joint measures by watercourse States. This analysis is supplemented by the Berlin Rules and international case law and arbitration decisions.

The next part looks at the EU Governance Framework for dealing with pollution, namely the UNECE Water Convention, the Water Framework Directive and the Water Quality Standards Directive. The focus is on its water quality objectives for dealing with pollution, its prescribed environmental quality standards, its combination approach to dealing with both point and diffuse sources of pollution,

⁵⁶⁸ United Nations *Report of the United Nations Conference on Sustainable Development* (A/CONF.216/16, Rio de Janeiro, Brazil, 20–22 June 2012) at 24. Available at <http://www.uncsd2012.org/content/documents/814UNCSD%20REPORT%20final%20revs.pdf> ; para 124; Also see Resolution adopted by the General Assembly of the UN, *The Future We Want* GA Res 66/288, LXVI A/Res/66/288 (2012).

its monitoring parameters, analysis and reporting. It also looks at how the EU is dealing with the evolving nature of pollution. This is followed by the case studies.

The case studies of the Jordan, the Nile and the Indus River Basins looks at the extent of pollution in these basins, the governance regime for dealing with pollution in these basins and gaps in the legal regime. The aims of this chapter are to fill-in the gaps in the legal governance regime as well as to propose amendments so that the UN Watercourses Convention can also be strengthened in light of the progress being made at ground level in this area.

3.2 Pollution of International River Basins

Under the UN Watercourses Convention, ‘pollution of an international watercourse’ has been defined as: “any detrimental alteration in the composition or quality of the waters of an international watercourse which results directly or indirectly from human conduct.”⁵⁶⁹ The scope of this definition has been elaborated on by the International Law Commission in the following terms:⁵⁷⁰ (1) it does not mention any particular type of pollution or polluting agents; (2) the definition simply refers to “any detrimental alteration” and thus does not prejudge the question of the threshold at which pollution becomes impermissible;⁵⁷¹ (3) it does not refer to any specific ‘detrimental’ effects,⁵⁷² but requires that there be a detrimental alteration in the “composition or quality” of the waters. The term ‘composition’ refers to “all substances contained in the water, including solutes, as well as suspended particulate matter and other insoluble substances.” The term ‘quality’ refers to the “essential nature and degree of purity of water” and; (4) the definition does not refer to the means by which pollution is caused, but requires only that the ‘detrimental alteration’ result from “human conduct.” This includes

⁵⁶⁹ UN Watercourses Convention; Article 21(1). Berlin Rules; Article 3, Para 16.

⁵⁷⁰ International Law Commission, above n 237, at 121–122.

⁵⁷¹ It encompasses all pollution, whether or not it results in ‘significant harm’ within the meaning of Article 7.

⁵⁷² Such as harm to human health or safety, beneficial uses or living resources as under Article 21(2). Also see Aylward, above n 195, at 190–193.

both acts and omissions. It, therefore, only includes pollutants introduced into the watercourse by humans, thus excluding naturally occurring contaminants. It also includes pollution resulting from an activity which, without directly polluting the watercourse, reduces its flow to the extent that it diminishes its capacity to absorb pollutants.⁵⁷³

The quality of natural water in rivers depends on a number of interrelated factors such as geography, climate, biological processes and land use together with the time the water has been in residence.⁵⁷⁴ However, over the last 200 years, human activities have developed to such an extent that there are now few examples of natural water bodies largely due to increased population and urbanization, industrialization, expansion and intensification of agriculture and transportation of waste water produced through such activities.⁵⁷⁵ All of these have disrupted the river's physical, chemical and/or biological characteristics.⁵⁷⁶ The scale and intensity of such pollution varies across river basins of the world, depending mainly on the natural geology of the river basin⁵⁷⁷ and the levels of extraction of water and discharge of wastes into it.⁵⁷⁸ It is estimated that the amount of polluted

⁵⁷³ Attila Tanzi and Maurizio Arcari *The United Nations Convention on the Law of International Watercourses: A Framework for Sharing* (Kluwer Law International, London, 2001) at 55.

⁵⁷⁴ United Nations World Water Assessment Programme, above n 18, at 85.

⁵⁷⁵ Gerald A Best, Teresa Bogacka and Elzbieta Niemirycz *International River Water Quality: Pollution and Restoration* (Taylor & Francis, London, New York, 1997) at 212.

⁵⁷⁶ Hendrik Blockeel, Saso Dzeroski and Jasna Grbovic "Simultaneous Prediction of Multiple Chemical Parameters of River Water Quality with TILDE" in Jan Zytkow and Jan Rauch (eds) *Principles of Data Mining and Knowledge Discovery: Third European Conference, Prague, Czech Republic, 15-18 September 1999* (Springer, Berlin, 1999) at 32.

⁵⁷⁷ Jim Perry and Elizabeth Leigh Vanderklein *Water Quality: Management of a Natural Resource* (John Wiley & Sons, Chichester, 2009) at 160.

⁵⁷⁸ World Health Organisation, United Nations Educational, Scientific and Cultural Organisation, and United Nations Environment Programme *Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring* (2nd ed, E & FN SPON, 1996) at 9.

freshwater worldwide exceeds the total amount of water contained in the world's 10 largest river basins at any given moment.⁵⁷⁹

The main chemical, physical and microbial factors which are negatively affecting freshwater quality include: organic pollutants, nutrients, heavy metals, microbial contamination, toxic organic compounds, traces of chemicals and pharmaceutical drugs, suspended particles, nuclear waste, salinization and acidification.⁵⁸⁰ Of all the sectors, the industrial sector is responsible for producing the highest number of pollutants.⁵⁸¹ Essentially, nutrients become pollutants when they are not treated and allowed to collect in waterways, along with industrial chemicals.⁵⁸² Pollutants, which cause pollution, originate from many sources.⁵⁸³ These are divided into 'point source' and 'non-point source' or 'diffuse source'.⁵⁸⁴ A point source pollutant is one originating from a clearly defined source and non-point or diffuse sources of pollution are ones which are not easily traceable to their original sources.⁵⁸⁵ Water pollution, be it from point or non-point source, is known to exacerbate water scarcity.⁵⁸⁶ Freshwater resources are reduced by pollution because while water is "available", it is not fit for consumption. Furthermore, land-based pollution carried by surface waters, accounts for about

⁵⁷⁹ See International Monetary Fund *Inflation: Too High, Too Low, or Just Right?* (IMF, Washington, DC, 2003).

⁵⁸⁰ R Andreas Kraemer, Keya Choudhury and Eleftheria Kampa "Protecting Water Resources: Pollution Prevention - Thematic Background Paper" (paper presented to International Conference on Freshwater, Bonn, 2001) at 2.

⁵⁸¹ At 3.

⁵⁸² Jim Motavelli and Elaine Robbins "'The Coming Age of Water': An Interview with Sandra Postel" (1998) 9 E: The Environmental Magazine at 10.

⁵⁸³ John P Smol *Pollution of Lakes and Rivers: A Paleoenvironmental Perspective* (2nd ed, Blackwell Publishing, Malden, MA; Oxford; Carlton, Vic, 2008) at 8.

⁵⁸⁴ Ibid.

⁵⁸⁵ Ibid.

⁵⁸⁶ United Nations Environment Programme, above n 466, at 21.

80 percent of the marine pollution.⁵⁸⁷ Thus, pollution of international rivers - a major source of marine pollution⁵⁸⁸ - is regulated by the law of international watercourses.

3.3 International Law and Policy

Though the first efforts at water purification can be traced to 2,000 BC with Egyptian wall inscriptions depicting man's efforts to purify water by boiling it in copper vessels,⁵⁸⁹ water pollution did not become a subject of international law until the early 20th Century when it was dealt with as a subject matter under the aegis of the Institute de Droit International,⁵⁹⁰ International Law Association⁵⁹¹ and the International Law Commission.⁵⁹² Without going into the history, the following part of the chapter explores the current international law and policy comprising of the relevant provisions of the UN Watercourses Convention, supplemented by the Berlin Rules and international case law and arbitrary decisions.

⁵⁸⁷ Sergei Vinogradov "Marine Pollution via Transboundary Watercourses - An Interface of the 'Shoreline' and 'River-Basin' Regimes in the Wider Black Sea Region" (2007) 22 Int'l J Marine & Coastal L 584 at 585.

⁵⁸⁸ Pollution of the marine environment from land-based sources is primarily dealt with by the United Nations Convention on the Law of the Sea; above n 106.

⁵⁸⁹ Fred V Witaschek "International Control of River Water Pollution" (1972) 2 Denv J Int'l L & Pol'y 35 at 38.

⁵⁹⁰ Starting with the International Regulations Regarding the Use of International Watercourses for Purposes other than Navigation also known as the Madrid Declaration. Institute of International Law, 24 Annuaire de l'Institut de Droit International (20 April 1911).

⁵⁹¹ Starting with the Statement of (eight) Principles of 1956 also known as 'the Dubrovnik Rules' in International Law Association *Report of the Forty-Seventh Conference of the International Law Association held in Dubrovnik, 28 August 1956* (1956) at 241-243.

⁵⁹² Starting with the UN Watercourses Convention.

UN Watercourses Convention

Part IV of the UN Watercourses Convention deals with the protection, preservation⁵⁹³ and management of international watercourses.⁵⁹⁴ The general obligations cover protection and preservation of ecosystems⁵⁹⁵ as well as the marine environment (including estuaries),⁵⁹⁶ and management.⁵⁹⁷ The provision specific to the prevention, reduction and control of pollution is divided into three parts.⁵⁹⁸ The first part defines pollution (as already covered at the beginning of this chapter). The second part defines watercourses States' obligations with regards to preventing, reducing and controlling pollution of international watercourses in the following terms:⁵⁹⁹

“Watercourse States shall, individually and, where appropriate, jointly, *prevent, reduce and control* the pollution of an international watercourse that *may cause significant harm* to other watercourse States or to their environment, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse. Watercourse States shall take steps to harmonize their policies in this connection” [emphasis added].

The third part of the obligation to pollution control is covered later. The following analyses the second part in detail.

⁵⁹³ Note that the words “conservation and management” was replaced with “protection, preservation and management” so as to use the term conservation in its widest connotation. See Tanzi and Arcari, above n 573, at 54.

⁵⁹⁴ Through Articles 20-26.

⁵⁹⁵ UN Watercourses Convention; Article 20. The Berlin Rules provides for “appropriate measures to protect the ecological integrity necessary to sustain ecosystems...”; Article 22.

⁵⁹⁶ UN Watercourses Convention; Article 23.

⁵⁹⁷ UN Watercourses Convention; Article 24. See chapter 2.

⁵⁹⁸ UN Watercourses Convention; Article 21(1)-(3), respectively.

⁵⁹⁹ UN Watercourses Convention; Article 21(2).

Unilateral Actions

The second part of the obligation requires that measures to prevent, reduce and control pollution be taken individually or jointly by watercourse States. For individual State actions, the principle was confirmed by the ICJ in 1949 in the *Corfu Channel* case,⁶⁰⁰ which involved a dispute between U.K. and Albania whereby mines laid in Albanian waters damaged British vessels exercising their right to safe passage. Although the ICJ did not deal with the issue of water pollution, it nevertheless enunciated the general principle that it is “every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.”⁶⁰¹ Thus the principle was extended to the rights of other States, not limiting harm to State territory.⁶⁰² This is in line with the requirement of the UN Watercourses Convention, which covers the obligation not to cause significant harm to “other watercourse States or to their environment.” The *Corfu Channel* principle could be applied in a wider geographical context regarding long-distance pollution as well.⁶⁰³ It confirms the principle that the State is either directly responsible or attributed responsibility for non-State actors in transboundary issues as a function of a State’s “exclusive control” over the activities concerned.⁶⁰⁴ Furthermore, the ICJ in the *Legality of the Threat or Use of Nuclear Weapons* case of 1996 clarified watercourses States’ general obligation with regards to transboundary pollution in the following terms:⁶⁰⁵

⁶⁰⁰ *Corfu Channel (Merits) (United Kingdom v Albania)*, above n 274.

⁶⁰¹ At 22.

⁶⁰² Prue Taylor *An Ecological Approach to International Law: Responding to Challenges of Climate Change* (Routledge, Oxon, 1998) at 81.

⁶⁰³ Marie-Louise Larsson *The Law of Environmental Damage: Liability and Reparation* (Kluwer Law International and Norstedts Juridik, Cambridge, MA and Stockholm, 1999) at 160.

⁶⁰⁴ *Corfu Channel (Merits) (United Kingdom v Albania)*, above n 274, at 18.

⁶⁰⁵ *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226 at 241-242, para 29.

“The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.”

This statement was reiterated by the ICJ again in 1997 in the *Gabčíkovo-Nagymaros* case.⁶⁰⁶ Thus, the gist of the unilateral actions requirement is that watercourses States are individually responsible for all transboundary pollution emanating from all sources within its jurisdiction which “may cause significant harm” pollution.

Obligation to Prevent, Reduce and Control

Unlike the Berlin Rules, the UN Watercourses Convention does not impose an obligation to eliminate pollution in addition to the obligation to prevent, reduce and control it.⁶⁰⁷ The obligation to prevent relates to new pollution⁶⁰⁸ and renders the principle of precautionary action applicable, which inter alia imposes the duty to prevent the threat of such harm, especially in respect of dangerous substances such as those that are toxic, persistent or bio accumulative.⁶⁰⁹ The obligation to prevent pollution is akin to the obligation to protect the ecosystem. In the *Gabčíkovo-Nagymaros* case, the ICJ held that: “in the field of environmental protection, vigilance and prevention are required on account of the often irreversible character of damage to the environment and of the limitations inherent in the very mechanism of reparation of this type of damage.”⁶¹⁰ This was reiterated by the ICJ again in the *Pulp Mills* case.

⁶⁰⁶ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163.

⁶⁰⁷ Berlin Rules; Article 27(1).

⁶⁰⁸ See International Law Commission *Draft Articles on the Law of Transboundary Aquifers, with Commentaries* [2008] vol 2, pt 2 YILC 22 at 61.

⁶⁰⁹ At 61; Watts, above n 235, at 1403.

⁶¹⁰ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, at 78, para 140.

The second part of the obligation to reduce and control relate to existing pollution,⁶¹¹ which indicates a practice of general willingness of watercourse States to tolerate even significant pollution harm, provided that the origin State is making its best efforts to reduce the pollution to a mutually acceptable level.⁶¹² These include pollution that is harmful to human health and safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse.⁶¹³ The obligation to prevent, reduce and control pollution is signified by the words “may cause.”⁶¹⁴

‘May Cause’

Like the obligation to prevent new pollution, the essence of the phrase “may cause” is also the practicable application of the precautionary approach,⁶¹⁵ again in respect of dangerous substances such as those that are toxic, persistent or bioaccumulative.⁶¹⁶ Although not expressly mentioned under the UN Watercourses Convention, the Berlin Rules expressly require that “States shall apply the precautionary approach.”⁶¹⁷ The Rules further put States under an obligation to “take all appropriate measures to prevent, eliminate, reduce, or control harm to the aquatic environment when there is a serious risk ... even without conclusive proof of a causal relation between an act or omission and its

⁶¹¹ International Law Commission, above n 608, at 61.

⁶¹² Watts, above n 235, at 1403.

⁶¹³ This includes flora and fauna dependent upon the watercourse, and the amenities connected with it such as the use of a watercourse for recreational purposes or for tourism. See UN Watercourses Convention; Article 21(2).

⁶¹⁴ Watts, above n 235, at 1403.

⁶¹⁵ United Nations World Water Assessment Programme, *World Water Development Report 3: Freshwater and International Law: The Interplay between Universal, Regional and Basin Perspectives* (UNESCO, Paris, 2009) at 4.

⁶¹⁶ International Law Commission, above n 608, at 61–62.

⁶¹⁷ Berlin Rules; Article 23(1).

expected effects.”⁶¹⁸ In the 1957 *Lake Lanoux Arbitration*, which involved a dispute between Spain and France over a hydroelectric project on an international watercourse, though pollution of the waters was not alleged the Arbitration Tribunal nevertheless stated that:⁶¹⁹

“It could have been argued that the works would bring about an ultimate pollution of the waters ... or that the returned waters would have a chemical composition or a temperature or some other characteristic which could injure Spanish interests. Spain could then have claimed that her rights had been impaired ...”

The *Lake Lanoux Arbitration* relied on the term “seriously” (*gravement*).⁶²⁰ Other Conventions have also employed the term “substantial,” “serious” or like the UN Watercourses Convention, “significant.”⁶²¹ It is noted that previously, international environmental law imposed an obligation where there was a “significant risk of substantial harm.”⁶²² The Berlin Rules also require that there be “a serious risk of significant adverse effect.”⁶²³ This threshold is higher under the UN Watercourses Convention which requires a precautionary approach to a risk which “may cause” significant harm.

Significant Harm

The notion that any activity or project that pollutes an international watercourse or alters it to the extent that it *may cause* significant harm will be captured by the provision dealing with pollution under the UN Watercourses Convention.⁶²⁴ In the

⁶¹⁸ Berlin Rules; Article 23(2).

⁶¹⁹ *Lake Lanoux Arbitration (France v Spain)* [1957] 24 ILR 101; at para 1065.

⁶²⁰ At 101.

⁶²¹ International Law Commission, above n 163, at 108.

⁶²² J G Lammers *Pollution of International Watercourses: A Search for Substantive Rules and Principles of Law* (BRILL, The Hague, Boston, 1984) at 351.

⁶²³ Berlin Rules; Article 23(2).

⁶²⁴ Attila Tanzi “UN Economic Commission for Europe Water Convention” in Flavia Rocha Loures and Alistair Rieu-Clarke (eds) *The UN Watercourses Convention in Force: Strengthening*

Gabčíkovo-Nagymaros case,⁶²⁵ the ICJ did not expressly apply the ‘no harm’ principle despite Hungary’s reliance upon it. Instead, it endorsed the principle of ‘equitable utilization’ thereby indicating that the ‘no harm’ principle is subordinate to it.⁶²⁶ In other words, a use becomes inequitable and unreasonable to the extent that it may cause significant pollution harm to other watercourse States or to their environment.⁶²⁷ The idea that customary international law prohibits all levels of pollution harm has thus generally been rejected.⁶²⁸ The obligation to prevent pollution that “may cause significant harm” includes the duty to exercise due care⁶²⁹ or due diligence to prevent the threat of such harm.⁶³⁰ The International Law Commission considered the obligation of due diligence that arose in a dispute between Germany and Switzerland over pollution of the Rhine and the latter’s acknowledgement of its lack of due diligence in preventing pollution through adequate regulation of its pharmaceutical industries.⁶³¹ A watercourse State can be deemed to have violated its obligation to exercise due diligence only if it knew or ought to have known that the particular use of an

International Law for Transboundary Water Management (Routledge, Oxon, New York, 2013) at 234.

⁶²⁵ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163.

⁶²⁶ Stephen C McCaffrey *The Law of International Watercourses* (2nd ed, Oxford University Press, Oxford, New York, 2007) at 422.

⁶²⁷ At 386–399.

⁶²⁸ M Habibur Rahman *Legal Regime of Marine Environment in the Bay of Bengal* (Atlantic Publishers & Distributors (P) LTD, New Delhi, 2007) at 234.

⁶²⁹ Lammers, above n 622, at 353.

⁶³⁰ Ved P Nanda “The Law of the Non-Navigational Uses of International Watercourses: Draft Articles on Protection and Preservation of Ecosystems, Harmful Conditions and Emergency Situations, and Protection of Water Installations” (1992) 3 *Colo J Int’l Envtl L & Pol’y* 175 at 189.

⁶³¹ International Law Commission *Draft Articles on Responsibility of States for Internationally Wrongful Acts* [2001] vol 2, part 2 YILC 26 at [76] at 154.

international watercourse would cause significant harm to other watercourse States.⁶³² As McCaffrey points out, that:

“exercising due diligence to prevent trans frontier pollution... generally means adopting and effectively enforcing legislative and administrative measures that protect other [S]tates and areas beyond the limits of national jurisdiction. The standard of protection ... may in some cases be determined by reference to internationally agreed minimum standards in the field.”⁶³³

Whilst in the case of international watercourses, it was opined that it may prove difficult to establish the existence of such minimum standards given the uniqueness of each watercourse and the paucity of instruments in international water law, action plans such as Chapter 18 of Agenda 21 may be of assistance.⁶³⁴ It is not intended to guarantee that in utilizing an international watercourse, significant harm would not occur⁶³⁵ as it is an obligation of conduct⁶³⁶ rather than as to result.⁶³⁷ However, as polluting substances become more dangerous, the level of diligence required also increases.⁶³⁸ Thus, the obligation of due diligence is one that is flexible and takes into account practical realities and difficulties in controlling pollution.⁶³⁹ In the 1941 *Trail Smelter* arbitration,⁶⁴⁰ which involved a dispute between the United States and Canada regarding damage to the United

⁶³² *Corfu Channel (Merits) (United Kingdom v Albania)*, above n 274, at 18; Also see Watts, above n 235, at 1367.

⁶³³ McCaffrey, above n 626, at 439–440; *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; paras 181-189.

⁶³⁴ McCaffrey, above n 626, at 440.

⁶³⁵ International Law Commission *Draft Articles on the Law of the Non-Navigational Uses of International Watercourses and Commentaries Thereto and Resolution on Transboundary Confined Groundwater* [1994] vol 1, pt 2 YILC 89 at 103.

⁶³⁶ At 103; *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; paras 181-182 and 195-197.

⁶³⁷ Boyle, above n 271, at 14–15; Pisillo-Mazzeschi, above n 271, at 24; Handl, above n 271, at 429.

⁶³⁸ McCaffrey, above n 626, at 451.

⁶³⁹ Tanzi, above n 573, at 261.

⁶⁴⁰ *Trail Smelter (United States v Canada)* [1941] III RIAA 1911.

States territory inflicted by sulphur dioxide emissions resulting from smelting plants located in British Columbia, the Arbitration Tribunal held that:⁶⁴¹

“No State has the right to use or permit the use of its territory in such a manner as to cause injury ... in or to the territory of another or the properties or persons therein, when the case is of serious consequences and the injury is established by clear and convincing evidence.”

In making this statement, the Tribunal has effectively qualified the obligation not to pollute by requiring that the pollution be of “serious consequences” and that injury suffered be “established by clear and convincing evidence.”⁶⁴² The threshold for “serious consequences” is equivalent to the term “significant harm”⁶⁴³ as is “seriously” (gravement) relied upon by the International Arbitration Court in *Lake Lanoux Arbitration*. Thus, in its *Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons* first,⁶⁴⁴ then in the *Gabčíkovo-Nagymaros* case,⁶⁴⁵ and again more recently in the *Pulp Mills* case,⁶⁴⁶ the ICJ has endorsed the ‘no significant harm’ obligation as a general rule of international customary law. Moreover, the *Pulp Mills* decision clearly confirms that the State’s obligation towards environmental protection is “vigilance and prevention”, having its origin in due diligence that is required of a State in its territory.⁶⁴⁷ To this end, a watercourse State will be held liable if it is proven that the pollution has caused significant harm and once this threshold is crossed then the State is strictly liable and not only if it is proven by clear and convincing evidence that it had acted unreasonably or negligently.⁶⁴⁸

⁶⁴¹ At 1965.

⁶⁴² Elli Louka *International Environmental Law: Fairness, Effectiveness and World Order* (Cambridge University Press, New York, 2006) at 41.

⁶⁴³ International Law Commission, above n 237, at 108.

⁶⁴⁴ *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)*, above n 605, at 257.

⁶⁴⁵ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, at 78, para 140.

⁶⁴⁶ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 82–84, paras 203–206.

⁶⁴⁷ At 77, para 188.

⁶⁴⁸ Thomas W Merrill “Golden Rules for Transboundary Pollution” (1997) 46 *Duke Law Journal* 931 at 938.

Furthermore, in the *Pulp Mills* case, Argentina claimed that the burden to prove that the mills would not pollute the river fell upon Uruguay, following the precautionary approach. However, the ICJ rejected Argentina's 'precautionary approach' argument under the well-established principle of *onus probandi incumbit actori*; "it is the duty of the party which asserts certain facts to establish the existence of such facts."⁶⁴⁹ Hence, it is the State claiming to have suffered (or may suffer as the case may be) significant harm by pollution, either to its territory or its environment, to establish it using clear and convincing evidence and not the State which allegedly caused significant harm pollution.

'To other Watercourse States or to Their Environment'

It is apparent what "to other watercourse States" mean but the term "environment" of the other Watercourse States is intended to encompass matters, in particular, "the living resources of the watercourse, flora and fauna dependent upon the watercourse, and the amenities connected with it."⁶⁵⁰ It is thus broader than the concept of the "ecosystem approach" to an international watercourse⁶⁵¹ and certainly not limited to the right to an equitable use. Pollution that does not rise to the level of causing significant harm to other Watercourse States or to their environment is not covered under this provision. However, falling short of "significant harm to other Watercourse States or to their environment," the alleged activity or measure could still violate either Article 20,⁶⁵² concerning protection of

⁶⁴⁹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 165.

⁶⁵⁰ Watts, above n 235, at 1404.

⁶⁵¹ Ibid.

⁶⁵² Watercourses States have an obligation, either individually or jointly, to "protect and preserve the ecosystems of the international watercourses."

the ecosystems of international watercourses or Article 23,⁶⁵³ concerning protection and preservation of the marine environment.⁶⁵⁴

Requirement for Harmonization of Policies

For joint actions, Watercourses States are under a positive obligation to “take steps to harmonize their policies”⁶⁵⁵ in order to prevent, reduce and control pollution. The obligation to take joint action also derives from certain general obligations: to “participate in the . . . protection of an international watercourse in an equitable and reasonable manner”⁶⁵⁶ as well as to “cooperate . . . in order to attain . . . adequate protection of an international watercourse”⁶⁵⁷ which may, in some situations, call for joint participation in the application of pollution control measures⁶⁵⁸ through freshwater agreements. These general obligations are also relevant to the duty to harmonize national policies so as to avoid conflicts arising due to divergent policies or application of different standards concerning pollution of international watercourses,⁶⁵⁹ invoking the principle of good faith. It involves two processes; one is the initial achievement of harmonization and the other is the continuing cooperative efforts to maintain harmonization as new pollutants emerge.⁶⁶⁰

⁶⁵³ “Watercourse States shall, individually and, where appropriate, in cooperation with other States, take all measures with respect to an international watercourse that are necessary to protect and preserve the marine environment, including estuaries . . .”

⁶⁵⁴ International Law Commission, above n 608, at 62.

⁶⁵⁵ UN Watercourses Convention; Article 21(2).

⁶⁵⁶ UN Watercourses Convention; Article 5(2).

⁶⁵⁷ UN Watercourses Convention; Article 8.

⁶⁵⁸ International Law Commission, above n 635, at 122–123.

⁶⁵⁹ Owen McIntyre “Environmental Protection of International Rivers: Case Concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia)” (1998) 10 J Environmental Law 79 at 216.

⁶⁶⁰ Watts, above n 235, at 1405.

Mutually Agreeable Measures and Methods

The obligation to prevent, reduce and control pollution that may cause significant harm to other watercourse States or to their environment, has been opined to be an extremely broad-ranging statement, which if it was fully implemented, would seriously limit the non-navigational uses of transboundary watercourses.⁶⁶¹ The third part in relation to pollution control acknowledges this fact and provides that: “Watercourse States shall, at the request of any of them, consult with a view to arriving at mutually agreeable measures and methods to prevent, reduce and control pollution of an international watercourse” such as: (1) setting joint water quality objectives and criteria⁶⁶² (2) establishing techniques and practices to address pollution from point and non-point sources⁶⁶³ and (3) establish lists of substances the introduction of which into the waters of an international watercourse is to be prohibited, limited, investigated or monitored.⁶⁶⁴ This part of the obligation, which requires joint action as well, can also be regarded as giving specific effect to the general obligations to: cooperate⁶⁶⁵ on an equitable basis,⁶⁶⁶

⁶⁶¹ Peter Beaumont “The 1997 UN Convention on the Law of Non-navigational Uses of International Watercourses: Its Strengths and Weaknesses from a Water Management Perspective and the Need for New Workable Guidelines” (2000) 16 International Journal of Water Resources Development 475 at 484–485.

⁶⁶² UN Watercourses Convention; Article 21(1). Such criteria would have to be set at a level that would permit the water of the river to be used for certain purposes, whilst at the same time ensuring that the highest possible quality of the river ecosystem is maintained. It has also been suggested that this would reduce State discretion and enjoin Watercourse States to national measures to implement joint objectives set at regional levels; At 485; Nahid Islam *The Law of Non-navigational Uses of International Watercourses* 8 (Kluwer Law International, Alphen aan den Rijn, 2010) at 223.

⁶⁶³ UN Watercourses Convention; Article 21(2). This extends the scope of management of pollution from the watercourse to land-based activities from around the watercourse that may affect the quality of its waters. At 223.

⁶⁶⁴ UN Watercourses Convention; Article 21(3).

⁶⁶⁵ “1. Watercourse States shall cooperate ... in order to attain optimal utilization and adequate protection of an international watercourse.” UN Watercourses Convention; Article 8.

⁶⁶⁶ International Law Commission, above n 608, at 62.

“participate in the . . . protection of an international watercourse . . .”⁶⁶⁷ and “... take all appropriate measures . . . in consultation with the affected State, to eliminate or mitigate . . . harm . . .”⁶⁶⁸ This puts into practical effect the duty to exercise due diligence that is required to avoid causing significant harm. The three measures and methods to prevent, reduce and control pollution are discussed in turn.

Whilst the UN Watercourses Convention provides for joint water quality objectives and criteria, the Berlin Rules deal with water quality standards separately from pollution control. It specifically provides, without any qualification, that “States shall establish water quality standards that preserve the appropriate quality of waters” for human needs and health as well as the aquatic environment.⁶⁶⁹ The standards, as a minimum, are to include specific quality objectives for all waters within a riparian States’ control as well as objectives applicable to a basin or part thereof.⁶⁷⁰ In other words, the Berlin Rules provide for water quality standards taking an integrated approach to water resources management. Additionally, the Rules provide that “States shall take all appropriate measures to assure compliance” with environmental quality standards.⁶⁷¹

Further to the above, the Berlin Rules specifically provide that “States shall ensure that wastes, pollutants, and hazardous substances are handled, treated, and disposed of using the best available techniques or the best environmental practices, as appropriate to protect the aquatic environment.”⁶⁷² As stated earlier, the UN Watercourses Convention does not define pollutants and does not address any specific types of pollutants either. It does, however, state the requirement for

⁶⁶⁷ UN Watercourses Convention; Article 5(2).

⁶⁶⁸ McIntyre, above n 659, at 217; UN Watercourses Convention; Article 7(2).

⁶⁶⁹ Berlin Rules; Article 28(1).

⁶⁷⁰ Berlin Rules; Article 28(2).

⁶⁷¹ Berlin Rules; Article 27(2).

⁶⁷² Berlin Rules; Article 27(3).

establishing techniques and practices to address pollution from point and non-point sources. Again, although it has not stated “best available techniques” or “best environmental practices,” this can be read into the provision given that the provision does require establishment of “techniques and practices” to address pollution from point and non-point sources.

The practice of establishing lists of substances whose discharge into international watercourses is either prohibited or subject to special regulation has been followed in a number of international agreements.⁶⁷³ Such substances are principally those that are toxic, persistent or bio accumulative, which makes them particularly dangerous and long-lasting in nature.⁶⁷⁴ The Berlin Rules specifically, and separately from its Articles dealing with pollution and environmental quality standards, provides that “States shall take all appropriate measures to prevent the introduction of hazardous substances into the waters subject to its jurisdiction or control.”⁶⁷⁵ According to the commentary to the UN Watercourses Convention, this part of the obligation to control pollution is applicable to “dangerous substances that should be subjected to special controls” due to their toxic, persistent or bioaccumulative characteristic.⁶⁷⁶

⁶⁷³ Watts, above n 235, at 1405. These include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 28 ILM 649 (opened for signature 22 March 1989, entered into force 5 May 1992), the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 38 ILM 1 (opened for signature 11 September 1998, entered into force 24 February 2004) and the Stockholm Convention on Persistent Organic Pollutants 40 ILM 532 (opened for signature 23 May 2001, entered into force 17 May 2004). Three Conventions, developed under the auspices of the UNEP, together provide an international framework governing the environmentally sound management of hazardous chemicals throughout their lifecycles.

⁶⁷⁴ Example given later in this chapter is the practice in EU. Also see International Law Commission, above n 608, at 61.

⁶⁷⁵ Berlin Rules; Article 26.

⁶⁷⁶ International Law Commission, above n 608, at 61 and 63.

As already stated, the biggest polluter of international rivers is industrial waste. The Tribunal in the *Lake Lanoux Arbitration* stated that:⁶⁷⁷

“... States are today perfectly conscious of the importance of the conflicting interests brought into play by the industrial use of international rivers, and of the necessity to reconcile them by mutual concessions. The only way to arrive at such compromises of interests is to conclude agreements on an increasingly comprehensive basis. International practice reflects the conviction that States ought to strive to conclude such agreements; there would thus appear to be an obligation to accept in good faith all communications and contacts which could, by a broad confrontation of interests and by reciprocal good will, provide States with the best conditions for concluding agreements.”

Thus, the Arbitration Tribunal drew a nexus between mutual concessions and benefits from concluding comprehensive agreements aiming for the prevention, control and reduction of pollution, especially from industrial effluents. This was reiterated by the ICJ in the *Pulp Mills* case in the following terms:⁶⁷⁸

“The attainment of optimum and rational utilization requires a balance between the Parties’ rights and needs to use the river for economic and commercial activities on the one hand, and the obligation to protect it from any damage to the environment that may be caused by such activities on the other.”

This links the economic uses of rivers with the environmental factors, which is the essence of the concept of sustainable development. To the point where a balance should be struck between the protection of the environment and the right of the States to (an equitable) use the waters of a shared river,⁶⁷⁹ the focus of the obligation is not so much on an imposition of strict liability where States fail to prevent significant pollution harm but a “general standard of reciprocity, [which] provide[s] a better foundation for building a consensus for meaningful regulation

⁶⁷⁷ *Lake Lanoux Arbitration (France v Spain)*, above n 619, at 129–130.

⁶⁷⁸ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 175.

⁶⁷⁹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 74–75; para 177 citing *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163. Also see Ilias Plakokefalos “The Pulp Mills Case” (2011) 26 *International Journal of Marine and Coastal Law* 169 at 175–176.

of transboundary pollution.”⁶⁸⁰ In the *Pulp Mills* case, the ICJ discussed Argentina’s and Uruguay’s obligations to adopt rules and measures individually to “protect and preserve the aquatic environment and, in particular, to prevent its pollution” distinct from regulatory functions entrusted to CARU (an institute established under the Treaty).⁶⁸¹ To this end, both Argentina and Uruguay were to prevent any transboundary pollution by coordinating, through CARU, adoption of the necessary measures.⁶⁸² Whilst the UN Watercourses Convention does not obligate watercourse States to establish a watercourse institute to serve as a forum to come to mutually agreeable methods and measures, the ICJ observed that the obligation to prevent transboundary pollution comprises of not only in the adoption of a regulatory framework through a watercourse institute but also in the observance as well as enforcement by Parties of the measures adopted.⁶⁸³ The Court considered that the obligation to adopt regulatory or administrative measures either individually or jointly and to enforce them is an obligation of specific conduct.⁶⁸⁴ It would constitute the exercise of due diligence in acting through an institute for the necessary measures to preserve the ecological balance of a watercourse.⁶⁸⁵

Therefore, the UN Watercourses Convention provides for unilateral and joint actions to prevent, reduce and control pollution of international river basins to the extent that an activity or project “may cause significant harm” to another

⁶⁸⁰ Merrill, above n 648, at 937. Under international law, all rights of an international character come with obligations. It is a well established principle that where, in exercising a legal right, a State breaches its obligations by acts and/or omissions (and this is established) thereby committing what is called “an internationally wrongful act”, international responsibility is established immediately. The State is accordingly held liable. This is based on breaches of international obligations pertaining to primary or substantive obligations and secondary obligations of responsibility. See International Law Commission, above n 631, at 28 and 29.

⁶⁸¹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 79, para 195.

⁶⁸² At 76, para 185.

⁶⁸³ Ibid.

⁶⁸⁴ At 77, para 187.

⁶⁸⁵ Ibid.

watercourse State or to its environment. In doing so, this provision supports the application of the precautionary principle, use of the best available technology and best environmental practices. Given that it is consensus-based, the provision does not impose the polluter-pays principle though it has been described as a “general principle of international environmental law”⁶⁸⁶ but is a matter that would be addressed if a significant harm pollution case is dealt with either through the ICJ or the Permanent Court of Arbitration. What is lacking, which has been provided for under the Berlin Rules, is elimination of certain types of pollutants which are considered hazardous. While the UN Watercourses Convention captures this under the general obligation to control pollution, it is not enough given the toxic, persistent or bioaccumulative characteristic of certain types of pollutants. So this is one area under the UN Watercourses Convention that needs to be addressed in the overall framework for dealing with pollution of international rivers. Also, whilst it provides for joint quality standards, indicating an integrated approach, this needs to be spelled out.

3.4 *The European Framework*

The legal framework with regards to qualitative aspects of international river basin management within the EU region mainly comes from the UNECE Water Convention, the Water Framework Directive, the Environmental Quality Standards Directive⁶⁸⁷ and specific treaties governing individual basins such as the Convention on Cooperation for the Protection and Sustainable Use of the Danube River⁶⁸⁸ and the Convention on the Protection of the Rhine.⁶⁸⁹

⁶⁸⁶ International Convention on Oil Pollution Preparedness, Response and Co-Operation 1891 UNTS 51 (opened for signature 30 November 1990, entered into force 13 May 1995); Preamble, para 7.

⁶⁸⁷ Directive 2008/105/EC, above n 171.

⁶⁸⁸ Convention on Co-Operation for the Protection and Sustainable Use of the Danube River, International Commission for the Protection of the Danube River reprinted in OJ L 342/19, 12 December 1997 (adopted 29 June 1994, entered into force 22 October 1998). Available at <http://www.icpdr.org/main/icpdr/danube-river-protection-convention>

⁶⁸⁹ Convention on the Protection of the Rhine reprinted in OJ L 289/31, 16 November 2000 (adopted 12 April 1999, entered into force 1 January 2003). Available at

Collectively, these rules, which prescribe legal duties and obligations, seek to address water quality concerns, including but not limited to, at the basin level. The first two legal instruments are discussed in turn.

3.4.1 UNECE Water Convention

The main goal of the UNECE Water Convention is to “prevent, control and reduce any transboundary impact”, in particular, but not limited, to establish a framework for bilateral or multilateral cooperation “[t]o prevent, control and reduce pollution of waters causing or likely to cause transboundary impact ...”⁶⁹⁰ ‘Transboundary impact’ has been defined to mean:⁶⁹¹

“any significant adverse effect on the environment resulting from a change in the conditions of transboundary waters caused by a human activity, the physical origin of which is situated wholly or in part within an area under the jurisdiction of a party, within an area under the jurisdiction of another party.”

This encapsulates both harm to the waters of the watercourse deriving from activities and harm caused by uses of the waters of the watercourse.⁶⁹² Like the UN Watercourses Convention, the provision does not seek elimination of pollution but goes on to specify that significant adverse effects on the environment include “effects on human health and safety, flora, fauna, soil, air, water”⁶⁹³ However, unlike the UN Watercourses Convention, it requires that measures for the prevention, control and reduction of water pollution should be taken, where possible, at source.⁶⁹⁴ Its guiding principles are the precautionary principle, the polluter-pays principle and sustainable water resources

http://www.iksr.org/fileadmin/user_upload/Dokumente_en/Convention_on_the_Protection_of_the_Rhine_12.04.99-EN_01.pdf

⁶⁹⁰ UNECE Water Convention; Article 2(1) and (2)(a), respectively.

⁶⁹¹ UNECE Water Convention; Article 1(2).

⁶⁹² Tanzi, above n 573, at 63.

⁶⁹³ UNECE Water Convention; Article 1(2).

⁶⁹⁴ UNECE Water Convention; Article 2(3).

management, with an ecosystems approach.⁶⁹⁵ The UNECE Water Convention also expressly obliges Member States to employ best available technology,⁶⁹⁶ and best environmental practices⁶⁹⁷ as far as possible.⁶⁹⁸ It also expressly encourages Parties to adopt and implement more stringent measures than those set down by the Convention.⁶⁹⁹

For Riparian Parties specifically, the UNECE Water Convention encourages them to “cooperate ... in order to develop harmonized policies, programmes and strategies ... aimed at the prevention, control and reduction of transboundary impact and ... protection of the environment of transboundary waters or the environment influenced by such waters.”⁷⁰⁰ To this end, unlike the UN Watercourses Convention, the Convention urges Parties, on the basis of equality and reciprocity, to enter into bilateral or multilateral agreements or other arrangements in order to define their mutual relations and conduct regarding the prevention, control and reduction of transboundary impact, which would *inter alia* provide for the establishment of joint bodies.⁷⁰¹ It further prescribes tasks for the joint bodies, as they relate to the prevention, control and reduction of pollution, which are to:⁷⁰² collect, compile and evaluate data in order to identify pollution sources likely to cause transboundary impact and to draw up inventories and exchange information on these sources; elaborate joint monitoring programmes concerning water quality and quantity; elaborate emission limits for waste water and evaluate the effectiveness of control programmes; elaborate joint water-

⁶⁹⁵ UNECE Water Convention; Article 2(5) and 3(1)(i).

⁶⁹⁶ UNECE Water Convention; as defined in Annex I.

⁶⁹⁷ Guidelines for developing best environmental practices are given in Annex II of the UNECE Water Convention.

⁶⁹⁸ UNECE Water Convention; Article 3(1).

⁶⁹⁹ UNECE Water Convention; Article 2(8).

⁷⁰⁰ UNECE Water Convention; Article 2(6).

⁷⁰¹ UNECE Water Convention; Article 9(1) and (2). Joint body means “any bilateral or multilateral ... institutional arrangements for cooperation between Riparian Parties”; Article 1(5).

⁷⁰² UNECE Water Convention; Article 9(2)(a)-(f) and (i).

quality objectives and criteria⁷⁰³ and propose relevant measures for maintaining and, where necessary, improving the existing water quality; develop concerted action programmes for the reduction of pollution loads from both point sources and diffuse sources; and promote cooperation and exchange of information on the best available technology, as well as encourage cooperation in scientific research programmes.

For the purpose of jointly monitoring and assessing the condition of the shared waters, the Riparian Parties are under an obligation to establish and implement joint programmes, agree upon pollution parameters and pollutants whose discharges and concentrations would be regularly monitored and at regular intervals, carry out joint or coordinated assessments of the conditions of the transboundary waters and the effectiveness of measures taken for the prevention, control and reduction of transboundary impact.⁷⁰⁴ For these purposes, Riparian Parties are to harmonize rules for the setting up and operation of monitoring programmes, measurement systems, devices, analytical techniques, data processing and evaluation and methods for registering pollutants discharged.⁷⁰⁵ Thus, there two main approaches to preventing, controlling and reducing water pollution in the EU: (1) the “water quality objective approach” and (2) the “emission limits value approach.” While the former sets minimum quality requirements for waters, the latter establishes maximum allowed quantities for pollutants discharged to watercourses.⁷⁰⁶ These obligations are further exemplified under the Water Framework Directive.

⁷⁰³ In this regard, the Riparian States are under an obligation to undertake specific research and development activities in support of achieving and maintaining the water-quality objectives and criteria: UNECE Water Convention; Article 12.

⁷⁰⁴ UNECE Water Convention; Article 11(1)-(3), respectively.

⁷⁰⁵ UNECE Water Convention; Article 11(4).

⁷⁰⁶ United Nations Economic Commission for Europe *Strategies for Monitoring and Assessment of Transboundary Rivers, Lakes and Groundwaters* (UN Publications, New York, Geneva, 2006) at 6. Available at

<http://www.unece.org/fileadmin/DAM/env/water/publications/documents/StrategiesM&A.pdf>

3.4.2 Water Framework Directive

The purpose of the Water Framework Directive is to establish a framework for the protection of European, including but not limited to, river basins through pollution prevention and control, which would inter alia, contribute to: “the provision of the sufficient supply of good quality surface water ... as needed for sustainable, balanced and equitable water use” as well as “the objectives of relevant international agreements, including those which aim to prevent and eliminate pollution of the marine environment...” contributed to by land-based sources.⁷⁰⁷

Water Quality Objectives

As already mentioned, the key objective of the Water Framework Directive is to achieve “good water status.” This comprises the objective of “good surface water status”; achieved by a surface water body when both its ecological⁷⁰⁸ and chemical statuses⁷⁰⁹ are at least “good” – in terms of not just quantity but quality as well.⁷¹⁰ ‘Good surface water chemical status’ is the chemical status required to meet the environmental objectives for surface water; in other words, it is the chemical status achieved by a body of surface water in which concentrations of pollutants do not exceed the established environmental quality standards.⁷¹¹ Pollution has been defined as “the direct or indirect introduction, as a result of human activity, of substances ... into the ... water ... which may be harmful to

⁷⁰⁷ Water Framework Directive; Article 1(c) and (e).

⁷⁰⁸ An expression of the quality of surface waters, classified in accordance with Annex V; Water Framework Directive; Article 2(21).

⁷⁰⁹ Achieved by a body of surface water in which concentrations of pollutants do not exceed the environmental quality standards established in Annex IX, under Article 16(7), and under other relevant legislation setting environmental quality standards at the EU level; Water Framework Directive; Article 2(24).

⁷¹⁰ Water Framework Directive; Article 2(18).

⁷¹¹ Water Framework Directive; Annex IX and under Article 16(7), and under other relevant Community legislation setting environmental quality standards at Community level. See Article 2(24).

human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems, ...which impair or interfere with ... legitimate uses of the environment.” The aim of the Water Framework Directive is to cease or be phase out discharges, emissions and losses of priority hazardous substances so as to contribute to achieving concentrations in the marine environment near background values for naturally occurring substances as well as to progressively reduce pollution from priority substances.⁷¹² To this end, Member States are under an obligation to adopt measures which would otherwise prevent them from achieving good surface water status.⁷¹³ This entails identifying “priority substances” which are causing “significant risk” pollution and compliance with the EU environmental quality standards established to deal with such pollutants.

Environmental Quality Standards for Priority Substances

As part of its “strategies against pollution of water,” the Water Framework Directive requires the European Commission to identify priority substances among those pollutants,⁷¹⁴ which present “significant risk” to or via, animal and plant life in the aquatic environment and to the human health⁷¹⁵ and to set EU Environmental Quality Standards for those substances in water⁷¹⁶ as well as in sediment and/or biota.⁷¹⁷ Thus, the Environmental Quality Standards Directive⁷¹⁸

⁷¹² Water Framework Directive; Preamble, paras (27) and (43) and Article 4(1)(iv).

⁷¹³ Water Framework Directive; Preamble, para 45.

⁷¹⁴ “Pollutant” has been defined as “any substance liable to cause pollution, in particular those listed in Annex VIII.” Water Framework Directive; Article 2(29).

⁷¹⁵ Directive 2008/105/EC, above n 171; para 1.

⁷¹⁶ Water Framework Directive; Article 16(1).

⁷¹⁷ See European Union *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 25 on Chemical Monitoring of Sediment and Biota under the Water Framework Directive* (Office for Official Publications of the European Communities, Luxembourg, 2010). Available at <https://circabc.europa.eu/sd/a/7f47ccd9-ce47-4f4a-b4f0-cc61db518b1c/Guidance%20No%2025%20-%20Chemical%20Monitoring%20of%20Sediment%20and%20Biota.pdf>

has harmonized environmental quality standards for 41 dangerous chemical substances, including 33 priority substances (ranging of industrial chemicals, plant protection products and metals/metal compounds)⁷¹⁹ and 8 other pollutants. In essence, the environmental quality standards are the “maximum acceptable concentration and/or annual average concentration” which, if met, allows the chemical status of the water body to be described as ‘good.’⁷²⁰ Whilst Member States have been given an option to derive environmental quality standards for the 41 dangerous chemical substances in sediment and/or biota at the national level (so long as they can afford the same level of protection as that established at the European Community level),⁷²¹ for prescribed environmental quality standards, distinction is drawn between ‘Priority Dangerous Substances’ and ‘Priority Hazardous Substances’, whereby more restrictive actions have been put in place for Priority Hazardous Substances because of their persistence, bioaccumulation and/or toxicity or equivalent level of concern.⁷²² The Water Framework Directive states that in identifying priority hazardous substances, account should be taken of the precautionary principle.⁷²³ In addition, the objective of good ecological status requires that for chemicals identified as substances of concern at local/river-basin/national level but not as priority substances at EU level, standards have to be set at national levels.⁷²⁴ These chemicals are known as river basin specific

⁷¹⁸ Directive 2008/105/EC, above n 171.

⁷¹⁹ European Commission *Proposal for a Directive of the European Parliament and of the Council amending Directives 2000/60/EC and 2008/105/EC as regards Priority Substances in the Field of Water Policy* COM(2011) 876 Final (EC, 2012) at 2. Available at http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2012/com_2011_0876_en.pdf

⁷²⁰ European Communities *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 27 - Technical Guidance for Deriving Environmental Quality Standards* (European Communities, 2011) at 9. Available at <https://circabc.europa.eu/sd/a/0cc3581b-5f65-4b6f-91c6-433a1e947838/TGD-EQS%20CIS-WFD%2027%20EC%202011.pdf>

⁷²¹ See European Union, above n 717, at 1.

⁷²² European Commission, above n 719, at 2; Water Framework Directive; Article 2(29).

⁷²³ Water Framework Directive; Preamble, para 44.

⁷²⁴ European Commission, above n 719, at 3.

pollutants.⁷²⁵ Therefore, selection of quality elements for the purpose of chemical status monitoring includes priority list substances discharged into the river basin. Other pollutants also need to be monitored if they are discharged in “significant quantities.”⁷²⁶ Whilst a definition of ‘significant’ has not been given, quantities that could compromise the achievement of one of the Directive’s objectives would clearly be significant.⁷²⁷ Examples given by the European Commission include “a discharge that impacted a Protected Area, or caused exceedance of any national standard set under Annex V 1.2.6 of the Water Framework Directive or caused a biological or ecotoxicological effect in a water body would be expected to be significant.”⁷²⁸ Whilst Member States are encouraged to deal with chemicals at the basin level, they would have to bear in mind that any development in water status would have to be monitored on a systematic and comparable basis throughout the European Community.⁷²⁹

⁷²⁵ Ibid.

⁷²⁶ Water Framework Directive; Annex V, para 1.1.1.

⁷²⁷ European Communities *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 19 – Guidance on Surface Water Chemical Monitoring under the Water Framework Directive* (Office for Official Publications of the European Communities, Luxembourg, 2009) at 9. Available at <https://circabc.europa.eu/sd/a/e54e8583-faf5-478f-9b11-41fda9e9c564/Guidance%20No%2019%20-%20Surface%20water%20chemical%20monitoring.pdf>

⁷²⁸ At 9; Also see European Commission *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 7 - Monitoring under the Water Framework Directive* Working Group 2.7 (Office for Official Publications of the European Communities, Luxembourg, 2003). Available at [https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20\(WG%202.7\).pdf](https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf)

⁷²⁹ European Communities, above n 727, at 7.

Furthermore, the Marine Strategy Framework Directive of 2008,⁷³⁰ which is intended to extend the ecosystems approach by linking integrated freshwater resource management with the marine environment, will address the issue of land-based marine pollution within the EU overall. Whilst the European Commission has confirmed that there is an overlap between the Water Framework Directive and the Marine Strategy Framework Directive regarding chemical pollutants in territorial waters, at that same time the Commission has acknowledged that there is a gap between monitoring activities for both Directives and has therefore proposed that a link between the two be established.⁷³¹ Together, these quality standards are expected to translate the concept of ‘good status’ into transparent numerical values based on best available science and knowledge.⁷³² To this end, the European Commission has acknowledged that its guidance to Member States as to the monitoring of chemical status is based on “current state of technical development in a field that is undergoing continuous changes through ongoing scientific research,” which denotes that the guidance is open to “continuous improvements” with possible updates along the 6 years river basin management cycle of the Directive.⁷³³ The list of priority substances, however, is to be revised every 4 years.⁷³⁴ Thus, the environmental quality standards are tools for assessing the chemical status of water bodies but mechanisms for which differ based on whether pollutants are from point or diffuse sources.

⁷³⁰ Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy. OJ L 164/19, 25 June 2008.

⁷³¹ European Communities, above n 727, at 5.

⁷³² European Commission “Environment: Commission Welcomes EP Vote on Water Quality Standards” (17 June 2008). Available at http://europa.eu/rapid/press-release_IP-08-958_en.htm

⁷³³ European Communities, above n 727, at 5.

⁷³⁴ Water Framework Directive; Article 16(4).

The Combined Approach to Pollution Prevention and Control

The mechanisms for pollution control have previously followed two competing concepts: (1) the use of environmental quality standards⁷³⁵ applicable to the water body (for diffuse sources) and (2) the use of emission limit values (for point sources).⁷³⁶ These have now been brought together based on the combined approach.⁷³⁷ The Water Framework Directive has established a new regime for the prevention and control of pollution of surface water by requiring Member States to ensure that all discharges⁷³⁸ and emissions are controlled according to the combined approach.⁷³⁹ To this end, Member States are under an obligation to ensure the establishment and/or implementation of:⁷⁴⁰ (a) the emission controls based on best available techniques, or (b) the relevant emission limit values, or (c) in the case of diffuse impacts, the controls including, as appropriate, best environmental practices. Thus, those discharging chemical pollutants into watercourses will be subject to controls that will limit their emissions from point sources, while at the same time, the relevant authorities will set numerical standards for chemicals in the receiving watercourses.⁷⁴¹ These reflect the required ecological status of the waters and provide upper limits of concentrations for pollutants discharged from point sources together with any such pollutants that

⁷³⁵ “Environmental quality standard” means the concentration of a particular pollutant or group of pollutants in water, sediment or biota which should not be exceeded in order to protect human health and the environment. Water Framework Directive; Article 2, para 35.

⁷³⁶ Emission limit values means the mass, expressed in terms of certain specific parameters, concentration and/or level of an emission, which may not be exceeded during any one or more periods of time. Such values may also be laid down for certain groups, families or categories of substances. See Water Framework Directive; Article 2, para 40 and Article 16.

⁷³⁷ Water Framework Directive; Article 2, para 36 and Article 10.

⁷³⁸ Comprising of point, diffuse and accidental releases. European Communities, above n 727, at 9.

⁷³⁹ Water Framework Directive; Article 10.

⁷⁴⁰ Water Framework Directive; Article 10(2)(a)-(c), respectively.

⁷⁴¹ Peter A Chave *The EU Water Framework Directive: An Introduction* (IWA Publishing, London, 2001) at 14.

have also gained access through diffuse sources.⁷⁴² In addition, the Directive provides that where a quality objective or quality standard requires stricter conditions than those imposed under the Directive, more stringent emission controls are to be set accordingly,⁷⁴³ just as is promoted under the UNECE Water Convention.

Chemical Status Monitoring and Assessment

Based on characterisation of the river basin and ascertainment of the impact of human activity on the waters against the environmental objective of good chemical status,⁷⁴⁴ the Member States are required to undertake chemical status monitoring using chemical parameters.⁷⁴⁵ In order to monitor the chemical status of surface water, the Water Framework Directive requires Member States to establish programmes in order to ascertain a coherent and comprehensive overview of water status within each river basin district, covering, but not limited to, the ecological and chemical status.⁷⁴⁶ Programme of measures established by Member States, as a basin minimum, has to consist of:⁷⁴⁷ (1) regulations for emission controls for point source discharges liable to cause pollution and (2) regulations to prevent or control the input of such pollutants from diffuse sources liable to cause pollution. In addition to its objective to deal with priority list substances, the Water Framework Directive also considers that “[t]here is a need to prevent or reduce that impact of incidents in which water is accidentally polluted.

⁷⁴² At 14.

⁷⁴³ Water Framework Directive; Article 10(3).

⁷⁴⁴ Water Framework Directive; Article 11(1).

⁷⁴⁵ Philippe Quevauviller “Water Status Monitoring under the WFD” in Philippe P Quevauviller, Ulrich Borchers, Clive Thompson and Tristan Simonart (eds) *The Water Framework Directive: Ecological and Chemical Status Monitoring* (John Wiley & Sons, West Sussex, 2008) at 5.

⁷⁴⁶ Water Framework Directive; Article 8(1)(ii).

⁷⁴⁷ Water Framework Directive; Article 3(g) and (h).

Member States must include measures with the aim of doing so in the programme of measures.”⁷⁴⁸

As for monitoring of the chemical status of surface waters, there are three types of monitoring:⁷⁴⁹ (1) surveillance, which measures pollution load across boundaries and on to the marine environment, (2) operational, which is undertaken for water bodies identified at risk of failing to meet the environmental objectives and for those water bodies into which priority list substances are discharged and (3) investigative, to deal with matters including accidental pollution. In order to improve and coordinate water monitoring and pollution control as provided for under the Water Framework Directive,⁷⁵⁰ the Commission Directive 2009/90/EC has laid down technical specifications for chemical analysis and provides for standardized methods for analysis and monitoring of water status.⁷⁵¹ Classification criteria are employed to transform monitoring into assessment. The minimum performance criteria for all methods of analysis applied are fixed.⁷⁵² In the absence of relevant environmental quality standard or method of analysis meeting the minimum performance criteria, monitoring is carried out using best available techniques (not entailing excessive costs).⁷⁵³ In addition, the Water Framework Directive states that the standards for the monitoring of quality elements for physico-chemical parameters shall be “any relevant CEN/ISO standards or such

⁷⁴⁸ Water Framework Directive; Preamble, para 39.

⁷⁴⁹ Water Framework Directive; Annex V, para 1.3.

⁷⁵⁰ Water Framework Directive; As per Articles 8(3) and 21.

⁷⁵¹ See Commission Directive 2009/90/EC of 31 July 2009 Laying Down, Pursuant to Directive 2000/60/EC of the European Parliament and of the Council, Technical Specifications for Chemical Analysis and Monitoring of Water Status. OJ L 201/36, 31 July 2009; Article 1; and Miloš Gregor “Surface- And Groundwater Quality Changes in Periods of Water Scarcity” (PhD Research, Comenius, 2013) for a discussion on water quality.

⁷⁵² See Water Framework Directive; Article 4(1) for details and Ronald E Hester and Roy M Harrison *Sustainable Water* (Royal Society of Chemistry, Cambridge, 2011) at 58.

⁷⁵³ Water Framework Directive; Article 4(2).

other national or international standards which will ensure the provision of data of an equivalent scientific quality and comparability.”⁷⁵⁴

The monitoring frequencies required under the Water Framework Directive is once-a-month for priority substances⁷⁵⁵ and once-per-three-months for river basin specific pollutants but for sediment and biota, the frequency can be once per year unless technical knowledge and expert judgment justify another interval.⁷⁵⁶ It is recommended that Member States assess:⁷⁵⁷ (1) compliance with the no deterioration objective of the Water Framework Directive, (2) the long-term changes in natural conditions as well as, (3) the long-term changes resulting from widespread anthropogenic activities. These assessments are then reported to the EC in the RBMPs.

River Basin Management Plans

The control of chemical (and biological) pollution is of key significance in protecting ecosystems⁷⁵⁸ for which the Water Framework Directive requires a systematic monitoring of chemical parameters as part of its management of river basins. The monitoring data is used for classifying water status, to identify possible pollution trends and address them accordingly. The Water Framework Directive requires (among other matters) that RBMPs include:⁷⁵⁹ an estimation of point and diffuse source pollution, a map of monitoring networks to deal with pollution, a summary of programme of measures established by Member States, a summary of controls adopted for point source discharges, a summary of measures taken to deal with priority substances, a summary of measures taken to prevent or

⁷⁵⁴ Water Framework Directive; Annex V.1.3.6.

⁷⁵⁵ Water Framework Directive; Annex V 1.3.4; Also see European Commission, above n 727, at 15; and European Commission, above n 728.

⁷⁵⁶ European Union, above n 717, at 9.

⁷⁵⁷ At 2–3.

⁷⁵⁸ United Nations World Water Assessment Programme, above n 18, at 132.

⁷⁵⁹ Water Framework Directive; Annex VII, paras (1), (2), (4) and (7).

reduce the impact of accidental pollution incidents as well as a summary of measures taken for water bodies which are unlikely to achieve good chemical status and details of supplementary measures identified as necessary to meet the objective of good chemical status together with details on measures taken to avoid increases in the pollution of the marine waters.

The first set of river basin management plans of 2009 reviewed by the Commission revealed that there is a “clear gap in monitoring” ecological and chemical status and that “some countries show important gaps in the development and application of assessment methods.”⁷⁶⁰ The Commission concluded that good status will not be reached in 2015 for a significant proportion of water bodies in Europe⁷⁶¹ and that whilst the chemical quality of the water bodies has significantly improved in the last 30 years, pollution remains one of the main pressures on the water environment.⁷⁶² The Commission has therefore recommended that Member States “[i]mprove and expand monitoring and assessment tools to ensure a statistically robust and comprehensive picture of the status of the aquatic environment for the purpose of further planning.”⁷⁶³

Dealing with the Evolving Nature of Pollution

As a strategy for dealing with pollution of water from chemicals, the Water Framework Directive requires the European Commission to review regularly its list of priority substances, identified among those that pose a significant risk to or via the aquatic environment.⁷⁶⁴ The Directive also provides a mechanism for

⁷⁶⁰ European Commission, above n 8, at 7.

⁷⁶¹ The Water Framework Directive recognises that good status might take more time in some water bodies. For this reason, it allows Member States to rely on an exemption on the basis of the natural conditions of the water body, and to extend the deadline up to 2027 or beyond. See Article 4(4)(c); and European Commission, above n 8, at 6.

⁷⁶² At 6.

⁷⁶³ At 8.

⁷⁶⁴ Water Framework Directive; Article 16(1).

renewing these standards and establishing new ones by means of a prioritization mechanism for hazardous chemicals.⁷⁶⁵ This will ensure at least a minimum chemical quality, particularly in relation to very toxic substances, everywhere in the European Community.⁷⁶⁶ Recently, the European Commission proposed to add 15 new chemical substances to the list of priority substances through a draft directive following a risk assessment based on scientific evidence of some 2000 substances in terms of their concentration in surface waters, their hazardousness and their production and use.⁷⁶⁷

The main features of the proposal are: 15 additional priority substances, 6 of them designated as priority hazardous substances; stricter environmental quality standards for four existing priority substances and slightly revised environmental quality standards for three others; the designation of two existing priority substances as priority hazardous substances; the introduction of biota standards for several substances; provisions to improve the efficiency of monitoring and the clarity of reporting with regard to certain substances behaving as ubiquitous persistent, bio accumulative and toxic (PBT) substances; and a provision for a watch-list mechanism designed to allow targeted EU-wide monitoring of substances of possible concern to support the prioritization process in future reviews of the priority substances list.⁷⁶⁸ It is noted that the Commission has included pharmaceuticals in the list for the first time. To enter into force, it needs formal approval by the European Parliament and by the Council (after the plenary

⁷⁶⁵ Hans Bressers and Stefan Kuks *Integrated Governance and Water Basin Management: Conditions for Regime Change and Sustainability* (Kluwer Academic Publishers, Dordrecht, 2004) at 9.

⁷⁶⁶ Ibid.

⁷⁶⁷ HighBeam Research “Environment: Commission Tightens Water Quality Standards” *Europe Agri.* (online ed, 10 February 2012) <http://www.highbeam.com/doc/1G1-279884966.html>

⁷⁶⁸ European Commission, above n 719.

vote in Parliament).⁷⁶⁹ In agreement with Member States, the European Parliament has added 12 new substances to the EU list of Priority Substances. For the first time, three pharmaceuticals have also been included on a “watch list” (due to much opposition) of emerging pollutants that could later be added to the priority list.⁷⁷⁰

Therefore, the regime for pollution prevention and control in the EU employs the subsidiarity and proportionality principles⁷⁷¹ with the aim to enhance protection and improve the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances.⁷⁷² Whilst priority substances are identified and environmental quality standards are harmonized at the EU level, specific and additional pollution control measures are left to the Member States that can choose the most effective way of achieving the objective of good chemical status taking into account local conditions.⁷⁷³ Member States report their progress in controlling pollution against the environmental objectives in the RBMPs, which are then scrutinized by the European Commission. The Commission then makes recommendations based on gaps identified in the RBMPs. Thus, whilst the regime is comprehensive and ambitious, it is, at the same time flexible.

⁷⁶⁹ Council of European Union “The Council and the European Parliament Reach Informal Agreement on Priority Substances in the Field of Water Policy” (17 April 2013). Available at http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/136826.pdf.

⁷⁷⁰ European Parliament/News “Surface Waters: 12 New Controlled Chemicals, Three Pharmaceuticals on Watch List” (2 July 2013). Available at <http://www.europarl.europa.eu/news/en/news-room/content/20130701IPR14760/html/Surface-waters-12-new-controlled-chemicals-three-pharmaceuticals-on-watch-list>.

⁷⁷¹ European Commission, above n 719, at 6.

⁷⁷² Water Framework Directive; Article 1(c).

⁷⁷³ European Commission, above n 719, at 6.

3.5 Case Studies

The following looks at the extent of pollution in the Jordan, the Nile and the Indus River Basins and the level to which riparian States have cooperated thus far to address the threat of pollution in their respective river basins.

3.5.1 Pollution of the Jordan River Basin

Differences in water quality between the upper and the lower Jordan River Basin are significant. North of Lake Kinneret, the quality of the Jordan waters is of acceptable quality but on the Yarmouk⁷⁷⁴ and Southern side, the quality of water is unacceptable, not only due to pollution downstream but exacerbated by over-extractions and diversions upstream.⁷⁷⁵ Whereas mismanagement has resulted in the dumping of untreated sewage, runoff of fish pond water and intrusion by salt water due to diversion of saline springs,⁷⁷⁶ these have contributed to the pollution of the lower Jordan waters by agricultural and industrial effluents.⁷⁷⁷ Thus, the state of the lower Jordan River presents the most important environmental rehabilitation need.⁷⁷⁸

There is no doubt that the primary polluter of the Lower Jordan River is the dumping of untreated sewage.⁷⁷⁹ “The Lower River is an open sewage canal, and the sad irony is that the sewage water is keeping the river flowing...” said Gideon

⁷⁷⁴ See Ahmad A Al-Taani “Seasonal Variations in Water Quality of Al-Wehda Dam North of Jordan and Water Suitability for Irrigation in Summer” (2011) 6 *Arabian Journal of Geosciences* 1131.

⁷⁷⁵ As already covered in Chapter 2.

⁷⁷⁶ Efrat Farber and others “Management Scenarios for the Jordan River Salinity Crisis” (2005) 20 *Applied Geochemistry* 2138 at 2140.

⁷⁷⁷ United States *Congressional Record: Proceedings and Debates of the 110th Congress - First Session* (Government Printing Office, 2007) at 25375.

⁷⁷⁸ Munther J Haddadin *Water Resources in Jordan: Evolving Policies for Development, the Environment, and Conflict Resolution* (Resources for the Future, Washington, DC, 2006) at 270.

⁷⁷⁹ Michele Chabin “Much of Jordan River Polluted with Sewage” (2005) 122 *The Christian Century* 17 at 17.

Bromberg, director of then Friends of the Earth Middle East.⁷⁸⁰ Approximately 13 MCM of sewage effluents is dumped into the river annually,⁷⁸¹ some of which comes from the Jordanian, Israeli and Palestinian villages that house more than 300,000 people in communities along the banks of the lower Jordan River.⁷⁸² While pollution from untreated sewage was not specifically addressed under the 1994 Peace Treaty between Israel and Jordan, proper management of sewage systems was covered under the 1995 Interim Agreement between Israel and Palestine (covered in the legal section). However as a study has found, even if sewage will be eliminated from flowing to the lower Jordan River, the nitrogen content of the Lower Jordan River is expected to be high due to the influx of nitrate-rich shallow groundwater derived from agricultural activities in the vicinity of the river.⁷⁸³

Non-point source of pollutants in the Jordan River Basin mainly comes from agricultural runoff of nitrogen and phosphorous based fertilizers and pesticides.⁷⁸⁴ Agriculture in the Basin accounts for 65.6 percent of total water withdrawal. The following table shows a breakdown of water withdrawal for the agriculture sector by individual riparian States:⁷⁸⁵

⁷⁸⁰ Anonymous “Pollution Threatens Revered Jordan River” US Water News (online ed, November 2005) <http://www.uswaternews.com/archives/arcglobal/5pollthre11.html>.

⁷⁸¹ Farber, above n 776, at 2138.

⁷⁸² Vanessa O’Brien “A Last Ditch Effort to Rescue the River Jordan” *DWDE* (27 August 2012) <http://www.dw.de/a-last-ditch-effort-to-rescue-the-river-jordan/a-16179528>.

⁷⁸³ Michal Segal-Rozenhaimer and others “Sources and Transformations of Nitrogen Compounds along the Lower Jordan River” (2004) 33 *Journal of Environmental Quality* 1440 at 1450.

⁷⁸⁴ At 1450; M A Civic “Water Scarcity in the Jordan River Basin” (1999) 4 *Global Issues* 16 at 16.

⁷⁸⁵ Frenken, above n 38, at 220, 238, 269, 287 and 331, respectively.

Table 17: Water Withdrawal for Agriculture in the Jordan River Basin

Country	Percentage of Total Water Withdrawal for Agriculture
Israel	58 (2004)
Jordan	65 (2005)
Lebanon	60 (2005)
Palestine – West Bank	57 (2000)
Syria	88 (2006)

In the Upper Jordan, the river discharges 1, 610 tonnes of nitrogenous and 130 tonnes of phosphorous compounds annually into Lake Kinneret alone.⁷⁸⁶ Pollution by agricultural effluents is further exacerbated by the dumping of industrial wastes.

Industrial wastewater is another major source of water pollution in the Jordan River Basin. A major industrial pollutant downstream is brine effluent (diluted seawater) from the desalination plants. Approximately 16.5 MCM of brine effluent is discharged into the Lower Jordan River annually.⁷⁸⁷ Another major emerging concern is the presence of heavy metals, especially in the Yarmouk River.⁷⁸⁸ It appears, though, that scientific studies around these are scattered and more would need to be done in order to ascertain the exact level of contribution thereof to the problem of pollution in the Jordan River Basin.

Due to the obvious pollution in the Basin, the current state of the lower Jordan River is that it is now a “damaged ecosystem.”⁷⁸⁹ According to EcoPeace Middle East, Israel is working on a master plan to rehabilitate its section of the lower Jordan River. Israel is also leading the way with its wastewater treatment plants

⁷⁸⁶ Committee on Sustainable Water Supplies in the Middle East, above n 200, at 199.

⁷⁸⁷ Farber, above n 776, at 2138.

⁷⁸⁸ K M Banat and F M Howari “Pollution Load of Pb, Zn, and Cd and Mineralogy of the Recent Sediments of Jordan River/Jordan” (2003) 28 Environment International 581; S M Al-Weher “Levels of Heavy Metal Cd, Cu and Zn in Three Fish Species Collected from the Northern Jordan Valley, Jordan” (2008) 1 Jordan Journal of Biological Sciences 41.

⁷⁸⁹ Segal-Rozenhaimer, above n 783, at 1440.

which are treating all of Israel's wastewater before it enters the Jordan River.⁷⁹⁰ The facility will ensure that chlorine levels in the treated water drop from 3,000 milligrams per litre to 1,000 milligrams per litre, and will help solve the issue of waste-water penetrating the riverbed.⁷⁹¹ EcoPeace Middle East is also in the process of developing complementary master plans for the Jordanian and the Palestinian sections of the lower Jordan River and upon completion will be the first comprehensive regional master plan for the rehabilitation of the Lower Jordan River.⁷⁹² Two of the next steps for the EcoPeace Middle East will be to launch:⁷⁹³ (1) a regional study to identify all the sources of pollution of the lower River Jordan and (2) a campaign to rehabilitate the Jordan River and its side wadis, including the prohibition of wastewater discharge in the rivers and eradication of other types of pollution. Thus, pollution of the Jordan River Basin comes from numerous sources and riparians and its abatement and control will require intervention in Syria, Jordan, Israel and Palestine's West Bank.⁷⁹⁴

3.5.2 Pollution Control in the Jordan Basin

In the Jordan River Basin, the legal regime for the control of pollution comprises of the Peace Treaty and the Interim Agreement, relevant provisions of which are discussed respectively.

⁷⁹⁰ O'Brien, above n 782.

⁷⁹¹ Udasin, above n 411.

⁷⁹² Friends of the Earth Middle East "Projects - Jordan River Rehabilitation: 2012-2015 Regional NGO Master Plan" (2012). Available at http://foeme.org/www/?module=projects&record_id=205.

⁷⁹³ See Friends of the Earth Middle East "Projects - Jordan River Rehabilitation: FoEME's Jordan River Vision" Available at http://foeme.org/www/?module=projects&record_id=49; Royal Haskoning DHV *Lower Jordan River Basin Transboundary Regional NGO Master Plan - Final Inception Report* (WEDO/FoEME, January 2013). Available at [http://foeme.org/uploads/13904848300~%5E\\$%5E~RHDHV_Inception_Report_January_2013.pdf](http://foeme.org/uploads/13904848300~%5E$%5E~RHDHV_Inception_Report_January_2013.pdf)

⁷⁹⁴ Alfred Abed Rabbo "Water in the Middle East: Crisis, Management, Challenges and Peace" in Antonino Zichichi (ed) *The Role of Science in the Third Millennium - International Seminar on Nuclear War and Planetary Emergencies 44th Session* (World Scientific Publishing, New Jersey, 2012) at 235.

Peace Treaty 1994

Under the Peace Treaty of 1994, Israel and Jordan, in agreeing to search for ways to alleviate water shortages and cooperate for this purpose, have agreed to “[prevent] ... the contamination of water resources.”⁷⁹⁵ To this end, Israel and Jordan have both undertaken to unilaterally protect the shared waters within their own jurisdiction and water systems in their own territory.⁷⁹⁶

They are to protect such waters against “any pollution, contamination, harm”.⁷⁹⁷ In practical terms, the water quality objective is water that is of acceptable quality. To put this into effect, Israel and Jordan have agreed that each Party will prohibit the disposal of municipal and industrial wastewater into the course of the Jordan Rivers before they are treated to standards allowing their unrestricted agricultural use.⁷⁹⁸ Furthermore, both Parties have also agreed not to dispose of brine in the Jordan waters.⁷⁹⁹ By doing this, the Parties have effectively established water quality standards to deal with pollution control from domestic and industrial effluents and abatement of pollution from brine.

Unlike the UN Watercourses Convention, their obligation with regards to pollution prevention and control is not qualified by the principle of “significant harm.” Moreover, Israel and Jordan have agreed that the quality of water supplied to the other will be equivalent to the quality of water used by the same.⁸⁰⁰ By

⁷⁹⁵ Peace Treaty; Article 6(4)(2).

⁷⁹⁶ Peace Treaty; Annex II, Article III(1) and (6).

⁷⁹⁷ Peace Treaty; Annex II, Article III(1) and (6).

⁷⁹⁸ Peace Treaty; Annex II, Article III(3).

⁷⁹⁹ Peace Treaty; Annex II, Article III(5); Also see Aaron Schwabach “Using International Law to Prevent Environmental Harm from Increased Use of Desalination” (1999) 34 Tex Int’l L J 187 for state of international law with regards to pollution from desalination.

⁸⁰⁰ Peace Treaty; Annex II, Article III(4).

doing this, the Treaty ensures that the upper riparian does not impose a pollution externality on the lower riparian in the form of downstream pollution.⁸⁰¹

For joint actions, both Parties have undertaken to monitor the quality of water along their boundary by use of the jointly established monitoring stations to be operated under the guidance of the Joint Water Committee.⁸⁰² Israel and Jordan have also agreed to co-operate “along the common boundaries” of the Jordan River in the areas of:⁸⁰³ the ecological rehabilitation of the Jordan River; environmental protection of water resources so as to ensure optimal water quality (qualified by reasonable use standards); and the control of agricultural pollution and liquid wastes. Thus, while parameters for monitoring and assessment have not been expressly defined under the Treaty,⁸⁰⁴ protection of water quality and of the environment is an integral part of the Peace Treaty.⁸⁰⁵ Although the full extent of the role of the Joint Water Committee has been difficult to ascertain, it is clear that it is involved at least in the monitoring of water quality of the Lower Jordan River. In furtherance of the water quality objectives provided for under the Peace Treaty, the Parties, within the framework of the Environmental Agreement of 1995, have agreed to the “Abatement and control of pollution, contamination and other man-made hazards to the environment.”⁸⁰⁶ While they renewed this Agreement in 2000, they have yet to ratify it.

⁸⁰¹ Miner, above n 552, at 213.

⁸⁰² Peace Treaty; Annex II, Article III(2).

⁸⁰³ Peace Treaty; Annex IV, para II.1.

⁸⁰⁴ Tamar Achiron-Frumkin and Ron Frumkin “Water Allocation for Nature and the ‘End of Conflict’ Era” in Hillel Shuval and Hassan Dweik (eds) *Water Resources in the Middle East: Israel-Palestinian Water Issues - From Conflict to Cooperation* (Springer, Berlin, 2007) at 236.

⁸⁰⁵ Uri Shamir ““Water Agreements between Israel and Its Neighbors”” (1998) 103 *Middle Eastern Natural Environments Bulletin* 274 at 279.

⁸⁰⁶ Peace Treaty; Article 3(A)(6).

Interim Agreement 1995

Under the Interim Agreement of 1995, Israel and the Palestinians have dealt with issues of water and sewage together, whereby both Parties have agreed to “coordinate the management of water and sewage resources and systems in the West Bank” (given that pollution from sewage is a major cause for concern in the lower Jordan River).⁸⁰⁷ To this end they have agreed to:⁸⁰⁸ (1) maintain existing quantities of utilization from the resources, (2) prevent the deterioration of water quality in water resources, (3) use the water resources in a manner which will ensure sustainable use in the future “in quality”, (4) take “all necessary measures to *prevent any harm* to water resources” [emphasis added], (5) treat, reuse or properly dispose of all domestic, urban, industrial, and agricultural waste, (6) operate, maintain and develop existing water and sewage systems in a coordinated manner, and (7) take all necessary measures to prevent any harm to the water and sewage systems in their respective areas. Thus, the water quality objective is one that meets their needs in the present as well as the future. The Parties have agreed to prevent any harm, thereby invoking the application of the precautionary principle as per the UN Watercourses Convention requirements for pollution control. Like the Peace Treaty, they have not qualified the no harm obligation by use of the term ‘significant’ thereby imposing a higher standard. Also, the Parties have also addressed all point and non-point sources of water pollution from all the sectors.

In order to deal with all water and sewage related issues in the West Bank, both Parties have established a “permanent Joint Water Committee” (‘JWC’) but for the interim period.⁸⁰⁹ Its specific responsibilities with regards to pollution prevention and control include:⁸¹⁰ protection and coordinated management of

⁸⁰⁷ Interim Agreement 1995; Annex III, Appendix I, Article 40(3).

⁸⁰⁸ Interim Agreement 1995 Annex III, Appendix I, Article 40(3)(a),(b), (c), (e), (f), (g) and (h), respectively.

⁸⁰⁹ Interim Agreement 1995; Annex III, Appendix I, Article 40(11).

⁸¹⁰ Interim Agreement 1995; Annex III, Appendix I, Article 40(12)(a)-(f), (i), (j) and (14).

water resources, protection and coordinated management of water and sewage systems, exchange of information on pollution laws and regulations, overseeing joint supervision and enforcement, resolution of disputes (reached by consensus), joint monitoring systems and regulations and any other issues of mutual interest. In addition to jointly preventing and controlling pollution levels, the Agreement has also established enforcement arms of the JWC - the Joint Supervision and Enforcement Teams ('JSET'), to "monitor, supervise, and enforce" water and sewage related provisions⁸¹¹ and to "rectify the situation whenever an infringement has been detected" such that: "[p]revention of contamination and pollution of water resources and systems"⁸¹² and "[o]peration and maintenance of systems for collection, treatment, disposal and reuse, of domestic and industrial sewage, of urban and agricultural runoff, and of urban and agricultural drainage systems"⁸¹³ and "[w]ater and sewage quality analyses carried out in approved laboratories, to ascertain that these laboratories operate according to acceptable standards and practices, as agreed by the JWC."⁸¹⁴ They have also been conferred extremely broad inspection and data collection powers.⁸¹⁵

On the "Protection of Water Resources and Water and Sewage Systems" specifically, both Parties have agreed to "take all necessary measures to prevent any harm, pollution, or deterioration of water quality of the water resources"⁸¹⁶ and to "take all necessary measures to prevent any pollution or contamination of the water and sewage systems, including those of the other side."⁸¹⁷ On "Environmental Protection" generally, Israel and the PLO, in "recognizing the need to protect the environment and to utilize natural resources on a sustainable

⁸¹¹ Interim Agreement 1995; Annex III, Appendix I, Schedule 9(4).

⁸¹² Interim Agreement 1995; Annex III, Appendix I, Schedule 9(4)(d).

⁸¹³ Interim Agreement 1995; Annex III, Appendix I, Schedule 9(4)(f).

⁸¹⁴ Interim Agreement 1995; Annex III, Appendix I, Schedule 9(4)(i).

⁸¹⁵ Shamir, above n 805, at 282.

⁸¹⁶ Interim Agreement 1995; Annex III, Appendix I, Article 40(21).

⁸¹⁷ Interim Agreement 1995; Annex III, Appendix I, Article 40(23).

basis,”⁸¹⁸ have also agreed to protect the environment from sewage, solid waste, pesticides and hazardous substances from damage,⁸¹⁹ and that in utilizing and exploiting their natural resources, the Parties will “take all necessary measures to ensure that activities in their respective areas do not cause damage to the environment of the other side.” Thus these address transboundary pollution from thereof.⁸²⁰

Furthermore, each Party has agreed to “act for the protection of the environment and the prevention of environmental risks, hazards and nuisances including all kinds of ... water ... pollution.”⁸²¹ To fulfil this obligation, they have agreed to:⁸²²

“respectively adopt, apply and ensure compliance with internationally recognized standards concerning the following: levels of pollutants discharged through emissions and effluents; acceptable levels of treatment of solid and liquid wastes, and agreed ways and means for disposal of such wastes; ... and standards for the prevention and abatement of ... other nuisances, which may affect the other side.”

It further provides that “Both sides shall cooperate in implementing internationally accepted principles and standards relating to environmental issues of global concern ...”⁸²³ For water specifically, the Agreement provides that:⁸²⁴

“Each side shall take the necessary and appropriate measures to prevent the uncontrolled discharge of wastewater and/or effluents to water sources, water systems and water bodies, including groundwater, surface water and rivers which may affect the other side, and to promote the proper treatment of domestic and industrial wastewater, as well as solid and hazardous wastes.”

⁸¹⁸ Interim Agreement 1995; Annex III, Appendix I, Article 12(A).

⁸¹⁹ Interim Agreement 1995; Annex III, Appendix I, Article 12(A)(1).

⁸²⁰ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(3).

⁸²¹ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(4).

⁸²² Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(5).

⁸²³ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(13).

⁸²⁴ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(6).

Both Parties have also “recognize[d] the importance of taking all necessary precautions to prevent water ... pollution”⁸²⁵ and have agreed to “control and monitor the transfer of ... any internationally banned and restricted chemicals in their respective areas.”⁸²⁶ They have also agreed to cooperate in carrying out environmental studies, including a profile, in the West Bank.⁸²⁷ For mutual benefit, both Parties have agreed to cooperate in different environmental fields through their respective authorities in the future and have also agreed to establish an Environmental Experts Committee for environmental cooperation and understandings.⁸²⁸

Yarmuk Waters Agreement 1987

Given that pollution is not an issue in the Yarmouk river raised by the downstream riparian, Jordan, it is not surprising that the Parties have not addressed it in the 1987 Agreement. However, a provision dealing with the matter could become necessary in the near future given that 88 percent (2006) and 65 percent (2005) of Syria’s and Jordan’s water withdrawal, respectively, is utilized by the agricultural industry⁸²⁹ and the increasing number of scientific studies being undertaken with regards to pollution by heavy metals.⁸³⁰

⁸²⁵ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(9).

⁸²⁶ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(19).

⁸²⁷ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(21).

⁸²⁸ Interim Agreement 1995; Annex III, Appendix I, Article 12(B)(22).

⁸²⁹ Frenken, above n 38, at 238 and 331, respectively.

⁸³⁰ F M Howari and K M Banat “Assessment of Fe, Zn, Cd, Hg, and Pb in the Jordan and Yarmouk River Sediments in Relation to their Physicochemical Properties and Sequential Extraction Characterization” (2001) 132 Water, Air and Soil Pollution 43; Y Abu-Rukah and H A Ghrefat “Assessment of the Anthropogenic Influx of Metallic Pollutants in Yarmouk River, Jordan” (2001) 40 Environmental Geology 683.

Therefore, pollution control agreements in the Jordan Basin are only between Israel and Jordan and Israel and the Palestinians, both to the exclusion of Lebanon and Syria. Under the Peace Treaty, Israel and Jordan are under an obligation to take unilateral actions to prevent and control pollution as well as to protect the environment generally. In addition, they have jointly undertaken to monitor the water quality of the Lower Jordan River. However, what they need to establish to complement these obligations are: (1) mutually acceptable measures and methods for joint water quality assessment and reporting; (2) obligations with regards to best available techniques and best environmental practices to address pollution from point and non-point sources and; (3) list of specific substances the introduction of which into the waters of the Lower Jordan River are to be prohibited, limited, investigated or monitored as per the UN Watercourses Convention and the European regional framework for pollution control. Thus, while the framework for pollution control exists under the Treaty, the Parties have not been able to address the practical aspects of their unilateral and joint obligations.

While the Palestinian people living in the West Bank are not able to exercise their equitable rights to the Jordan waters (though Israel has recognized their “water rights” in the Jordan waters)⁸³¹ being a riparian of the Jordan River Basin, they are nevertheless under an obligation to prevent, control and manage pollution of the Jordan waters. This is through the binding Agreement they have with Israel.⁸³² It is also noted that the Interim Agreement is more comprehensive than the Peace Treaty with respect to pollution prevention, monitoring and enforcement (as evidenced by the establishment of JSETs) and with respect to the specific

⁸³¹ Interim Agreement 1995; Annex III, Appendix I, Article 40(1).

⁸³² Although there has been opinion to the contrary as to the non-binding nature of the Agreement. See Peter Malanczuk “Some Basic Aspects of the Agreements Between Israel and the PLO from the Perspective of International Law” (1996) 7 *European Journal of International Law* 485 for arguments as to why it is binding.

functions of the joint oversight bodies.⁸³³ Therefore, it is a better framework compared to the Peace Treaty.

While Syria's cooperation, due to its current political relations with Israel, may make it impossible to attain a basin-wide agreement with regards to pollution control, given the existence of the Peace Treaty and the Interim Agreement, a framework for the prevention, reduction and control of pollution involving Israel, Jordan and Palestine is a possibility.⁸³⁴ With assistance from EcoPeace Middle East, it is certainly within reach and one that should be pursued because not only should point and non-point source of pollutants in the lower Jordan River be identified but mutually agreeable measures and methods establishing environmental quality objectives and standards also need to be established and enforced. These will enable them to effectively tackle the threat of pollution in the much needed portion of the Jordan Basin which is the lower Jordan River.

3.5.3 Pollution of the Nile River Basin

Demand for water in the entire Nile Basin has escalated along with population and industrial and agricultural demands and is exacerbated by pollution from those same demanding sectors.⁸³⁵ The main threats to basin-wide water quality are insufficiently treated domestic, urban and industrial wastes, pollution from pesticide and fertilizer residues, siltation and sedimentation, increased salinity and wetlands loss.⁸³⁶ Toxic and hazardous mining wastes represent dangers in some

⁸³³ Shamir, above n 805, at 283.

⁸³⁴ Rabbo, above n 794, at 235.

⁸³⁵ Kristin Wiebe "The Nile River: Potential for Conflict and Cooperation in the Face of Water Degradation" (2001) 41 Nat Resources J 731 at 732; Nile Basin Initiative *Nile Transboundary Environmental Action Project: Nile Basin National Water Quality Monitoring Baseline Study Report for Egypt* (NBI, 2005) at 12.

⁸³⁶ Ian McAllister Anderson *Agricultural Water in the Nile Basin - An Overview Efficient Water Use for Agricultural Production (EWUAP Project)* (NBI, April 2008) at 47. Available at http://nileis.nilebasin.org/system/files/over_0.pdf

local areas.⁸³⁷ Although most of the Nile River Basin's water quality is within acceptable levels, there are several spots in the main stem Nile, irrigation canals and drainages where pollution is increasing.⁸³⁸ For example, recent pollution studies show that eutrophication has increased from human activities in Lake Victoria.⁸³⁹ This has been aggravating water quality and scarcity downstream.⁸⁴⁰ The Lower Nile has thus become increasingly polluted by agro-chemicals, untreated sewage and industrial wastes.⁸⁴¹ The Nile Basin's most polluted wetlands are those of the Nile Delta.⁸⁴² While some countries particularly those on the rift valley can have natural pollutants such as fluoride,⁸⁴³ most sources of both point and non-point pollution in the Nile River Basin come from the domestic, agricultural and industrial sectors and contribute in this order of significance.⁸⁴⁴

⁸³⁷ Ibid.

⁸³⁸ United States Agency for International Development/Egypt *Survey of Nile System Pollution Sources* Agricultural Policy Reform Program: Report No 64 (September 2002) at 1. Available at http://pdf.usaid.gov/pdf_docs/Pnacrl68.pdf

⁸³⁹ Poolad Karimi and others "Nile Basin Farming Systems and Productivity" in Seleshi Bekele Awulachew, Vladimir Smakhtin, David Molden, Don Peden (eds) *The Nile River Basin: Water, Agriculture, Governance and Livelihoods* (Routledge, Oxon, New York, 2012) at 150.

⁸⁴⁰ Wiebe, above n 835, at 735.

⁸⁴¹ See James Kinyangi and others "The Nile Basin, People, Poverty and Vulnerability" in Seleshi Bekele Awulachew, Vladimir Smakhtin, David Molden, Don Peden (eds) *The Nile River Basin: Water, Agriculture, Governance and Livelihoods* (Routledge, Oxon, New York, 2012) at 32.

⁸⁴² United Nations Environment Programme *Africa Environment Outlook 2: Our Environment, Our Wealth* (UNEP, Nairobi, 2006) at 141.

⁸⁴³ Nile Basin Initiative *Nile Transboundary Environmental Action Project: Nile Basin Regional Water Quality Monitoring Baseline Study Report for Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda* (NBI, 2005) at 55.

⁸⁴⁴ Ibid.

Point source pollution is concentrated around settlements and factories and for the most part only serious around urban centres.⁸⁴⁵ The main source of domestic pollution is wastewater treatment, resulting in faecal contamination, which is producing high bacteriological counts, as well as higher ammonia and chloride concentrations, high biochemical oxygen demand (“BOD”) and chemical oxygen demand (“COD”) values.⁸⁴⁶ Although most industrial and urban centres in the Nile basin have sewerage and sewage treatment works, many of these are inefficient or inoperative.⁸⁴⁷ As a result, industrial effluents and sewage pass into many parts of the Nile system with little or no treatment.⁸⁴⁸ Insufficient treatment of industrial wastewater can also raise the BOD values and produce additional pollutants such as heavy metals and complex toxic organic compounds.⁸⁴⁹ For example, the total amount of BOD discharged to the River Nile by industrial plants in Egypt alone equals 270 tonnes per day.⁸⁵⁰ This amount corresponds to the untreated discharge of wastewater from more than six million people.⁸⁵¹ While no data is available on the discharge of toxic substances into the Nile Basin as a whole, it is suspected that chemical, iron and steel industries are the most polluting sources from this sector.⁸⁵²

⁸⁴⁵ Nile Basin Initiative, Shared Vision Programme *Transboundary Environmental Analysis* (NBI, May 2001). Available at http://nile.riverawarenesskit.org/English/NRAK/Resources/Document_centre/Transboundary_Environmental_Assessment_TEA_.pdf

⁸⁴⁶ Nile Basin Initiative, above n 843, at 55.

⁸⁴⁷ Nile Basin Initiative, above n 845.

⁸⁴⁸ Ibid.

⁸⁴⁹ Nile Basin Initiative, above n 843, at 55.

⁸⁵⁰ R A Wahaab and M I Badawy “Water Quality Assessment of the River Nile System: An Overview” (2004) 17 *Biomedical and Environmental Sciences* 87 at 90.

⁸⁵¹ Ibid.

⁸⁵² Nile Basin Initiative, above n 835, at 14.

Given that many of the Nile Basin countries are dependent on an agricultural economy, this creates the problem of non-point pollution from unsuitable and/or excessive use of fertilizers (giving high nitrate and phosphate levels), pesticides, herbicides and other complex organic compounds that have reduced water quality in many areas of the Nile River Basin.⁸⁵³ There are over 90 agricultural drains that discharge into the Nile River Basin but which also include industrial wastewater.⁸⁵⁴ With population that is only going to increase in the Nile Basin (at least double by 2025),⁸⁵⁵ this means further increase in agricultural and industrial output, imposing a much higher burden to control pollution from both point and non-point sources.

3.5.4 Pollution Prevention in the Nile Basin

Overall, emerging evidence suggests that regulations on pollution control are not effective because of the weak enforcement capacity in both upstream and downstream parts of the Nile Basin.⁸⁵⁶ The Nile Waters Agreement 1959 does not deal with the issue of pollution at all having not being a threat to the River Basin at the time the Agreement was concluded. The Cooperative Framework Agreement, on the other hand, does provide that the “Nile Basin States shall take all appropriate measures, individually and ... jointly, to protect, conserve and ... rehabilitate the Nile River Basin and its ecosystems, in particular, by: (a) protecting and improving *water quality* within the Nile River Basin” [emphasis added].⁸⁵⁷ Additionally, it provides that: “Nile Basin States shall, through the Nile River Basin Commission, take steps to harmonize their policies in relation to the provisions of this article.” Although worded along similar lines to the UN

⁸⁵³ Nile Basin Initiative, above n 843, at 55; Nile Basin Initiative, above n 845.

⁸⁵⁴ Nile Basin Initiative, above n 835, at 15.

⁸⁵⁵ See Chapter 2.

⁸⁵⁶ Nile Basin Initiative, Shared Vision Program, Water Resources Planning and Management Project *Baseline and Needs Assessment of National Water Policies of the Nile Basin Countries: A Regional Synthesis* Water Policy Component (NBI, December 2006) at 34. Available at http://ocid.nacse.org/rewab/arabic/docs/Baseline_Needs_Assessment_Egypt.pdf

⁸⁵⁷ Cooperative Framework Agreement; Article 6(1).

Watercourses Convention, this provision: (1) does not mention the ‘no significant harm’ principle, (2) stops short of addressing pollution and other obligations associated with it specifically and (3) captures not only the Nile River Basin but its ecosystem as well. These are addressed in turn.

Even though ‘significant harm’ is not expressly stated under this provision, separately, the Cooperative Framework Agreement just like the UN Watercourses Convention, obliges Member States to, “in utilizing Nile River System water resources in their territories, take all appropriate measures to prevent the causing of significant harm to other Basin States.”⁸⁵⁸ Here, the term ‘pollution’ is not mentioned at all but collectively, both provisions of the Cooperative Framework Agreement will be able to capture no significant harm pollution where a Member State has failed to exercise due diligence by not taking precautionary measures to prevent such level of pollution so as to cause significant harm to another basin State. Perhaps the intention of the drafting committee was to keep the water quality provision generic so that it can be used to deal with all sorts of matters ancillary to issues of protection, conservation and rehabilitation under this one provision as has been the practice of the Nile Basin Initiative (‘NBI’) (see below). In effect, this provision is a combination of the UN Watercourses Convention Articles which deal with prevention, reduction and control of pollution⁸⁵⁹ and protection and preservation of ecosystems.⁸⁶⁰

The requirement by the Cooperative Framework Agreement that the Nile Basin States take steps to harmonize their policies in relation to the provisions of this Article is something that is very much needed in the Nile Basin. It is noted from a regional study undertaken by the NBI that although the Nile Basin States have passed numerous excellent regulations on water quality, these legislative regulations differ between countries and implementation of these is very limited

⁸⁵⁸ Cooperative Framework Agreement; Article 5(1).

⁸⁵⁹ UN Watercourses Convention; Article 21.

⁸⁶⁰ UN Watercourses Convention; Article 20.

and needs to be improved.⁸⁶¹ The NBI also opined that if more commitment was made by applying the polluter-pays principle, then pollution control could eventually be “self- sustainable.”⁸⁶² While the Cooperative Framework Agreement does not impose the polluter-pays principle, it does provide that where significant harm (pollution) is caused, that the two Parties affected will consult each other with regards to elimination or mitigation of such harm and, where appropriate, to discuss compensation.⁸⁶³

Once established, the Nile River Basin Commission will serve as an institutional framework for cooperation in the (among other matters) protection, conservation and management of the Nile River Basin and its waters.⁸⁶⁴ A Technical Advisory Committee will also be established, which will be empowered to (among other matters):⁸⁶⁵ (1) establish specialised working groups to deal with matters within its competence (that could be pollution control and rehabilitation of the Lower Nile Basin), (2) propose to the Council of Ministers⁸⁶⁶ rules, procedures, guidelines and criteria provided for in the Framework (this would potentially include water quality standards as well as objectives and criteria for the monitoring, assessment and reporting of water quality), (3) prepare for the consideration of the Council cooperative programs for the integrated and sustainable management and development of the Nile River Basin, (4) make recommendations to the Council on the implementation of the provisions of the Framework, and (5) advise the Council on technical matters (again this could include matters pertaining to pollution control). It is therefore envisaged that the Technical Advisory Committee will be involved in the implementation of the Cooperative Framework Agreement just as the European Commission is involved in the implementation of the Water Framework Directive.

⁸⁶¹ Nile Basin Initiative, above n 843, at i.

⁸⁶² Ibid.

⁸⁶³ Cooperative Framework Agreement; Article 5(2).

⁸⁶⁴ Cooperative Framework Agreement; Article 16(b).

⁸⁶⁵ Cooperative Framework Agreement; Articles 25(2) and 26(1), (3), (4) and (6), respectively.

⁸⁶⁶ Cooperative Framework Agreement; Article 22.

Pending ratification of the Cooperative Framework Agreement, the NBI, through the principle of subsidiarity, is dealing with the issue of pollution in the Nile River Basin under the banner of “water quality management.”⁸⁶⁷ In 2005, the NBI conducted a regional water quality study on the Nile Basin under which not only were studies undertaken on a regional level but national as well, with recommendations to undertake actions at both levels.⁸⁶⁸ In order to ensure standardised reporting and consistency between Member States, the NBI issued a number of guideline documents to enable Nile Basin States to achieve that.⁸⁶⁹ Through its Transboundary Environmental Action Project, the NBI has also funded local NGOs and communities to promote community-based approaches to water conservation to reduce pollution.⁸⁷⁰ However, it has been recently suggested by a study that in addition, the NBI should educate communities on how to use less agriculture inputs especially nitrogen and phosphate fertilizers.⁸⁷¹ While efforts to improve the Nile waters quality is underway through the NBI, Egypt has implemented real time monitoring and reporting of the Nile waters quality, including point source pollution discharges from (including) agricultural runoff, sewage and industrial effluents and their timing.⁸⁷² Even though Egypt is able to collect raw data, which is important for the studying of the Nile River waters quality, the technology is not apt to detect in real time any threat to water quality

⁸⁶⁷ See Nile Council of Ministers *Policy Guidelines for the Nile River Basin Strategic Action Program* (Nile Basin Initiative, 1999).

⁸⁶⁸ Nile Basin Initiative, above n 843.

⁸⁶⁹ See Nile Basin Initiative, Nile Information System “Water Quality Management” documents available from <http://nileis.nilebasin.org/nileis/taxonomy/term/9?page=1>.

⁸⁷⁰ Alebel Abebe Belay and others “SWOT Analysis and Challenges of Nile Basin Initiative: An Integrated Water Resource Management Perspective” (2010) 8 Chinese Journal of Population Resources and Environment 8 at 10.

⁸⁷¹ At 17.

⁸⁷² Haseen Khan and others “Water Resources Management System for Nile River” (IACSIT Press, paper presented to 2011 International Conference on Environment Science and Engineering, Singapore, 2011) 308 at 308 and 310.

from any event based on environmental pollution.⁸⁷³ Hence, while this technology is important for checking water quality for consumptive uses, the proposed regime under the Cooperative Framework Agreement regarding abatement, reduction and control of pollution in the Nile waters is something which the Nile Basin States still need to implement.

3.5.5 Pollution of the Indus River Basin

Overall, water quality of the Indus River and its tributaries in terms of total dissolved solids has been reported as “excellent.”⁸⁷⁴ However, that is not to say that there is no pollution in the Basin. There are increasing reports of deterioration of water quality of the Indus River system.⁸⁷⁵ Water pollution in the Indus results from three sources: return-agriculture flows (through drainage structures,⁸⁷⁶ which came in the wake of irrigation⁸⁷⁷ and is the 12th largest drainage area in the world,⁸⁷⁸) industrial and municipal wastewater discharges, all in this order of significance.⁸⁷⁹ While untreated sewage is directly polluting the Indus River,⁸⁸⁰

⁸⁷³ At 310.

⁸⁷⁴ Karen Frenken (ed) FAO Land and Water Division *Irrigation in Southern and Eastern Asia in figures - AQUASTAT Survey - 2011* Water Report 37 (FAO, Rome 2012) at 133. Available at <http://www.fao.org/docrep/016/i2809e/i2809e.pdf>

⁸⁷⁵ Iftikhar Gilani “Pakistan to Raise River Pollution Issue with Delhi” *Daily Times* (Pakistan, 28 May 2007) http://www.dailytimes.com.pk/default.asp?page=2007/05/28/story_28-5-2007_pg7_5.

⁸⁷⁶ F H Mughal “Indus Water Pollution” *Sindhi Association of North America* (no date given) <http://www.sanalist.org/kalabagh/a-4.htm>.

⁸⁷⁷ Altaf, above n 533, at 66.

⁸⁷⁸ Awais Piracha and Zahid Majeed “Water Use in Pakistan’s Agricultural Sector: Water Conservation under the Changed Climatic Conditions” (2011) 1 *International Journal of Water Resources and Arid Environments* 170 at 172.

⁸⁷⁹ David Michel and Russell Sticklor “Toxic Brew: Water Quality, Public Health, and Human Welfare in the Indus Basin” *Stimson* (19 March 2013) <http://www.stimson.org/spotlight/toxic-brew-water-quality-public-health-and-human-welfare-in-the-indus-basin/>

⁸⁸⁰ World Wildlife Fund Global “Indus River Dolphin - Threats: Its Habitat Cut Up in Pieces” (WWF, date not given). Available at http://wwf.panda.org/what_we_do/endangered_species/cetaceans/about/river_dolphins/indus_river

since the key economic activity is agriculture, the major polluting factor in the Basin is agricultural pollution.⁸⁸¹ According to the United Nations Environmental Programme, some 55 km³ of wastewater from all three sectors are dumped into the Indus Basin every year, with agriculture accounting for 90 percent of the effluents.⁸⁸² Studies have reported that entry of effluents from pesticides, fertilizers as well as hazardous and industrial chemical wastes⁸⁸³ into tributaries feeding the Western Rivers on the Indian side is causing serious environmental implications for Pakistan's Eastern Rivers.⁸⁸⁴ Thus, Pakistan as the lower riparian, suffers from cross-border pollution from industrial and agricultural pollution from entering its surface water (and groundwater). This is due to the lack of pollution controls.⁸⁸⁵ Further growth of chemical agriculture and industry in India would only further deteriorate the quality of drainage effluents entering into Pakistan.⁸⁸⁶ According to the Organisation for Economic Cooperation and Development, as India boosts its crop production by some 50 percent by 2030, annual nitrogen loads in the country's wastewater will increase fivefold and phosphorous loading

[dolphin/irdolphin_threats/index.cfm](#); In Pakistan, only 3 percent of the industrial wastewater is treated while large proportion goes into the drainage system untreated. Suttinon, above n 519, at 1.

⁸⁸¹ World Wildlife Fund Global "Indus" (WWF, date not given). Available at http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_problems/river_decline/10_rivers_risk/indus/

⁸⁸² Observer Research Foundation, Stimson, and Sustainable Development Policy Institute, Indus Basin Working Group *Connecting the Drops: An Indus Basin Roadmap for Cross-Border Water Research, Data Sharing and Policy Coordination* (Observer Research Foundation, Stimson, and SDPI, 2013) at 17. Available at http://www.stimson.org/images/uploads/research-pdfs/connecting_the_drops_stimson.pdf

⁸⁸³ Miner, above n 552, at 209.

⁸⁸⁴ International Union for Conservation of Nature and Natural Resources *Beyond Indus Water Treaty: Water Cooperation for Managing Groundwater Environments - Policy Issues and Options* (IUCN Pakistan, Karachi, 2013) at 5. Available at http://cmsdata.iucn.org/downloads/ulr_water_coopertaion_for_managing_groundwater_environments.pdf

⁸⁸⁵ Miner, above n 552, at 209.

⁸⁸⁶ International Union for Conservation of Nature and Natural Resources, above n 884, at 5.

will more than triple over the year 2000 levels.⁸⁸⁷ This is not to say that Pakistan is not causing pollution. It may be an even bigger polluter than India given its larger scale of agriculture in the region. Moreover, in 1995, around 12 km³ per year of untreated water was being discharged by Pakistan into the local water bodies.⁸⁸⁸ It was estimated that 0.5 and 0.3 km³ per year of sewage was produced in Karachi and Lahore metropolitan areas respectively, most of which were discharged into water bodies untreated.⁸⁸⁹ Increased pollution of the Indus Basin will create problems in two areas: (1) it will affect those who rely on it locally, thereby impairing the health of those relying on the water for drinking and household use, and decrease the agricultural potential of the area; and (2) it will also be a source of bilateral tension, as Pakistan will suffer from its own pollution combined with that flowing downstream from India.⁸⁹⁰ For Pakistan, these chemically polluted waters have been linked to decreased soil fertility, reduced agricultural yields, depletion of riverine and mangrove forests⁸⁹¹ as well as serious health consequences.⁸⁹² Thus, experts have called for a joint India-Pakistan effort to monitor pollution levels in the Indus Basin so that its water quality can be improved,⁸⁹³ and maintained.

3.5.6 Pollution Prevention in the Indus Basin

The objective of the Indus Waters Treaty of 1960 is that both India and Pakistan “being equally desirous of attaining the most complete and satisfactory utilization” of the Indus waters, recognized the need for “fixing and delimiting, in

⁸⁸⁷ Organisation for Economic Cooperation and Development, above n 67, at 225–226.

⁸⁸⁸ Frenken, above n 874, at 133.

⁸⁸⁹ Ibid.

⁸⁹⁰ Brian E Concannon “The Indus Waters Treaty: Three Decades of Success, Yet, Will It Endure?” (1989) 2 *Geo Int’l Env’tl L Rev* 55 at 72.

⁸⁹¹ See S M Saifullah and others “Land Use-Iron Pollution in a Mangrove Habitat of Karachi” (2004) 8 *Indus Delta Earth Interactions* 1.

⁸⁹² Neda Akram Zawahri “The Water Weapon: Havoc and Harmony Over International Rivers” (Post Doctoral Thesis, University of Virginia, 2004).

⁸⁹³ Gilani, above n 875.

a spirit of goodwill and friendship, the rights and obligations of each in relation to the other concerning the use of these waters.”⁸⁹⁴ On the matter of pollution prevention and control, the Treaty provides that:⁸⁹⁵

“Each Party declares its intention to prevent, as far as practicable, undue pollution of the waters of the Rivers which might affect adversely uses similar in nature to those to which the waters were put on the Effective Date [19 September 1960], and agrees to take all reasonable measures to ensure that, before any sewage or industrial waste is allowed to flow into the Rivers, it will be treated, where necessary, in such manner as to not materially affect those uses ...”

This provision seeks to prescribe unilateral obligations with regards to pollution prevention and control but not reduction as pollution was not an issue at the time the Treaty was drawn. Although the term “undue” has not been defined under the Treaty, “to prevent ... undue pollution” invokes the obligation not to cause significant harm. In fact, this provision has been cited by the International Law Commission as an example of “an obligation of due diligence, as an objective standard” from treaties governing the utilization of international watercourses.⁸⁹⁶ It is noted, that like the UN Watercourses Convention, prevention of harm extends not just to the uses of the other Watercourse State, but to “the waters of the Rivers” as well. However, the obligation to exercise due diligence is qualified by the phrase “as far as practicable.” The employment of the phrase “which might” implies that the Treaty begged the Parties to take a precautionary approach towards the control and prevention of pollution in the Basin. The criteria for ‘reasonableness’ is “the customary practice in similar situations on the Rivers.”⁸⁹⁷ Consequently, as long as everyone pollutes uniformly throughout the Basin, the Treaty does not prohibit it⁸⁹⁸ unless it can be proven to be ‘undue.’

⁸⁹⁴ Indus Waters Treaty; Preamble.

⁸⁹⁵ Indus Waters Treaty; Article IV(10).

⁸⁹⁶ Watts, above n 235, at 1366.

⁸⁹⁷ Indus Waters Treaty; Article IV(10).

⁸⁹⁸ Concannon, above n 890, at 73.

In addition, the Treaty protects only uses that existed in 1960, and therefore does not accommodate new uses that require higher water quality.⁸⁹⁹ Clearly, the only pollutants expressly addressed are sewage and industrial waste and undue pollution from these sources would arise where they materially affect uses qualified by the above-mentioned provision. However, a lack of explicit reference to agricultural effluents, which was not a source of pollution at the time the Treaty was drawn, would not exclude it from the ambit of this provision as the Treaty has been held to be a “progressive instrument.”⁹⁰⁰ Moreover, the ICJ has observed in the *Case Concerning the Dispute Regarding Navigational and Related Rights* that:⁹⁰¹

“there are situations in which the parties’ intent upon conclusion of the treaty was, or may be presumed to have been, to give the terms used - or some of them - a meaning or content capable of evolving, not one fixed once and for all, so as to make allowance for, among other things, developments in international law.”

Moreover, customary rules on treaty interpretation as reflected in the Vienna Convention on the Law of Treaties: “interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the ... in their context and in light of its object and purpose.”⁹⁰² Thus, reference to other pollutants such as agricultural effluents can arguably be implied but as has been stated by the ICJ in the *Case Concerning the Gabčíkovo-Nagymaros Project*, that such adaptation was a joint responsibility and that general obligations have to be transformed into specific obligations of performance through a process of consultation and

⁸⁹⁹ Ibid.

⁹⁰⁰ As was held by the expert determination based on the Baglihar Hydropower Project discussed later in this Chapter.

⁹⁰¹ *Navigational and Related Rights (Costa Rica v Nicaragua)* [2009] ICJ Rep 213 at 242; para 64; *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; paras 108 and 112.

Vienna Convention on the Law of the Treaties; 1155 UNTS 331 (adopted 23 May 1969, entered into force 27 January 1980); Article 31.

negotiation.⁹⁰³ Thus, while the Treaty may not exclude new pollutants, it does have limitations when it comes to taking pollution control measures and methods.

Under “Future Cooperation”, the Treaty provides that: “the two Parties recognize that they have a common interest in the optimum development of the Rivers, and, to that end, they declare their intention to co-operate, by mutual agreement, to the fullest possible extent.”⁹⁰⁴ In addition, it provides that each Party will, if so agreed to, set up or install hydrological observation stations and carry out such observations, as may be requested and supply the data so obtained.⁹⁰⁵ To this end, India is undertaking the monitoring and assessment of water quality levels at 72 locations (as of 2010) in its Eastern Rivers, unilaterally, as part of its national efforts to manage the quality of its waters.⁹⁰⁶ Pakistan is doing the same with its National Water Quality Monitoring Programme and National Water Quality Laboratory.⁹⁰⁷ Both Parties have their own methods and measures. However, while the data collected contributes towards the management of local water bodies in both countries, it is not adequate to fully prevent, reduce and control the transboundary nature of pollution of the Indus waters, which is only going to exacerbate. To date, the Parties have not agreed to any common measures and methods for water quality control in the basin for the governance of pollution control in the Basin in terms of water quality objectives and standards and approaches to adequately deal with both point and non-point sources of pollution in the Basin.

⁹⁰³ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; Also see McIntyre, above n 236, at 84.

⁹⁰⁴ Indus Waters Treaty; Article VII(1).

⁹⁰⁵ Indus Waters Treaty; Article VII(1)(a).

⁹⁰⁶ See Ministry of Environment and Forests of India, Central Pollution Control Board, *Status of Water Quality in India* Monitoring of Indian Aquatic Resources, Series: MINARS/ /2009-10 (2010). Available at http://cpcb.nic.in/upload/NewItems/NewItem_169_waterquality.pdf

⁹⁰⁷ See Pakistan Council of Research in Water Resources “Water Quality” available at <http://www.pcrwr.gov.pk/water%20quality.aspx> . Note that certain documents uploaded on this webpage are secured by passwords and therefore inaccessible.

Among other functions, the Indus Waters Treaty has created the Permanent Indus Commission to “establish and maintain co-operative arrangements for the implementation of th[e] Treaty, ... promote co-operation between the Parties in the development of the waters of the Rivers and ... study and report to the two Governments on any problem relating to the development of the waters of the Rivers ... ”⁹⁰⁸ In particular, it provides that the Commission will furnish or exchange information or data provided for under the Treaty.⁹⁰⁹ For the fulfilment of this provision, it needs to be ensured that the data collected and assessed is comparable between the two Parties. Furthermore, the Treaty provides that “The Commission shall determine its own procedures,”⁹¹⁰ allowing the Commissioners to jointly adopt means to consider issues of mutual interest.⁹¹¹ Whether, pollution in the Basin is an “issue of mutual interest” is doubtful as it seems to be a problem only for Pakistan at this stage, at national and transboundary levels. Thus, whilst there are provisions for addressing pollution prevention and control under the Treaty, so far pollution has not been addressed by the Permanent Indus Commission though it had been raised by the Pakistani Commissioner with his Indian counterpart back in 2007.⁹¹² According to one author, given the state of their political relations, there is scope for coordinated unilateral action (not joint action) by India and Pakistan for preventing, reducing and controlling pollution.⁹¹³ At this stage, though there are unilateral actions by both Parties, the level of efforts required at ground level is not being made to control pollution in the Indus Basin by either country and certainly not within the framework of the Indus Waters Treaty.

⁹⁰⁸ Indus Waters Treaty; Article VIII(4)(a).

⁹⁰⁹ Indus Waters Treaty; Article VIII(1)(a).

⁹¹⁰ Indus Waters Treaty; Article VIII(10).

⁹¹¹ Miner, above n 552, at 204.

⁹¹² Gilani, above n 875.

⁹¹³ Miner, above n 552, at 204.

Therefore, as the case studies demonstrate, that pollution in the three Basins are only being managed or attempted to, by Israel, Jordan and the Palestinians in the lower Jordan River, the Nile Basin States outside the framework of the Cooperative Framework Agreement through the NBI and through limited unilateral actions by India and Pakistan in the Indus Basin. None of these Basins have the regime offered by the EU Water Framework Directive which takes a set chemical status objective and monitors, assesses and reports against it in order to decipher the progress being made towards set water quality standards.

3.6 Conclusion

The UN Watercourses Convention provides for unilateral and joint actions to prevent, reduce and control pollution of international river basins to the extent that an activity or project “may cause significant harm” to another watercourse State or to its environment, a principle that has been endorsed by the ICJ as customary international environmental law. In doing so, this provision supports the application of the precautionary principle, the best available technology and best environmental practices. Given that it is consensus-based, the provision does not impose the polluter-pays principle though it has been described as a “general principle of international environmental law”⁹¹⁴ but is a matter that would be addressed if a significant harm pollution case is dealt with either through the ICJ or the Permanent Court of Arbitration.

As already mentioned, the UN Watercourses Convention does not expressly impose an obligation on watercourse States to eliminate pollution from substances that are toxic, persistent or of bioaccumulative characteristic though this can be read into the text under pollution control. As already discussed, the Berlin Rules expressly and under a separate provision provides for dealing with hazardous substances. As already stated, there are international conventions such as the Basel Convention, the Rotterdam Convention and the Stockholm Convention that provide an international framework governing the environmentally sound

⁹¹⁴ International Convention on Oil Pollution, Preparedness, Response and Co-Operation; Preamble, para 7. Above n 686.

management of hazardous chemicals throughout their lifecycles. The European framework also seeks to cease or phase-out discharges, emissions and losses from “priority hazardous substances.” Given the extent of threat from pollution on international rivers and the evolving nature of pollutants which is only going to continue to affect the quality of available freshwater resources, it is recommended that the UN Watercourses be amended to reconcile with existing and new conventions to provide for the elimination of pollution from hazardous substances. Just like the EC is responsible for recommending revisions, so can watercourse States be made obliged to monitor, assess and report on the quality of their respective river basin and identify hazardous substances which are toxic, persistent or of bioaccumulative characteristic and work towards ceasing or phasing them out.

The EU, in furtherance of the no “significant adverse effect” and the principle of sustainable water use, has introduced specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances together with the requirement for national level measures to deal with basin specific pollutants. These measures are monitored, assessed and reviewed on a regular interval. By contrast, the case studies show that while there are some forms of pollution control measures to deal with pollution in portions (not the whole) of all the River Basins, specific measures to implement those obligations and adequately deal with the threat from pollution remain a challenge.

In the Jordan Basin, Israel and Jordan have agreed to keep the Lower Jordan waters to acceptable quality levels. While they have agreed to prevent and control pollution from domestic and industrial wastes as well as pollution from agriculture, they have not addressed pollution from hazardous substances and have only agreed to abate pollution specifically from brine. Even though Israel and Jordan are under an obligation to prevent and control pollution and have undertaken to monitor the water quality of the Lower Jordan River, mutually acceptable measures and methods joint water quality assessment and reporting, establishing best available techniques and best environmental practices to address

pollution from point and non-point sources and establishing lists of specific substances (in addition to brine) the introduction of which into the waters of the Lower Jordan River are to be prohibited, limited, investigated or monitored as per the UN Watercourses Convention and the European framework for pollution control, are still lacking. Thus, while there is a framework for pollution control under the Treaty, they have yet to take full advantage of it.

Under the Interim Agreement, Israel and the Palestinian people of the West Bank have also agreed to address pollution from agricultural, industrial and the domestic sectors, which is to be enforced and monitored for compliance. Its comprehensive nature addresses all aspects of pollution prevention, reduction, control and abatement, including from hazardous substances. Therefore no recommendations for change is recommended except that the right of the Palestinian people of the West Bank to the Jordan waters be allowed to be realised under this, essentially, one way traffic Agreement.

As for the Yarmuk Waters Agreement 1987, no pollution control provisions have been provided for. Given that reduced water flows is a growing concern, pollution will only exacerbate the overall problem of freshwater availability in this already water scarce Basin. Thus it is recommended that both Jordan and Syria make a new agreement that will seek to address all aspects of pollution control in the Yarmouk River –from prevention to elimination of certain types of pollutants.

In the Nile Basin, the Nile Waters Agreement 1959 does not address pollution at all. The issue is currently being dealt with through subsidiarity action programmes of the NBI. However, a strong legal regime is required given the challenges associated with the problem of pollution as is demonstrable by the EU governance framework. Thus, once the Cooperative Framework Agreement is ratified by all the Nile Basin States and the Nile River Basin Commission is established together with the Technical Advisory Committee, the Nile Basin States can then work towards protecting and improving water quality within the Nile River Basin. Although the pollution control regime is unspecified, it is envisaged that the Basin Commission and the Technical Advisory Committee will perform functions

similar to that of the EC by monitoring States' compliance and making recommendations for improvement. As for the Cooperative Framework Agreement itself, it is recommended that it deals with the problem of pollution from hazardous substances separately and oblige the Nile Basin States to not only establish water quality standards but aim to eliminate pollution from hazardous substances and to keep it and any other priority substances identified, under review as the nature of pollutants evolve over time.

The Indus Waters Treaty governing the Indus Basin does provide for pollution control from sewage and industrial wastes, but not agricultural effluents though this is the largest polluter of the Indus waters. Moreover, India and Pakistan have to prevent 'undue pollution' from these sources and that too, if it "materially affects" the other Party. Given that pollution is a problem in the Indus waters, the Treaty needs to be amended (which has been duly provided for under the Treaty) in order to impose an obligation on both Parties to prevent, reduce and control pollution from all domestic, industrial and agricultural sectors which cause "significant harm" to not only the other Party but to the Basin in general. Moreover, the Treaty needs to introduce water quality objectives given that 'undue' is too vague a standard to work with, and have proper monitoring, assessment and reporting requirements in place so that pollution levels can be monitored and dealt with effectively. The Parties are also recommended to identify and introduce ways to deal with hazardous substances in the Indus Basin given that water availability, especially for Pakistan, is already a matter of concern and quality issues will only add to the water availability problem overall.

Overall, as evidenced by the current state of pollution levels in the Basins, more needs to be done in terms of drafting, implementation and enforcement of the Agreements in order to effectively deal with pollution of these Basin waters. Strengthening the UN Watercourses Convention by incorporating elimination of pollution from hazardous substances will aid Basin States towards dealing with the threat from pollution to international rivers. This will, inter alia, contribute towards addressing the quality aspects of global freshwater security concerns.

4 Damming and Infrastructural Development



For dams and infrastructural development, “the challenge ... is to find ways of sharing water resources equitably and sustainably – ways that meet the needs of all people as well as those of the environment and economic development ... needs that are all intertwined, and our challenge is to resolve competing interests collectively.”⁹¹⁵

4.1 Introduction

This chapter looks at the threats posed by damming and infrastructural development to international river basins. It especially looks at: (1) river channel modifications and (2) dams and other constructions, and their impacts on large river systems. It then looks at international law and policy with regards to the substantial rights and obligations as well as procedural obligations of riparian States in relation to damming and infrastructural development provided for under the UN Watercourses Convention, including prior notification, consultations and negotiations. This is supplemented by the Berlin Rules as well as international case law and arbitration decisions.

The chapter then looks at the EU governance framework for damming and infrastructural development covered under the UNECE Water Convention, the UNECE’s Espoo (EIA) Convention, the SEA Protocol, the SEA Directive, the EIA Directive as well as the Water Framework Directive. Together they deal with Member States’ obligations with regards to planned projects with the potential to pose significant adverse impacts essentially through the requirements for environmental impact assessments. They also prescribe procedures for the

⁹¹⁵ See World Commission on Dams *Dams and Development: A New Framework for Decision-Making: The Report of the World Commission on Dams* (Earthscan, London, 2000) at xxix.

monitoring, assessment and reporting of the impact of such development on its international rivers against prescribed environmental objectives.

The chapter then looks at the extent of the threat from damming and infrastructural development in the three case studies, namely the Jordan, the Nile and the Indus River Basins. In each case study, this is followed by an analysis of the governing legal regime and identification of the gaps in the regime. The aims of this chapter is to fill-in these gaps as well as to recommend changes to the UN Watercourses Convention so as to strengthen international law with regards to damming and infrastructural development of international rivers.

4.2 Damming and Infrastructural Development of International Rivers

Rivers and their ecosystems are the result of adaptations to the natural hydrological regime.⁹¹⁶ Rivers can be indirectly but naturally altered by processes such as climate change.⁹¹⁷ They can also be physically and unnaturally altered by human conduct through the process of river engineering.⁹¹⁸ This chapter concerns the latter. River engineering includes river channel modifications and river flow regulations, which inter alia include the building of dams, storage of water in reservoirs and water diversion schemes.⁹¹⁹ These not only increase water availability but also decrease the socio-economic impacts of reduced water availability, thus dealing with water quantity issues.⁹²⁰ Ecological river engineering has been defined as the design and implementation of river works and

⁹¹⁶ Pavel Kabat and others *Vegetation, Water, Humans and the Climate: A New Perspective on an Interactive System* (Springer, Berlin, 2004) at 342.

⁹¹⁷ Kirstie A Fryirs and Gary J Brierley *Geomorphic Analysis of River Systems: An Approach to Reading the Landscape* (John Wiley & Sons, Chichester, West Sussex, Hoboken N J, 2012) at 272.

⁹¹⁸ This is concerned with the entire process of planning, design, construction and operation of works of various kinds. Mauro Marchetti and Victoria Rivas *Geomorphology and Environmental Impact Assessment* (A A Balkema Publishers, Amsterdam, 2001) at 83.

⁹¹⁹ Fryirs, above n 917, at 272.

⁹²⁰ European Commission, above n 175, at 5 and 8.

river restoration works for the benefit of human society.⁹²¹ It also guarantees the sustainable ecological functions of a river, such as its habitats and self-purification of its water.⁹²² Both river channel modifications and dams are discussed in the following paragraphs.

River Channel Modifications

Natural river channels are complex, dynamic systems, which are free to adjust their form and flow at rates, in directions and locations determined by its natural environmental properties over a range of time scales.⁹²³ However, today there is hardly any river in the world that is entirely natural due to river channel modifications (or channelization as they are sometimes called). River channel modifications may be defined as those management activities that alter the form of the river channel, specifically affecting the form, cross-section and longitudinal profile.⁹²⁴ Such modifications include bypass and diversion channels.⁹²⁵ Major reasons for channel modification include extensive land drainage schemes which require improvement in the efficiency of river network and protection from floods, either to confine high flows within the river network or to speed up the passage of flow through the channel.⁹²⁶ There are direct and indirect geomorphological impacts of river channel modifications depending on the location, extent and type of modification.⁹²⁷

⁹²¹ Hyoseop Woo “Trends in Ecological River Engineering in Korea” (2010) 4 Journal of Hydro-environment Research 269 at 269.

⁹²² Ibid.

⁹²³ David Sear and others “River Channel Modification in the UK” in Mike Acreman (ed) *The Hydrology of the UK: A Study of Change* (Routledge, Oxon, New York, 2012) at 55.

⁹²⁴ Kabat, above n 916, at 362.

⁹²⁵ Andrew S Goudie *The Human Impact on the Natural Environment: Past, Present, and Future* (7th ed, Blackwell Publishing, Chichester, 2013) at 129.

⁹²⁶ Kabat, above n 916, at 362.

⁹²⁷ At 362–363.

Dams and other constructions

Water retaining structures have been built in many parts of the world for nearly 5000 years.⁹²⁸ Depending upon the time of the year, three to six times the water that exists at any given time in all the world's rivers is now stored behind large dams.⁹²⁹ This is to ensure that freshwater is available for domestic and agricultural purposes throughout the year. However, over the past two centuries, due to increase in human populations around rivers, not only has it been necessary to provide assured freshwater supply for domestic, agricultural and now industrial purposes but also the need to reduce damages from floods and droughts.⁹³⁰ Hence the steady increase in the number of dams and reservoirs. Furthermore, dam technology advanced slowly until the Industrial Revolution from when larger dams were built in less time and from man-made materials.⁹³¹ There are now approximately 800, 000 dams in the world of which 48, 000 are classified as large dams⁹³² and 300 as major dams.⁹³³ The Global Reservoir and Dam Database, which compiles data on reservoirs with a storage capacity of more than 0.1 km³,

⁹²⁸ Asit K Biswas "Impacts of Large Dams: Issues, Opportunities and Constraints" in Cecilia Tortajada, Asit K Biswas and Dogan Altinbilek (eds) *Impacts of Large Dams: A Global Assessment* (Springer, Verlag, Berlin, Heidelberg, 2012) at 1.

⁹²⁹ Bigas, above n 217, at 11.

⁹³⁰ Biswas, above n 928, at 1.

⁹³¹ Marcus W Beck, Andrea H Claassen and Peter J Hundt "Environmental and Livelihood Impacts of Dams: Common Lessons across Development Gradients that Challenge Sustainability" (2012) 10 *International Journal of River Basin Management* 73 at 73.

⁹³² The most widely accepted definition of large dams is one given by the International Commission on Large Dams, which has defined a large dam as being over 15 metres high. The definition also includes dams between 5 to 15 metres high with a reservoir exceeding 3 MCM. See International Commission on Large Dams *World Register of Large Dams* (ICOLD, Paris, 2009); However, also see M Dinesh Kumar, M V K Sivamohan and Nitin Bassi *Water Management, Food Security and Sustainable Agriculture in Developing Economies* (Routledge, Oxon, New York, 2013) at 62 for a critique of the ICOLD definition.

⁹³³ A major dam is a giant that meets one of the criteria prescribed for large dams as above. Anonymous "Damming Statistics" *International Rivers* (22 October 2007) <http://www.internationalrivers.org/damming-statistics>

has recorded 6, 862 reservoirs globally, with a cumulative storage capacity of 6,197 km³.⁹³⁴

Adverse Impacts on Large River Systems

While hydropower, urban water supply and irrigation remain the major uses of large dams, ‘flood control’ continues to be emphasised as the major benefit associated with large dams.⁹³⁵ There are negative impacts of dam building as well, such as on the environment including disruption of the interconnectivity of an aquatic ecosystem impacting upon the lifecycle of aquatic species and natural resource-based livelihoods of local peoples.⁹³⁶ However, such impacts of dams are often considered by decision-makers to be acceptable costs relative to the economic benefits these structures can provide.⁹³⁷ According to the World Water Assessment Programme, about 60 percent of the world’s 292 largest river systems have interrupted stream flows due to dams and other infrastructural development.⁹³⁸ The World Wild Fund has also documented that only one-third of the world’s 177 large rivers remain free-flowing from source to mouth, with only 21 such rivers retaining a direct connection to the sea.⁹³⁹ Given the global increase in the construction of dams and the associated negative impacts, The World Commission on Dams (WCD) was established in 1998 to promote more sustainable approaches to dam development. The WCD Report was released in

⁹³⁴ Global Water System Project “GRanD Database” <http://www.gwsp.org/products/grand-database/global-reservoir-and-dam-grand-database-project.html>

⁹³⁵ Scudder, above n 11, at 298.

⁹³⁶ See Beck, above n 931, at 74; Scott WD Pearse-Smith “The Return of Large Dams to the Development Agenda: A Post-Development Critique” (2014) 11 *Consilience: The Journal of Sustainable Development* 123.

⁹³⁷ Beck, above n 931, at 74.

⁹³⁸ ‘A large river system’ is defined as “a river system that has a river channel section with a virgin mean annual discharge ... of at least 350 m³ per second anywhere in its catchment.” United Nations World Water Assessment Programme, above n 18, at 176.

⁹³⁹ Here, ‘large rivers’ are those which are over 1,000 km in length. World Wildlife Fund, above n 205, at 1.

2000 as: (1) an assessment of the effectiveness of large dams and (2) a proposed international framework for planning, appraisal, construction, operation, monitoring, and decommissioning of dams.⁹⁴⁰ The framework of the WCD promotes the use of three global norms, five core values, five key decision points, seven strategic priorities, 33 associated policy principles and 26 guidelines in the implementation and advocacy of dam-related activities.⁹⁴¹ Thus, the relationship between economic development and environmental degradation has been recognized by many, including international law and policy in this area.

4.3 International Law and Policy

International law and policy with regards to damming and infrastructural development will look at the relevant provisions of the UN Watercourses Convention and supplemented by the Berlin Rules and international case law and arbitration decisions.

The UN Watercourses Convention

Although the UN Watercourses Convention takes into account “problems affecting many international watercourses” and does not expressly include hydromorphological pressures resulting from damming and infrastructural development on international watercourses, it does provide for certain procedural rules with regards to such development.

In addition to the provisions dealing with general but substantive principles of equitable and reasonable utilization and no significant harm, Part III of the UN Watercourses Convention covers issues pertaining to “planned measures” in international watercourses. In the *Pulp Mills* case,⁹⁴² in acknowledging the “functional link” between procedural and substantive obligations intended to

⁹⁴⁰ World Commission on Dams, above n 915; D Moore, J Dore and D Gyawali “The World Commission on Dams + 10: Revisiting the Large Dam Controversy” (2010) 3 Water Alternatives 3.

⁹⁴¹ Beck, above n 931, at 2.

⁹⁴² *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; at 14.

ensure the equitable and sustainable management of a shared natural resource, the ICJ went some way towards clarifying the respective roles of the interrelated hierarchy of substantive and procedural rules commonly found in treaty regimes and, by implication, in general international law.⁹⁴³ The generality of the principle of equitable and reasonable utilisation and the due diligence nature for the prevention of transboundary harm require that they must be made normatively operational by means of a number of procedural requirements⁹⁴⁴ spread over 9 Articles which are specific to planned measures and are intended to codify customary international environmental law.

Although ‘planned measures’ has not been defined under the UN Watercourses Convention, they refer to new projects or programmes of major or minor nature as well as changes in existing uses of an international watercourse.⁹⁴⁵ Put simply, they act as a means to bring about development of international rivers for the optimal utilization of international rivers, but subject to the sustainable development principle.

Sustainability of Planned Measures

The ICJ in the *Gabčíkovo-Nagymaros* case⁹⁴⁶ stated that: “[I]n order to evaluate the environmental risks, current standards must be taken into consideration.”⁹⁴⁷ The Court, being mindful that “in the field of environmental protection, vigilance and prevention are required on account of the often irreversible character of

⁹⁴³ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 79; See Owen McIntyre “The World Court’s Ongoing Contribution to International Water Law: The Pulp Mills Case between Argentina and Uruguay” (2011) 4 Water Alternatives 124 at 136.

⁹⁴⁴ *Ibid.*

⁹⁴⁵ International Law Commission, above n 237, at 111.

⁹⁴⁶ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163.

⁹⁴⁷ At para 140.

damage to the environment and of the limitations inherent in the very mechanism of reparation...”⁹⁴⁸ additionally held that:⁹⁴⁹

“Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind - for present and future generations - of pursuit of such interventions at an unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades. Such new norms [relating to protection of the environment] have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past. This need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.”

Thus, the ICJ in this case endorsed the concept of sustainable development, which played the role of reconciling competing interests of Hungary and Slovakia in this instance, namely economic development with the protection of the environment,⁹⁵⁰ both of which have customary environmental law status.⁹⁵¹

How the applicability of the concept of sustainable development translates to large-scale planned projects was elaborated on by the Permanent Court of Arbitration (‘PCA’) in the *Indus Waters Kishenganga Arbitration* in the following terms:⁹⁵²

⁹⁴⁸ Ibid.

⁹⁴⁹ Ibid.

⁹⁵⁰ Peter H F Bekker “Gabčíkovo-Nagymaros Project (Hungary/Slovakia), Judgement” (1998) 92 *The American Journal of International Law* 273 at 276.

⁹⁵¹ Afshin A-Khavari and Donald R Rothwell “The ICJ and the Danube Dam Case: A Missed Opportunity for International Environmental Law?” (1998) 22 *Melb U L Rev* 507 at 528.

⁹⁵² Above n 166; para 450.

“Applied to large-scale construction projects, the principle of sustainable development translates, as the International Court of Justice recently put it in *Pulp Mills*, into “a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource.” The International Court of Justice affirmed that “due diligence, and the duty of vigilance and prevention which it implies, would not be considered to have been exercised, if a party planning works liable to affect the regime of the river or the quality of its waters did not undertake an environmental impact assessment on the potential effects of such works.”⁹⁵³ Finally, the International Court of Justice emphasized that such duties of due diligence, vigilance and prevention continue “once operations have started and, where necessary, throughout the life of the project.”

The PCA thereby linked the principle of sustainable development with the *ongoing* duty to undertake an environmental impact assessment where there is a potential for risk to the quantity or quality of the international river waters from large-scale planned projects.

Environmental Impact Assessment

Even though the UN Watercourses Convention has only mentioned EIA reports loosely and has in very certain terms made it optional as it does not oblige watercourse States to undertake an environmental impact assessment neither before a planned project is implemented nor on an ongoing basis post-implementation,⁹⁵⁴ the Berlin Rules has dedicated Chapter VI of the Rules to ‘impact assessments.’ Among other matters, it provides that:⁹⁵⁵

“States shall undertake prior and continuing assessment of the impact of programs, projects, or activities that may have a significant effect on the aquatic environment or the sustainable development of waters” [emphasis added].

Endorsement of an obligation to undertake prior and continuing EIA was slow by the ICJ. In the *Gabčíkovo-Nagymaros* case, it held that: “The awareness of the vulnerability of the environment and the recognition that environmental risks have

⁹⁵³ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 14 and 83.

⁹⁵⁴ See section on notification regarding content of notification.

⁹⁵⁵ Berlin Rules; Article 29(1).

to be assessed on a continuous basis has become much stronger in the years...”⁹⁵⁶ Although the Court refrained from explicitly referring to environmental impact assessment and failed to consider the precautionary principle (raised by Hungary⁹⁵⁷) as a principle of international environmental law and the consequences of not taking it into consideration instead choosing to rely on Treaty law principles,⁹⁵⁸ Vice-President Weeramantry in his separate opinion explicitly supported EIA as an emerging area of customary environmental law.⁹⁵⁹

“[e]nvironmental law in its current state of development would read into treaties which may reasonably be considered to have a significant impact upon the environment, a duty of environmental impact assessment and this means also, whether the treaty expressly so provides or not, a duty of monitoring the environmental impacts of any substantial project during the operation of the scheme. EIA, being a specific application of the larger general principle of caution, embodies the obligation of continuing watchfulness and anticipation.”

Thus, Justice Weeramantry was of the opinion that the obligation to conduct environmental impact assessments, which is an application of the precautionary approach, exists independently of a treaty obligation.⁹⁶⁰

Subsequently, the ICJ in the *Pulp Mills* case endorsed the obligation to conduct EIAs as a “requirement under general international law ... where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource”⁹⁶¹ and which “must be

⁹⁵⁶ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, at para 140.

⁹⁵⁷ At para 97.

⁹⁵⁸ A-Khavari, above n 951, at 530.

⁹⁵⁹ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, Separate Opinion of Vice-President Weeramantry at 112-113.

⁹⁶⁰ E Hey “International Water Law Placed in a Contemporary Environmental Context: the Gabčíkovo-Nagymaros Case” (2000) 25 *Physics and Chemistry of the Earth, Part B: Hydrology, Oceans and Atmosphere* 303 at 306.

⁹⁶¹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 204.

conducted prior to the implementation of a project.”⁹⁶² The Court further stated that:⁹⁶³

“due diligence, and the duty of vigilance and prevention which it implies, would not be considered to have been exercised, if a party planning works liable to affect the regime of the river or the quality of its waters did not undertake an environmental impact assessment on the potential effects of such works.”

Thus, the ICJ not only linked EIAs to the duty to act diligently as required by the obligation to prevent significant harm under customary international law, as endorsed under Article 7 of the UN Watercourses Convention but it also linked the requirement for EIAs directly to the principle of equitable and reasonable utilisation stating that: “such utilization could not be considered to be equitable and reasonable if the interests of the other riparian State in the shared resource and the environmental protection of the latter were not taken into account.”⁹⁶⁴

The ICJ observed that general international law does specify the scope and content of an environmental impact assessment and held that it “is for each State to determine in its domestic legislation or in the authorization process for the project” depending on “the nature and magnitude of the proposed development and its likely adverse impact on the environment” as well as “the need to exercise due diligence in conducting such an assessment.”⁹⁶⁵ The Court added that “notification is intended to enable the notified party to participate in the process of ensuring that the assessment is complete, so that it can then consider the plan and its effects with a full knowledge of the facts.”⁹⁶⁶ Thus the duty to notify, and the related duty to conduct an EIA, exist in customary international law and, as

⁹⁶² At para 205.

⁹⁶³ At para 204.

⁹⁶⁴ At para 177.

⁹⁶⁵ At para 205.

⁹⁶⁶ At para 112.

confirmed by the ICJ, apply to all States, not just those that have concluded international agreements containing such obligations.⁹⁶⁷

Exchange of Information

In addition to the general obligation to regularly exchange data and information,⁹⁶⁸ for any planned measure it is a requirement of the UN Watercourses Convention that watercourse States “exchange information and consult each other and, if necessary, negotiate on the *possible effects* of planned measures on the condition of an international watercourse.”⁹⁶⁹ [Emphasis added] ‘Possible effects’ include all potential effects of planned measures, be it adverse or beneficial.⁹⁷⁰ Thus, they are unconditional, irrespective of the actual effects of the planned measures. The obligation is intended to avoid problems inherent in a unilateral assessment of the possible effects of planned measures.⁹⁷¹ However, as per international environmental law, it is established that the obligation to inform is separate from the obligation to notify.⁹⁷²

Notification

Notification deals with issues pertaining to unilateral development of international watercourses. The obligation to notify and respond and failure to do these, are discussed in turn.

⁹⁶⁷ McIntyre, above n 943, at 124.

⁹⁶⁸ UN Watercourses Convention; Article 9.

⁹⁶⁹ UN Watercourses Convention; Article 11.

⁹⁷⁰ Christina Leb *Cooperation in the Law of Transboundary Water Resources* (Cambridge University Press, New York, 2013) at 131.

⁹⁷¹ M Monirul Qader Mirza (ed) *The Ganges Water Diversion: Environmental Effects and Implications* (Kluwer Academic Publishers, Dordrecht, 2004) at 210.

⁹⁷² Phoebe N Okowa “Procedural Obligations in International Environmental Agreements” (1997) 67 *British Yearbook of International Law* 275 at 289.

Unilateral Development

The UN Watercourses Convention provides that before a watercourse State implements or permits the implementation of planned measures (which may have a significant adverse effect upon other watercourse States), it is under an obligation to provide those States with notification thereof.⁹⁷³ This provision thereby emphatically rejects the notion that a watercourse State has an unfettered discretion to unilaterally deal with the portion of an international watercourse within its territory.⁹⁷⁴ As the Tribunal in the *Lake Lanoux Arbitration* held:⁹⁷⁵

“A State has the right to use unilaterally the part of a river which traverses it to the extent that this use is likely to cause on the territory of another State a limited harm only, a minimal inconvenience, which comes within the bounds of those that derive from good neighbourliness.”

Thus, in order to develop one's portion of the international river where such development may cause adverse effect to another watercourse State, the developing State has to notify the State(s) concerned as a practical act of cooperation embodying the principle of good neighbourliness.⁹⁷⁶ In the *Gabčíkovo-Nagymaros* case,⁹⁷⁷ which concerned Slovakia's unilateral diversion of the Danube following Hungary's unilateral suspension and subsequent abandonment of the project contemplated under the bilateral Treaty on the Construction and operation of the Gabčíkovo-Nagymaros System of Locks,⁹⁷⁸ the

⁹⁷³ UN Watercourses Convention; Article 12.

⁹⁷⁴ The doctrine of “absolute territorial sovereignty,” which would support such unfettered discretion, is epitomized by the “Harmon Doctrine.” See Stephen C McCaffrey “The Harmon Doctrine One Hundred Years Later: Buried, Not Praised” (1996) 36 Nat Resources J 549.

⁹⁷⁵ *Lake Lanoux Arbitration (France v Spain)*, above n 619, at 197.

⁹⁷⁶ See Philippe Sands, Jacquelin Peel, Adriana Fabra and Ruth MacKenzie *Principles of International Environmental Law* (Cambridge University Press, New York, 2012) at 204.

⁹⁷⁷ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163.

⁹⁷⁸ Treaty Concerning the Construction and Operation of the Gabčíkovo-Nagymaros System of Locks 32 ILM 124 (signed 16 September 1977, entered into force 30 June 1978). The principal objective of the project, which was a joint investment, constituted a single and indivisible operational system of works, namely a reservoir, a dam, a bypass canal, hydroelectric power

ICJ referred to the ‘community of interest’ principle’ in the *River Oder* judgment of the PCIJ⁹⁷⁹ and came to the view that unilateral action by Slovakia, essentially for its own use and benefit of between 80 and 90 percent of the waters of the Danube before returning them to the main bed of the river, constituted an “internationally wrongful act.”⁹⁸⁰ It expressed that the effects of a countermeasure must be commensurate with the injury suffered, taking account of the rights in question.⁹⁸¹ It considered that by depriving Hungary of its right to an equitable and reasonable share of the natural resources of the Danube with the continuing effects of the diversion of the waters on the ecology of the riparian area, Slovakia failed to respect the proportionality which is required by international law.⁹⁸² In other words, the diversion of the Danube was not a lawful countermeasure because it was not proportionate. Thus, unilateral actions impacting upon another watercourse State(s) rights are important considerations which demands notification of planned measures.

plants, the deepening of the bed of the Danube and a reinforcement of flood-control works. As a result of the project, part of the Hungarian territory would have been inundated and the course of the Danube River diverted. The proclaimed aim of the mutually beneficial Project was economic as well as ecological: essentially, the production of hydroelectricity, improvement of navigation on the Danube and flood control but also regulation of ice-discharge, maintenance of water quality and protection of the natural environment. See *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, paras 15, 18, 57, 77, 103, 135 and 137.

⁹⁷⁹ “[the] community of interest in a navigable river becomes the basis of a common legal right, the essential features of which are the perfect equality of all riparian States in the user of the whole course of the river and the exclusion of any preferential privilege of any one riparian State in relation to the others.” *Territorial Jurisdiction of the International Commission of the River Oder (“Six Governments”) v Poland*, above n 234, at 27.

⁹⁸⁰ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 78.

⁹⁸¹ At para 85.

⁹⁸² *Ibid.*

Notification regarding Possible Adverse Effects

The duty to notify arises where the planned measures “may have a significant adverse effect upon other watercourse States.”⁹⁸³ Use of the term ‘may’ means that the notifying State does not have to be sure that the significant adverse effect will in fact occur. The duty to provide notification arises when a State planning measures believes that the project may result in ‘significant adverse effect’, which is a lower threshold to ‘significant (or serious) harm.’⁹⁸⁴ The lower threshold was introduced in order to require notification even before legally significant harm might occur.⁹⁸⁵ Also note that the requirement is that the significant adverse effect has to be upon other watercourse States and not to their environment. In other words, it has to possibly infringe their substantial right to an equitable and reasonable use.

Where significant adverse effect might occur, the UN Watercourses Convention requires that notification, which has to be made in a “timely” manner,⁹⁸⁶ has to include available technical data and information, including the results of any environmental impact assessment.⁹⁸⁷ The Berlin Rules provide for the obligation to “promptly” notify States or competent organizations that may be affected “significantly” by a planned measure⁹⁸⁸ and that the notification has to be accompanied by an environmental impact assessment. The Rules prescribe that impacts to be assessed include, among others, effects on the environment and the sustainability of the use of waters.⁹⁸⁹ It further spells out that impact assessment

⁹⁸³ UN Watercourses Convention; Article 12.

⁹⁸⁴ International Law Commission, above n 237, at 111; Although the Berlin Rules have used the term “significant”; Article 57(1).

⁹⁸⁵ McCaffrey, above n 626, at 473.

⁹⁸⁶ UN Watercourses Convention; Article 12.

⁹⁸⁷ UN Watercourses Convention; Article 12.

⁹⁸⁸ Berlin Rules; Article 57.

⁹⁸⁹ Berlin Rules; Article 29(2)(b) and (e), respectively.

reports have to include:⁹⁹⁰ assessment of waters and environment likely to be affected, identification of ecosystems and human activities likely to be affected, description of the project and mitigating measures, and appraisal of institutional arrangements and facilities. Such prescriptions regarding EIAs are absent under the UN Watercourses Convention.

The *Pulp Mills* case has expounded that in order to ensure the meaningful and effective application of international environmental rules to planned measures, States should understand that the duty to notify comprises of two stages: (1) initial notification as soon as a plan is received and there is an intention to proceed with the works; and (2) subsequent detailed notification on the basis of an EIA study.⁹⁹¹ This is to enable the notified State to study and evaluate the possible effects of the planned measures and communicate its findings to the notifying State within the permissible timeframe of six months (though this can be extended for another six months at the request of the notified State).⁹⁹²

Obligations of the Notifying and Notified State

During the six months period: (1) the notifying State must cooperate by providing any requested additional information that is available and necessary for an accurate evaluation of the planned measures and refrain from implementation unless consented to by the notified States⁹⁹³ (2) the notified States is under an obligation to communicate their findings to the notifying State as early as possible. The notified State can either consent to the planned measures or if it finds that implementation of the planned measures would be inconsistent with the principle of equitable and reasonable utilization or cause significant harm, it has to attach to its finding a documented explanation setting forth the reasons for the finding.

⁹⁹⁰ Berlin Rules; Article 31.

⁹⁹¹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 60; para 120.

⁹⁹² UN Watercourses Convention; Article 13.

⁹⁹³ UN Watercourses Convention; Article 14.

Absence of Reply

If, however, objection is not made within the prescribed time, the notifying State is deprived of the opportunity to meet objections to its plans by clarifying or modifying them so that they do not infringe the legal rights of other watercourse States.⁹⁹⁴ While by setting a time limit, the Convention has intended to maintain a balance between both States' interests, there is an inherent imbalance between the notifying State and the notified State because while the former remains legally bound by all procedural provisions, the latter may ignore the procedural rules with impunity.⁹⁹⁵ It follows then that the notifying State "may" proceed to implement them in accordance with the notification and any other data and information provided to the notified States but remain subject to Article 5 (the principle of equitable and reasonable use) and Article 7 (the obligation not to cause significant harm).⁹⁹⁶ Although in the legal sense, absence of a reply from the notified State does not constitute consent to the planned project and it remains able to raise objections at any later stage pursuant to Articles 5 and 7, any claims by the notified State may be offset by the costs incurred by the notifying State for action undertaken which could have been avoided had objection been made within the prescribed time limit.⁹⁹⁷ The *Gabčíkovo-Nagymaros* case highlights this point. Given that the Convention is silent as to the appropriate sanction for either the non-responsive State or the notifying State, the appropriate remedy is something that will have to be determined on a case-by-case basis. As McCaffrey put it: "The facts and circumstances of each case, rather than any a priori rule, will ultimately be the key determinants of the rights and obligations of the parties."⁹⁹⁸

⁹⁹⁴ Charles B Bourne "The International Law Commission's Draft Articles on the Law of International Watercourses: Principles and Planned Measures" (1992) 3 *Colo J Int'l Env'tl L & Pol'y* 65 at 68.

⁹⁹⁵ At 69.

⁹⁹⁶ UN Watercourses Convention; Article 16(1).

⁹⁹⁷ UN Watercourses Convention; Article 16(2).

⁹⁹⁸ Stephen C McCaffrey and Mpazi Sinjela "The 1997 United Nations Convention on International Watercourses" (1998) 92 *The American Journal of International Law* 97 at 101.

Absent consent to the planned measure from the satisfied notified watercourse State following notification, it should then ideally lead to consultations and negotiations on aspects of the proposed planned measure.

Consultations and Negotiations

Where it is considered that the planned measures would affect the notified State's right to equitable and reasonable use or otherwise cause significant harm to it, in other words, if it is going to affect the quantity or quality of the other Party's water resources, then the watercourse States are under an obligation to consult⁹⁹⁹ and if necessary, to negotiate in "good faith" paying "reasonable regard to the rights and legitimate interests of the other State"¹⁰⁰⁰ with a view to arriving at an "equitable resolution" of the situation.¹⁰⁰¹

To this end, the ICJ in the *Pulp Mills* case drew attention to the characteristics of the obligation to negotiate and to the conduct which this imposes on the States concerned.¹⁰⁰² It highlighted the importance of cooperation, which is dictated by the principle of good faith.¹⁰⁰³ The Court recalled¹⁰⁰⁴ in the cases concerning *Nuclear Tests (Australia v. France)*: "One of the basic principles governing the creation and performance of legal obligations, whatever their source, is the principle of good faith. Trust and confidence are inherent in international co-operation ..."¹⁰⁰⁵ and in the *North Sea Continental Shelf* case that: "[the Parties]

⁹⁹⁹ The Berlin Rules; Article 58(1) provides that consultation can be on "actual or potential issues."

¹⁰⁰⁰ UN Watercourses Convention; Article 17(2).

¹⁰⁰¹ UN Watercourses Convention; Article 17(1).

¹⁰⁰² *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 146.

¹⁰⁰³ At paras 144-145.

¹⁰⁰⁴ At 67.

¹⁰⁰⁵ See *Nuclear Tests Case (Australia v France)* [1974] ICJ Rep 253 at 268; para 46 and at 473; para 49; *Border and Transborder Armed Actions (Jurisdiction of the Court and Admissibility of the Application) (Nicaragua v Honduras)* [1988] ICJ Rep 69 at 105; para 94.

are under an obligation so to conduct themselves that the negotiations are meaningful.”¹⁰⁰⁶ Although the Court recalled that “an obligation to negotiate does not imply an obligation to reach an agreement”¹⁰⁰⁷ but added that:¹⁰⁰⁸

“there would be no point to the co-operation mechanism provided for by [the provision concerned] if the party initiating the planned activity were to authorize or implement it without waiting for that mechanism to be brought to a conclusion. Indeed, if that were the case, the consultations and negotiations between the parties would no longer have any purpose.”

In addition to this, the ICJ in the *Gabčíkovo-Nagymaros* case, held that during consultation, it is a duty of both Parties to take into account “newly developed norms of environmental law”¹⁰⁰⁹, which “requires a mutual willingness to discuss in good faith actual and potential environmental risks.”¹⁰¹⁰ The ICJ attached great significance to respect for the environment:¹⁰¹¹ “the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn.” Thus, absent specific obligations of performance,¹⁰¹² the ICJ qualified the relevant Articles of the Treaty concerned, as “evolving provisions” based on “emerging norms of international law.”¹⁰¹³ Thus the Parties were under a legal obligation in this instance to take into consideration “newly developed norms of environmental law” “by agreement.”¹⁰¹⁴

¹⁰⁰⁶ *North Sea Continental Shelf (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands)* [1969] ICJ Rep 3 at 47; para 85.

¹⁰⁰⁷ *Railway Traffic between Lithuania and Poland* [1931] PCIJ Series A/B No 42 107 at 116.

¹⁰⁰⁸ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 147.

¹⁰⁰⁹ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 112.

¹⁰¹⁰ *Ibid.*

¹⁰¹¹ At para 53; *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)*, above n 605, at 241–242; para 29.

¹⁰¹² *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 112.

¹⁰¹³ *Ibid.*

¹⁰¹⁴ *Ibid.*

Furthermore, if requested by the notified State during the course of consultation and negotiation, the UN Watercourses Convention obliges the notifying State to refrain from implementing or allowing it to be so for a period of six months.¹⁰¹⁵ Further to the UN Watercourses Convention obligations, the Berlin Rules also obliges Parties to “coordinate approaches” to planned measures in order to arrive at not just an equitable resolution of the situation but one that is sustainable as well.¹⁰¹⁶

Other Obligations and Exceptions

The obligations regarding the exchange of information, notification, consultation and negotiation will also arise when a watercourse State has “reasonable grounds to believe” that another watercourse State is planning measures that may have a *significant adverse effect* upon it, notice of which has not been received, and requests the other State to comply with such provisions¹⁰¹⁷ [emphasis added]. There are three exceptions though; Articles 19 (implementation of urgent measures), 25 (emergency situations) and 31(national defence or security).¹⁰¹⁸ In these exceptional cases, the normal substantive principles regarding equitable utilization and no significant harm will still apply to any measures that may be implemented.

Dispute Resolution

As already stated, the principle of good faith requires watercourse States to cooperate and find an equitable resolution. In the *Gabčíkovo-Nagymaros* case, the ICJ recalled its statement in the *North Sea Continental Shelf* case where it held that: “[the Parties] are under an obligation so to conduct themselves that the

¹⁰¹⁵ UN Watercourses Convention; Article 17(3).

¹⁰¹⁶ Berlin Rules; Article 58(3).

¹⁰¹⁷ UN Watercourses Convention; Article 18(2).

¹⁰¹⁸ Patricia Wouters *International Water Law: Selected Writings of Professor Charles B Bourne* (Martinus Nijhoff Publishers, London, 1997) at 84–85.

negotiations are meaningful, which will not be the case when either of them insists upon its own position without contemplating any modification of it.”¹⁰¹⁹ However, where watercourse States are not able to come to an equitable resolution regarding the planned measures, the UN Watercourses Convention prescribes a framework for dispute settlement via peaceful means which the Parties may do so through:¹⁰²⁰ negotiation, mediation, conciliation by a third party, arbitration, settlement through the ICJ or an impartial fact-finding commission.¹⁰²¹

The *Pulp Mills* case¹⁰²² is an example of the way to settle a dispute that arises over a common watercourse when at least one of the two parties - Argentina in this case - considered that procedural obligations pertaining to planned measures had not been observed.¹⁰²³ The *Indus Waters Kishenganga Arbitration*¹⁰²⁴ is another example concerning a hydro-electric development project which threatened breach of substantive rights.

Breach of Procedural Obligations and Reparation

Although dispute resolution via peaceful means has been explicitly provided for under the UN Watercourses Convention, the issue of reparation is absent from its text. In the *Gabčíkovo-Nagymaros* case, the ICJ summarized its position as to the

¹⁰¹⁹ *North Sea Continental Shelf (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands)*, above n 1006; para 85.

¹⁰²⁰ UN Watercourses Convention; Articles 17(2) and 33(1) and (2).

¹⁰²¹ The UN General Assembly has adopted a Declaration on Fact-finding by the United Nations in the Field of Maintenance of International Peace and Security in which it has defined “fact-finding” to mean “acquiring detailed knowledge about the factual circumstances of any dispute or situation.” *Declaration on Fact-Finding by the United Nations in the Field of the Maintenance of International Peace and Security* GA Res 46/59, A/RES/46/59 (1991); Annex, para 2.

¹⁰²² *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164, at 14.

¹⁰²³ Vasiliki-Maria Tzatzaki “The UN Convention on International Watercourses and Integrated Water Management: A Bridge Built” (2008) 4 *Earth and Environmental Science* at 4.

¹⁰²⁴ Above n 166.

legal effects of breaches of procedural obligations committed by both Hungary and Slovakia in the following terms:

“Reparation must, as far as possible, wipe out all the consequences of the illegal act. In this case, the consequences of the wrongful acts of both Parties will be wiped out “as far as possible” if they resume their co-operation in the utilization of the shared water resources of the Danube, and if the multi-purpose programme, in the form of a co-ordinated single unit, for the use, development and protection of the watercourse is implemented in an equitable and reasonable manner. What it is possible for the Parties to do is to re-establish co-operative administration of what remains of the Project.”¹⁰²⁵

In the *Pulp Mills* case, even though Uruguay was found to have breached its procedural obligations, the ICJ held that its declaration to this effect constituted an “appropriate satisfaction.”¹⁰²⁶ It reached this conclusion after failing to find how restitution could be the preferred remedy because Uruguay was found not to have breached Argentina’s substantive obligations.¹⁰²⁷ In other words, despite the “functional link” between the two sets of obligations, the Court was not prepared to accept their “indivisibility” to the extent that a breach of the procedural obligations automatically entails a breach of the substantive obligations.¹⁰²⁸ Thus, in this instance, breach of procedural obligations by Uruguay was not reflected in any sort of remedial award. Therefore, rather than making any punitive awards, the ICJ in both cases has preferred to encourage ongoing cooperative actions between the Parties concerned.

Therefore, Part III of the UN Watercourses Convention contains a set of procedures to be followed by watercourse States when undertaking any planned measures on an international watercourse. The basic requirements of the obligation to exchange information, notify, consult, and negotiate will as from 17 August 2014 constitute binding international law to those Party to the Convention. Although optional under the UN Watercourses Convention, these requirements

¹⁰²⁵ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163; para 150.

¹⁰²⁶ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 282.

¹⁰²⁷ At para 275.

¹⁰²⁸ At 78-79.

are further supplemented by the obligation to undertake assessments of impacts of planned measures, not only before but during and post-implementation as well, which constitute customary international law as have been endorsed by both the ICJ and the PCA.

4.4 *The European Regional Framework*

The European law and policy with regards to damming and infrastructural development is contained under (but not limited to) the UNECE Water Convention, the UNECE's Espoo (EIA) Convention, the SEA Protocol, the SEA Directive, the EIA Directive and the Water Framework Directive. The following covered all of these in this order. Although other legislative (such as the Public Participation Directive) and policy documents are also relevant, they are excluded from this section.

4.4.1 UNECE Water Convention

In order to prevent, control and reduce transboundary impact, the UNECE Water Convention, which seeks to lay down rights and obligations of Parties specifically regarding the protection and use of international rivers, obliges all Parties to take all appropriate measures to prevent, control and reduce any transboundary impact.¹⁰²⁹ In particular, they are to ensure that: (1) transboundary waters are used in a reasonable and equitable way, taking into particular account their transboundary character, in the case of activities which cause or are likely to cause transboundary impact¹⁰³⁰ as well as (2) conservation and, where necessary, restoration of ecosystems.¹⁰³¹ In order to prevent, control and reduce transboundary impact, all Parties are under an obligation to develop, adopt, implement and, as far as possible, render compatible relevant legal, administrative, economic, financial and technical measures, in order to ensure that: environmental impact assessment and other means of assessment are

¹⁰²⁹ UNECE Water Convention; Article 2(1).

¹⁰³⁰ UNECE Water Convention; Article 2(2)(C). See above n 691 for the definition of 'transboundary impact' under the Convention.

¹⁰³¹ UNECE Water Convention; Article 2(2)(d).

applied¹⁰³² and sustainable water-resources management, including the application to the ecosystems approach, is also promoted.¹⁰³³

In terms of bilateral and multilateral cooperation between Riparian Parties, the Convention specifically provides for the establishment of joint bodies, one of the purposes of which is to serve as a forum for the exchange of information on existing and planned uses of water and related installations that are likely to cause transboundary impact¹⁰³⁴ and another is to participate in the implementation of environmental impact assessments relating to transboundary waters, in accordance with appropriate international regulations,¹⁰³⁵ whereby specific reference has been made to the provisions of the Espoo (EIA) Convention.¹⁰³⁶ The Convention also provides for transboundary consultations.¹⁰³⁷

4.4.2 Espoo (EIA) Convention

While the UNECE Water Convention contains general provisions regarding the Parties obligations to “prevent, control and reduce transboundary impact,” the UNECE’s Espoo (EIA) Convention obliges its Parties to, “either individually or jointly, take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed

¹⁰³² UNECE Water Convention; Article 3(1)(h). For “other means of assessment”, reference has been made to the SEA Protocol, which makes SEA relevant for the purpose of fulfilling the obligations under this provision. See Simon Marsden and Robin Warner (eds) *Transboundary Environmental Governance: Inland, Coastal and Marine Perspectives* (Ashgate Publishing Ltd, Surrey, Burlington, VT, 2012) at 149.

¹⁰³³ UNECE Water Convention; Article 3(1)(i).

¹⁰³⁴ UNECE Water Convention; Article 9(2)(h).

¹⁰³⁵ UNECE Water Convention; Article 9(2)(j).

¹⁰³⁶ See United Nations Economic and Social Council, Economic Commission for Europe, *Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Fifth Session Geneva, 10-12 November 2009 - Integrated Management of Water and Related Ecosystems: Draft Guide to Implementing the Convention* (2009) at 91, footnote 94.

¹⁰³⁷ UNECE Water Convention; Article 10.

activities.”¹⁰³⁸ ‘Proposed activity’ has been defined as “any activity or any major change to an activity subject to a decision of a competent authority in accordance with an applicable national procedure.”¹⁰³⁹ In other words, this comprises of not only new or planned activities, but also any major change to an activity, though it does not define what a major change is.¹⁰⁴⁰ This includes “large dams and reservoirs.”¹⁰⁴¹ General guidance for identifying criteria to determine “significant adverse impact” is also prescribed.¹⁰⁴²

In terms of environmental impact assessment, the Espoo (EIA) Convention obliges the Party of origin¹⁰⁴³ to: undertaken an EIA prior to a decision to authorize or undertake a proposed activity and to notify affected Parties.¹⁰⁴⁴ The Convention requires that as a basic, notification has to include:¹⁰⁴⁵ (a) information on the proposed activity, including any available information on its possible transboundary impact; (b) the nature of the possible decision; and (c) an indication of a reasonable time within which a response is required, taking into account the nature of the proposed activity. The Convention encourages that EIAs, as a

¹⁰³⁸ Espoo (EIA) Convention; Article 2(1). “Environmental impact assessment” has been defined as “a national procedure for evaluating the likely impact of a proposed activity on the environment.” “Impact” constitutes “any effect caused by a proposed activity on the environment.” “Transboundary impact” means “any impact, not exclusively of a global nature, within an area under the jurisdiction of a Party caused by a proposed activity the physical origin of which is situated wholly or in part within the area under the jurisdiction of another Party.” Articles 1(vi), (vii) and (viii), respectively.

¹⁰³⁹ Espoo (EIA) Convention; Article 1(v).

¹⁰⁴⁰ European Commission *Guidance on the Application of the Environmental Impact Assessment Procedure for Large-Scale Transboundary Projects* (European Union, 2013) at 3. Available at <http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf>

¹⁰⁴¹ Espoo (EIA) Convention; Appendix I; para 11.

¹⁰⁴² Espoo (EIA) Convention; Appendix III.

¹⁰⁴³ The Contracting Party or Parties to this Convention under whose jurisdiction a proposed activity is envisaged to take place; Article 1(ii).

¹⁰⁴⁴ Espoo (EIA) Convention; Articles 2(3) and (4).

¹⁰⁴⁵ Espoo (EIA) Convention; Article 3(2).

minimum requirement, be undertaken at the project level of the proposed activity.¹⁰⁴⁶ It also prescribes the minimum information that an EIA documentation has to contain,¹⁰⁴⁷ which has to be furnished to the joint body.¹⁰⁴⁸ Upon completion of the EIA documentation, the Party of origin is under an obligation to, without undue delay, enter into consultations with the affected Party concerning, inter alia, the potential transboundary impact of the proposed activity and measures to reduce or eliminate its impact.¹⁰⁴⁹ This may be conducted through an appropriate joint body.¹⁰⁵⁰ The Convention provides that a final decision on the proposed activity, due account is to be taken of the outcome of the environmental impact assessment, including the environmental impact assessment documentation, any comments received and the outcome of the consultations.¹⁰⁵¹ The Convention also provides for post-project analysis if one is warranted.¹⁰⁵² Such elaborations on EIAs are completely absent from its other global counterpart - the UN Watercourses Convention.

4.4.3 The SEA Protocol

In the context of the Espoo (EIA) Convention, the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context of 2003 ('the SEA Protocol')¹⁰⁵³ was adopted with the objective "to provide for a high level of protection of the environment."¹⁰⁵⁴ Strategic Environmental Assessment ('SEA') means "the

¹⁰⁴⁶ Espoo (EIA) Convention; Article 2(7).

¹⁰⁴⁷ Espoo (EIA) Convention; Article 4(1) and Appendix II.

¹⁰⁴⁸ Espoo (EIA) Convention; Article 4(2).

¹⁰⁴⁹ Espoo (EIA) Convention; Article 5.

¹⁰⁵⁰ Espoo (EIA) Convention; Article 5.

¹⁰⁵¹ Espoo (EIA) Convention; Article 6(1).

¹⁰⁵² Espoo (EIA) Convention; Article 7.

¹⁰⁵³ Above n 169.

¹⁰⁵⁴ SEA Protocol; Article 1.

evaluation of the likely environmental ... effects ...”¹⁰⁵⁵ and is undertaken for official draft plans and programmes, and any modifications to them, which are likely to have significant environmental effects¹⁰⁵⁶ though not limited to transboundary impacts. A SEA is mandatory for plans and programmes which are prepared for water management and this includes “large dams and reservoirs.”¹⁰⁵⁷ The resulting environmental report¹⁰⁵⁸ has to identify, describe and evaluate the likely significant environmental effects of implementing the plan or programme and its reasonable alternatives.¹⁰⁵⁹ Like its parent Convention, the Protocol also provides for transboundary consultations.¹⁰⁶⁰ When a plan or programme is adopted, the Protocol requires that the conclusions of the environmental report, the measures to prevent, reduce and mitigate the adverse effects and consultations are duly taken account of.¹⁰⁶¹ Additionally, the Protocol requires that upon adoption, the consulted Parties are informed and that the plan or programme is made available to them together with a summary of how the environmental considerations have been integrated, how comments received by them have been taken into account and the reasons for adopting it in light of reasonable alternatives considered.¹⁰⁶² The basic difference between SEAs and EIAs are that SEAs are undertaken much earlier in the decision-making process than EIAs, offer a broader range of alternatives for consideration rather than as mitigating factors and provides for greater opportunity to achieve environmental objectives.¹⁰⁶³ Thus, SEAs are seen as a key tool for sustainable development.¹⁰⁶⁴

¹⁰⁵⁵ SEA Protocol; Article 2(6).

¹⁰⁵⁶ SEA Protocol; Articles 2(5) and 4(1).

¹⁰⁵⁷ SEA Protocol; Article 4(2) and Annex I, para 11.

¹⁰⁵⁸ SEA Protocol; Article 7(1).

¹⁰⁵⁹ SEA Protocol; Article 7(2).

¹⁰⁶⁰ SEA Protocol; Article 10.

¹⁰⁶¹ SEA Protocol; Article 11(1).

¹⁰⁶² SEA Protocol; Article 11(2).

¹⁰⁶³ See Hussein Abaza, Ron Bisset and Barry Sadler *Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach* (UNEP, 2004) at 87.

4.4.4 The SEA Directive

The SEA Directive¹⁰⁶⁵ requires certain public plans and programmes, and any modifications to them, to undergo a procedural environmental assessment during their preparation and before their adoption, which are likely to have significant effects on the environment.¹⁰⁶⁶ Although, it predates the SEA Protocol, this Directive also seeks to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.¹⁰⁶⁷ The Directive specifically encourages States to apply the principles of the Espoo (EIA) Convention to such plans and programmes.¹⁰⁶⁸ An environmental assessment is mandatory for all plans and programmes which are prepared for water management and which set the framework for future development consent of projects listed in Annexes I and II to the EIA Directive (see below) including “dams and other installations.”¹⁰⁶⁹ An environmental assessment includes preparation of an environmental report¹⁰⁷⁰ in which the likely significant effects on the environment (in accordance with the specified criteria)¹⁰⁷¹ and reasonable alternatives are identified and consultations, including with Member States in the case of transboundary impacts,¹⁰⁷² are carried out. The environmental report and the results of the consultations are taken into account *before* the plans and programmes are adopted.¹⁰⁷³

¹⁰⁶⁴ Eric van Hooydonk *The Impact of EU Environmental Law on Ports and Waterways* (Maklu Publishers, Antwerp-Apeldoorn, 2006) at 57.

¹⁰⁶⁵ Above n 172.

¹⁰⁶⁶ SEA Directive; Preamble, paras 4, 5 and 9 and Articles 1 and 2(a).

¹⁰⁶⁷ SEA Directive; Article 1.

¹⁰⁶⁸ SEA Directive; Preamble, para 7.

¹⁰⁶⁹ SEA Directive; Article 3(2)(a).

¹⁰⁷⁰ Information to be included is specified under Annex I of the Directive.

¹⁰⁷¹ SEA Directive; Annex II.

¹⁰⁷² SEA Directive; Article 7.

¹⁰⁷³ SEA Directive; Article 8.

The SEA Directive stipulates that Member States may provide for coordinated and joint procedures in situations where an obligation to carry out assessments of the effects on the environment arises from both the SEA Directive and other Community legislation.¹⁰⁷⁴ As such, the SEA Directive is closely linked with other Directives such as the Water Framework Directive but also has formal and explicit links with the EIA Directive.

4.4.5 The EIA Directive

The EIA Directive¹⁰⁷⁵ has been amended three times, in 1997, in 2003 and in 2009. Like the SEA Protocol and the SEA Directive, the EIA Directive seeks to assess environmental effects of those public and private projects which are likely to have significant effects on the environment.¹⁰⁷⁶ Directive 97/11/EC brought the original Directive in line with the UNECE Espoo (EIA) Convention, widening the scope of the EIA Directive by increasing the types of projects covered, and the number of projects requiring mandatory environmental impact assessment. This included moving “[d]ams and other installations designed to hold water or store it on a long-term basis”¹⁰⁷⁷ from a discretionary EIA to a mandatory EIA where “dams and other installations designed for the holding back or permanent storage of water, where a new or additional amount of water held back or stored exceeds 10 MCM.”¹⁰⁷⁸ The EIA Directive also requires preparation of an environmental impact assessment with the information specified as well as transboundary consultations.¹⁰⁷⁹ The information gathered and the results of any consultations are to be taken into consideration in the development of consent procedures for any projects.¹⁰⁸⁰

¹⁰⁷⁴ SEA Directive; Article 11.

¹⁰⁷⁵ Above n 173.

¹⁰⁷⁶ EIA Directive; Article 1(1).

¹⁰⁷⁷ EIA Directive; Annex II; para (10)(f) and Article 4(2).

¹⁰⁷⁸ EIA Directive; Article 4(1) and Annex I; para 15.

¹⁰⁷⁹ EIA Directive; Articles 5(1) and 7 and Annex IV.

¹⁰⁸⁰ EIA Directive; Article 8.

The SEA and the EIA Directives are to a large extent complementary. The SEA is “up-stream” and identifies the best options at an early planning stage of the project plan while the EIA is “down-stream” and refers to the projects that are coming through at a later stage.¹⁰⁸¹ Hence, they address different stages and processes. However, both concern the effects of the projects on the environment including water, irrespective of whether the project might be transboundary in nature.¹⁰⁸² While in theory, an overlap of the two processes is unlikely to occur, in practice, potential overlaps in the application of the two Directives have been identified.¹⁰⁸³ This is where, for example, large scale projects are made up of sub-projects, or are of such a scale as to have more than local significance.¹⁰⁸⁴ Hence, Member States have highlighted the need for further guidance on the link between the SEA and the EIA Directives.

Altogether, the focus of the UNECE Water Convention, the UNECE Espoo (EIA) Convention, the SEA Protocol and the SEA and EIA Directives are to undertake assessments of projects including those which are likely to have a transboundary

¹⁰⁸¹ European Commission *Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (Directive 2001/42/EC)* COM(2009) 469 Final Report (EC, 2009) at 6. Available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0469&from=EN>

¹⁰⁸² As clarified by the Court of Justice, projects listed in Annex I to the EIA Directive which extend to the territory of a number of Member States cannot be exempted from the application of the Directive solely on the ground that it does not contain any express provision in regard to them as such an exemption would seriously interfere with the objective of the EIA Directive. That finding is strengthened by Article 7, which provides for inter-State cooperation when a project is likely to have significant effects on the environment in another Member State. See European Commission *Environmental Impact Assessment of Projects: Rulings of the Court Of Justice* (European Union, 2013) at 29. Available at http://ec.europa.eu/environment/eia/pdf/eia_case_law.pdf

¹⁰⁸³ European Commission, above n 1081, at 6.

¹⁰⁸⁴ William Sheate, Helen Byron, Suzan Dagg and Lourdes Cooper *The Relationship Between the EIA and SEA Directives: Final Report to the European Commission* (August 2005) at v. Available at http://ec.europa.eu/environment/archives/eia/pdf/final_report_0508.pdf

impact and engage States in consultations with likely to be affected States in order to ensure that the project is environmentally sustainable where there are no alternatives to the proposed activity.

4.4.6 The Water Framework Directive

As already mentioned, the Water Framework Directive aims to achieve “good ecological status” and “good surface water chemical status” in all bodies of surface water across Europe. However, some water bodies may not achieve this objective for different reasons. Hence, in addition to assessments of natural water bodies, in which the ecological status is a perceived or measured deviation from a reference condition, the Water Framework Directive also defines and has to consider ‘Artificial Water Bodies’ - those created by human activity and ‘Heavily Modified Water Bodies’ (‘HMWB’) - those physically altered by human activity.¹⁰⁸⁵ This section will only focus on HMWBs.

Designation of a Heavily Modified Water Body

The concept of a HMWB was introduced into the Water Framework Directive in recognition that many water bodies in Europe have been subject to “major physical alterations so as to allow for a range of water uses.”¹⁰⁸⁶ These include rivers which have been dammed or developed by other infrastructural works.¹⁰⁸⁷ The Water Framework Directive defines a HMWB as: “a body of surface water which as a result of physical alterations by human activity is substantially changed

¹⁰⁸⁵ Water Framework Directive; Article 2(8) and (9).

¹⁰⁸⁶ European Communities *Identification and Designation of Heavily Modified and Artificial Water Bodies Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 4* (Produced by Working Group 2.2 – HMWB) (Office for Official Publications of the European Communities, Luxembourg, 2003) at 12. Available at [https://circabc.europa.eu/sd/a/f9b057f4-4a91-46a3-b69a-e23b4cada8ef/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-%20HMWB%20\(WG%202.2\).pdf](https://circabc.europa.eu/sd/a/f9b057f4-4a91-46a3-b69a-e23b4cada8ef/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-%20HMWB%20(WG%202.2).pdf)

¹⁰⁸⁷ Ibid.

in character, as designated by the Member State ...”¹⁰⁸⁸ In order to designate a water body as heavily modified, Member States must undergo the tests within Article 4 (3) which provides:

“Member States may designate a body of surface water as ... heavily modified, when: (a) the changes to the hydro morphological characteristics of that body which would be necessary for achieving good ecological status would have significant adverse effects on: (i) the wider environment; (ii) navigation ... ; (iii) activities for the purposes of which water is stored ... ; (iv) water regulation, flood protection, land drainage, or (v) other equally important sustainable human development activities; and (b) the beneficial objectives served by the ... modified characteristics of the water body cannot, for reasons of technical feasibility or disproportionate costs, reasonably be achieved by other means, which are a significantly better environmental option.”

In short, this requires consideration of: (1) whether the restoration measures required achieving “Good Ecological Status” (GES)¹⁰⁸⁹ will have “significant adverse effects” on the activity (use), that is, the beneficiary of physical change and (2) whether there are any other “significantly better environmental options.”¹⁰⁹⁰ Thus, the concept of HMWB was created to allow for the continuation of these specified uses which provide valuable social and economic benefits but at the same time allow mitigation measures to improve water quality.¹⁰⁹¹ The boundaries of HMWB are delineated by the extent of changes to the hydro morphological characteristics.¹⁰⁹² Once a river basin has been

¹⁰⁸⁸ Water Framework Directive; Article 2(9).

¹⁰⁸⁹ See Water Framework Directive; Article 2(22) and Annex V.

¹⁰⁹⁰ European Communities *Heavily Modified Water Bodies: “Information Exchange on Designation, Assessment of Ecological Potential, Objective Setting and Measures”* (Common Implementation Strategy Workshop, Brussels, 12-13 March 2009) - Key Conclusions (18 May 2009) at 3. Available at <http://www.ecologic-events.de/hmwb/documents/FinalHMWBConclusions.pdf>

¹⁰⁹¹ European Communities, above n 1086, at 12.

¹⁰⁹² European Communities *Identification of Water Bodies Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document No 2* (Produced by Working Group on Water Bodies) (Office for Official Publications of the European Communities, Luxembourg, 2003) at 8. Available at <https://circabc.europa.eu/sd/a/655e3e31-3b5d-4053-be19-15bd22b15ba9/Guidance%20No%20-%20Identification%20of%20water%20bodies.pdf>

designated as a HMWB (and this is optional),¹⁰⁹³ it is then necessary to identify the appropriate reference conditions.

Reference Conditions for a HMWB

The environmental objectives for all water bodies are set in relation to reference conditions. For natural water bodies, reference conditions are based on “high ecological status”¹⁰⁹⁴ but for HMWB, they are based on “maximum ecological potential” (‘MEP’).¹⁰⁹⁵ MEP is defined as the state where “the values of the relevant biological quality elements reflect, as far as possible, those associated with the closest comparable surface water body type, given the physical conditions which result from the artificial or heavily modified characteristics of the water body.”¹⁰⁹⁶ Thus, MEP represents the maximum ecological quality that could be achieved for a HMWB in comparison with the closest surface water body once all mitigation measures, that do not have significant¹⁰⁹⁷ adverse effects on its specified uses or on the wider environment, have been applied.¹⁰⁹⁸ It is

¹⁰⁹³ The designation of HMWB is optional i.e. Member States do not have to designate water bodies as HMWB. Where modified waters are not designated, the objective will be good ecological status, not the less stringent good ecological potential. Where it is not possible to designate a water body subject to hydromorphological changes as HMWB then Article 4(4) or 4(5) derogations may apply. If a water body is designated as HMWB then Article 4(5) and/or 4(4) may be applied if GEP cannot be achieved. See European Communities, above n 1086, at 11–12.

¹⁰⁹⁴ Ulrich Irmer and Bettina Rechenberg ““Designation and Assessment of Artificial and Heavily Modified Water Bodies under the EC Water Framework Directive”” (2004) 32 *Acta Hydrochimica et Hydrobiologica* 75 at 75.

¹⁰⁹⁵ See Angel Borja and Michael Elliott “What Does ‘Good Ecological Potential’ Mean, Within the European Water Framework Directive?” (2007) 54 *Marine Pollution Bulletin* 1559 for how MEP is calculated.

¹⁰⁹⁶ Water Framework Directive; Annex V, Section 1.2.5.

¹⁰⁹⁷ “Significance” is held to vary across sectors and will be influenced by the socio-economic priorities of Member States. European Communities, above n 1086, at 40.

¹⁰⁹⁸ At 5.

intended to ensure the “best approximation to ecological continuum”¹⁰⁹⁹ given the hydromorphological characteristics of the HMWB.¹¹⁰⁰ Under the Water Framework Directive, it was uncertain how absolute the requirements for ecological continuum are or whether lateral connectivity is part of the ecological continuum.¹¹⁰¹ According to an EC Common Implementation Strategy Guidance Document, best approximation to ecological continuum requires consideration of all hydromorphological mitigating measures that could reduce any obstacles to migration and improve the quality, quantity and range of habitats affected by the physical alterations.¹¹⁰² This could also include connectivity of water bodies.¹¹⁰³ Similarly, this also applies to any new dam or other structures that affect the ecological continuum. Once the reference condition for a HMWB has been ascertained, it is then necessary to identify environmental objectives for the water body.

Environmental Objectives for a HMWB¹¹⁰⁴

Instead of good ecological status (‘GES’) - the objective applied to water bodies that are not heavily modified or artificial, the principal environmental objective

¹⁰⁹⁹ Water Framework Directive; Annex V, Table 1.2.5.

¹¹⁰⁰ Royal Haskoning *Management Strategies and Mitigation Measures for the Inland Navigation Sector in Relation to Ecological Potential for Inland Waterways* Final Report (Association of Inland Navigation Authorities, March 2008) at 3. Available at <http://www.aina.org.uk/docs/AINAWFDReport2008.pdf>

¹¹⁰¹ E Kampa *Heavily Modified Water Bodies: Synthesis of 34 Case Studies in Europe* (Springer, Berlin, New York, 2004) at 144.

¹¹⁰² European Communities, above n 1086, at 57.

¹¹⁰³ Kampa, above n 1101, at 144.

¹¹⁰⁴ See European Commission *Overall Approach to the Classification of Ecological Status and Ecological Potential Water Framework Directive: Common Implementation Strategy* (Produced by Working Group 2A) (Office for Official Publications of the European Communities, Luxembourg, 2003). Available at [https://circabc.europa.eu/sd/a/06480e87-27a6-41e6-b165-0581c2b046ad/Guidance%20No%2013%20-%20Classification%20of%20Ecological%20Status%20\(WG%20A\).pdf](https://circabc.europa.eu/sd/a/06480e87-27a6-41e6-b165-0581c2b046ad/Guidance%20No%2013%20-%20Classification%20of%20Ecological%20Status%20(WG%20A).pdf)

for HMWBs is that they should all be protected and enhanced with the aim of achieving “good ecological potential” (‘GEP’) and “good surface water chemical status”¹¹⁰⁵ by 2015. In terms of implementing the Water Framework Directive, an assessment is made of the status of HMWBs in terms of achieving GEP, which is taken from an ecological point of view, taking into account some ecological restoration principles.¹¹⁰⁶ There have been two approaches by Member States to achieving GEP: (1) based on establishing biological quality elements; and (2) the “Prague” approach which is based on identifying practicable mitigation measures.¹¹⁰⁷ Thus, GEP differs from GES in that it makes allowances for the ecological impacts resulting from physical alterations that: (1) are necessary to support a specified use; or (2) must be maintained to avoid adverse effects on the wider environment.¹¹⁰⁸ In essence, good ecological potential is “what ecology should be there if the anthropogenic influences responsible for it not being there are removed” or “the potential to be in [good ecological potential] if only the stressor was removed.”¹¹⁰⁹ Although there are many definitions of what good ecological restoration is, one of the most widely cited definition is:¹¹¹⁰

¹¹⁰⁵ Water Framework Directive; Article 4(1)(a)(iii).

¹¹⁰⁶ Borja, above n 1095, at 1559.

¹¹⁰⁷ European Communities *Heavily Modified Water Bodies: “Information Exchange on Designation, Assessment of Ecological Potential, Objective Setting and Measures”* (Common Implementation Strategy Workshop, Brussels, 12-13 March 2009) - *Updated Discussion Paper* (23 April 2009) at 18–19. Available at http://www.ecologic-events.de/hmwb/documents/Discussion_Paper_Updated.pdf

¹¹⁰⁸ Royal Haskoning, above n 1100, at 3.

¹¹⁰⁹ Borja, above n 1095, at 1561.

¹¹¹⁰ National Research Council *Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy* (National Research Council, 1992); Also see Eric Higgs *Nature by Design: People, Natural Process, and Ecological Restoration* (MIT Press, Cambridge, Mass, 2003); J Baird Callicott “Postmodern Ecological Restoration: Choosing Appropriate Temporal and Spatial Scales” in Kevin deLaplante, Bryson Brown and Kent A Peacock (eds) *Philosophy of Ecology* (Elsevier, Oxford, 2011) at 312–315.

“... restoration is defined as the return of an ecosystem to a close approximation of its condition prior to disturbance. In restoration, ecological damage to the resource is repaired. Both the structure and the functions of the ecosystem are recreated. Merely recreating the form without the functions, or the functions in an artificial configuration bearing little resemblance to a natural resource, does not constitute restoration. The goal is to emulate a natural, functioning, self-regulating system that is integrated with the ecological landscape in which it occurs. Often, natural resource restoration requires one of the following approaches: reconstruction of the antecedent physical, hydrologic and morphologic conditions; chemical clean[up] or adjustment of the environment; and biological manipulation, including re[-]vegetation and the reintroduction of absent or currently nonviable native species.”

This definition gives an indication of where to arrive (and, consequently, what ecological status is expected), when restoring a modified ecosystem.¹¹¹¹ Thus, restoration measures for achieving GES may range from measures aimed at reducing the environmental impact of the physical alteration to measures resulting in the complete removal of the physical alteration.¹¹¹² Thus, the designation of HMWB is not an opportunity to avoid achieving demanding ecological and chemical objectives, since GEP is an ecological objective albeit tailored to a HMWB.

Monitoring and Assessment of an existing HMWB

The Water Framework Directive prescribes the use of biological as well as supporting hydro morphological and physico-chemical quality elements, which are to be used by Member States in the assessment of the ecological potential of a HMWB.¹¹¹³ These quality elements are estimated using monitored parameters. For ‘good chemical status,’ which is assessed using the same quality elements as is used for a natural water body, is defined as per quality standards established for

¹¹¹¹ Borja, above n 1095, at 1561.

¹¹¹² Kampa, above n 1101, at 111.

¹¹¹³ Water Framework Directive; Annex V, Table 1.2.5.

chemical substances at the EU level.¹¹¹⁴ Given that chemical status assessment is relevant more to a topic of polluted water bodies, further discussion of this has been excluded from this chapter.

Programme of Measures

Where the results of the monitoring programmes and assessments indicate that a HMWB is likely to fail to achieve GEP, Member States are required to establish an appropriate set of measures to improve the ecological potential of a water body with the aim of achieving GEP. This would require a good understanding of how measures will improve the ecological potential of the water body. For example, the identification of the relevant GEP hydromorphological conditions will require an understanding of the relationships between hydromorphological (that is quantity and dynamics of flow, river depth and width variation)¹¹¹⁵ and biological elements. This knowledge is still relatively limited and States are expected to guide themselves employing best available knowledge and judgement.¹¹¹⁶

Derogations for Planned, New Modifications and Activities

Although the Water Framework Directive provides that “overall principles should be laid down for control on impoundment in order to ensure the environmental sustainability of the affected water systems,”¹¹¹⁷ it has also included a provision; the “objective derogation”,¹¹¹⁸ which allows Member States to fail achieving good

¹¹¹⁴ See Directive 2008/105/EC, above n 171. Also see European Commission, above n 719; and Article 2(29) of the Water Framework Directive for information regarding progress being made in this area.

¹¹¹⁵ Giorgos Kallis and David Butler “The EU Water Framework Directive: Measures and Implications” (2001) 3 Water Policy 125 at 130.

¹¹¹⁶ European Communities, above n 1086, at 62-63.

¹¹¹⁷ Water Framework Directive; Preamble, 41.

¹¹¹⁸ Ana Barreira *Dams in Europe - The Water Framework Directive and the World Commission on Dams Recommendations: A Legal and Policy Analysis* WWF International Dams Initiative

ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of surface water when it is the result of *new modifications* to the physical (hydromorphological) characteristics of a surface water body¹¹¹⁹ but not the chemical and ecological dimensions of good water status.¹¹²⁰ This also allows Member States to fail to prevent deterioration from high status to good status of a body of surface water if it results from *new sustainable human development activities*,¹¹²¹ and cannot be used for obtaining derogation when surface waters deteriorate from good status.¹¹²² A definition of sustainable human development activities has not been given but what these could be will largely depend on how sustainability is interpreted.¹¹²³ Thus, these exemptions can be applied for new modifications and developments. However, this possibility is very restrictive in order not to make the Water Framework Directive an ineffective instrument.¹¹²⁴ Member States will have to prove that all the requisite conditions have been met which are that:¹¹²⁵ (a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water; (b) the reasons for modifications are of overriding public interest and/or the benefits to the environment and to society of achieving the environmental objectives are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development; (c) the

(WWF, January 2004) at 8. Available at

<http://awsassets.panda.org/downloads/wfddamsineurope.pdf>

¹¹¹⁹ Water Framework Directive; Article 4(7).

¹¹²⁰ Barreira, above n 1118, at 41.

¹¹²¹ Water Framework Directive; Article 4(7).

¹¹²² Barreira, above n 1118, at 41.

¹¹²³ European Commission *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance Document on Exemptions to the Environmental Objectives* Guidance Document No 20 (Office for Official Publications of the European Communities, Luxembourg, 2009) at 24–25. Available at http://ec.europa.eu/environment/water/water-framework/objectives/pdf/Guidance_document_20.pdf

¹¹²⁴ Barreira, above n 1118, at 8.

¹¹²⁵ Water Framework Directive; Article 4(7)-(9).

beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option; (d) it does not permanently exclude or compromise the achievement of the environmental objectives in other bodies of waters within the same river basin district and is consistent with the implementation of other Community legislation; and (e) it is guaranteed at least the same level of protection as the existing Community legislation. These conditions, in essence, assesses if the benefits of the new modification outweigh the benefits from good status and that there are no other means which are significantly better environmental option not entailing disproportionate cost.¹¹²⁶ Thus, if there are other means that could achieve the beneficial objectives of the modification or alteration fulfilling the specified criteria, then the derogation will not be available and as a consequence, the modification to the physical characteristics of the surface water body such as a dam could not be executed. Otherwise, it would constitute a breach of the Water Framework Directive.¹¹²⁷ These objectives are to be reviewed every 6 years.¹¹²⁸

River Basin Management Plans

Annex VII of the Water Framework Directive specifies the information that should be included in a River Basin Management Plan ('the RBMP'). For surface

¹¹²⁶ European Commission *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Economics and the Environment - The Implementation Challenge of the Water Framework Directive Guidance Document No 1* (Produced by Working Group 2.6 - WATECO) (Office for Official Publications of the European Communities, Luxembourg, 2003) at 10.

Available at <http://ec.europa.eu/environment/water/water-framework/economics/pdf/Guidance%201%20-%20Economics%20-%20WATECO.pdf>

¹¹²⁷ Since the Directive is a legislative act adopted by the European Council and Parliament following a legislative procedure, it is binding in its requirement as to results and breach of it could lead to formal infringement proceedings by the European Commission against the Member State and eventually referred to the European Court of Justice. See European Commission at Work "Monitoring the Application of Union Law" available at http://ec.europa.eu/atwork/applying-eu-law/index_en.htm

¹¹²⁸ Water Framework Directive; Article 4(7)(b).

waters, RBMPs should include:¹¹²⁹ information regarding reference conditions, a summary of significant pressures and impact of human activity on the status of surface water, results of the monitoring programmes carried out for ecological and chemical status, a list of the environmental objectives, a summary of programme(s) of measure(s) and a register of any more detailed programmes and management plans. Updated versions of the RBMPs should include:¹¹³⁰ a summary of the reviews, an assessment of the progress made towards the achievement of the environmental objectives including presentation of the monitoring results and an explanation for any environmental objectives which have not been reached, a summary of, and an explanation for, any measures foreseen in the earlier version of the river basin management plan which have not been undertaken and a summary of any additional interim measures adopted since the publication of the previous version of the RBMPs. For international rivers, the Water Framework Directive requires that Member States: (1) produce a single RBMP;¹¹³¹ (2) coordinate the requirements for the achievement of the environmental objectives;¹¹³² and (3) provide reasons and details of modifications and alterations.¹¹³³ Such coordinated approach is opined to be more natural and can be more productive¹¹³⁴ as is demonstrated by successful examples of the Danube and Rhine RBMPs. In these Basins, the riparian States have used their respective river basin institution as a platform to deal with matters ancillary to

¹¹²⁹ Water Framework Directive; Annex VII, paras A(2), A(4.1), A(5), A(7) and A(8), respectively.

¹¹³⁰ Water Framework Directive; Annex VII, paras B(1)-(4).

¹¹³¹ Water Framework Directive; Article 13(3).

¹¹³² Water Framework Directive Article 3(4).

¹¹³³ Water Framework Directive; Article 4(7)(b).

¹¹³⁴ Brigitte Nixdorf, Atis Rektins and Ute Mischke “Standards and Thresholds of the EU Water Framework Directive (WFD) – Phytoplankton and Lakes” in Michael Schmidt and others (eds) *Standards and Thresholds for Impact Assessment* (Springer, Verlag, Berlin, Heidelberg, 2008) at 303.

coordinated reporting.¹¹³⁵ RBMP are required to be reviewed and updated every six years. The next one is due in 2015.¹¹³⁶

Commission Implementation Report

The European Commission's Report of 2012 on the implementation of the Water Framework Directive has already been covered in chapter 2. In that Report, the Commission found that hydromorphological pressures remains one of the main pressures on the water environment.¹¹³⁷ For those not able to achieve their environmental objective by 2015, the new deadline will be 2027.¹¹³⁸

Therefore, in addition to the requirements for SEAs and EIAs for proposed activities, the EU, through the Water Framework Directive, is not only seeking to meet the environmental objective of good status for all its water bodies by 2015 but through the concept of HMWB and the lower environmental objective of GEP, is also trying to strike the right balance between environmental benefits of thereof and human needs based on existing and new damming and infrastructural developments.

4.5 Case Studies

The following section looks at the impact of damming and infrastructural development on the Jordan, the Nile and the Indus River Basins, respectively. It then looks at the governance regime in each river basin and identified the gaps in the regime using international law and policy as well as the European regional framework.

¹¹³⁵ For more information visit IKSR "International Commission for the Protection of the Rhine" <http://www.iksr.org/index.php?id=12&L=3>; and ICPDR "International Commission for the Protection of the Danube" <http://www.icpdr.org/main/>

¹¹³⁶ Water Framework Directive; Article 13(7).

¹¹³⁷ European Commission, above n 8, at 6.

¹¹³⁸ Ibid.

4.5.1 Damming and Infrastructural Development in the Jordan River Basin

In chapter 2, it was highlighted that upstream diversions mainly by Israel, Jordan and Syria is intricately intertwined with over-extraction. Constructions of dams within the Basin have exacerbated the issue of reduced water flows. The following table shows large dams (as defined by the International Commission on Large Dams¹¹³⁹) in the Jordan River Basin.¹¹⁴⁰

Table 18: Large Dams in the Jordan River Basin

Dam	Country	River	Year	Height	Capacity (MCM)
King Talal	Jordan	Zarqa	1987	108	75
Karamah		Wadi Al Mallaha	1998	45	53
Wadi Arab		Wadi Arab	1986	84	20
Shurabil Bin Hasna		Wadi Ziglab	1967	48	4
Kafrein		Wadi Kafrein	1997	37	9
Shueib		Wadi Shueib	1969	32	2
Al Wahda/Unity (Maqarin dam)	Jordan & Syria	Yarmouk	2007	87	110
Total					273

Diversions and damming in the Jordan Basin account for 98 percent of water utilization for domestic and agricultural purposes by Israel, Jordan and Syria.¹¹⁴¹ As a result, the outflow rate prior to 1950 of 1,250 MCM is now reduced to 2 percent, which is about 25-30 MCM.¹¹⁴² Hydromorphological changes is apparent with reduced outflows to the extent that the level of the Dead Sea, which the Jordan Basin drains into,¹¹⁴³ is dropping at an alarming rate of 1 to 1.2 meters per year and the Sea's surface area is shrinking accordingly.¹¹⁴⁴ Thus, the following section looks at the legal regime in place for the regulation of damming and

¹¹³⁹ World Water Assessment Programme, above n 18, at 83.

¹¹⁴⁰ Frenken, above n 38, at 86.

¹¹⁴¹ Gafny, above n 402, at 13.

¹¹⁴² Global Nature Fund, above n 404.

¹¹⁴³ For more on the Dead Sea and its status see Lipchin, above n 399.

¹¹⁴⁴ TAHAL Group and Geological Survey of Israel and Associates, above n 407, at 4.

infrastructural development as well as monitoring and assessment for the impact thereof within the Basin.

4.5.2 Legal Governance Regime in the Jordan River Basin

The legal governance regime for damming and infrastructural development is covered by the Peace Treaty, the Yarmuk Waters Agreements and the Agreements between Israel and the Palestinian people of the West Bank.

The Peace Treaty

Substantive Rights and Obligations

The Peace Treaty between Israel and Jordan provides for storage reservoirs on both the Yarmouk River and the Jordan River with the stated purposes on the Yarmouk to improve diversion efficiency¹¹⁴⁵ and on the Jordan for flood control.¹¹⁴⁶ It has also provided for future storage reservoirs as well.¹¹⁴⁷ As for hydromorphological changes, the Treaty provides for “[a]rtificial changes in or of the course of the Jordan and Yarmouk Rivers” but which can only be made by mutual agreement.¹¹⁴⁸ Thus, the Treaty clearly envisages further damming and infrastructural development of the Lower Jordan Basin provided both Parties agree to it.

Procedural Obligations

For any intended projects which is likely to change the flow of water (affecting quantity of water available for the other Party’s use) or the quality of such flow, each Party has undertaken to notify the other 6 months in advance.¹¹⁴⁹ Once

¹¹⁴⁵ Peace Treaty; Annex II, Article II(1).

¹¹⁴⁶ Peace Treaty; Annex II, Article II(2).

¹¹⁴⁷ Peace Treaty; Annex II, Article II(3).

¹¹⁴⁸ Peace Treaty; Annex II, Article V(1).

¹¹⁴⁹ Peace Treaty; Annex II, Article V(2).

notification is received, the subject is to be deliberated under the aegis of the Joint Water Committee (“JWC”) with the aim of preventing harm and mitigating any adverse impacts that the project may cause.¹¹⁵⁰ There is no mention of any obligation to undertake an environmental impact assessment for any planned projects. However, given that the aim of the deliberation under the JWC is to prevent any harm (in general and not significant, thereby constituting a higher threshold) and mitigate any adverse impacts from a planned project, then the Party intending to undertake any such projects would nevertheless need to conduct an EIA if it is to ascertain its likely impact on the flow of the river or the quality of its waters. If the JWC is not able to fulfil its mandate, then the dispute resolution mechanism provided for under the Treaty can be invoked, which is essentially through negotiations and failing that, by conciliation or arbitration.¹¹⁵¹ There is no requirement under the Treaty that the resolution, in case of a dispute, be equitable and/or sustainable.

Monitoring and Assessments

Apart from providing for further damming and infrastructural development in the Lower Jordan Basin, the Peace Treaty has no provisions to deal with adverse effects of existing development on the quality and quantity of the common waters as there are neither environmental objectives in place nor prescriptions for monitoring, assessment and reporting the impacts thereof. In other words, there is no provision for post-implementation impact assessment.

Yarmuk Waters Agreements

The Yarmuk Waters Agreement 1953 provided for several joint projects between the Parties under the Yarmuk scheme¹¹⁵² including construction of a large dam and reservoir at Maqarin with a storage capacity of 300 MCM and a joint

¹¹⁵⁰ Peace Treaty; Annex II, Article V(2).

¹¹⁵¹ Peace Treaty; Article 29.

¹¹⁵² Yarmuk Waters Agreement 1953; Article 1(g).

electricity generating station.¹¹⁵³ However, Israel's increased access to the Yarmouk Waters after the 1967 war by virtue of its control of the Golan Heights and renewed mediation efforts by the United States to assist in the construction of the Maqarin dam necessitated the negotiation of a new agreement.¹¹⁵⁴

The Yarmuk Waters Agreement 1987 was again for the purposes of irrigation and generation of electricity.¹¹⁵⁵ For these purposes, it provided for the Yarmuk scheme¹¹⁵⁶ namely constructions of the Wahdah (formerly called Maqarin and currently known as Unity) dam and reservoir and the Wahdah electricity generating station.¹¹⁵⁷ While the total height of the dam was fixed at 100 meters (with provision for increasing it in the future),¹¹⁵⁸ the storage capacity was reduced from 300 MCM to 225 MCM in reflection of the decreasing Yarmouk water flows.¹¹⁵⁹ The Unity dam was eventually completed in 2007, with a height of 87 metres and a further reduced storage capacity of 110 MCM.¹¹⁶⁰ Overall, the storage capacity was reduced by more than 50 percent in two decades in reflection of reduced water flows of the Yarmouk River. In light of this, the Agreement ought to have provided for ongoing environmental impact assessment of the Unity dam should there be further reductions of the Yarmouk flows. Also, the Yarmuk Waters Agreement does not stipulate any future planned measures and therefore does not have any provisions that the Parties would have to follow should a need

¹¹⁵³ Yarmuk Waters Agreement 1953; Article 7.

¹¹⁵⁴ Neda A Zawahri "Governing the Jordan River System: History, Challenges and Outlook" (2010) 1 *Journal of Transboundary Water Resources* 125 at 137.

¹¹⁵⁵ Yarmuk Waters Agreement 1987; Preamble.

¹¹⁵⁶ Yarmuk Waters Agreement 1987; Article 1(g).

¹¹⁵⁷ Yarmuk Waters Agreement 1987; Article II(a) and (b).

¹¹⁵⁸ Yarmuk Waters Agreement 1987; Article VI.

¹¹⁵⁹ See F Hof "Dividing the Yarmouk's Waters: Jordan's Treaties with Syria and Israel" (1998) 1 *Water Policy* 81.

¹¹⁶⁰ See Government of Jordan "Dams in Jordan" available from <http://www.jva.gov.jo/sites/en-us/SiteCollectionDocuments/dams%20in%20jordan.pdf>

to further develop the Yarmouk River arise. It would naturally follow that the Parties would have to negotiate a new agreement.

Agreements between Israel and the Palestinian People

There are a number of agreements between Israel and the Palestinians; the Declaration of Principles on Interim Self-Government Arrangements, the Agreement on the Gaza Strip and the Jericho Area and the Interim Agreement on the West Bank and the Gaza Strip.

The Protocol on Israeli-Palestinian Cooperation Concerning Regional Development Programs, annexed to the Declaration of Principles on Interim Self-Government Arrangements,¹¹⁶¹ calls for an Economic Development Programme for the West Bank and the Gaza Strip and as well as a Regional Economic Development Program. The former provides for an Infrastructure Development Programme for water.¹¹⁶² The Protocol also proposes “development of a joint Israeli-Palestinian-Jordanian Plan for coordinated exploitation of the Dead Sea area ... and other water development projects.”¹¹⁶³ However, there is no mention of the development of the Jordan River waters.

The Agreement on the Gaza Strip and the Jericho Area, Israel – Palestine Liberation Organisation of 1994 (“the Gaza-Jericho Agreement”),¹¹⁶⁴ which placed the territorial waters under the jurisdiction of the Palestinian Authority,¹¹⁶⁵ provides that all water and sewage systems and resources must be operated,

¹¹⁶¹ Declaration of Principles on Interim Self-Government Arrangements, Israel – Palestine Liberation Organisation 32 ILM 1525 (13 September 1993, entered into force 13 October 1993).

¹¹⁶² Protocol on Israeli-Palestinian Cooperation Concerning Regional Development Programs; Annex IV, para 2(A)(3).

¹¹⁶³ Protocol on Israeli-Palestinian Cooperation Concerning Regional Development Programs; Annex IV(2)(B)(2) and (4) respectively.

¹¹⁶⁴ Agreement on the Gaza Strip and the Jericho Area, Israel – Palestine Liberation Organisation 33 ILM 622 (4 May 1994).

¹¹⁶⁵ Gaza-Jericho Agreement; Article V(1)(a).

managed and developed in a manner that prevents any harm to the water resources.¹¹⁶⁶ Again, no reference was made to the Jordan waters.

The Interim Agreement reaffirmed the Palestinian jurisdiction over its territorial waters¹¹⁶⁷ but again, did not provide for any planned measures on the Jordan River Basin. Thus, none of the agreements between Israel and the Palestinians concern damming and infrastructural development. As already mentioned in Chapter 2, the Palestinian people living in the West Bank do not have access to and therefore no right to develop the Lower Jordan Basin.

Therefore, there are two formal Agreements between Jordan and Syria but both neither cover procedural nor substantive obligations related to planned measures or any ongoing assessment of the impact of the Unity dam on the Yarmouk waters. The Peace Treaty between Israel and Jordan provides for more storage facilities in order to improve diversion and flood control as well as future infrastructural development. While the Treaty spells out the procedural obligations of the Parties and the no harm principle, it does not oblige the Parties to conduct environmental impact assessments before, during or post-implementation of planned projects and certainly no monitoring and assessment of existing dams and infrastructure against any environmental objective as compared to international and regional standards.

4.5.3 Damming and Infrastructural Development in the Nile River Basin

Regulation of the Nile's water flows dates back to 4,000 BC when the Egyptian's developed irrigation techniques but significant modification of its hydrology has only occurred over the last century with the building of the first Aswan dam for irrigation purposes.¹¹⁶⁸ This commenced the dominant basin-wide strategy for the management of the Nile waters through the construction of large dams and

¹¹⁶⁶ Gaza-Jericho Agreement; Annex II, Article II(B)(31)(a).

¹¹⁶⁷ Interim Agreement 1995; Article XVII, para 2(a).

¹¹⁶⁸ Patrick L Osborne *Tropical Ecosystems and Ecological Concepts* (2nd ed, Cambridge University Press, New York, 2012) at 192.

reservoirs.¹¹⁶⁹ Before the High Aswan Dam was completed in 1970, 38 percent of the Nile's total water flow ran through the Nile delta and reached the Mediterranean Sea.¹¹⁷⁰ However, post completion of the Dam, 60 percent of the water discharged was either lost to evaporation or seeped into aquifers or was drawn for irrigation before draining out into the Mediterranean Sea.¹¹⁷¹ Given the current state of affairs, water experts believe that there is not enough water in the Nile to meet the various irrigation goals of the riparian States.¹¹⁷² In addition to "unrealistic ambitions for irrigation schemes"¹¹⁷³ in the Basin, development projects are underway in many of the Basin's States and are being considered in others, which include hydropower dams and other water-diversion schemes.¹¹⁷⁴ A number of dams have been constructed on the Nile to regulate river flow.¹¹⁷⁵ The following table lists the major dams in the Nile.¹¹⁷⁶

¹¹⁶⁹ Avijit Gupta (ed) *Large Rivers: Geomorphology and Management* (John Wiley & Sons, West Sussex, 2007) at 288.

¹¹⁷⁰ Ivan Valiela *Global Coastal Change* (Blackwell Publishing Ltd, Malden, MA, Oxford, Victoria, 2006) at 93.

¹¹⁷¹ Ibid.

¹¹⁷² Lori Pottinger *Can the Nile States Dam Their Way to Cooperation?* IRN Backgrounder on the Nile Basin Initiative (International Rivers Network, March 2004) at 1. Available at http://www.internationalrivers.org/files/attached-files/nile_briefing.pdf

¹¹⁷³ Ibid.

¹¹⁷⁴ United Nations Environment Programme, above n 467, at 75.

¹¹⁷⁵ Mohamed H Fadlalla *Short History of Sudan* (iUniverse, Lincoln, NE, 2004) at 61.

¹¹⁷⁶ Karyabwite, above n 481, at 30 and 32; Food and Agriculture Organisation of the United Nations - Aquastat *Dams and Agriculture in Africa* (FAO, May 2007) at 8. Available at http://www.fao.org/nr/water/aquastat/damsafrica/aquastat_dams_africa_070524.pdf; Myles J Fisher and Simon E Cook *Water, Food and Poverty in River Basins: Defining the Limits* (Routledge, Oxon, 2012) at 191.

Table 19: Major Dams in the Nile River Basin

Dam	Country	River	Year	Purpose	Capacity (BCM)
Nalubaale (Owen Falls)	Uganda	Victoria - Nile	1954	Storage, hydroelectric	-
High Aswan	Egypt	Nile	1970	Storage, irrigation, hydroelectric	162
Old Aswan ¹¹⁷⁷	Egypt	Nile	1902, 1912 & 1933	Irrigation	5
Jebel Aulia	Sudan	White Nile	1937	Regulate flow	3.5
Sennar	Sudan	Blue Nile	1925	Irrigation, hydroelectric	0.930
Roseires	Sudan	Blue Nile	1966	Storage & irrigation	2.2
Khashm el Girba	Sudan	Atbara	1964	Irrigation	1.3

Large dams built on the Nile post 2000 include the Merowe dam in Sudan and the Takeze dam in Ethiopia. According to *International Rivers*, the Merowe dam is “one of the world’s most destructive hydropower projects” because of displacement of more than 50,000 people, drowning of thousands of people who refused to leave their homes¹¹⁷⁸ and submergence of immeasurable archaeological treasures in its reservoir.¹¹⁷⁹ It appears that the dam was built without any proper environmental impact assessment.¹¹⁸⁰ As for the Takeze dam, it is expected to completely change the face of one of Africa’s deepest canyons as the depth of the canyon walls will likely contribute to major sedimentation at the dam site once the region is flooded.¹¹⁸¹ The resulting siltation will also likely reduce the capacity

¹¹⁷⁷ Replaced by High Aswan Dam so data may no longer be correct; dam still exists approximately 6km downstream.

¹¹⁷⁸ Anonymous “Merowe Dam, Sudan” *International Rivers*
<http://www.internationalrivers.org/campaigns/merowe-dam-sudan-0>

¹¹⁷⁹ Ibid.

¹¹⁸⁰ Ibid.

¹¹⁸¹ Anonymous “Tekeze Dam, Ethiopia” *International Rivers*
<http://www.internationalrivers.org/resources/tekeze-dam-ethiopia-3607>

and lifespan of the dam itself.¹¹⁸² Other plans to build large dams on the Nile Basin include the Kajbar, Shereik and Dal dams in Sudan;¹¹⁸³ the Grand Ethiopian Renaissance, Baro 1, Baro 2, Karadobi, and Tana Beles dams in Ethiopia and the Bujagali dam in Uganda.¹¹⁸⁴ The Report on the Kajbar dam anticipates that this project would submerge some 90 villages, displace about 10,000 people and destroy an estimated 500 archaeological sites.¹¹⁸⁵ As for the Bujagali dam, the Report states that the costly dam's power will not meet the energy needs of most Ugandans and will drown the Bujagali waterfall and could harm Lake Victoria.¹¹⁸⁶ The latest 2014 report on the Grand Ethiopian Renaissance dam shows inadequacy of the hydrological-impacts study undertaken to understand how the dam will affect people and ecosystems downstream.¹¹⁸⁷

Dams can also have major impacts on a river basin's hydrology. For example, before the Aswan High Dam, the Nile River carried about 124 million tons of sediment to the sea each year, depositing nearly 10 million tons on the floodplain and delta.¹¹⁸⁸ As of 1996, 98 percent of that sediment remained behind the dam.¹¹⁸⁹ The result has been a drop in soil productivity and depth among other

¹¹⁸² Ibid.

¹¹⁸³ Anonymous "Kajbar Dam, Sudan" *International Rivers*
<http://www.internationalrivers.org/campaigns/kajbar-dam-sudan>

¹¹⁸⁴ Anonymous "Nile Basin" *International Rivers*
<http://www.internationalrivers.org/en/africa/nile-basin>

¹¹⁸⁵ Anonymous "Bujagali Dam, Uganda" *International Rivers*
<http://www.internationalrivers.org/campaigns/bujagali-dam-uganda>

¹¹⁸⁶ Ibid.

¹¹⁸⁷ Lori Pottinger "No Room for Debate on Grand Ethiopian Renaissance Dam?" *International Rivers* (17 April 2014) <http://www.internationalrivers.org/blogs/229/no-room-for-debate-on-grand-ethiopian-renaissance-dam>

¹¹⁸⁸ Lori Pottinger "Environmental Impacts of Large Dams: African Examples" *International Rivers* (1 October 1996) <http://www.internationalrivers.org/africa/environmental-impacts-large-dams-african-examples>

¹¹⁸⁹ Ibid.

serious changes to Egypt's floodplain agriculture.¹¹⁹⁰ The Aswan Dam has also led to serious coastal erosion, another problem stemming from the loss of sediments in a dammed river.¹¹⁹¹ Damming can also lead to reductions in water levels. A Report, *Connections Between Recent Water Level Drops in Lake Victoria, Dam Operations and Drought*, by an independent Kenya-based hydrologic engineer, found that about 55 percent of Lake Victoria's drop during 2004 and 2005 was due to the Owen Falls dams (now known as Nalubaale and Kiira dams) releasing excessive amounts of water from the lake.¹¹⁹² The natural rock formation controlling Lake Victoria's outflow was replaced by the first Owen Falls dam in the 1950s.¹¹⁹³ The second dam was built in the 1990s.¹¹⁹⁴ Given that damming can lead to reductions in water levels, possible climate change must be considered in the development of more dams on the Nile Basin.¹¹⁹⁵

4.5.4 Legal Governance Regime in the Nile River Basin

The Nile River Basin Legal Regime is based on the Nile Waters Agreement 1959 and the Cooperative Framework Agreement. These are covered in turn.

1959 Nile Waters Agreement

The Nile Waters Agreement 1959 between Egypt and Sudan provides for "increasing [the Nile Basin's] yield for the full utilization of its waters" and "to regulate [the] benefits [of the Nile Basin projects]".¹¹⁹⁶ The "Nile Control

¹¹⁹⁰ Ibid.

¹¹⁹¹ Ibid.

¹¹⁹² Daniel Kull *Connections Between Recent Water Level Drops in Lake Victoria, Dam Operations and Drought* (2006) at 7. Available at http://www.internationalrivers.org/files/attached-files/full_report_pdf.pdf

¹¹⁹³ Ibid.

¹¹⁹⁴ Ibid.

¹¹⁹⁵ Ibid.

¹¹⁹⁶ As provided for under the Nile Waters Agreement 1959; Article 3(1).

Projects” provided for the construction of the Sudd el Aali at Aswan by Egypt in order to regulate the River waters and control their flow into the sea.¹¹⁹⁷ It also provided for the construction of the Reseires Dam on the Blue Nile and any other works by Sudan which it considered essential for the utilization of its shares.¹¹⁹⁸ The Agreement additionally made provision for projects for the utilization of lost waters in the Nile Basin.¹¹⁹⁹ In order to prevent losses of considerable volumes of the Nile Basin waters in the swamps and to increase the yield of the River for use in agricultural expansion in the two countries, it was decided that Sudan will construct projects in the swamps of Bahr El Jebel, Bahr El Zeraf, Bahr El Ghazal and its tributaries and the Sobat River and its tributaries and the White Nile Basin.¹²⁰⁰ It was further agreed that the associated costs and net yield would be divided equally between Egypt and Sudan.¹²⁰¹

While the Agreement provides that any further constructions on the Nile will be dealt with under the aegis of the Permanent Joint Technical Committee subject to approval by the governments of Egypt and Sudan,¹²⁰² it does not expressly cover any of the substantive rights and procedural obligations pertaining to planned measures provided for under the UN Watercourses Convention. Furthermore, considerations for ongoing monitoring and assessment of existing dams and reservoirs are also absent. While the Agreement has focused on and provided for the benefits of damming and infrastructural development of the Nile waters, it has failed to consider the ecological impact of such development.

¹¹⁹⁷ Nile Waters Agreement 1959; Preamble, Para 1.

¹¹⁹⁸ Nile Waters Agreement 1959; Preamble, para 2.

¹¹⁹⁹ Nile Waters Agreement 1959; Third Article.

¹²⁰⁰ Nile Waters Agreement 1959; Third Article.

¹²⁰¹ Nile Waters Agreement 1959; Third Article, Para 1.

¹²⁰² Nile Waters Agreement 1959; Fourth Article.

Cooperative Framework Agreement 2010

Given that the Cooperative Framework Agreement is largely based on the UN Watercourses Convention, it also prescribes substantive rights and obligations in addition to prescribing procedural requirements for planned measures.

Substantive and Procedural Rights and Obligations

The Cooperative Framework Agreement provides for not only the substantive rights and obligations of equitable and reasonable utilization of the Nile waters but to prevent substantive harm as well.¹²⁰³ It also provides for the regular exchange of data and information¹²⁰⁴ as well as exchange of information regarding any planned measures through the Nile River Basin Commission.¹²⁰⁵ To this end, the Nile Basin States will be under an obligation observe the rules and procedures established by the Nile River Basin Commission for exchanging information concerning planned measures.¹²⁰⁶

Environmental Impact Assessments and Audits

For any planned measures that “*may* have significant adverse environmental impacts” [emphasis added], the Nile Basin States will be under an obligation to undertake a “comprehensive assessment” of those impacts at “an early stage” (not defined) with regard to not only their own territory but the territories of the other Nile Basin States as well.¹²⁰⁷ This obligation is very loose under the UN Watercourses Convention which only talks about notification of available technical data and information regarding possible adverse effects, including the results of any environmental impact assessment thereby making the carrying out

¹²⁰³ Cooperative Framework Agreement; Articles 4 and 5, respectively.

¹²⁰⁴ Cooperative Framework Agreement; Article 7.

¹²⁰⁵ Cooperative Framework Agreement; Article 8(1).

¹²⁰⁶ Cooperative Framework Agreement; Article 8(2).

¹²⁰⁷ Cooperative Framework Agreement; Article 9(1).

of an EIA optional. The criteria and procedures for determining whether an activity is likely to have significant adverse environmental impacts are to be developed by the Nile River Basin Commission.¹²⁰⁸ Furthermore, where circumstances warrant (according to the criteria to be developed by the Nile River Basin Commission), a Nile Basin State that has implemented planned measures is required to conduct an audit of the environmental impacts of those measures and hold consultations with the affected States.¹²⁰⁹ As part of its obligations towards protecting and conserving the Nile Basin and its ecosystems, the Agreement also requires that the Nile Basin State restore and rehabilitate the degraded natural resource base.¹²¹⁰ Thus, if a dam or reservoir that has a negative impact on the Nile Basin and its ecosystems, the Nile Basin States would be under an obligation to take restorative measures.

Management of Development

One of the purposes and objectives of the Nile River Basin Commission will be to serve as an institutional framework for cooperation among the Nile Basin States in the development and management of the Nile River Basin and its waters.¹²¹¹ Its Technical Advisory Committee, will, among other functions, (1) prepare for the consideration of the Council cooperative programs for the integrated and sustainable management and development of the Nile River Basin¹²¹² and (2) advise the Council on technical matters relating to the development, protection, conservation and management of the Nile River Basin and the Nile River System.¹²¹³ The Cooperative Framework Agreement also provides for peaceful

¹²⁰⁸ Cooperative Framework Agreement; Article 9(2).

¹²⁰⁹ Cooperative Framework Agreement; Article 9(3).

¹²¹⁰ Cooperative Framework Agreement; Article 6(1)(e).

¹²¹¹ Cooperative Framework Agreement; Article 16(b).

¹²¹² Cooperative Framework Agreement; Article 26(1).

¹²¹³ Cooperative Framework Agreement; Article 26(6).

methods of dispute resolutions, initially by mediation or reconciliation through the Nile River Basin Commission.¹²¹⁴

Thus, while the Cooperative Framework Agreement provides for substantive rights and procedural obligations akin to the UN Watercourses Convention, once ratified, the Nile River Basin will be the first Basin in this study to oblige not only mandatory EIA of planned measures where needed but also be the first to warrant an audit following implementation of planned measures if so required. In fact, it has included environmental impact assessment and audit, as one of the general principles under the Agreement, alongside the equitable and reasonable utilization and no significant harm principles.¹²¹⁵ The requirement for ongoing environmental impact assessments and restorative efforts to deal with degradation of the Basin waters due to damming and infrastructural development is in line with what current environmental norms, as discussed in the International Law and Policy and EU sections, are aiming for. However, until the institutions under the Cooperative Framework Agreement are established, the Nile waters will likely continue to be dammed without proper EIAs.

4.5.5 Damming and Infrastructural Development in the Indus River Basin

The Indus River Basin development comprises of a number of dams, diversion structures and canals, including the 19th century Indus Basin Irrigation System ('the IBIS'). The IBIS, which is still the largest contiguous irrigation system in the world, constitutes an extensive system of diversion structures and canals on the Indus River Basin with a total length of 56,000 kilometres.¹²¹⁶ The later Indus Basin Project, which was implemented by Pakistan in the 1960s in order to replace the irrigation water supplies from tributaries allocated to India under the

¹²¹⁴ Cooperative Framework Agreement; Article 33.

¹²¹⁵ Cooperative Framework Agreement; Article 3(11).

¹²¹⁶ Daniel Hillel *Out of the Earth: Civilization and the Life of the Soil* (University of California Press, Berkeley and Los Angeles, CA, 1991) at 146.

Indus Water Treaty,¹²¹⁷ consisted of the construction of two major dams in Pakistan; the Mangla Dam and the Tarbela Dam (largest on the Indus River Basin).¹²¹⁸ It formed part of a wider set of infrastructural projects to further develop the IBIS and facilitate transfer of stored water from the Western Rivers to replace water lost from the Eastern Rivers.¹²¹⁹ The following table lists the major reservoirs and hydroelectric projects, ranked by the amount of reservoir storage, in the Indus River Basin.¹²²⁰

Table 20: Major Dams and Developments in the Indus River Basin

Dam	Country	River	Year	Storage (km³)	Power (MW)
Tarbela	Pakistan	Indus	1977	14.3 ¹²²¹	3, 478
Bkakra-Nangal ¹²²²	India	Sutlej	1963	9.62	1, 000
Pong	India	Beas	1974	8.57	396
Mangla	Pakistan	Jhelum	1967	5.86 ¹²²³	1, 000
Nathpa-Jhakri	India	Sutlej	2004	run of the river	1, 530
Ghazi Barotha	Pakistan	Indus	2004	run of the river	1, 450
Total					8, 854

¹²¹⁷ Saiyid Ali Naqvi *Indus Waters and Social Change: The Evolution and Transition of Agrarian Society in Pakistan* (Oxford University Press, New York, 2013) at 8.

¹²¹⁸ Shripad Dharmadhikary *Mountains of Concrete: Dam Building in the Himalayas* (International Rivers, Berkeley, CA, 2008) at 6. Available at http://www.internationalrivers.org/files/attached-files/ir_himalayas.pdf

¹²¹⁹ Asianics Agro-Development International *Tarbela Dam and Related Aspects of the Indus River Basin, Pakistan* A WCD Case Study prepared as an input to the World Commission on Dams (November 2000) at vi. Available from http://s3.amazonaws.com/zanran_storage/www.dams.org/ContentPages/1311315.pdf

¹²²⁰ Daniel Seligman *World's Major Rivers: An Introduction to International Water Law with Case Studies* (Colorado River Commission of Nevada, 2008) at 52. Available at http://crc.nv.gov/docs/Worlds_Major_Rivers.pdf

¹²²¹ The Tarbela dam's storage capacity has shrunk from 11.6 to 8.5 MAF due to sedimentation.

¹²²² Dharmadhikary, above n 1218, at 6.

¹²²³ The Mangla dam's storage capacity has shrunk from 7.25 km² due to sedimentation.

The combined effects of the existing storage and diversion projects on the rivers have already had serious impacts on the Indus Delta in Pakistan. According to a study by the International Union for Conservation of Nature and Natural Resources, the flow in the lower Indus River decreased from 105,000 MCM in 1932 to 43,000 MCM in 1970 as a result of the number of projects on the Indus and its tributaries.¹²²⁴ In the 1990s, the flow further reduced to 12,000 MCM.¹²²⁵ This led to a sharp reduction in the area of mangrove forests, declining fish production, degraded water quality and severe encroachment of the sea into the delta area with a resultant loss of 4,856 km² of farmland.¹²²⁶ Due to the 22 upstream dams, Indus flows today seldom cover 25 percent of its historic floodplain.¹²²⁷ Additional dams will further aggravate such problems in the deltaic regions.

However, further damming can be expected in the future. The World Bank's "Pakistan Country Water Strategy" argues strongly that there is an "urgent need for construction of major new storage on the Indus."¹²²⁸ This, it is considered, is ironic that a major argument for the necessity of new big dams is that heavy sedimentation has led to the loss of storage capacity of the biggest existing dams like Tarbela and Mangla and so new dams are needed as replacements as this ignores the fact that with the Indus being one of the largest sediment producing rivers in the world, the proposed new reservoirs would face the same

¹²²⁴ International Union for the Conservation of Nature - Water and Nature Initiative *The Lower Indus River: Balancing Development and Maintenance of Wetland Ecosystems and Dependent Livelihoods* (IUCN, 2003). Available at <http://cmsdata.iucn.org/downloads/indus.pdf>

¹²²⁵ Dharmadhikary, above n 1218, at 25.

¹²²⁶ International Union for the Conservation of Nature, above n 1224; Also see Thayer Scudder *Global Threats, Global Futures: Living with Declining Living Standards* (Edward Elgar Publishing, Glos, Northampton MA, 2010); and Nobuo Mimura (ed) *Asia-Pacific Coasts and Their Management: States of Environment* 11 (Springer, Dordrecht, 2008).

¹²²⁷ Scudder, *ibid*, at 84.

¹²²⁸ The World Bank *Pakistan - Country Water Resources Assistance Strategy: Water Economy Running Dry* Report No. 34081-PK (WB Publications, 14 November 2005) at 14. Available at <http://siteresources.worldbank.org/INTSAREGTOPAGRI/Resources/PKWaterCAS.pdf>

sedimentation problems.¹²²⁹ Agriculture continues to be the primary justification.¹²³⁰

Currently, there is an inventory of hydro-electric project disputes between India and Pakistan (as covered in the Damming-Related Disputes section).¹²³¹ Additional damming and infrastructural development of the Indus waters will only add to this inventory unless the Governance Framework for Dams and other engineering works are strengthened.

4.5.6 The Indus Waters Treaty

The Indus Waters Treaty provides for the right to develop the waters of the Indus Basin and spells out the procedural obligations of the Parties in this regard. It also outlines aspects of development and mechanisms for dispute resolution, which are covered in turn.

Substantive Rights and Obligations

Under the 1960 Indus Waters Treaty, India, being the upper riparian, is under an obligation:

“... to let flow all the waters of the Western Rivers, and shall not permit any interference with these waters, except for the following uses, restricted in the case of each ... (a) Domestic Use; (b) Non-Consumptive Use; (c) Agricultural Use ... and (d) Generation of hydro-electric power ...”¹²³²

¹²²⁹ Dharmadhikary, above n 1218, at 9; World Commission on Dams, above n 1219, at x.

¹²³⁰ Dharmadhikary, *ibid*, at 9.

¹²³¹ Shashank Kumar “The Indus Waters Kishenganga Arbitration (Pakistan v India)” *American Society of International Law Insights* (13 May 2013) <http://www.asil.org/insights/volume/17/issue/13/indus-waters-kishenganga-arbitration-pakistan-v-india>

¹²³² Indus Waters Treaty; Article III(2).

Pakistan, by way of concession, has allowed India to construct Run-of-River Plants on its Western Rivers¹²³³ but in conformity with the specified criteria.¹²³⁴ Thus, India is restricted in what it may do with the waters of the Western Rivers.¹²³⁵ India has also been permitted to construct storage works¹²³⁶ with a total maximum storage capacity of 3.6 MAF (0.4 on the Indus, 1.5 on the Jhelum and 1.7 on the Chenab) for general, power and flood storages.¹²³⁷ Apart from these specifications, the Treaty generally provides that:¹²³⁸

“Each Party will use its best endeavours to maintain the natural channels of the Rivers ... in such condition as will to avoid, as far as practicable, any obstruction to the flow in these channels likely to cause material damage to the other Party.”

While both Parties are entitled to construct on their own allocated Rivers, in order to decipher what the above-stated provision means, it has to be interpreted in light of current international standards. ‘Best endeavours’ is not defined but is obligatory and according to the PCA “expresses a stronger commitment” to merely being “aspirational in nature.”¹²³⁹ This can be interpreted to being akin to the requirement that the Parties act with ‘due diligence’ and the duty of vigilance and prevention will apply. As for the obligation “to maintain the natural channels”, the PCA has distinguished the “maintenance of the physical condition of the channels of the rivers [from] maintenance of the volume and timing of the

¹²³³ “Run-of-River Plant” has been defined as a hydro-electric plant that develops power without Live Storage as an integral part of the plant, except for Pondage and Surcharge Storage. Indus Waters Treaty; Annexure D, Article (2)(g).

¹²³⁴ Indus Waters Treaty; Annexure D, Article 8.

¹²³⁵ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)* [2013] PCA; para 369.

¹²³⁶ ‘Storage work’ has been defined to mean a work constructed for the purpose of impounding the waters of a stream, with exceptions. See Indus Waters Treaty; Annexure E, Article 2.

¹²³⁷ Indus Waters Treaty; Annexure E, Article (7).

¹²³⁸ Indus Waters Treaty; Article IV(6).

¹²³⁹ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 372.

flow of water in these channels” as the term “channel” was taken to “denote the bed of the river, which may or may not be filled with water.”¹²⁴⁰

In other words, the above-stated provision mandates preservation of the natural paths of the rivers in an effort to conserve the rivers’ capacity to carry water,¹²⁴¹ but does not extend to minimum environmental flows especially that which India has to maintain upstream of Pakistan.¹²⁴² The PCA further clarifies that Article IV(6) does not require the maintenance of the condition of the channels so as to avoid any type of riverbed degradation but bears more precisely on the avoidance of any obstruction to the flow in these channels likely to cause material damage to the other Party.¹²⁴³ The term ‘material damage’ is not defined and rightly so as according to Gulhati, “what might be material under one set of circumstances might not be so in a different set of conditions.”¹²⁴⁴

One principle which has been invoked frequently is that “there should be nothing in the treaty which would stand in the way of optimum utilisation of the water resources allocated to either party.”¹²⁴⁵ Added to this is that “nothing could be included in the Treaty which was against good and sound engineering

¹²⁴⁰ At para 373.

¹²⁴¹ Ibid.

¹²⁴² This was one of the major considerations in the recent *Kishenganga Arbitration* in which Pakistan requested the PCA to fix a minimum flow which India has to maintain downstream from its Kishenganga Hydroelectric project plant (details in the dispute resolution part of this section). See *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166.

¹²⁴³ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 374.

¹²⁴⁴ Niranjana Das Gulhati *Indus Waters Treaty: An Exercise in International Mediation* (Allied Publishers, Mumbai, 1973) at 266.

¹²⁴⁵ Ibid.

practice.”¹²⁴⁶ This is in line with how the PCA has interpreted the overall provision.¹²⁴⁷

“The general obligation upon both India and Pakistan covering all uses of the Western and the Eastern Rivers under Article IV(6) must yield to the specific Treaty rights of the Parties. The Court cannot accept that Article IV(6) debars the construction and operation of works specifically contemplated by the Treaty.”

In other words, the provision has been interpreted with the right to develop the Indus waters to achieve optimum utilization but the phrase “likely to cause” indicating that the Parties must take a precautionary approach to such development (as contended by Pakistan) was ignored in this instance.¹²⁴⁸ This is even though the ICJ in the *Pulp Mills* case stated that “a precautionary approach may be relevant in the interpretation and application of the provisions of the [Treaty].”¹²⁴⁹

Obligation to Notify

The Indus Waters Treaty provides that if either Party plans to construct any engineering works¹²⁵⁰ which would cause interference with the waters of any of the Rivers and which, in its opinion, would affect the other Party materially, it is under an obligation to notify the other Party of its plans and supply such data relating to the work as may be available and as would enable the other Party to inform itself of the nature, magnitude and effect of the work. Additionally, if a work would cause interference with the waters of any of the Rivers but would not, in the opinion of the Party planning it, affect the other Party materially, then the Treaty provides that the Party planning the work is under an obligation to supply

¹²⁴⁶ Ibid.

¹²⁴⁷ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 375.

¹²⁴⁸ This was raised by Pakistan as a customary principle of international law. *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 223.

¹²⁴⁹ *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, above n 164; para 164.

¹²⁵⁰ Indus Waters Treaty; Article VII(1)(c).

the other Party, *only if requested by it*, such data regarding the nature, magnitude and effect, if any, of the work as may be available.¹²⁵¹

Environmental Impact Assessments?

While the Treaty is specific in its provisions regarding upstream development (by India in all the six tributaries of the Indus Basin and by Pakistan on its Western Rivers) and in this regard provides for prior notification of planned measures, it does not however require that an environmental impact assessment be included though the notice has to provide details about “the nature, magnitude and effect” of the planned measures. It has been stated that so far India, being the upper riparian, has maintained a good record in fulfilling the obligation to notify by providing Pakistan with all the details of each of the projects on the Indus River Basin, following which Pakistan was able to raise objections.¹²⁵²

However, given the number of development-related disputes between the Parties, and recent international cases and arbitrations, it is now “a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource.”¹²⁵³ Thus, not undertaking an environmental impact assessment is no longer an option and a report must accompany notification.

In order to set a minimum flow downstream from the Kishenganga Hydro-Electric Project, the PCA in the *Indus Waters Kishenganga Arbitration* requested both India and Pakistan to provide an environmental impact assessment report of the project on the environment. The Court noted that “assessments of this nature are increasingly used by scientists and policymakers to bring a deeper understanding

¹²⁵¹ Indus Waters Treaty; Article VII(2).

¹²⁵² See Zafar Iqbal Choudhary “In Focus: 50 Years of Indus Water Treaty” (2010) 4 Epilogue 21.

¹²⁵³ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 450.

of ecology to bear on the management and development of river systems.”¹²⁵⁴
While the Court accepted that:¹²⁵⁵

“ ... there is no single “correct” approach to such environmental assessments. For any given river or project, the correct approach will depend upon the existing state of the river, the magnitude of anticipated changes, the importance of the proposed project, and the availability of time, funding, and local expertise... For some situations, a simple assessment may indeed be preferred ... [but] ... for a project of the magnitude of the KHEP, the Court is of the view that an in-depth assessment ... is a more appropriate tool for estimating potential changes in the downstream environment.”

The PCA clarified that what it was looking for was a “degree of certainty” as to the “results” and not any “attempt to apply contemporary international practices in a challenging setting.”¹²⁵⁶ Although the PCA worked with the impact assessment reports that had been submitted by both Parties, it added that “more comprehensive and accurate information on the likely impacts of infrastructure projects can only benefit decision-making in both Pakistan and India.”¹²⁵⁷ Hence, the Court urged both Parties to “continue or expand their attention to environmental considerations at other projects” an approach seen as “consistent with the acute need of both Parties for increased production of hydro-power.”¹²⁵⁸

Obligation to Consult and Negotiate

As already stated, the governing body for the Indus River Basin is the Permanent Indus Commission,¹²⁵⁹ the general role of which is to implement the Treaty and to promote cooperation between the Parties in the development of the waters of the Rivers.¹²⁶⁰ To this end, they are to serve as a “regular channel of communication”

¹²⁵⁴ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166, para 98.

¹²⁵⁵ At paras 99-100.

¹²⁵⁶ At para 100.

¹²⁵⁷ At para 101.

¹²⁵⁸ *Ibid.*

¹²⁵⁹ Indus Waters Treaty; Article VIII(3).

¹²⁶⁰ Indus Waters Treaty; Article VIII(4).

and for this are under an obligation to: (i) furnish or exchange information or data, (ii) give any notice or response to any notice¹²⁶¹ as well as to resolve any “questions” concerning the application or interpretation of the Treaty or the existence of any fact.¹²⁶² Hence, all notifications, consultations and negotiations are undertaken through the Commission. Failing resolution of the “questions” by the Commission, the matter is dealt with under the three dispute resolution mechanisms provided for under the Treaty (discussed under the Development-Related Disputes section).

Monitoring, Assessments and Reporting

Apart from the maintenance of the natural channels,¹²⁶³ (and pollution control¹²⁶⁴) the Treaty does not have any other provisions on environmental protection, preservation and management (unlike the UN Watercourses Convention and the UNECE Water Convention). This is not surprising given that there is no evidence that environmental considerations were taken into account during negotiations preceding the Indus Waters Treaty.¹²⁶⁵ The Permanent Indus Commission does play a monitoring role but exactly how monitoring is undertaken by the Commission is not very clear. Unlike the Water Framework Directive, the Treaty does not provide any guidelines or prescribes parameters for the biological, hydromorphological or physic-chemical status assessments. It does however provide for a monthly exchange of hydrological data collected daily regarding river flows, extractions for and releases from reservoirs, withdrawals, escapages (water flow from water infrastructures such as headworks, barrages or dams)¹²⁶⁶

¹²⁶¹ Indus Waters Treaty. As per Article VIII(1)(a) and (b), respectively.

¹²⁶² Indus Waters Treaty; Articles VIII(4)(a) and IX(1).

¹²⁶³ Indus Waters Treaty; Article IV(6).

¹²⁶⁴ Indus Waters Treaty; Article IV(10).

¹²⁶⁵ Muhammad Zafar Khan and Ghulam Akbar “In the Indus Delta It Is No More the Mighty Indus” in Philip J Boon and Paul J Raven (eds) *River Conservation and Management* (Wiley-Blackwell, Chichester, West Sussex, Hoboken NJ, 2012) at 71.

¹²⁶⁶ Indus Waters Treaty; Article VI(1)(a)-(d).

and deliveries.¹²⁶⁷ This, as confirmed by India to the PCA in the *Indus Waters Kishenganga Arbitration*, has been taking place since the Treaty's inception.¹²⁶⁸ Furthermore, under the Treaty, either Party can request for any additional data including hydrological data for the Rivers.¹²⁶⁹ Whilst this does promote exchange and coordination of hydrological data concerning: (1) aspects of the hydrological regime, that is the quantity and dynamics of water flow, and (2) river continuity (though this too is limited to Pakistan's border's on India's side), it does not make any connection to groundwater bodies and morphological conditions such as structure and substrate of the river bed and structure of the riparian zone.¹²⁷⁰

The Treaty also provides for the Permanent Indus Commission to undertake, once in every five years, "a general tour of inspection of the Rivers for ascertaining the facts connected with various developments and works on the Rivers."¹²⁷¹ Although the Commission can "study and report to the two Governments on any problem relating to the development of the waters of the Rivers which may be jointly referred to the Commission by the two Governments"¹²⁷² but because no such joint reference has ever been made, this provision remains unexplored.¹²⁷³ Thus, given the absence of environmental objectives within the Treaty, a lack of prescribed parameters (which seems to be the case) and an obligation to undertake proper assessments regarding the status, be it ecological or chemical, it is highly unlikely that assessments of impacts of existing hydromorphological modifications are being undertaken by the Commission. For new modifications, the only consideration is whether there would be "any obstruction to the flow ...

¹²⁶⁷ Indus Waters Treaty; Article VI(1)(e).

¹²⁶⁸ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166; para 75.

¹²⁶⁹ Indus Waters Treaty; Article VI(2).

¹²⁷⁰ River depth and width variation is not required to be assessed as such variations are forbidden under the Indus Waters Treaty.

¹²⁷¹ Indus Waters Treaty; Article VIII(4)(c).

¹²⁷² Indus Waters Treaty; Article VIII(4)(a).

¹²⁷³ Brahma Chellaney, above n 134, at 295.

likely to cause material damage to the other Party.”¹²⁷⁴ Whilst the Treaty does not take ecological factors into consideration, this has been read into it by the PCA in the *Indus Waters Kishenganga Arbitration*.¹²⁷⁵

Reporting in the Indus Basin is also undertaken by the Commissioners, who have an obligation to submit an annual report on its work to their respective governments by 1 June each year for the year ending the preceding 31st of March.¹²⁷⁶ This is in addition to any other report(s) submitted at any other time that it considered desirable.¹²⁷⁷ These reports, presumably undertaken annually since 1961, are not available publicly. Unlike the Water Framework Directive, the Treaty does not prescribe any details of what is to be included in the report except “work.” How these reports are assessed, utilized and by whom is unclear. Within the European framework, RBMPs are assessed by the EC, which is then able to make recommendations for improvement. Under the Treaty, any issues arising are then settled via one of the avenues provided for settlement of differences and disputes, which are through: the Commission, State-level talks, a Neutral Expert or a Court of Arbitration.¹²⁷⁸ The following are questions, differences and disputes regarding damming and infrastructural developments, which have arisen under the Indus Waters Treaty and which have either been resolved or are in the process of being resolved under the three dispute resolution avenues provided for under the Treaty, in addition to direct negotiations between the two Governments.

¹²⁷⁴ Indus Waters Treaty; Article IV(6).

¹²⁷⁵ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166.

¹²⁷⁶ Indus Waters Treaty; Article VI(8).

¹²⁷⁷ Indus Waters Treaty; Article VI(8).

¹²⁷⁸ Indus Waters Treaty; Article IX provides for all except State-level talks which is provided for under Article VIII(1).

Development-Related Dispute Resolution

Almost all the water disputes between India and Pakistan are over construction projects,¹²⁷⁹ which have either been or are being dealt with in all the avenues provided for under the Treaty; the Permanent Indus Commission, through State-level talks or by a Neutral Expert or through the Permanent Court of Arbitration.¹²⁸⁰ All of these procedures are designed to achieve resolution before construction of a Project commences.¹²⁸¹

“Questions” before the Permanent Indus Commission

Although there have been a number of “questions” which have come before the Permanent Indus Commission, which do not get published except those reported through the media, any question that does not get resolved by the Commission has to be dealt with directly by the two Governments through diplomatic channels.

‘State-level Talks’

The following are two prominent damming and infrastructural-related disputes; the Salal Dam and the Tulbul Navigation Project, which have been dealt with over at least two decades.

- Salal Dam Dispute 1968

The Salal Dam, a run-of-river hydroelectric project by India on the Chenab River, was the first challenge to the Indus Waters Treaty. Under the terms of the Treaty, India submitted its plan to the Permanent Indus Commission for Pakistan’s

¹²⁷⁹ Nausheen Wasi “Harnessing the Indus: Perspectives from Pakistan” (2009) 3 Epilogue 34 at 35.

¹²⁸⁰ Indus Waters Treaty, Article IX.

¹²⁸¹ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 444.

approval in 1968.¹²⁸² Pakistan objected to the design and storage capacity of the Salal project.¹²⁸³ Negotiations at State-level led to the Salal Agreement signed on 12 April 1978 in Delhi¹²⁸⁴ under which India agreed to make some changes in the design of the dam including reducing the height of the dam and to the permanent closure of the diversion canal after the hydel plant had been commissioned.¹²⁸⁵ The concessions made by India were hailed under the banner of ‘beneficial bilateralism’ in both countries.¹²⁸⁶

- Tulbul Navigation Project 1984

The Tulbul Navigation Project which Pakistan calls Wullar Barrage, was started by India in 1984 on the Jhelum River, which is at the mouth of Wullar Lake in the Indian Part of Kashmir.¹²⁸⁷ While India contends that the project will make the Lake navigable in summer, Pakistan has objected to its construction contending that it will allow India to control the flow of the River and therefore could be used as a geo-strategic weapon.¹²⁸⁸ Pakistan’s precondition to entering any talks regarding this project was suspension of the works, which India did on 2 October

¹²⁸² Shaista Tabassum “The Role of CBMs in Resolving Non-Military Issues Between India and Pakistan: A Case Study of the Indus Water Treaty” in Moonis Ahmar (ed) *The Challenge of Confidence-Building Measures in South Asia* (Har-Anand Publications Pvt Ltd, New Delhi, 2001) at 396.

¹²⁸³ Ibid.

¹²⁸⁴ Agreement between the Government of India and the Government of the Islamic Republic of Pakistan Regarding the Salal Hydro-Electric Plant [1978] INTSer 18 (14 April 1978).

¹²⁸⁵ Wasi, above n 1279, at 35. Also see Article 1 of the Agreement which lists all the salient features of the plant.

¹²⁸⁶ N Jayapalan *Foreign Policy of India* (Atlantic Publishers and Distributors, New Delhi, 2001) at 273; Rajpal Budania *India’s National Security Dilemma: The Pakistan Factor and India’s Policy Response* (Indus Publishing Company, New Delhi, 2001) at 231.

¹²⁸⁷ Amitabh Mattoo “India’s International Relations: The Search for Stability, Space and Strength” in Alyssa Ayras and Philip Oldenburg (eds) *India Briefing: Takeoff at Last?* (ME Sharpe, Inc, New York, 2005) at 97; Kulwant Rai Gupta *India-Pakistan Relations with Special Reference to Kashmir* (Atlantic Publishers and Distributors, New Delhi, 2006) at 181.

¹²⁸⁸ Mattoo, *ibid*, at 97.

1987.¹²⁸⁹ Since then, nine rounds of State-level talks have been held with the most recent on 27-28 March 2012. In a joint statement “... it was agreed that the Indian side will provide additional technical data to Pakistan. Both sides further agreed that, if required, they will explore the way forward for resolving the issue under the provisions of the Treaty”,¹²⁹⁰ which would have to be through the International Court of Arbitration, having constituted a “dispute.”

Differences before a Neutral Expert

This avenue for dispute resolution has been employed by the Parties only once thus far. It concerned the Baglihar Hydropower Project dispute.

- Baglihar Hydropower Project 2005

On 15 January 2005, Pakistan asked the World Bank to appoint a Neutral Expert stating that a “difference” has arisen between India and Pakistan under Article IX(2) of the Treaty in relation to the Baglihar project. Prior to this, no dispute had gone to a Neutral Expert for 45 years.¹²⁹¹ Pakistan contended that India was in breach of the Treaty provisions raising objections to the design,¹²⁹² the pondage capacity¹²⁹³ and the height and gates of the spillway structure of the project,¹²⁹⁴ all of which India did not agree with.¹²⁹⁵ The World Bank appointed Professor

¹²⁸⁹ Tabassum, above n 192, at 40.

¹²⁹⁰ Government of India, Ministry of External Affairs “India - Pakistan Joint Statement on Tulbul Navigation/Wullar Barrage Project” (28 March 2012) <http://mea.gov.in/bilateral-documents.htm?dtl/19084/India++Pakistan+Joint+Statement+on+Tulbul+NavigationWullar+Barrage+Project>

¹²⁹¹ Miner, above n 552, at 207.

¹²⁹² As per Indus Waters Treaty 1960; Annexure D, Para 8(a) and (e).

¹²⁹³ As per Indus Waters Treaty 1960; Annexure D, Para 8(c).

¹²⁹⁴ As per Indus Waters Treaty 1960; Annexure D, Para 8(e).

¹²⁹⁵ See Raymond Lafitte *Baglihar Hydroelectric Plant: Expert Determination on Points of Difference Referred by the Government of Pakistan under the Provisions of the Indus Waters Treaty - Executive Summary* (Lausanne, 12 February 2007), para 2 on the points of differences referred to by Pakistan and India. Available at

Raymond Lafitte, a Swiss civil engineer, on 12 May 2005 to render a decision on the “difference” between the two Governments.¹²⁹⁶ Professor Lafitte, after a detailed analysis of about 13, 000 dams worldwide, talks with both parties and visiting the dam site¹²⁹⁷ ruled on 12 February 2007¹²⁹⁸ that whilst India’s construction of the Baglihar dam on the Chenab River did not violate the Treaty but, upholding some minor objections of Pakistan, ordered that the height of dam structure be reduced by 1.5 meters, the poundage capacity be reduced from 37.5 MCM to 32.5 MCM and the power intake tunnels be raised by 3 meters, changes that India duly implemented.¹²⁹⁹ These design changes were to reduce the reservoir’s storage capacity thereby limiting some flow control capabilities of the earlier design.¹³⁰⁰

During the course of this determination, as far as interpretation of the Treaty in terms of dams and infrastructure goes, the Expert Determination is that since the Treaty was negotiated and concluded during a period of tension, those who drafted the Treaty aimed for predictability and legal certainty in its drafting so as to ensure sound implementation.¹³⁰¹ It also determined that the rights and obligations under the Treaty should be read in light of new technical norms and

<http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1171996340255/BagliharSummary.pdf>

¹²⁹⁶ Dale Lautenbach “World Bank Names Neutral Expert on Baglihar” *The World Bank News Release No:2005/463/SAR* (Washington, DC, 10 May 2005)
<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20485918~menuPK:34463~pagePK:34370~piPK:34424~theSitePK:4607,00.html>

¹²⁹⁷ Wasi, above n 1279, at 36.

¹²⁹⁸ Only the Executive Summary has been made available as the full report of the Expert Determination can only be disclosed and disseminated by the Parties themselves, according to their own procedures. Salman, above n 547, at 113.

¹²⁹⁹ Lafitte, above n 1295.

¹³⁰⁰ See Ariel Dinar and others *Bridges Over Water: Understanding Transboundary Water Conflict, Negotiation and Cooperation* 3 (World Scientific Publishing, Toh Tuck Link, 2007) at 278–279 for a full analysis of the decision.

¹³⁰¹ Lafitte, above n 1295, at 5.

new standards as provided for by the Treaty.¹³⁰² The Neutral Expert was of the opinion that the interpretation of the Treaty must be guided by the ‘principle of integration and the principle of effectiveness’ so as to allow for the fulfilling of the object(s) and purpose(s) of the Treaty as laid out in its Preamble in “a spirit of goodwill and friendship” and in “a co-operative spirit”.¹³⁰³ In view of this, it is considered that the Treaty is a “progressive instrument.”¹³⁰⁴ The Neutral Expert also took into account the “best and latest practices in the field of construction and operation of hydro-electric plants.”¹³⁰⁵

“Disputes” before the Permanent Court of Arbitration

The PCA has been used by the Parties only once since the Treaty was formulated. It concerned the Kishenganga Hydro-Electric Project (‘KHEP’).

- Kishenganga Arbitration 2010

The Kishenganga dispute is not new in the sense that the basic issue dates back to the late 1980s when Pakistan first raised an objection to the Project.¹³⁰⁶ In 2009, India began work on a 35.48-metre high (dropped from 75.48 metres)¹³⁰⁷ dam on the Kishenganga River (also known as the Neelum River) in the Indus Basin, from which a tunnel of 24 km was to divert the Kishenganga River into the Jhelum River through electricity-generating turbines.¹³⁰⁸ These were to redirect the Kishenganga waters some 100 km to Wullar Lake to support the Tulbul

¹³⁰² Ibid.

¹³⁰³ Zubair Ahmad Dar “Power Projects in Jammu & Kashmir: Controversy, Law and Justice” (Harvard Law and International Society, paper presented to LIDS Working Papers 2011-2012) at 12.

¹³⁰⁴ Lafitte, above n 1295, at 5.

¹³⁰⁵ Dar, above n 1303, at 12.

¹³⁰⁶ See Balraj K Sidhu “The Kishenganga Arbitration – Transboundary Water Resources Governance” (2013) 43 Environmental Policy and Law 147.

¹³⁰⁷ Government of India, Ministry of External Affairs “Rajya Sabha Unstarred Question No2506 to be Answered on 25082011” (25 August 2011) <http://archive.is/YLCZs>

¹³⁰⁸ Tabassum, above n 192, at 42–43.

Navigation project.¹³⁰⁹ On 17 May 2010, Pakistan instituted arbitration proceedings against India pursuant to Para 2(b) of Annexure G of the Indus Waters Treaty for the first time in 50 years since the signing of the Treaty.¹³¹⁰ A Court of Arbitration composed of seven members had been constituted. Although the Permanent Court of Arbitration acted as Secretariat to the Court of Arbitration pursuant to Paragraph 15(a) of Annexure G, the rest of the thesis refers to the Court as ‘PCA’ for simplicity. Pakistan had asked the PCA to determine two issues, one of which was whether India’s proposed diversion of the river Kishenganga (Neelum) into another tributary breached Pakistan’s substantive rights protected by: (1) Article III(2) (let flow all the waters of the Western rivers and not permit any interference with those waters) and (2) Article IV(6) (maintenance of natural channels).¹³¹¹

The full 7-member Court held that while the obligation to maintain the natural channels does not extend to ensuring minimum flows and that India’s the right to generate hydro-electric power (provided that such generation is conducted in accordance with Annexures D or E) is an express exception to India’s obligation to let flow the waters of the Western Rivers,¹³¹² nevertheless, the right to generate hydro-electric power obliges India to operate those projects in such a way as to avoid adversely affecting Pakistan’s “then existing” agricultural and hydro-electric uses. In addition to the duty to avoid transboundary harm, the PCA also took into account contemporary customary international law to take environmental protection into consideration when planning and developing projects that may cause injury to a bordering State:¹³¹³

¹³⁰⁹ Ibid.

¹³¹⁰ Permanent Court of Arbitration “Indus Waters Kishenganga Arbitration (Pakistan v India)” (17 May 2010) http://www.pca-cpa.org/showpage.asp?pag_id=1392

¹³¹¹ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Order on the Interim Measures)* [2011] PCA at 2.

¹³¹² *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 376.

¹³¹³ At 171.

“It is established that principles of international environmental law must be taken into account even when (unlike the present case) interpreting treaties concluded before the development of that body of law. ... Similarly, the International Court of Justice in *Gabčíkovo-Nagymaros* ruled that, whenever necessary for the application of a treaty, “new norms have to be taken into consideration, and . . . new standards given proper weight.”¹³¹⁴ It is therefore incumbent upon this Court to interpret and apply this 1960 Treaty in light of the customary international principles for the protection of the environment in force today.”

Thus, the PCA concluded that India is under an obligation to construct and operate the KHEP in such a way as to *maintain a minimum flow of water* in the Kishenganga/Neelum River at all times,¹³¹⁵ at the rate fixed by the PCA at 9 cumecs in its Final Award.¹³¹⁶ For the Treaty itself, Judge Stephen M. Schwebel, Chairman of the PCA in this dispute observed that: “The Indus Waters Treaty was a great achievement of Pakistan and India and of the World Bank, and it remains so; ... and these proceedings are an illustration of its continuing vitality.”¹³¹⁷

Although disputes over the Indus waters are not new, they have risen in the inventory of disputes between India and Pakistan recently especially due to India’s construction of hydel projects on the Western Rivers. Against the potential of 8, 800 MW on the Western Rivers, so far India has installed only 1, 425 MW with construction of another 1, 290 MW under progress¹³¹⁸ leaving a balance of 6, 085 MW or 69 percent of the total allowed under the Treaty. The basic driver for hydropower in India is the growing demand for electricity which mainly comes from the need to meet the power demands of the 9 percent plus annual growth rate

¹³¹⁴ *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, above n 163, at 7 and 78.

¹³¹⁵ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 453.

¹³¹⁶ See *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166.

¹³¹⁷ Permanent Court of Arbitration “Indus Waters Kishenganga Arbitration (Pakistan v India) Court of Arbitration Concludes Hearing on the Merits” (1 September 2012) http://www.pca-cpa.org/showpage.asp?pag_id=1392.

¹³¹⁸ Chandrakant D Thatte “Indus Waters and the 1960 Treaty between India and Pakistan” in Olli Varis, Cecilia Tortajada and Asit K Biswas (eds) *Management of Transboundary Rivers and Lakes* (Springer, Verlag, Berlin, Heidelberg, 2008) at 191.

of the economy.¹³¹⁹ The overall peak power demand in the year 2007-08 was 108,886 MW, which was met with a shortfall of 18,093 MW or 16.6 percent.¹³²⁰ Hence, there is a strong push for large hydropower projects in India.

As already stated, the Treaty does provide for India's construction of the hydel projects but on the proviso that it does not disrupt or reduce water flows to Pakistan. Its duty to ensure that a minimum flow reaches Pakistan also stems from the Treaty's interpretation in light of customary international law.¹³²¹ However, the Treaty neither obliges India to furnish an environmental impact assessment report for planned projects to evaluate transboundary impacts,¹³²² nor does it provide for ongoing audits of projects already constructed. The Treaty does, however, allow for modifications to be duly made to its texts and India and Pakistan should take advantage of that. Until then, while it may well be true that water inflow to Pakistan has been reduced, the onus remains on Pakistan to show that it is due to India's construction of the hydel projects which is contributing to the reduced flows.

4.6 Conclusion

Damming and infrastructural development is a threat to large river systems globally, which in the worse-case scenario reduces water flow downstream to an extent that it directly contributes to basin closure. The UN Watercourses Convention, in addition to substantive rights and obligations, provides that certain procedural obligations be observed namely with regards to notification including environmental impact assessment, consultations, negotiations and if warranted, dispute resolution aiming for an equitable and sustainable resolution of the

¹³¹⁹ Iram Khalid "Trans-Boundary Water Sharing Issues: A Case of South Asia" (2010) 1 Journal of Political Studies 79 at 81.

¹³²⁰ Akhtar, above n 192, at 9.

¹³²¹ Also see *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165, at 168–172.

¹³²² Arshad H Abbasi *Indus Water Treaty Between India and Pakistan* (Pakistan Institute of Legislative Development and Transparency, Islamabad, 2011) at 15.

damming and infrastructural-related dispute. What is lacking under the UN Watercourses Convention, but which is present in international policy and endorsed by international cases and arbitration decisions as customary international law, is the *obligation* of riparian States *to undertake environmental impact assessments* of planned projects. This is not just prior to undertaking a planned project but on an ongoing basis as part of monitoring and assessment of the continuing impact of such development on international rivers. It is thus strongly recommended that environmental impact assessments not just be included as a principle but be undertaken by watercourse States as an obligation prior, during and post-implementation of any planned project on an international watercourse.

The EU governance framework for damming and infrastructural development is largely covered under the UNECE Water Convention, the Espoo (EIA) Convention, the SEA Protocol, the SEA and EIA Directives and the Water Framework Directive. While the UNECE Water Convention deals with projects with potential to cause significant adverse impacts, the Espoo (EIA) Convention and its related Protocol primarily focus on environmental impact assessments of projects not just prior to notification and during/post-implementation of such projects but during the planning stage well before the project plan is adopted. This strategic impact assessment regime is supplemented by the requirements for monitoring, assessment and reporting on the hydromorphological impacts of such development on its rivers against prescribed environmental objectives. Collectively, the European governance regime is striving to ensure that Member States continue to strike the right balance between environmental objectives and human needs for development by ensuring that such development is environmentally sustainable.

As for the case studies, in the Jordan Basin, it is apparent that only Israel and Jordan have some procedural measures under the Peace Treaty for further development which is subject to ‘mutual agreement’ between the two Parties. There is no provision which requires environmental impact assessments at any stage of the project. Given that upstream diversions have directly contributed to

basin closure downstream, it is imperative that Israel and Jordan review the Peace Treaty and impose an obligation to assess the impact of dams and diversion structures on an ongoing basis. Since Syria's development is also causing problems for Jordan in terms of reduced flows and contributing to basin closure, Jordan should press to have a new agreement with Syria, which not only provides for further development but also monitors the ongoing impact of such development on the ecology of the Jordan Basin.

In the Nile Basin, while the Nile Waters Agreement 1959 has provided for the current infrastructure as well as for future development, it has not taken the ecological impact of such development into consideration and therefore there is no requirement for assessment of either the present infrastructure or for future development projects as well. On the other hand, once the Nile River Basin Commission is established, the Cooperative Framework Agreement will be the first legal instrument in these case studies to have not only proper procedural requirements (including EIAs) for damming and development in place but be the first to require ongoing audit of such developments. In doing so, it will uphold the principle of sustainable development as aspired by international law and policy with regards to development of international rivers.

The Indus Waters Treaty also provides for the right to develop but which is now constrained by India's obligation to maintain a minimum downstream flow in Pakistan's favour at least from the Kishenganga project. However, given the inventory of disputes between them and the lack of requirement for an environmental impact assessment and ongoing audits under the Treaty, the Parties will likely see this list of disputes growing unless they agree that it is now time to revise the Treaty and incorporate the environmental considerations missing in it, especially with regards to ecological flows.

Thus, while damming and infrastructural development is essential for making the optimum use of the water resources of international river basins, unless environmental considerations are taken into account, that is ecological flows and environmental impact assessments prior, during and post-implementation of such

projects, such development will not only result in reduced flows to downstream riparian States but in the worse-case scenario, lead to basin closure as evidenced in all the case studies. Therefore, is it imperative that development of international rivers comply with the principle of sustainable development which is so heavily endorsed by international law and policy.

5 Climate Change



“According to many experts, water and its availability and quality will be the main pressures on, and issues for, societies and the environment under climate change.”¹³²³

5.1 Introduction

This chapter looks at the threats posed by climate change and variability to international river basins. Specifically, it looks at: the adverse impacts of climate change and variability to the hydrology of international river basins namely flow variability and extremes of floods and droughts. It then looks at why the United Nations Framework Convention on Climate Change is inadequate to deal with the impacts of climate change on international rivers and the extent to which the UN Watercourses Convention is apt to deal with the uncertainties associated with climate change and its impacts on large river systems, namely through its provisions regarding flow regulation, the obligation to prevent and mitigate floods and droughts and obligations during flood events. This analysis is supplemented by the Berlin Rules as well as certain international cases and arbitration decisions.

In addition to the strategy for adaptation to climate change in river basins prescribed by international law and policy, the practical aspects of the adaptation process are spelled out by looking at the relevant EU governance framework, namely the UNECE Water Convention, the Water Framework Directive, the Flood Risks Directive and its policy with regards to water scarcity and droughts.

¹³²³ Bryson Bates, Zbigniew W Kundzewicz, Shaohong Wu and Jean Palutikof (eds) *Climate Change and Water* Technical Paper of the Intergovernmental Panel on Climate Change VI (IPCC Secretariat, Geneva, June 2008) at 7. Available at <http://ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf>

This mainly comprises of taking an ecological approach to climate change adaptation to enable basins to build resilience towards climate change and variability. Through this approach, the EU Member States are not only able to monitor, assess and report on the impacts of climate change but are also able to undertake vulnerability risk assessments for floods and droughts. Additionally, the EU is making efforts to build its scientific knowledge base and establish warning and alarm systems, all of which is going to enable adaptation to climate change as well as protecting against, preparing for, and responding to its adverse impacts.

Finally, this chapter looks at the extent of the impacts of climate change in the Jordan, the Nile and the Indus River Basins, both present and projected, and the legal governing regime in these three Basins and the gaps in the legal instruments. The aims of this chapter are to fill-in these gaps and additionally, propose amendments to strengthen the provisions of the UN Watercourses Convention as well.

5.2 The Impact of Climate Change on International Rivers

Climate is usually defined as the average state of the atmosphere (or weather) taken over a given period of time for a particular geographical location.¹³²⁴ Weather - the actual state of the atmosphere (or the day-to-day manifestation of climate), in terms of surface variables such as temperature, precipitation and wind, in a given location at a given time - plays a decisive role in the availability of freshwater.¹³²⁵ Hence, the relationship between climate change and freshwater resources.

¹³²⁴ World Meteorological Organisation *Our Future Climate* WMO-No. 952 (WMO, Geneva, 2003) at 9. Available at <http://www.staedtebauliche-klimafibel.de/pdf/WMO-2003.pdf>; Organisation for Economic Co-Operation and Development *Integrating Climate Change Adaptation into Development Co-operation: Policy Guidance* (OECD Publishing, July 2009) at 34. Available at <http://www.oecd.org/env/cc/integratingclimatechangeadaptationintodevelopmentco-operationpolicyguidance.htm>

¹³²⁵ World Meteorological Organisation, *ibid*, at 9; The Organisation for Economic Co-Operation and Development, *ibid*, at 34.

The United Nations Framework Convention on Climate Change of 1992 ('UNFCCC')¹³²⁶ has defined 'climate change' as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."¹³²⁷ The UNFCCC thus makes a distinction between climate change attributable to anthropogenic (human) activities altering the atmospheric composition and climate variability attributable to natural causes. However, scientists often use the term for any change in the climate. Thus, the Intergovernmental Panel on Climate Change ('IPCC') defines "climate change" as "a change in the state of the climate that can be identified ... by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer."¹³²⁸

In the context of climate change, the concepts of vulnerability and adaptability are often discussed. The most common definition employed is one given by the IPCC. It defines 'vulnerability to climate change' as: "the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes."¹³²⁹ 'Vulnerability' is defined as "a function of the character, magnitude and the rate of climate change and variation to which a system is exposed, its sensitivity and its adaptability."¹³³⁰ In terms of adaptability, the IPCC has defined 'adaptive capacity' as "the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with

¹³²⁶ United Nations Framework Convention on Climate Change 1771 UNTS 107 adopted 9 May 1992, entered into force 21 March 1994).

¹³²⁷ UNFCCC; Article 1(2).

¹³²⁸ Christopher B Field and others (eds) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, New York, 2012) at 5. Available at http://www.ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf

¹³²⁹ McCarthy, above n 80, at 6.

¹³³⁰ Ibid.

the consequences” of the adverse effects of climate change. The UNFCCC has defined ‘adverse effects of climate change’ as “changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.”¹³³¹ There are, however, many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof.¹³³²

Uncertainties in projected changes in the hydrological system arise from internal variability of the climate system, uncertainty in future greenhouse gas and aerosol emissions, the translation of these emissions into climate change by global climate models and hydrological models uncertainty.¹³³³ What is certain though is that it will influence water temperatures, weather systems, water availability as well as the quality of water.¹³³⁴ Observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change.¹³³⁵ There are persuasive reasons to believe that rivers will be among the “most sensitive” of all ecosystems to climate change simply because they are heated by processes similar to those warming the earth’s atmosphere.¹³³⁶ Also, river and air temperatures track each other closely, particularly in the headwaters.¹³³⁷ However, not all river basins are affected by

¹³³¹ UNFCCC; Article 1(1).

¹³³² UNFCCC; Preamble, para 5.

¹³³³ Bates, above n 1323, at 24–25.

¹³³⁴ Jennifer Hoffman, Tina Tin and George Ochoa *Climate: The Force that Shapes Our World and the Future of Life on Earth* (Rodale Books, London, 2005) at 132; International Commission for the Protection of the Danube River *ICPDR Strategy on Adaptation to Climate Change* (ICPDR, 2012). Available from <http://www.icpdr.org/main/publications/programmes>

¹³³⁵ Bates, above n 1323, at 3.

¹³³⁶ S J Ormerod “Climate Change, River Conservation and the Adaptation Challenge” (2009) 19 *Aquatic Conservation: Marine and Freshwater Ecosystems* 609 at 609.

¹³³⁷ *Ibid.*

climate change in the same way. It varies on basin latitude.¹³³⁸ In 2007, Intergovernmental Panel on Climate Change (IPCC) reported that:¹³³⁹

“There is high confidence that by mid-century, annual river run-off and water availability are projected to increase at high latitudes (and in some tropical wet areas) and decrease in some dry regions in the mid-latitudes and tropics. There is also high confidence that many semiarid areas (e.g. Mediterranean basin, western United States, southern Africa and northeast Brazil) will suffer a decrease in water resources due to climate change.”

Given that water is involved in all components of the climate system (atmosphere, hydrosphere, cryosphere, land surface and biosphere), climate change affects water through a number of mechanisms.¹³⁴⁰ The following identifies some of the changes that will affect the hydrologic cycle of the global river systems.

Increase in Temperature

According to the IPCC, the average temperature of the earth's surface has risen from 1850–1899 to 2001–2005 by 0.76°C (0.57°C to 0.95°C).¹³⁴¹ In its 5th Assessment Report of 2013, the IPCC stated that warming of the climate system is “unequivocal” and that each of the last three decades has been successively warmer than the earth's surface than any preceding decade since 1850.¹³⁴² This is

¹³³⁸ Ariel Dinar and others “Does Precipitation and Runoff Variability Affect Treaty Cooperation Between States Sharing International Bilateral Rivers?” (2010) 69 *Ecological Economics* 2568 at 2570.

¹³³⁹ R K Pachauri and A Reisinger *Climate Change 2007: Synthesis Report* Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, Cambridge, 2007) at 49.

¹³⁴⁰ Bates, above n 1323, at 15.

¹³⁴¹ S Solomon and others *Climate Change 2007: The Physical Science Basis* Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, Cambridge, 2007) at 4.

¹³⁴² Thomas F Stocker and others (eds) *Climate Change 2013: The Physical Science Basis* Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, Cambridge, 2013) at 5.

the strongest IPCC statement on climate change yet.¹³⁴³ Temperatures are expected to increase by another 1.8 °C to 4 °C (best estimate) by the year 2100.¹³⁴⁴ Consequently, climate change has the potential to alter river flow regimes considerably.¹³⁴⁵

Melting of Ice and Snow Cover

The cryosphere (consisting of snow, ice and frozen ground) on land stores about 75 percent of the world's freshwater.¹³⁴⁶ Climate change will impact both snow accumulation as well as melt. Snow cover has already decreased in most regions, especially in spring and summer and mountain glaciers have declined.¹³⁴⁷ Water supplies stored in glaciers and snow cover are projected to decline in the course of the century through the process of melting, thus reducing water availability during warm and dry periods (through a seasonal shift in stream flow, an increase in the ratio of winter to annual flows, and reductions in low flows) in regions supplied by melt water from major mountain ranges¹³⁴⁸ such as the Indus River Basin.

¹³⁴³ World Economic Forum, above n 82, at 22.

¹³⁴⁴ Solomon, above n 1341, at 13.

¹³⁴⁵ Julia Hall and Conor Murphy "Robust Adaptation Assessment - Climate Change and Water Supply" (2011) 3 International Journal of Climate Change Strategies and Management 302 at 302.

¹³⁴⁶ Bates, above n 1323, at 19.

¹³⁴⁷ See United Nations Environment Programme *Global Outlook for Ice and Snow* (UNEP, 2007). Available at http://www.unep.org/geo/geo_ice/PDF/full_report_LowRes.pdf

¹³⁴⁸ United Nations Development Programme *Human Development Report 2006: Beyond Scarcity: Power, Poverty and the Global Water Crisis* (UNDP, New York, 2006). Available at <http://www.undp.org/content/dam/undp/library/corporate/HDR/2006%20Global%20HDR/HDR-2006-Beyond%20scarcity-Power-poverty-and-the-global-water-crisis.pdf>; Also see Uli M Huber, K M Bugmann and Mel A Reasoner *Global Change and Mountain Regions: An Overview of Current Knowledge* 23 (Springer, Dordrecht, 2005).

Changes in Runoff

At the global scale, there is evidence of a broadly coherent pattern of change in annual runoff, with some regions (high latitudes) experiencing an increase in runoff and others experiencing a decrease.¹³⁴⁹ Climate is the principle factor causing large fluctuations in discharge, which inter alia determines the distribution of rainfall over the year.¹³⁵⁰ The timing of river flows in many regions where winter precipitation falls as snow has also been significantly altered because higher temperatures mean that a greater proportion of the winter precipitation falls as rain rather than snow (resulting in reduced snow cover and immediate runoff), and the snowmelt season begins earlier (with less snow cover resulting in reduced runoff).¹³⁵¹ Variations in flow from year to year are also influenced in many parts of the world.¹³⁵² A 2008 biophysical assessment shows that rivers impacted by dams and infrastructural development will require more management interventions compared to free-flowing rivers.¹³⁵³ River basins “almost certain” to require action include the Nile and the Indus.¹³⁵⁴

¹³⁴⁹ Bates, above n 1323, at 21–22.

¹³⁵⁰ World Health Organisation, above n 578, at 247.

¹³⁵¹ United Nations Environment Programme, above n 1347, at 53–54.

¹³⁵² Bates, above n 1323, at 22.

¹³⁵³ See Margaret A Palmer and others “Climate Change and the World’s River Basins: Anticipating Management Options” (2008) 6 *Frontiers in Ecology and the Environment* 81.

¹³⁵⁴ Jamie Pittock and Flavia Rocha Loures “Governing International Watercourses in an Era of Climate Change” in Flavia Rocha Loures and Alistair Rieu-Clarke (eds) *The UN Watercourses Convention in Force: Strengthening International Law for Transboundary Water Management* (Routledge, Oxon, New York, 2013) at 306.

Changes in Precipitation and Extreme Events

At regional scales, increases and decreases in precipitation are projected in different regions. Overall, precipitation over land is projected to increase by some 5 percent.¹³⁵⁵ As with water vapour projection for the same period, it has been found that over land, rainfall changes tend to be balanced by both evaporation and runoff.¹³⁵⁶ For the purpose of this study, it is noted that increased precipitation intensity and variability is projected to increase the risks of flooding and drought in many areas:¹³⁵⁷

“The frequency of heavy precipitation ... will be *very likely* to increase over most areas ... with consequences for the risk of rain-generated floods. At the same time, the proportion of land surface in extreme drought at any one time is [also] projected to increase (*likely*) ...”

Due to reduced precipitation and/or increased evapotranspiration, droughts will intensify in the 21st century in some seasons and areas (medium confidence)¹³⁵⁸ as evident in the Jordan River Basin.¹³⁵⁹ In addition, the projected changes in precipitation and temperature imply possible changes in floods. It has been projected (with medium confidence) that heavy rainfall will lead to increases in rain-generated local floods in some catchments or regions,¹³⁶⁰ as evidenced by the recent flash floods in the Indus River Basin.¹³⁶¹

¹³⁵⁵ Bates, above n 1323, at 25.

¹³⁵⁶ At 26.

¹³⁵⁷ Solomon, above n 1341, at 3. Very likely and likely mean “the assessed likelihood, using expert judgment” are over 90 percent and over 66 percent, respectively.

¹³⁵⁸ Field, above n 1328, at 13.

¹³⁵⁹ See Section 5.5.1 on ‘Impact of Climate Change in the Jordan River Basin.’

¹³⁶⁰ Field, above n 1328, at 178.

¹³⁶¹ See Section 5.5.1 on ‘Impact of Climate Change in the Indus River Basin.’

Indirect Consequences

One of the concerns regarding climate change is the impact it will have on future global freshwater supply.¹³⁶² All the above factors threaten both the quantity and the quality of river waters.¹³⁶³ These in turn are expected to have indirect consequences¹³⁶⁴ but the most important ones are food availability, stability, access and utilization.¹³⁶⁵

Therefore, climate change variability means that rainy seasons will become wetter and the dry seasons drier, the temperature will increase and as a result the hydrological cycle will accelerate resulting in extremes of floods and droughts.¹³⁶⁶ The resultant variability in water flow of rivers will inter alia affect freshwater security. The climate-security nexus is well recognized.¹³⁶⁷ In April 2007, the UN Security Council held its first open debate on the impact of climate change on peace and security.¹³⁶⁸ In 2009, the UN General Assembly adopted a non-binding resolution on climate change as having international security implications.¹³⁶⁹ This is just one of the many ways that climate change poses a risk to human

¹³⁶² See Charles J Vörösmarty and others “Global Water Resources: Vulnerability from Climate Change and Population Growth” (2000) 289 Science 284.

¹³⁶³ Hoffman, above n 1334, at 132.

¹³⁶⁴ See Ormerod, above n 1336, at 609 regarding other indirect consequences of climate change on rivers.

¹³⁶⁵ Bates, above n 1323, at 3.

¹³⁶⁶ Nicole Kranz, Timo Menniken and Jochen Hinkel “Climate Change Adaptation Strategies in the Mekong and Orange-Senqu Basins: What Determines the State-of-Play?” (2010) 13 Environmental Science & Policy 648 at 649.

¹³⁶⁷ Scheffran, above n 154, at S28.

¹³⁶⁸ United Nations Security Council 5663rd Meeting “Press Release: Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing over 50 Speakers” (17 April 2007) <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>.

¹³⁶⁹ *Climate Change and Its Possible Security Implications: Report of the Secretary-General* GA Res 64/350, LXIV A/64/350 (2009).

security which could lead to violent conflicts.¹³⁷⁰ A report written by a group of retired senior military officers attests that one of the most destabilizing impacts from climate change will be reduced access to freshwater, which could lead to conflict in certain areas.¹³⁷¹ Thus, the inextricable link between the Earth's waters, regional weather and global climate constitutes a hydro-climate reality - a reality which must be recognized by the global climate legal regime.¹³⁷² According to the World Economic Forum's Global Risks 2014 Report, failure to mitigate and adapt to the impacts of climate change has been identified as the top five highest concerns of global risks in 2014. It is not only a risk in itself but as seen as a multiplier of other risks such as extreme weather events as well as water and food crisis.¹³⁷³ On the other hand, a UN report on climate security has identified several "threat minimizers" such as "climate mitigation and adaptation" and "international cooperation" while emphasizing the need to "reinforc[e] cooperative mechanisms to deal with ... the management of transboundary waters."¹³⁷⁴ Adaptation to climate change is defined by the IPCC as "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities."¹³⁷⁵ The following looks at the extent to which international law and policy supports climate change adaptation at the river basin level.

¹³⁷⁰ See Jon Barnett and W Neil Adger "Climate Change, Human Security and Violent Conflict" (2007) 26 Political Geography 639.

¹³⁷¹ Military Advisory Board *National Security and the Threat of Climate Change* (CNA, 2007) at 13–16. Available from <https://www.cna.org/reports/climate>

¹³⁷² Katak B Malla "Hydro-Climate Legal Management of the Hindu-kush-Himalayas" (2009) 12 Asia Pacific Journal of Environmental Law 51 at 83.

¹³⁷³ World Economic Forum, above n 82, at 21.

¹³⁷⁴ United Nations General Assembly, above n 1369, at 2 and 27.

¹³⁷⁵ James D Ford and Lea Berrang-Ford *Climate Change Adaptation in Developed Nations: From Theory to Practice* (Springer, Dordrecht, Heidelberg, London, New York, 2011) at 53.

5.3 *International Law and Policy*

This section looks at the international law and policy with regards to dealing with the impact of climate change on international rivers, namely the adequacy of the UNFCCC provisions, the relevant provisions of the UN Watercourses Convention, supplemented by the Berlin Rules and international case law and arbitration decisions.

5.3.1 UNFCCC

Anthropogenic climate change adds a major pressure to States that are already confronting the issue of sustainable freshwater use.¹³⁷⁶ Thus, the “ultimate objective” of the UNFCCC is “to achieve ... [the] stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system ... to allow ecosystems to adapt naturally to climate change ...”¹³⁷⁷ Furthermore, it provides that all Parties shall “Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for ... water resources ... and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods.”¹³⁷⁸ This is because climate change challenges the traditional assumption that past hydrological experience provides a good guide to future conditions given that the consequences of climate change may alter the reliability of current water management systems and water-related infrastructure.¹³⁷⁹ However, while quantitative projections of changes in precipitation, river flows and water levels at the river-basin scale are uncertain, it is *very likely* that hydrological characteristics will change in the future.¹³⁸⁰ Hence

¹³⁷⁶ Bates, above n 1323, at 7.

¹³⁷⁷ UNFCCC; Article 2.

¹³⁷⁸ UNFCCC; Article 4(e).

¹³⁷⁹ Bates, above n 1323, at 4.

¹³⁸⁰ *Ibid.*

the need for adaptation procedures and risk management practices that incorporate projected hydrological changes with the related uncertainties.¹³⁸¹

Whilst the UNFCCC is designed to commit State Parties to minimize the adverse effects of climate change on the environment by taking an ecosystem approach, it is not enough on its own to promote better collaboration among watercourse States to deal with the adverse effects of climate change on international watercourses because: (1) the UNFCCC does not specifically aim to enable transboundary climate change adaptation through sustainable and cooperative management of international watercourses; and (2) nor it is intended to prevent and peacefully settle the types of disputes that typically arise between watercourse States.¹³⁸² Therefore, addressing the adverse impacts of climate change on international watercourses would require hydro-climate management.

Given that “the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response ...”,¹³⁸³ aspects of climate change and variability which are specific to international watercourses ought to be addressed through the UN Watercourses Convention. While the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought And/Or Desertification, Particularly in Africa (‘the UN Desertification Convention’)¹³⁸⁴ deals specifically with drought, like the UNFCCC, it does not deal with aspects of drought associated with transboundary watercourses or freshwater sharing. Nevertheless, in combating desertification, it seeks to contribute to achieving the

¹³⁸¹ Ibid.

¹³⁸² Flavia Loures, Alistair Rieu-Clarke and Marie-Laure Vercambre *Everything You Need to Know About the UN Watercourses Convention* (WWF, 2009) at 18. Available at http://www.unwater.org/downloads/wwf_un_watercourses_brochure_for_web_1.pdf

¹³⁸³ UNFCCC; Preamble, para 6.

¹³⁸⁴ 1954 UNTS 3.

objectives of the UNFCCC.¹³⁸⁵ Likewise, the UN Watercourses Convention, by providing for adaptation to climate change and preventing or mitigating the adverse impacts of climate change as they relate to transboundary watercourses, can also contribute to achieving the objectives of the UNFCCC.

5.3.2 The UN Watercourses Convention

The UN Watercourses Convention, which is specifically designed to govern cooperative relations between watercourse States, whilst does not specifically mention ‘climate change’, it does address aspects of it namely, regulation of stream flow, preventing and mitigating floods and droughts as well as responding to extremes of floods and, to a limited extent, droughts. These are supplemented by the Berlin Rules and international cases and arbitration decisions where possible. Note that this study excludes water quality concerns associated with climate change.

Regulation of Flow

The UN Watercourses Convention provides that “in order to attain optimal utilization and adequate protection of an international watercourse”¹³⁸⁶ watercourse States “shall cooperate, where appropriate, to respond to needs or opportunities for regulation of the flow of the waters of an international watercourse.”¹³⁸⁷ ‘Regulation’ under the UN Watercourses Convention means “the use of hydraulic works or any other continuing measure to alter, vary or otherwise control the flow of the waters of an international watercourse.”¹³⁸⁸ It further obliges watercourse States to “participate on an equitable basis in the construction and maintenance or defrayal of the costs of such regulation works as

¹³⁸⁵ UN Desertification Convention; Preamble, para 23. Also see Article 8 which deals with its relationship with the UNFCCC.

¹³⁸⁶ UN Watercourses Convention; Article 8(1).

¹³⁸⁷ UN Watercourses Convention; Article 25(1).

¹³⁸⁸ UN Watercourses Convention; Article 25(3).

they may have agreed to undertake.”¹³⁸⁹ While the concept of adequate¹³⁹⁰/minimum stream flows is expressly absent from this provision, given that equitable and reasonable utilization seeks to achieve “optimal and sustainable utilization ... consistent with adequate protection of the watercourse” together with “Watercourse States shall, individually and, where appropriate, jointly, protect and preserve the *ecosystems* of international watercourses” [emphasis added] and that “Watercourse States shall, individually and, where appropriate, in cooperation with other States, take all measures with respect to an international watercourse that are necessary to protect and preserve the marine environment, including estuaries,”¹³⁹¹ adequate flows can be read into the text of the Article dealing with regulation of flows. This is because ensuring adequate water flows would undoubtedly play a major role in achieving the purposes underlying this Article,¹³⁹² which is to attain optimal utilization and adequate protection of an international watercourse. Thus, the UN Watercourses Convention has taken an ecosystem approach¹³⁹³ that considers regulation of flows for the “ecological integrity” or “the natural condition of waters and other resources sufficient to assure the biological, chemical, and physical integrity of the aquatic environment.”¹³⁹⁴ It has been suggested that the choice of the word “ecosystem”

¹³⁸⁹ UN Watercourses Convention; Article 25(2).

¹³⁹⁰ See discussions around the excluded draft Article 10 of the Campion Consolidation of the ILA Rules on International Water Resources, 1996-1999 in Bogdanović, above n 186, at xv–xix.

¹³⁹¹ UN Watercourses Convention; Article 23.

¹³⁹² Albert E Utton and John Utton “The International Law of Minimum Streams Flows” (1999) 10 *Colo J Int’l Env’tl L & Pol’y* 7 at 27.

¹³⁹³ See Owen McIntyre “The Emergence of an ‘Ecosystem Approach’ to the Protection of International Watercourses under International Law” (2004) 13 *Review of European Community & International Environmental Law* 1; Allistair S Rieu-Clarke “A Survey of International Law Relating to Flood Management: Existing Practices and Future Prospects” (2008) 48 *Nat Resources J* 649 at 656–657; and McIntyre, above n 236, at 286–312.

¹³⁹⁴ As defined under the Berlin Rules; Article 3. Under the UN Watercourses Convention; Article 22, “ecological integrity” has been provided for in the following terms: “States shall take all appropriate measures to protect the ecological integrity necessary to sustain ecosystems dependent on particular waters. Also see draft Article 10 of the Campion Consolidation of the ILA Rules on

over “environment” under the UN Watercourses Convention is particularly helpful from an in-stream flow perspective and as such, environmental protection of shared water resources must include maintenance of adequate flow levels as essential to the integrity of watercourse systems.¹³⁹⁵ As already stated, the Berlin Rules expressly provides that “States shall take all appropriate measures to ensure flows adequate to protect the ecological integrity of the waters of a drainage basin, including estuarine waters.”¹³⁹⁶ This is to ensure that stream flows are “not less than the acceptable minimum” during the dry season or greater than “the natural acceptable reverse flow” during the wet season.¹³⁹⁷ The Murray-Darling Basin Plan,¹³⁹⁸ in recognition of the hydrological and ecological nexus, strives to develop water-dependent ecosystem’s resiliency towards climate change by providing for “environmental watering”¹³⁹⁹ (which is the same as ecological flows) and setting sustainable diversion limits.¹⁴⁰⁰ In doing so, ensuring that minimum flows are maintained. The idea is that by taking this ecosystem approach, the impact of climate change can be mitigated or lessened at the Basin

International Water Resources, 1996-1999 in Bogdanović, above n 186, at xv–xix; and A Dan Tarlock “How Well Can International Water Allocation Regimes Adapt to Global Climate Change?” (2000) 15 *Journal of Land Use and Environmental Law* 423 at 434.

¹³⁹⁵ Utton, above n 1392, at 26.

¹³⁹⁶ Berlin Rules; Article 24.

¹³⁹⁷ As provided for under the Mekong River Basin Agreement; Article 6 on the “maintenance of flows on the mainstream.” See above 183.

¹³⁹⁸ Murray-Darling Basin Plan 2012. It is a plan for the integrated management of Basin water resources made under the Water Act 2007. Full text of the Basin Plan is available from <http://www.comlaw.gov.au/Details/F2012L02240>

¹³⁹⁹ Murray-Darling Basin Plan; Chapter 8 and; Murray-Darling Basin Authority *Guidelines for the Method to Determine Priorities for Applying Environmental Water* (November 2012). Available from <http://www.comlaw.gov.au/Details/F2012L02240>; Also see Jamie Pittock and C Max Finlayson “Australia’s Murray–Darling Basin: Freshwater Ecosystem Conservation Options in an Era of Climate Change” (2011) 62 *Mar Freshwater Res* 232.

¹⁴⁰⁰ See Murray-Darling Basin Plan, above n 1398; Chapters 6 and 7.

level.¹⁴⁰¹ However, given the uncertainties associated with climate change, ecological flows have to be calculated based on a number of changing factors.

In the *Indus Waters Kishenganga Arbitration*, in fixing a minimum flow based on the effect of the hydro-electric project on dry-season flows being the principal determinant of ecological change, the Permanent Court of Arbitration ('PCA') saw no reason to consider a percentage or variable release regime even though the PCA noted that there is not only a degree of uncertainty inherent in any attempt to predict environmental responses to changing conditions brought about by development but additionally, uncertainty with attempts to predict future flow conditions which may "differ, perhaps significantly, from the historical record as a result of factors beyond the control of either Party, including climate change."¹⁴⁰² Thus, ecological flow is something that requires flexibility in light of uncertainty associated with environmental responses to anthropogenic development as well as climate change and would therefore require ongoing assessment. Although the obligation to undertake ongoing assessment is absent under the UN Watercourses Convention it can be said to be a practical application of the obligation to cooperate based on the need for regulation of flow as they become more variable in light of the changing climate. In addition to the obligation to regulate stream flow, watercourse States are also under an obligation to prevent and mitigate floods and droughts.

Prevention and Mitigation of 'Harmful Conditions'

The UN Watercourses Convention provides for the obligation of watercourse States to prevent and mitigate floods and droughts in the following terms:¹⁴⁰³

¹⁴⁰¹ Neil Saintilan, Kerry Lee Rogers and Timothy J Ralph "Matching Research and Policy Tools to Scales of Climate-Change Adaptation in the Murray-Darling, a large Australian River Basin: A Review" (2013) 708 *Hydrobiologia* 97 at 103.

¹⁴⁰² *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166; paras 104 and 117.

¹⁴⁰³ UN Watercourses Convention; Article 27.

“Watercourse States shall, *individually and, where appropriate, jointly*, take all appropriate measures to prevent or mitigate conditions related to an international watercourse that may be harmful to other watercourse States, whether resulting from natural causes or human conduct, such as flood or ... drought” [Emphasis added]

The unilateral aspect of this obligation is the same as the obligation to prevent transboundary harm which has been widely endorsed in international case law.¹⁴⁰⁴

The collective aspect, or more specifically the principle of shared responsibility, is also widely endorsed in international environmental law and now the emerging international disaster response (or relief) law, which is in the process of consolidation.¹⁴⁰⁵ In terms of what shared responsibility in the present context entails, the International Law Commission under its “Draft Articles on the Law of the Non-Navigational Uses of International Watercourses” has elaborated that:¹⁴⁰⁶

“The kinds of measures that may be taken ... are many and varied. They range from the regular and timely exchange of data and information that would be of assistance in preventing and mitigating the conditions in question, to taking all reasonable steps to ensure that activities in the territory of a watercourse State are so conducted as not to cause conditions that may be harmful to other watercourse States. They may also include the holding of consultations concerning the planning and implementation of joint measures, whether or not involving the construction of works, and the preparation of studies of the efficacy of measures that have been taken.”

While the UN Watercourses Convention generally provides for the prevention and mitigation of harmful conditions, which includes floods and droughts, the above-stated is also very generic and offers no specific guidance as to what sort of

¹⁴⁰⁴ As already discussed in Chapters 3 and 4. Although there is not a single case law on climate change, Palau is pushing for an advisory opinion from the International Court of Justice as to the relevance of the “no harm” principle in the context of climate change. See United Nations “Press Conference on Request for International Court of Justice Advisory Opinion on Climate Change” *Meetings Coverage and Press Releases* (New York, 3 February 2012). Available at http://www.un.org/press/en/2012/120203_ICJ.doc.htm and; Douglas A Kysar “Climate Change and the International Court of Justice” (Public Law Research Paper No 315, Yale Law School, 2013). Available from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2309943

¹⁴⁰⁵ See Andrea De Guttry, Marco Gestri and Gabriella Venturini (eds) *International Disaster Response Law* (T M C Asser Press, The Hague, 2012); and Field, above n 1328, at 400–401.

¹⁴⁰⁶ International Law Commission, above n 237, at 129.

actions prevention and mitigation of floods and droughts would require. For any preventative or mitigation measure, forecasts of floods and droughts would be necessary. To this end, the Convention provides that watercourse States are under an obligation to regularly exchange data and information on the condition of the watercourse particularly if the condition is of a “hydrological, meteorological, hydrogeological and ecological nature ... as well as *related forecasts*” [Emphasis added].¹⁴⁰⁷ Although forecasting is not an obligation, if undertaken, then it must be exchanged.

The Berlin Rules, on the other hand, specifically provides for cooperation with respect to flood control (which is largely based on the International Law Association’s draft Articles on Flood Control of 1972¹⁴⁰⁸) and which may include, among others:¹⁴⁰⁹ “(a) collection and exchange of relevant data; (b) preparation of surveys, investigations, studies, flood plain maps and their mutual exchange; (c) planning and designing of relevant measures; (d) execution, operation and maintenance of flood control measures; (e) flood forecasting and communication of flood warnings; (f) developing or strengthening necessary legislation and institutions for achieving such goals; and (g) setting up of a regular information service charged to transmit the height of water levels and the discharge quantities. Additionally, it obliges States to maintain all flood control measures in good order and to ensure that river channels for the discharge of excess waters are free for use.¹⁴¹⁰ In essence, the Berlin Rules provides for flood risks assessments, forecasting and preparedness.

¹⁴⁰⁷ UN Watercourses Convention; Article 9(1).

¹⁴⁰⁸ International Law Association *Report of the International Law Association on the Work of its Fifty-Fifth Conference held in New York, 21-26 August 1972* (1973) at 147; Also see Bogdanović, above n 186, at 23–25.

¹⁴⁰⁹ Berlin Rules; Article 34(4).

¹⁴¹⁰ Berlin Rules; Article 34(5) and (6), respectively.

For droughts, the Berlin Rules provide for cooperation including, among other matters:¹⁴¹¹ (1) an integrated strategy for mitigating the effects of droughts and moving towards the sustainable use of waters; and (2) development or strengthening the necessary legislation and institutions for dealing with droughts and allocation of adequate resources. This is also very generic. Thus, at this stage, international law and policy offers no guidance as to what drought prevention and mitigation encompasses. The Colorado River Interim¹⁴¹² Guidelines for Lower Basin Shortages and Coordinated Operations of Lake Powell and Lake Mead (“the Interim Guidelines”) of 2007¹⁴¹³ offers some guidance.

The Interim Guidelines is one example of a proactive approach and has been suggested as a model for other transboundary agreements as well.¹⁴¹⁴ The Interim Guidelines, which apportions water between seven basin States, provides for:¹⁴¹⁵ (1) shortage sharing through reduced delivery during drought and low reservoir conditions and (2) development and delivery of “intentionally created surplus”; an extraordinary conservation measure which allows lower basin water users namely, Arizona, California and Nevada to “bank” and store the water generated by such efforts for future use and “developed shortage supply”, which creates similar mechanisms to generate and store water to be delivered during declared

¹⁴¹¹ Berlin Rules; Article 35(c)-(e).

¹⁴¹² Until 2026.

¹⁴¹³ See United States Bureau of Reclamation *Record of Decision: Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead: Final Environmental Impact Statement* (USBR, December 2007). Available at <http://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf>

¹⁴¹⁴ Heather Cooley and Peter H Gleick “Climate-Proofing Transboundary Water Agreements” (2011) 56 *Hydrological Sciences Journal* 711 at 715.

¹⁴¹⁵ United States Bureau of Reclamation *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead: Final Environmental Impact Statement* (November 2007). Executive Summary is available from <http://www.usbr.gov/lc/region/programs/strategies/FEIS/>; and United States Bureau of Reclamation, above n 1413.

shortages.¹⁴¹⁶ It is noted that at the time the Interim Guidelines were adopted, the effects of climate change in its runoff forecasts were neglected due to scientific uncertainty.¹⁴¹⁷ However, its appendix provided for the review of science and methods for incorporating climate change information, which lay the foundation for future integration.¹⁴¹⁸ This review was finalized in December 2012,¹⁴¹⁹ which raises concerns regarding the reliability of the Colorado River system to meet future Basin resource needs given the likelihood of increasing demand for water throughout the Basin coupled with projections of reduced water supply due to climate change.¹⁴²⁰

While the Study has explored a broad range of options that can reduce the Basin resource vulnerability and improve the system's resiliency to dry hydrologic conditions, it has not attempted, at this stage, to offer any solutions to address the problems identified but has instead identified areas which need further study.¹⁴²¹ Thus, whilst in its current form it lacks adaptability to climate change, nevertheless, the Interim Guidelines has taken a proactive approach to draught management through shortage sharing and banking surplus. Hence, preparation and mitigation methods such as these would provide an effective solution given the uncertainties associated with climate change.

¹⁴¹⁶ Douglas L Grant "Collaborative Solutions to Colorado River Water Shortages: The Basin States' Proposal and Beyond" (2008) 8 Nevada Law Journal 964 at 974–976.

¹⁴¹⁷ Richard A Wildman and Noelani A Forde "Management of Water Shortage in the Colorado River Basin: Evaluating Current Policy and the Viability of Interstate Water Trading" (2012) 48 Journal of the American Water Resources Association 411 at 412.

¹⁴¹⁸ Peter H Gleick *The World's Water Volume 7: The Biennial Report on Freshwater Resources* (Island Press, Washington, DC, 2012) at 17.

¹⁴¹⁹ See United States Bureau of Reclamation *Colorado River Basin Water Supply and Demand Study: Final Study Reports* for the Executive Summary, Study Report and Technical Reports. Available from <http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/>

¹⁴²⁰ United States Bureau of Reclamation *Colorado River Basin Water Supply and Demand Study: Executive Summary* (2012) at 4. Available at <http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/>

¹⁴²¹ At 26.

In addition to the obligation to prevent and mitigate floods and droughts, the UN Watercourses Convention also obliges watercourse States to deal with floods and, to some extent, droughts.

Floods

‘Floods’ are not defined under the UN Watercourses Convention but has been defined by the International Law Association as “the rising of water levels which would have detrimental effects on life and property in co-basin States.”¹⁴²² For emergency¹⁴²³ situations such as floods, the UN Watercourses Convention provides that a watercourse State within whose territory an emergency originates “shall, without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations” and “in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency.”¹⁴²⁴ Although ‘practical measures’ has not been defined, the Berlin Rules provide that “States shall jointly develop contingency plans for responding to foreseeable flood conditions.” The Columbia River Basin example also sheds lights as to what these might be.¹⁴²⁵ This will enable not only better preparedness but better response in an emergency situation as well.

¹⁴²² Articles on Flood Control 1972; Article 1(1). Text of the Articles are available from International Law Association, above n 1408.

¹⁴²³ Defined as “a situation that causes, or poses an imminent threat of causing, serious harm to watercourse States or other States and that results suddenly from natural causes, such as floods ...”; Articles on Flood Control 1972; Article 28(1).

¹⁴²⁴ Articles on Flood Control 1972; Article 28.

¹⁴²⁵ Execution of flood control measure was one consideration in the Columbia River Basin Treaty, above n 188, which stipulates that Canada (the upstream Party) will adjust its operation of hydro-electric dams to mitigate flooding in the USA. Articles II(2), VI(1) and V of the Treaty requires Canada to provide 15.5 MAF of storage for improving the flow of the Columbia River through the construction of 3 dams in return for a one-off payment of US\$64.4 million. The additional power which is generated in the U.S. and results from the Canadian storage is equally shared between the

Droughts

The UN Watercourses Convention and the Berlin Rules do not define ‘drought’ and though there are several definitions of what a drought is¹⁴²⁶ the common theme is that “drought results from some level of water shortage relative to human and environmental needs.”¹⁴²⁷ The UN Convention also does not state what is to happen during a drought but the Berlin Rules, which has a separate provision on ‘droughts,’ offers some guidance and specifies that:¹⁴²⁸ (1) cooperation among watercourse States “shall ... include ... [t]he definition of criteria that activate the provisions of this Article”; (2) “States *likely to be affected* by drought [according to the agreed criteria] shall promptly communicate among themselves...” [emphasis added] and; (3) cooperation among watercourse States should also include “an integrated strategy for addressing the physical, biological and socio-economic aspects of the drought” as well as development or strengthening the necessary legislation and institutions for dealing with droughts and allocation of adequate resources. It further provides that the Rules do not limit the rights of States to protect themselves unilaterally from the effects of droughts so long as

two countries. Given that some of the flood control provisions of this Treaty are due to expire in 2024, it is difficult to speculate at this point how much will be changed in order to account for climate change and variability. Thus, the use of financial transfers/side-payments or the linking of non-water related issues can help institutionalize transboundary flood control. Ultimately, any strategy for climate change adaptation at the basin level inter alia has to be part of the River Basin Management plans. Also see Barbara Cosens “Resilience and Law as a Theoretical Backdrop for Natural Resource Management: Flood Management in the Columbia River Basin” (2012) 42 *Envtl L* 241; and Shlomi Dinar and others “Climate Change and State Grievances: The Resiliency of International River Treaties to Increased Water Variability” (2010) 3 *Insights* 1.

¹⁴²⁶ See Robert W Adler “Drought, Sustainability, and the Law” (2010) 2 *Sustainability* 2176.

¹⁴²⁷ Donald A Wilhite and Michael H Glantz “Understanding: The Drought Phenomenon: The Role of Definitions” (1985) 10 *Water International* 111. The UN Desertification Convention defines it as “the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems”; Article 1(c).

¹⁴²⁸ Berlin Rules; Article 35(2)(b), (3) and (2)(a), (d) and (e), respectively.

measure taken do not infringe upon the rights of other watercourse States.¹⁴²⁹ Even though what a cooperative integrated strategy may include is not elaborated upon, stream flow drought essentially has to do with issues of water allocation.

A recent report,¹⁴³⁰ commissioned by the World Bank, analysed treaty resilience to climate change along five characteristics derived empirically from an analysis of existing river basin organizations: (1) presence of an international watercourses treaty, (2) presence of water allocation mechanisms, (3) existence of variability management mechanisms, (4) existence of conflict management mechanisms, and (5) establishment of a river basin organization.¹⁴³¹ While several factors have been identified as crucial for treaty resilience, the seemingly most important factor is the provision of water allocation mechanisms that are adaptable to changes in water flow and water quantity.¹⁴³² In order to avoid conflict during droughts, agreements must contain flexible water allocation mechanisms. Flexibility can mean either the ability to change the rules of governance for example in light of new scientific knowledge, or the option to apply a variety of policies in the face of changing conditions.¹⁴³³ The UN Watercourses Convention does not deal with methods of water allocations though it promotes water sharing through the

¹⁴²⁹ Berlin Rules; Article 35(4).

¹⁴³⁰ Lucia De Stefano and others *Mapping the Resilience of International River Basins to Future Climate Change-Induced Water Variability* Paper No 15 (The World Bank, Washington, DC, March 2010). Available at <http://www.transboundarywaters.orst.edu/publications/publications/De%20Stefano%20et%20al%202010.pdf>

¹⁴³¹ Lucia De Stefano and others “Climate Change and the Institutional Resilience of International River Basins” (2012) 49 *Journal of Peace Research* 193 at 195.

¹⁴³² Susanne Schmeier *Resilience to Climate Change-Induced Challenges in the Mekong River Basin: The Role of the MRC* (The World Bank, Washington, DC, 2011) at 4. Available from <http://documents.worldbank.org/curated/en/2011/05/14187896/resilience-climate-change-induced-challenges-mekong-river-basin-role-mrc>

¹⁴³³ Alena Drieschova, Mark Giordano and Itay Fischhendler “Governance Mechanisms to Address Flow Variability in Water Treaties” (2008) 18 *Global Environmental Change* 285 at 286.

principle of equitable and reasonable utilization and factors relevant to it.¹⁴³⁴ One such factor in tune with water variability is the ‘needs based’ approach (as opposed to a rights based approach).¹⁴³⁵ This approach addresses the issue raised by IPCC: “One major implication of climate change for [freshwater] agreements ... is that allocating rights in absolute terms may lead to further disputes in years to come when the total absolute amount of water available may be different.”¹⁴³⁶ Hence, in order to cater for the uncertainties associated with climate change, watercourse States would have to aim for flexibility when deciding on equitable allocations.

In the 20th century, of the 145 international agreements signed on water use in international rivers, almost 50 percent of these agreements covered water allocation issues,¹⁴³⁷ but the majority of which did not take into account the hydrologic variability of river flow.¹⁴³⁸ Those that did include water allocation provisions may/may not be flexible enough to deal with droughts. Even though eight allocation methods have been identified,¹⁴³⁹ two common approaches for water allocation are proportional allocation and fixed flow allocation.¹⁴⁴⁰ Studies have compared the efficiency of fixed flow allocations with proportional allocations and found that though fixed flow allocations are the most common, they tend to be less efficient when flow variability increases and in many situations, proportional allocations are more efficient.¹⁴⁴¹

¹⁴³⁴ UN Watercourses Convention; Articles 5(1) and 6.

¹⁴³⁵ Such as absolute territorial sovereignty/integrity. See Dinar, above n 1425, at 5.

¹⁴³⁶ McCarthy, above n 80; Section 4.7.3.

¹⁴³⁷ Wolf, above n 159, at 262.

¹⁴³⁸ Meredith A Giordano and Aaron T Wolf “Sharing Waters: Post-Rio International Water Management” (2003) 27 *Natural Resources Forum* 163.

¹⁴³⁹ Dinar, above n 1425, at 7.

¹⁴⁴⁰ Erik Ansink and Arjan Ruijs “Climate Change and the Stability of Water Allocation Agreements” (2008) 41 *Environ Resource Econ* 249 at 250.

¹⁴⁴¹ *Ibid.*

Hence, cooperation may include drought contingency plans for strengthening preparedness and management as provided for under the Convention to Combat Desertification,¹⁴⁴² incorporating flexible allocation mechanisms. Allocation mechanisms that are adaptable to changes in water flow and water quantity would necessarily require that State Parties' respective shares under a water-sharing agreement are either based on percentages so that it can accommodate changes in water availability or if they are fixed, then have "escape clauses"¹⁴⁴³ or regular treaty renegotiations/periodic reviews so that variability can be accommodated.¹⁴⁴⁴

Therefore, the UN Watercourses Convention provides for adaptation to climate change at the basin level by dealing with flow regulation taking into account the ecological needs of the basin as well as prescribing for response to floods (specifically) and droughts (albeit indirectly through the principle of equitable and reasonable utilization). However, delivering climate change adaptation strategy should be based on an integrated approach to water resources management that

¹⁴⁴² UN Desertification Convention; Article 10(3)(a).

¹⁴⁴³ The Utilization of Waters of Colorado and Tijuana Rivers and of the Rio Grande, United States - Mexico 3 UNTS 314 (signed 3 February 1944, entered into force 8 November 1945), Article 10 allots Mexico 1.5 MAF annually from the Colorado River but subject to pro rata reduction "[i]n the event of extraordinary drought or serious accident to the irrigation system in the United States ... making it difficult for the United States to deliver the guaranteed quantity." It also allows Mexico to supply less than the minimum amount of water to the USA during an "extraordinary drought" for up to five years, during which time Mexico incurs a water debt that it must then repay by increasing flows during the next five-year cycle or in case of a persistent drought, for up to ten years. What constitutes an "extraordinary drought" is determined by the "Minutes" of the International Boundary Waters Commission, which has proven to be "a flexible mechanism of binational cooperation, allowing for the application, extension, elaboration, and modification of the treaty's provisions" when such a need arises. See Hamid Sarfraz "Revisiting the 1960 Indus Waters Treaty" 38 *Water International* 204 at 652–659.

¹⁴⁴⁴ Sabine Schulze and Susanne Schmeier "Governing Environmental Change in International River Basins: The Role of River Basin Organizations" (2012) 10 *International Journal of River Basin Management* 229 at 231–232.

considers the river basin as a functional unit.¹⁴⁴⁵ The concept of integrated river basin management is absent under the Convention. Also absent are elaborate rules on how watercourse States are to prevent and mitigate floods and droughts. Whilst the obligation to exchange data and information regarding forecasts are present and the Berlin Rules offer some guidance on flood control measures, what is lacking is the obligation to undertake risk assessments which is critical to meet this obligation. Given that information and knowledge base are so important in light of the uncertainties associated with climate change, this provision ought to be amended to promote scientific research associated with climate change so that preventative and mitigation measures can be based on the newly emerging principle of best available knowledge. Together these will ensure that watercourse States have a climate change adaptation strategy which not only enables them to prevent and mitigate the impacts of climate change but prepare for and respond to them as well.

5.4 The European Regional Framework

The European climate change governance framework comprises of the UNECE Water Convention, the Water Framework Directive, the Flood Risks Directive and European Commission's policy on Water Scarcity and Drought, all of which are discussed in turn.

5.4.1 UNECE Water Convention

Like the UN Watercourses Convention, the UNECE Water Convention does not mention 'climate change.' What it is "concerned [about is] the existence and threats of adverse effects, in the short or long term, of changes in the conditions of transboundary watercourses on the environment"¹⁴⁴⁶ and has thus defined 'transboundary impact' as "any significant adverse effect on the environment resulting from a change in the conditions of transboundary waters caused by a

¹⁴⁴⁵ Jos G Timmerman, Claudia Pahl-Wostl and Jörn Möltgen *The Adaptiveness of IWRM: Analysing European IWRM Research* (IWA Publishing, London, 2008) at 9.

¹⁴⁴⁶ UNECE Water Convention; Preamble, para 2.

human activity...”¹⁴⁴⁷ Unfortunately, this definition does not capture climate change as climate change deals with the adverse effect on the environment resulting in (as opposed to from) a change in the conditions of transboundary waters caused by a human activity. Nevertheless, certain provisions of the UNECE Water Convention are worth mentioning.

Maintenance of Ecological Flows?

The UNECE Water Convention provides for conservation and restoration of ecosystem¹⁴⁴⁸ but does not specifically provide for maintenance of adequate ecological flows. This is not to be assumed given the interpretation of maintenance of natural channels is different from maintenance of flows as iterated by the PCA in the *Indus Waters Kishenganga Arbitration*.¹⁴⁴⁹

Obligation to Prevent, Control and Reduce Transboundary Impact

In order to prevent, control and reduce transboundary impact, the UNECE Water Convention provides for unilateral measures including (but not limited to): assessments; (of flood and drought risks); research and development including development of environmentally sound water-construction works and water-regulation techniques (and exchange thereof); development of contingency plans (for disaster preparedness and response); and monitoring.¹⁴⁵⁰ For riparian States specifically, the Convention provides that they shall: (1) define their mutual relations and conduct regarding the prevention, control and reduction of transboundary impact; (2) specify the catchment area, or part(s) thereof, subject to cooperation; and (3) provide for the establishment of joint bodies entrusted to (among others): (a) elaborate and implement joint monitoring programmes concerning water (quality and) quantity of transboundary waters, including floods

¹⁴⁴⁷ UNECE Water Convention; Article 1(2).

¹⁴⁴⁸ UNECE Water Convention; Article 2(2)(d).

¹⁴⁴⁹ See the ‘Indus River Basin’ Section in Chapter 3.

¹⁴⁵⁰ UNECE Water Convention; Articles 3(1)(h) and (j), 5(g) and 6.

and transboundary impacts and that they, at regular intervals, carry out joint or coordinated assessments of the conditions of transboundary waters and the effectiveness of measures taken for the prevention, control and reduction of transboundary impact; (2) set up coordinated or joint warning and alarm systems with the aim of obtaining and transmitting information, which are to operate on the basis of compatible data transmission;¹⁴⁵¹ and (3) participate in the implementation of environmental impact assessments. Thus, unlike the UN Watercourses Convention which only prescribes a general obligation to regularly exchange data and information including forecasts as well as notification specific to emergency flood situations, the UNECE Water Convention provisions on the other hand collectively cover unilateral and coordinated assessments, monitoring as well as exchange of information and disaster warning and alarm.

Critical Situations

The UNECE Water Convention has similar provisions regarding ‘critical situations’ as the UN Watercourses Convention does for ‘extreme events.’ It provides that during ‘critical situations’ (though not defined but could be extended to floods and droughts), the riparian Parties are under an obligation to: (1) inform each other, without delay, about any critical situation that may have transboundary impact; (2) set up, where appropriate, and operate coordinated or joint communication, warning and alarm systems with the aim of obtaining and transmitting information; and (3) elaborate and agree upon procedures for mutual assistance addressing, inter alia (including but not limited to), the direction, control, coordination and supervision of assistance.¹⁴⁵² While it encourages riparian States to offer mutual assistance during ‘critical situations’, as already

¹⁴⁵¹ UNECE Water Convention; Article 14; Also see the United Nations Economic Commission for Europe *Guidance on Water and Adaptation to Climate Change* (UN Publications, New York, Geneva, 2009). Available at http://www.unece.org/fileadmin/DAM/env/water/publications/documents/Guidance_water_climate.pdf

¹⁴⁵² UNECE Water Convention; Articles 14 and 15(2).

mentioned, development of contingency plans is an individual State responsibility.¹⁴⁵³

Given that ‘transboundary impact’ does not capture climate change impacts resulting in changes in the conditions of transboundary waters, the rest of the provisions are not that well fitted either but is indicative of what it could entail if it was amended to make it inclusive of climate change adaptation. Nevertheless, it does deal with aspects of preventing and mitigating floods and droughts as well as responding in critical situations.

5.4.2 Water Framework Directive

The following looks at the relevant aspects of the Water Framework Directive, namely ecological flows and the Directive’s incorporation of climate change and variability generally.

Ecological Flows

As already stated, the Water Framework Directive has not expressly employed the term ‘ecological flows’ but currently the European Commission is in the process of developing guidelines on water accounts/ecological flows.¹⁴⁵⁴ Whilst it is work in progress, it has defined ‘ecological flow’ as “a flow regime consistent with the achievement of the environmental objectives of the Water Framework Directive.”¹⁴⁵⁵ As already mentioned, the environmental objective of the Directive is to achieve good ecological status in all water bodies; assessed using biological quality elements. At present, ‘ecological flows’ is expected to cover quantity and timing of flow, minimum flow, flow variation and flow change rate.¹⁴⁵⁶ Since it is accepted that ecologically appropriate hydrological regimes are necessary to meet

¹⁴⁵³ UNECE Water Convention; Article 3(1)(j).

¹⁴⁵⁴ European Commission, above n 351, at 6.

¹⁴⁵⁵ Minna Torsner “Ecological Flows in the Context of the EU Water Framework Directive Implementation” (paper presented to IEA Seminar, 2014) at 4.

¹⁴⁵⁶ Ibid.

the good ecological status,¹⁴⁵⁷ it can be assumed that accounting for ecological flows will form part of the overall climate change adaptation strategy as well.

Climate Change Adaptation

In 2009, the European Commission issued a guidance document on how to integrate climate change into river basin management plans ('RBMPs') warranted under the Water Framework Directive.¹⁴⁵⁸ This document identified 3 pillars of the approach to adaptation through river basin management:¹⁴⁵⁹ (1) effective long term monitoring (to enable climate change signals to be identified and reacted to in due course); (2) the assessment of the likely additional impact of climate change on existing anthropogenic pressures; and (3) the incorporation of this information into the design of measures (particularly for proposed measures with a long term design life). Through this it is expected that as a minimum, Member States should clearly be able to demonstrate how climate change projections have been considered in the pressures and impacts assessment, in the monitoring programmes and in the choice of measures.¹⁴⁶⁰ As climate change and its effects did not feature explicitly enough in the first round of RBMPs prepared by the Member States in 2009, it is expected that the 2015 plans will consider and report the effects of climate change on river basins.¹⁴⁶¹

¹⁴⁵⁷ See M C Acreman and A J D Ferguson "Environmental Flows and the European Water Framework Directive" (2010) 55 *Freshwater Biology* 32.

¹⁴⁵⁸ European Commission *Common Implementation Strategy for the Water Framework Directive (2000/60/EC): Guidance document No 24 on River Basin Management in a Changing Climate* (European Communities, 2009). Available at https://circabc.europa.eu/sd/a/a88369ef-df4d-43b1-8c8c-306ac7c2d6e1/Guidance%20document%20n%2024%20-%20River%20Basin%20Management%20in%20a%20Changing%20Climate_FINAL.pdf

¹⁴⁵⁹ Ibid.

¹⁴⁶⁰ Ibid.

¹⁴⁶¹ European Environment Agency *Water Resources in Europe in the Context of Vulnerability: EEA 2012 State of Water Assessment* EEA Report No 11 (Office for Official Publications of the European Union, Luxembourg, 2012) at 5. Available at

Thus, by defining and providing methodology for calculating ‘ecological flows’ and having Member States integrate climate change adaptation measures in the RBMPs, the Water Framework Directive will ensure an ongoing climate change impact assessment and response at the basin level. While this framework contributes to, among other things, “mitigating the effects of floods and droughts” through the ecosystem approach,¹⁴⁶² given that “reducing the risk of floods is not one of the principal objectives of that Directive, nor does it take into account the future changes in the risk of flooding as a result of climate change”,¹⁴⁶³ the Water Framework Directive is complemented by a Flood Risks Directive.

5.4.3 Flood Risks Directive

The Flood Risks Directive provides “a framework for the assessment and management of flood risks ...”¹⁴⁶⁴ ‘Flood risk’ has been defined to mean “the combination of the probability of a flood event and of the potential adverse consequences ... associated with a flood event.”¹⁴⁶⁵ The Directive has endorsed the principle of solidarity, which it considers “very important in the context of flood risk management.”¹⁴⁶⁶ In order to plan for the management of flood risks, the Directive required Member States to first carry out a preliminary flood risk assessment by 2011 to identify river basins at risk of flooding.¹⁴⁶⁷ By the end of 2013, they were to draw up flood risk maps to identify those areas for which they concluded that the potential significant flood risks exist or might be considered likely to occur.¹⁴⁶⁸ This is so that they can establish flood risk management plans

<http://europedirect.pde.gov.gr/images/pubs/Water-resources-in-Europe-in-the-context-of-vulnerability.pdf>

¹⁴⁶² Water Framework Directive; Article 1(e).

¹⁴⁶³ Flood Risks Directive, above n 174, Preamble, para 4.

¹⁴⁶⁴ Flood Risks Directive; Article 1.

¹⁴⁶⁵ Flood Risks Directive; Article 2(2).

¹⁴⁶⁶ Flood Risks Directive; Preamble, paragraph 15.

¹⁴⁶⁷ Flood Risks Directive; Article 4.

¹⁴⁶⁸ Flood Risks Directive; Articles 5 and 6.

by 2015.¹⁴⁶⁹ The Directive provides that “Member States shall establish appropriate objectives for the management of flood risks ... focusing on the reduction of potential adverse consequences of flooding ... and, if considered appropriate, on non-structural initiatives and/or on the reduction of the likelihood of flooding.”¹⁴⁷⁰

For Flood Risk Management Plans (‘FRMPs’) dealing with international river basins, the Flood Risks Directive promotes the idea of one single FRMP, or a set of FRMPs coordinated at the river basin level.¹⁴⁷¹ It provides that “Member States should base their assessments, maps and plans on appropriate “best practice” and “best available technologies”¹⁴⁷² but without elaborating as to what these may be in terms of flood risk management. It is noted that all assessments, maps and plans will be reviewed every six years, with the requirement that all reviews for the assessments and plans shall take into account the “likely impact of climate change on the occurrence of floods.”¹⁴⁷³

Finally, the Directive prescribes components of the FRMPs, which are: conclusions of the preliminary assessments, maps, descriptions of objectives of flood risk management, a summary of the measures and their prioritization aiming to achieve those objectives and a description of the methodology of cost-benefit analysis used to assess measures with transnational effects.¹⁴⁷⁴ This is complementary to the RBMPs prescribed by the Water Framework Directive with the Water Framework Directive’s ‘environmental objectives’ representing the link

¹⁴⁶⁹ Flood Risks Directive; Article 7(5).

¹⁴⁷⁰ Flood Risks Directive; Article 7(2).

¹⁴⁷¹ Flood Risks Directive; Article 8.

¹⁴⁷² Flood Risks Directive; Preamble, para 18.

¹⁴⁷³ Flood Risks Directive; Article 14.

¹⁴⁷⁴ Flood Risks Directive; Annex, para A.

between the two. Both plans are to be reviewed and updated every six years.¹⁴⁷⁵ This means that the next set of FRMPs and RBMPs will be due together in 2015.

Thus, the Flood Risks Directive is a comprehensive risk-based framework to effectively deal with the random and uncertain nature of flood phenomena, the management aspect of which comprises of preventative and protection measures (undertaken through the FRMPs), preparedness as well as response measures.

5.4.4 Drought Risks Directive?

Unlike for floods, there is no complementary droughts risks directive to the Water Framework Directive. In 2010, the European Parliament reiterated the request to introduce drought risk planning and management similar to the Flood Risks Directive. Thus the European Commission is currently reviewing its policies with regards to its policy on ‘water scarcity and drought in Europe’.¹⁴⁷⁶ One of the aims of this policy is to “step away from a crisis response to a modern, comprehensive risk management approach based, among other things, on an advanced monitoring and early warning system at the European level.”¹⁴⁷⁷

¹⁴⁷⁵ Water Framework Directive; Article 13(7); and Jos Brils and others “The European Water Framework Directive Beyond 2010: Let Actions Speak Louder Than Words” (2010) 12 J Environ Monit 2204 at 2204.

¹⁴⁷⁶ “Water scarcity” refers to “a long-term, systemic imbalance between water supply and demand” and “draught” refers to “a temporary deviation of the natural water cycle from the long-term average.” European Commission, above n 1458, at 8.

¹⁴⁷⁷ Pierre Strosser and others *Gap Analysis of the Water Scarcity and Droughts Policy in the EU: Final Report* Study for the European Commission (August 2012) at 105. Available at <http://ec.europa.eu/environment/water/quantity/pdf/WSDGapAnalysis.pdf> Currently, the European Commission is running the European Flood Awareness (or Alert) System on a pre-operational basis while there are also plans to develop an European Drought Observatory (2013/2014) for drought forecasting, detection and monitoring. The European Drought Observatory (EDO) for drought forecasting, assessment and monitoring has been developed at the Join Research Centre (JRC), Institute for Environment and Sustainability. European Commission, above n 351, at 23.

Therefore, adaptation to climate change within the European region is not so much dealt with under the UNECE Water Convention but through the Water Framework Directive's ecological objective of good status, which means ensuring that the ecological status is in a position to adapt to climate change and variability. This is complemented with the Floods Risks Directive and the Water Scarcity and Drought policy, whose focus is on managing risks and reducing vulnerability so that extremes of floods and droughts can be prevented, mitigated and responded to effectively. All three are undertaken through ongoing monitoring, assessments and reporting while at same time studying and building a knowledge base on the uncertainties associated with climate change.

5.5 Case Studies

Two of the top 10 world's rivers at risk due to climate change are:¹⁴⁷⁸ the Indus Basin, due to its high dependency on glacier water; and the Nile Basin, due of its sensitivity to increases in temperature because of its high rate of evaporation. The UNFCCC has pointed out that "arid and semi-arid areas or areas liable to floods, drought ... are particularly vulnerable to the adverse effects of climate change."¹⁴⁷⁹ The Jordan and the Nile are located in such areas. In fact, water is one of the five issues in the war-torn region of the Middle East and the Jordan Basin is the only international River to serve its riparians. Thus, the following looks at the impact of climate change on the Jordan, the Nile and the Indus River Basins, respectively and examines the adequacy of the legal regime in place to deal with the impacts of climate change on these river basins.

5.5.1 Impact of Climate Change in the Jordan River Basin

While specific research on the impact of climate change on the Jordan River Basin is lacking, current research on the impact of climate change on the Middle East water resources by the IPCC are that:¹⁴⁸⁰ by the middle of the 21st century, annual average river runoff and water availability are projected to decrease over some dry

¹⁴⁷⁸ Wong, above n 154, at 24.

¹⁴⁷⁹ UNFCCC; Preamble, para 19.

¹⁴⁸⁰ Bates, above n 1323, at 3, 29 and 127.

regions at mid-latitudes and in the dry tropics, many semi-arid and arid areas will be particularly exposed to the impacts of climate change and are projected to suffer: a decrease of water resources due to climate change (high confidence), changes in river flows due to climate change depend primarily on changes in the volume and timing of precipitation and, crucially, on whether precipitation falls as snow or rain, changes in evaporation also affect river flows, flows in major rivers in the Middle East would decrease, and in areas where rainfall and runoff are very low (for example, desert areas), small changes in runoff can lead to large percentage changes. Therefore, water resources in the region is expected to become “highly vulnerable” to climate change, which has been assessed by IPCC with “very high” level of confidence.¹⁴⁸¹

While concrete interpretations of these statements at the Jordan River Basin level would not be fair to make, nevertheless they do indicate the likely influence of climate change on the Basin, which are reduced precipitation, increased evaporation and reduced annual runoff. GLOWA-Jordan River Project experts have put some numbers to these events: precipitation in the headwaters of the Jordan River is projected to decrease by 25 percent, the temperature is projected to increase by 4.5 degrees Celsius, which combine to decrease the river’s runoff by 23 percent for the period 2070 to 2100.¹⁴⁸² Therefore, it can safely be concluded that the Jordan River system, which already fails to carry sufficient water to meet water demands of its five riparian States, would effectively be a “closed basin.”¹⁴⁸³ This situation is likely to be further aggravated by climate change resulting in low flow variability with episodes of droughts (but with no projections for risk of floods). Thus, a legal regime for the effective governance of

¹⁴⁸¹ Parry, above n 484, at 497.

¹⁴⁸² Peter Suppan and others “Impact of Climate Change on Water Availability in the Near East” in Fathi Zereini, Heinz Hötzl (eds) *Climatic Changes and Water Resources in the Middle East and North Africa* (Springer, Verlag, Berlin, Heidelberg, 2008); Also see Oli Brown and Alec Crawford *Rising Temperatures, Rising Tensions: Climate change and the Risk of Violent Conflict in the Middle East* (International Institute for Sustainable Development, Winnipeg, 2009).

¹⁴⁸³ Venot, above n 397.

the impact of climate change on the Jordan River Basin is crucial for the long term stability of the freshwater supply.

5.5.2 Legal Regime for Addressing Climate Change in the Jordan Basin

Israel's and Jordan's "rightful allocations"

The Peace Treaty¹⁴⁸⁴ provides for the "rightful allocations" to Israel and Jordan of the waters from the Jordan River and the Yarmouk River "in accordance with the agreed acceptable principles, quantities and quality."¹⁴⁸⁵ These quantified "rightful allocations" have already been specified in Chapter 2. However, given that the Jordan Basin still remains a closed Basin means that ecological flows have not been taken into account before their rightful allocations were calculated. While the Parties have acknowledged the importance of the ecology of the region¹⁴⁸⁶ and have specifically agreed to cooperate in the ecological rehabilitation of the Lower Jordan Basin,¹⁴⁸⁷ there is no mention of how and when that would happen or any ongoing obligation for them to maintain adequate ecological flows. An ecological solution would have been to start accounting for ecological flows with a reduced share and gradually increasing that as the Basin is restored.

While flooding is not a threat and Israel and Jordan have decided to use any excess flood waters that would otherwise go to waste,¹⁴⁸⁸ this means that only low flows and draughts are the two symptoms of climate change variations that would need to be accommodated. Given that the Jordan River Basin already suffers from low flows, frequency in draughts will only exacerbate this problem. Although both Parties under the Treaty "recognize that their water resources are not

¹⁴⁸⁴ Peace Treaty, above n 414.

¹⁴⁸⁵ Peace Treaty; Article 6(1) and Annex II.

¹⁴⁸⁶ Peace Treaty; Annex IV, Preamble, para (1).

¹⁴⁸⁷ Peace Treaty; Annex IV(4)(2)(II.1).

¹⁴⁸⁸ Peace Treaty; Article I(1) and (2).

sufficient to meet their needs”,¹⁴⁸⁹ and have agreed to search for ways in which to alleviate water shortages,¹⁴⁹⁰ they have neglected to include provisions to manage a climate-induced reduction in water availability.

For droughts, Israel and Jordan have not addressed this issue under the Peace Treaty possibly because such events only became severe 5 years after the Treaty was concluded. The IPCC’s Third Assessment Report stated that “one major implication of climate change for agreements between competing users (within a region or upstream versus downstream) is that allocating rights in absolute terms may lead to further disputes in years to come when the total absolute amount of water available may be different.”¹⁴⁹¹

Since the Peace Treaty was signed, 18 complaints or grievances have been recorded as of 2010.¹⁴⁹² However, for the purpose of implementing the Peace Treaty, a Joint Water Committee (JWC) comprising of three representatives from each country was established and has been relied upon in the past to fill the void of absence of drought provisions.¹⁴⁹³ During the severe drought of 1998-99, the JWC brokered a temporary arrangement to modify allocations to reflect water availability, thus resolving the conflict.¹⁴⁹⁴ However by quantifying their “rightful allocations” in fixed quantifies and not providing for any flexibility in their allocations and measures for drought risk assessment and response, Israel and Jordan have effectively not accounted for climate change impacts on their allocations under the Peace Treaty.

¹⁴⁸⁹ Peace Treaty; Annex II, Article 6.3.

¹⁴⁹⁰ Peace Treaty; Annex II, Article 6.1(c).

¹⁴⁹¹ McCarthy, above n 80, at 225.

¹⁴⁹² Dinar, above n 1425, at 8.

¹⁴⁹³ Olivia Odom and Aaron T Wolf “Institutional Resilience and Climate Variability in International Water Treaties: The Jordan River Basin as ‘Proof-of-Concept’” (2011) 56 *Hydrological Sciences Journal* 703 at 709.

¹⁴⁹⁴ *Ibid.*

Water Rights of Jordan and Syria

The Yarmuk Waters Agreement 1953¹⁴⁹⁵ defined Syria's and Jordan's water rights in volumetric terms.¹⁴⁹⁶ The Yarmuk Waters Agreement 1987¹⁴⁹⁷ reaffirmed Syria's and Jordan's water rights on exactly the same terms¹⁴⁹⁸ and once again did not provide for a fixed quantitative allocation of the Yarmouk waters between them.

Like the Interim Agreement 1995 (see below), the Yarmuk Waters Agreement 1987 does not address aspects of climate change at all though reduced water flows in the Yarmouk River due to Syria's use upstream has been raised as an issue by Jordan with Syria for a few years now, which may also be attributable to climate change as well.¹⁴⁹⁹ Even though Syria is currently exploring ways to adapt to and mitigate the impact of climate change on the Yarmuk River,¹⁵⁰⁰ matters to do with reduced flows have yet to be resolved bilaterally with Jordan.

Palestinian Water Rights under the Interim Agreement

The Interim Agreement 1995¹⁵⁰¹ between Israel and the Palestinian people provides for “adjusting the utilization of the resources according to variable climatological and hydrological conditions.”¹⁵⁰² As already stated in Chapter 2,

¹⁴⁹⁵ Yarmuk Waters Agreement 1953, above n 435.

¹⁴⁹⁶ Yarmuk Waters Agreement 1953; Article 8(a) and (b).

¹⁴⁹⁷ Yarmuk Waters Agreement 1987, above n 437.

¹⁴⁹⁸ Yarmouk River Agreement 1987; Article VII.

¹⁴⁹⁹ Lipchin, above n 399, at 53–55; Committee on Sustainable Water Supplies in the Middle East, above n 200, at 47–48.

¹⁵⁰⁰ See Consulting Engineers Salzgitter GmbH Syria: *Climate Change Adaptation and Mitigation - Climate Proofing and Emission Saving: Yarmouk Wastewater Treatment Plant* (2012). Available at http://cms.ces-info.com/CES/pdf/98-0901e-cc_08-2012.pdf

¹⁵⁰¹ Interim Agreement 1995, above n 446.

¹⁵⁰² Interim Agreement 1995; Annex III, Article 40(3)(d).

while “Israel recognizes the Palestinian water rights in the West Bank,” these have yet to be realized. Hence, while there is cooperation between the Parties, the Agreement does not extend to the Jordan waters. Given that climate change may further hinder the Parties’ ability to reach agreements over the Jordan Basin waters, which is experiencing Basin closure, it has been opined that enhanced cooperation between them is one of the adaptive policies that are of central importance in the Israeli-Palestinian context.¹⁵⁰³ Thus, for cooperation to be effective, it would need to cater for ecological flows and management of low flows and droughts.

Lebanon’s Shares in the Jordan River Basin?

As already stated in Chapter 2, currently Israel gets 160 MCM from Lebanon (138 MCM is from the Hasbani River and this includes 30 MCM from the Wazzani Springs) which is not submitted through a treaty.¹⁵⁰⁴ Any attempt by Lebanon to pump the Wazzani Springs (because of its higher quality of water resources)¹⁵⁰⁵ remains a source of contention between the two States. Given the state of political relations between the two countries, any adoption of a climate change adaptation strategy between them is inconceivable at this stage. Also, because Lebanon is not fully utilizing its share in the Jordan waters means that Israel would be solely responsible for ensuring that adequate ecological flows are accounted for and maintained.

Therefore, out of the five riparians of the Jordan River Basin, only Israel and Jordan and Jordan and Syria have agreements to share the waters of the Jordan River Basin and though Israel and Jordan have committed themselves to rehabilitate the Lower Jordan River, this has yet to eventuate. Pending that, climate-induced disputes would have to be resolved by the JWC. While the

¹⁵⁰³ Eran Feitelson, Abdelrahman Tamimi and Gad Rosenthal “Climate Change and Security in the Israeli–Palestinian Context” (2012) 49 *Journal of Peace Research* 241 at 252 and 254.

¹⁵⁰⁴ Food and Agriculture Organisation of the United Nations - Aquastat, above n 463.

¹⁵⁰⁵ Haddadin, above n 464, at 180.

Interim Agreement 1995 accounts for adjustment in the utilization of the resources according to variable climatological and hydrological conditions, the Agreement does not extend to the Jordan waters. Thus, none of the Parties allocations have the flexibility to adjust to climate variations in water resources and none of the Agreements have provisions on drought response either. This means that as far as adaptation to climate change is concerned, the current regime is inadequate.

5.5.3 Impact of Climate Change in the Nile River Basin

According to the IPCC, Africa is one of the continents that is “most vulnerable” to climate change and climate variability.¹⁵⁰⁶ The major effects of climate change on African water systems will be through changes in the hydrological cycle, the balance of temperature and rainfall.¹⁵⁰⁷ In 2007, IPCC warned that climate change and variability has the potential to impose additional pressures on “water availability, water accessibility and water demand”¹⁵⁰⁸ in Africa and even in the absence of climate change, present population trends and patterns of water use indicated that more African countries will exceed the limits of their “economically usable, land-based water resources before 2025.”¹⁵⁰⁹ In some assessments, the population at risk of increased water stress in Africa is projected to be 75-250 million and 350-600 million people by the 2020s and 2050s, respectively.¹⁵¹⁰ However, just as water is unevenly distributed across Africa, the impact of climate change on water resources across the continent is not going to be uniform either.

¹⁵⁰⁶ Parry, above n 484, at 435.

¹⁵⁰⁷ R T Watson, M C Zinyowera and R H Moss (eds) *The Regional Impacts of Climate Change: An Assessment of Vulnerability* An IPCC Report (Cambridge University Press, New York, 1997) at 6–7.

¹⁵⁰⁸ Parry, above n 484, at 444.

¹⁵⁰⁹ Peter J Ashton “Avoiding Conflicts over Africa’s Water Resources” (2002) 31 *Ambio* 236.

¹⁵¹⁰ Nigel W Arnell “Climate Change and Global Water Resources: SRES Emissions and Socio-Economic Scenarios” (2004) 14 *Global Environmental Change* 31 at 43.

Analysis of the Nile River Basin dictates low runoff efficiency and a high dryness index, indicating that the Nile is “very sensitive” to climate change.¹⁵¹¹ The challenges emanating from climate change in the Nile Basin (as identified by a recent UNEP project on the Nile River Basin) include:¹⁵¹² uncertainty in precipitation and river flow, floods and droughts. To this end, two main scenarios capture possible changes in the Nile between 2030 and 2050:¹⁵¹³ (1) with increased temperature, decreased average rainfall and annual Nile flows, there is likely to be an increase in inter-annual variability; and (2) increases in temperature, average rainfall and inter-annual flows would be associated with increased Nile flows. Overall, by 2100, water flow in the Nile River region is expected to decrease by 75 percent.¹⁵¹⁴

Conway¹⁵¹⁵ on the other hand has argued that there is no clear indication of how the hydrology of the Nile will be affected by climate change because of the uncertainty about the future rainfall patterns in the Basin and the influence of complex water management and governance structures.¹⁵¹⁶ While IPCC does consider that more detailed research on “water hydrology, drainage and climate change” is required,¹⁵¹⁷ an array of serious threats to the Nile Basin due to climate change is apparent including that there will be a high degree of uncertainty about

¹⁵¹¹ Watson, above n 1507, at Section 2.3.2.

¹⁵¹² United Nations Environment Programme *Adapting to Climate Change Induced Water Stress in the Nile River Basin* (2013) at 135–137. Available at <http://www.unep.org/climatechange/adaptation/EcosystemBasedAdaptation/NileRiverBasin/tabid/29584/Default.aspx>

¹⁵¹³ At 135.

¹⁵¹⁴ United Nations Environment Programme, above n 466, at 21.

¹⁵¹⁵ Declan Conway “From Headwater Tributaries to International River: Observing and Adapting to Climate Variability and Change in the Nile Basin” (2005) 15 *Global Environmental Change* 99 at 104.

¹⁵¹⁶ Parry, above n 484, at Section 9.4.2.

¹⁵¹⁷ At 446.

the flow of the Nile.¹⁵¹⁸ On a practical level, Conway suggests that climate change should certainly be considered in any future negotiations to share the Nile waters, which could include proportional shares rather than fixed volumes.¹⁵¹⁹ Furthermore he suggests that in terms of adaptation, two key indicators of the effectiveness of an adaptation action are: (1) robustness to uncertainty and flexibility, or ability to change in response to altered circumstances in the design of institutions and (2) accords for international water management.¹⁵²⁰

5.5.4 Legal Regime Addressing Climate Change in the Nile Basin

The legal regime in the Nile River Basin comprises of the Nile Waters Agreement 1959, the Cooperative Framework Agreement and the works of the Nile Basin Initiative, all covered in turn.

Nile Waters Agreement 1959

There are currently 11 riparian States who border the Nile River Basin. The Nile Waters Agreement 1959 deals only with Egypt's and Sudan's "acquired rights" which is fixed with Egypt's at 48 BCM and Sudan's at 4 BCM.¹⁵²¹ While it has fixed the parties' respective shares in the Nile waters, it has also added flexibility by providing that if the average yield increases, then the net increase would be divided equally¹⁵²² and in case of exceptional low flows, the Parties' shares would be determined based on recommendation from the Permanent Joint Technical

¹⁵¹⁸ At box 9.2.

¹⁵¹⁹ Conway, above n 1515, at 112.

¹⁵²⁰ At 112; W Neil Adger, Nigel W Arnell and Emma L Tompkins "Successful Adaptation to Climate Change Across Scales" (2005) 15 *Global Environmental Change* 77 at 81 which looks at elements of effectiveness, efficiency, equity and legitimacy in judging success of adaptation strategies to climate change.

¹⁵²¹ Nile Waters Agreement 1959; First Article, paras 1 and 2, respectively.

¹⁵²² Nile Waters Agreement 1959; First Article, para 4.

Committee ('PJTC').¹⁵²³ Although climate change was not an issue at the time the Agreement was drafted, water flow variations was accommodated in the allocation provision but its practical workability is questionable. The nine-year drought of the 1980s dropped the Nile's water levels to the lowest in recorded history.¹⁵²⁴ During this time, the PJTC reportedly failed to make recommendations and failure to act in a time of crisis raises doubts about the capacity of the Nile's current institutional regime to respond to the impacts of climate change.¹⁵²⁵ Thus while the Parties' shares are specified in volumetric terms, the flexibility with allocation in times of flooding and droughts makes this a provision adaptable to deal with the impacts of climate change but not workable as illustrated.

Cooperative Framework Agreement 2010

The Cooperative Framework Agreement covers aspects of climate change through: ecological flows, the obligation to prevent and mitigate harmful conditions as well as emergency situations. All of which are covered respectively.

Ecological Flows

The Cooperative Framework Agreement 2010 takes it a step further than the Nile Waters Agreement 1959 and provides that the Nile Basin States are under an obligation to ensure that their right to an equitable and reasonable use of the Nile waters will take into account, among others, ecological factors.¹⁵²⁶ In addition, it also provides that the "Nile Basin States shall... keep the status of their water utilization under review in light of substantial changes in relevant factors and

¹⁵²³ Nile Waters Agreement 1959; Fourth Article, para 1(e). Though the Commission has never exercised this power. Conway, above n 1515.

¹⁵²⁴ Greta Goldenman "Adapting to Climate Change: A Study of International Rivers and Their Legal Arrangements" (1990) 17 Ecology LQ 741 at 755–756.

¹⁵²⁵ Ibid.

¹⁵²⁶ Cooperative Framework Agreement; Article 4(2)(a).

circumstances.”¹⁵²⁷ The Nile Basin States are also under an obligation to take “all appropriate measures, individually and, where appropriate, jointly, to protect, conserve and, where necessary, rehabilitate the *Nile River Basin and its ecosystems*” [emphasis added]. Therefore, although there is no specific mention of ‘ecological flows’, this is nevertheless addressed through the combination of these provisions which shows that an ecological approach water use has been taken, which is at the core of adaptation to climate change strategy.

Obligation to Prevent and Mitigate Harmful Conditions

The Cooperative Framework Agreement further provides that “Nile Basin States shall, individually and, where appropriate, jointly ... take all appropriate measures to prevent or mitigate conditions related to the Nile River System that may be harmful to other Nile Basin States ... such as flood conditions, ... drought ...”¹⁵²⁸ Although the Agreement is largely based on the UN Watercourses Convention and provides for the regular exchange of data and information, it only covers “existing measures and on the condition of the water resources” not mentioning any forecasts.¹⁵²⁹ The Nile River Basin Commission once established will develop guidelines relating to the prevention and mitigation of “harmful conditions” including impacts of climate change.¹⁵³⁰ This may include guidelines to undertake floods and droughts risk assessments as well which will cover this gap. The Technical Advisory Committee (also to be established) will be tasked to advice the Ministerial Council on technical matters relating to the use, development, protection, conservation and management of the Nile River Basin and the Nile River System, including protection from drought and floods.¹⁵³¹ Whereas there are no other provisions which deal with droughts, there is a provision that deals with response in the event of floods.

¹⁵²⁷ Cooperative Framework Agreement Article 4(5).

¹⁵²⁸ Cooperative Framework Agreement; Article 11.

¹⁵²⁹ Cooperative Framework Agreement; Article 7(1).

¹⁵³⁰ Cooperative Framework Agreement; Article 11.

¹⁵³¹ Cooperative Framework Agreement; Article 26(6).

Emergency Situations

The Cooperative Framework Agreement has defined ‘emergency’ as “a situation that causes, or poses an imminent threat of causing, serious harm to Nile Basin States or other States and that results suddenly from natural causes, such as floods...”¹⁵³² In such situations, the Nile Basin States are under an obligation to “without delay and by the most expeditious means available, notify other potentially affected States ... of any emergency originating in its territory.”¹⁵³³ Such a State is also under an obligation, in cooperation with potentially affected States, to “immediately take *all practicable measures* necessitated by the circumstances to prevent, mitigate and eliminate harmful effects” of the floods [emphasis added]. Like the UN Watercourses Convention, ‘practical measures’ has not been defined. In addition, the Agreement also provides that when “necessary, Nile Basin States shall jointly develop contingency plans for responding to emergencies, in cooperation, where appropriate, with other potentially affected States...” Thus, contingency plans, unlike the Berlin Rules, are not part of their obligation to prevent and mitigate harm but their obligation to respond in emergency situations.¹⁵³⁴

Not only will the Nile Basin States have to prevent and mitigate the “harmful conditions” and respond collectively in emergency situations but also keep their water use under review. Although the Agreement has not been signed by DR Congo, Egypt, Sudan and South Sudan,¹⁵³⁵ the Agreement only requires six

¹⁵³² Cooperative Framework Agreement; Article 12(1).

¹⁵³³ Cooperative Framework Agreement; Article 12(2).

¹⁵³⁴ Cooperative Framework Agreement; Article 12(4).

¹⁵³⁵ South Sudan applied for membership in the NBI following its formal secession from Sudan 9 July 2011, and its membership was approved 5 July 2012.

ratifications or accessions to enter into force.¹⁵³⁶ Upon achieving that Ethiopia became the first to ratify the Agreement on 13 June 2013.¹⁵³⁷

Actions under the NBI

While efforts to take solidarity actions continue, currently the 11 Nile Basin States (including South Sudan which has been a member of the Nile Basin Initiative ('NBI') since 5 July 2012¹⁵³⁸) are working through the NBI's 5-year (2012-2016) 'The Nile Basin Climate Resilient Growth Project' in order support climate resilience in the Nile Basin, primarily through the principle of subsidiarity. They hope to support climate resilience through: (1) an integrated hydro-meteorological and forecasting/early warning system to improve system operations and to better manage floods/droughts; (2) knowledge base and analysis relating to climate variability and change; (3) capacity building on mainstreaming climate resilience in water resources development; and (4) facilitating cooperation of shared regional/sub-regional approaches to climate adaptation.¹⁵³⁹ Thus, they are taking an ecosystem approach through cooperative efforts to understand and take action on climate change and its impacts at the Basin level. The NBI has already worked with the United Nations Environment Programme on 'Adapting to Climate Change Induced Water Stress in the Nile River Basin Project' which was launched in March 2010 with the overall goal to engage all Nile Basin States in the collection of relevant data, mapping of 'hotspots' within the Basin and defining adaptation options,¹⁵⁴⁰ very similar to the actions taken within the EU.

¹⁵³⁶ Cooperative Framework Agreement; Article 42.

¹⁵³⁷ Federal Democratic Republic of Ethiopia, Ministry of Foreign Affairs "Press Release: The Ethiopian Parliament Ratifies the Nile Basin Cooperative Framework Agreement" (13 June 2013) <http://www.mfa.gov.et/news/more.php?newsid=2120>.

¹⁵³⁸ Nile Basin Initiative "South Sudan Admitted to the Nile Basin Initiative" (6 July 2012) http://www.nilebasin.org/newsite/index.php?option=com_content&view=article&id=127%3Asouth-sudan-admitted&catid=40%3Alatest-news&Itemid=84&lang=en

¹⁵³⁹ Nile Basin Initiative "Focusing on Climate Resilient Growth in the Nile Basin" (2012) 9 Nile News: A Quarterly Newsletter of the Nile Basin Initiative.

¹⁵⁴⁰ See United Nations Environment Programme, above n 1512.

The project report was published in 2013.¹⁵⁴¹ Whilst they have already conducted comprehensive assessments identifying existing activities and good practices related to climate change adaptation across the basin, their next step is to identify capacity needs and develop a strategy for policy and institutional support.¹⁵⁴²

Thus, pending the establishment of the Nile River Basin Commission and the Technical Advisory Committee, the legal regime for dealing with climate change-induced stress in the Nile Basin comprises of the Nile Waters Agreement 1959 and the NBI. While the Nile Waters Agreement 1959 will be useful in dealing with Egypt's and Sudan's allocation issues during low flows and extremes of floods and droughts, the basin-wide action will only go as far as the NBI is able to deal with the impact of climate change on the ecology of the Nile Basin through the principle of subsidiarity. While this is better than taking no actions at all, it cannot be in place of a proper legal regime that takes an ecological approach to not only dealing with equitable and reasonable rights to the use of the Nile waters, but is also able to prevent, mitigate and respond to extremes of floods and droughts.

5.5.5 Impact of Climate Change in the Indus River Basin

The Indus River Basin is “extremely sensitive to climate change” as temperature controls the rate of glacier melt, which in turn, provides more water in dry, warm years and less water in cool years.¹⁵⁴³ In the Himalayan region, glaciers and snow cover have been thinning since the end of the 19th century in line with global trends.¹⁵⁴⁴ With significant snout fluctuations, most of the glaciers in the Himalayan mountain ranges have been retreating at accelerated rates in the last

¹⁵⁴¹ Ibid.

¹⁵⁴² Ibid.

¹⁵⁴³ World Wildlife Fund, above n 526.

¹⁵⁴⁴ Divya Mohan, Shirish Sinha and Sejal Worah (eds) *Witnessing Change: Glaciers in the Indian Himalayas* (WWF India and WWF Nepal, 2009) at 5. Available at http://awsassets.wwfindia.org/downloads/glacier_report.pdf

three decades¹⁵⁴⁵ and their rate of retreat is much faster than that of glaciers in other parts of the world.¹⁵⁴⁶ These changes correspond to the rising surface temperature trends in the Himalayas which have been reported to be higher than the global average warming.¹⁵⁴⁷ The Greater Himalayas as a whole is very sensitive to global climate change.

Progressive increases in warming at high elevations are already occurring at approximately 3 times the global average.¹⁵⁴⁸ The IPCC has projected that average annual mean warming will be about 3 degrees Celsius by the 2050s and about 5 degrees Celsius in the 2080s over the Asian land mass, with temperatures on the Tibetan Plateau rising substantially more.¹⁵⁴⁹ The IPCC predicts that the average annual precipitation will increase by 10 to 30 percent on the Tibetan Plateau as a whole by 2080, though rising evapotranspiration rates may dampen this effect.¹⁵⁵⁰ The freshwater melt from the glacierised basins is a vital element in regulating the dry season flows of perennial Himalayan river systems, including the Indus River Basin.¹⁵⁵¹ Of all the Asian “water towers”, while melt water plays only a modest role for the Ganges, the Yangtze, and the Yellow Rivers and is important for the Brahmaputra Basin, it is extremely important in the Indus Basin.¹⁵⁵²

¹⁵⁴⁵ World Wildlife Fund *An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China* (WWF Nepal, March 2005) at 68. Available at <http://awsassets.panda.org/downloads/himalayaglaciersonreport2005.pdf>

¹⁵⁴⁶ M Monirul Qader Mirza and Q K Ahmad (eds) *Climate Change and Water Resources in South Asia* (Taylor & Francis, London, 2005) at 15.

¹⁵⁴⁷ Augustin Colette *Case Studies on Climate Change and World Heritage* (UNESCO World Heritage Centre, Paris, 2009) at 19. Available at <http://whc.unesco.org/en/activities/473>

¹⁵⁴⁸ Jianchu Xu and others “The Melting Himalayas: Cascading Effects of Climate Change on Water, Biodiversity, and Livelihoods” (2009) 23 *Conservation Biology* 520.

¹⁵⁴⁹ *Ibid.*

¹⁵⁵⁰ *Ibid.*

¹⁵⁵¹ Mohan, above n 1544, at 3.

¹⁵⁵² Xu, above n 1548.

It is estimated that glacial melt in river flow is 44.8 percent¹⁵⁵³ while discharge generated by snow and glacial melt is 151 percent of the total discharge naturally generated in the downstream areas.¹⁵⁵⁴ Projected trends include about 19 percent increase in rainfall; increase in river flow between 14 and 90 percent; flow from glacial sub-basin peaks at about 150 percent of initial flow around 2060; and 4 percent less annual mean flow.¹⁵⁵⁵

A huge difference also exists between basins in the extent to which climate change is predicted to affect water availability and food security but comparatively, effects in the Indus Basin (and Brahmaputra) is likely to be severe owing to the large population and the high dependence on irrigated agriculture and melt water.¹⁵⁵⁶ A study adopted by the IPCC in its 2007 report suggests that the average annual runoff in the Indus River Basin would decline by 27 percent by the year 2050¹⁵⁵⁷ affecting food security of more than 26 million people¹⁵⁵⁸ and conceivably by a terrifying 30 to 40 percent in 100 years' time.¹⁵⁵⁹ Adding to this, Australia's Office of National Assessments – a top intelligence agency, recently predicted that South-East Asia will be the region worst affected by climate change by 2030, with decreased flows from the Himalayan glaciers triggering a “cascade of economic, social and political consequences.”¹⁵⁶⁰ Thus, not surprisingly, the

¹⁵⁵³ Ibid.

¹⁵⁵⁴ Walter W Immerzeel, Ludovicus PH van Beek and Marc FP Bierkens “Climate Change Will Affect the Asian Water Towers” (2010) 328 Science 1382 at 1382.

¹⁵⁵⁵ Xu, above n 1548.

¹⁵⁵⁶ Immerzeel, above n 1554, at 1382.

¹⁵⁵⁷ United Nations Development Programme, above n 1348, at 563.

¹⁵⁵⁸ Immerzeel, above n 1554, at 1382.

¹⁵⁵⁹ The World Bank, above n 1228, at 25.

¹⁵⁶⁰ Philip Dorling and Richard Baker “Climate Change Warning over South-East Asia” *The Sydney Morning Herald* (Sydney, 16 December 2010) <http://www.smh.com.au/national/climate-change-warning-over-southeast-asia-20101215-18y6b.html>

Indus Basin has been ranked in the top ten of the world's most vulnerable river basins.¹⁵⁶¹

While science is still in its infancy, best estimates by the World Bank are that there will be 50 years of glacial retreat, during which time river flows will increase.¹⁵⁶² This, in combination with the predicted heavier rainfall, is likely to exacerbate the already serious problems of flooding and draining,¹⁵⁶³ especially in the lower parts of the Indus Basin in the next few decades.¹⁵⁶⁴ Of late, Pakistan has encountered the worst floods in the years 2010 and 2011 where nearly 2000 people died and over 20 million people were affected in the former¹⁵⁶⁵ and at least 233 people were killed, almost 5.5 million people affected as well 1.6 million acres of arable land inundated in the latter.¹⁵⁶⁶ Both disasters were caused by massive flooding as a result of monsoon rains. The 2011 Official Report highlighted that “The experiences of 2011 indicate the tremendous challenges posed by ever changing monsoon patterns as a result of climate change.”¹⁵⁶⁷

The 2007 UNEP Report on *Global Outlook on Ice and Snow* has forewarned that in the Himalayas–Hindu Kush region, projected changes in snowfall and glacier melt are expected to increase risks of both floods and water shortages, potentially

¹⁵⁶¹ Wong, above n 154.

¹⁵⁶² The World Bank, above n 1228, at 25.

¹⁵⁶³ See Vishwas Kale “On the Link Between Extreme Floods and Excess Monsoon Epochs in South Asia” (2012) 39 *Clim Dyn* 1107.

¹⁵⁶⁴ The World Bank, above n 1228, at 25.

¹⁵⁶⁵ National Disaster Management Authority *Pakistan Floods 2010: Learning from Experience* (NDMA, Islamabad, 2011) at 17. Available at http://www.ndma.gov.pk/Documents/flood_2010/lesson_learned/Lessons%20Learned%20-%20Flood%202010.pdf

¹⁵⁶⁶ National Disaster Management Authority and the United Nations *Pakistan Floods 2011: Rapid Response Plan* (UNICEF Pakistan, 2011) at iv. Available at <https://www.iom.int/jahia/webdav/shared/shared/mainsite/media/docs/reports/Pakistan-Floods-2011-Rapid-Response-Plan.pdf>

¹⁵⁶⁷ At 1.

affecting hundreds of millions of people including those living in Pakistan and India and that strategies and policies for water management and protection (and land-use planning) is needed to reduce vulnerability to the impacts of global warming.¹⁵⁶⁸ In response to the recent floods, while several sectors are taking actions, Pakistan recognizes that what is missing in their efforts is an integrated response, which cannot come about without reforming the institutional arrangement.¹⁵⁶⁹ During India and Pakistan Track II Dialogue on Climate Change in 2012, they declared their intention to establish ‘Climate Policy Coordination Group’ between policymakers of the two countries to harmonise positions at the international forum.¹⁵⁷⁰ Thus, given that the impacts of climate change are already being felt in the Basin, both India and Pakistan realize that they would have to step outside the status quo and take action.

5.5.6 The Indus Waters Treaty

The Indus River Basin is governed by the Indus Waters Treaty 1960,¹⁵⁷¹ which is between India and Pakistan and is the only legal document governing the Basin. As already stated, the Treaty is purely a water allocation agreement and only deals with matters ancillary to it. The Treaty has allocated the Basin according to the geography of the tributaries¹⁵⁷² by dividing the 3 Eastern Rivers for the “unrestricted use of India”¹⁵⁷³ and the 3 Western Rivers for the unrestricted use all those waters of the Western Rivers” by Pakistan.¹⁵⁷⁴ These allocations are not

¹⁵⁶⁸ United Nations Environment Programme, above n 1347, at 222.

¹⁵⁶⁹ Ayesha Salman (ed) *Institutional Arrangements for Climate Change in Pakistan* Project Report Series No 19 (Sustainable Development Policy Institute, July 2011) at 13–14. Available at <http://www.sdpi.org/publications/files/project%20report%2019.pdf>

¹⁵⁷⁰ Sustainable Development Policy Institute *Pakistan India Track II Dialogue on Climate Change, 13-15 February 2012* (SDPI, Islamabad, 2012). Available at <http://in.boell.org/sites/default/files/downloads/PDF14C3.pdf>

¹⁵⁷¹ Indus Waters Treaty, above n 535.

¹⁵⁷² Zentner, above n 537, at 130.

¹⁵⁷³ Indus Waters Treaty; Article II(1).

¹⁵⁷⁴ Indus Waters Treaty; Article III(1).

absolute as both Parties have been allowed certain uses in the rivers allocated to the other, subject to certain qualifications. One of the primary strengths of the Indus Treaty is its adaptation to the climatological and hydrological conditions of the Indus Basin.¹⁵⁷⁵ This approach adds strength but at the cost of flexibility. While the Indus Waters Treaty deals with water allocation, it does not address water availability or flow variations,¹⁵⁷⁶ or mechanisms to address issues not specified in the Treaty per se, such as those related to climate change.¹⁵⁷⁷ The following looks at climate change-induced issues around ecological flows as well as floods and droughts.

Provision for Ecological Flows?

Apart from the Parties obligations with regards to pollution control,¹⁵⁷⁸ the Treaty generally provides that:¹⁵⁷⁹

“Each Party will use its best endeavours to maintain the natural channels of the Rivers ... in such condition as will to avoid, as far as practicable, any obstruction to the flow in these channels likely to cause material damage to the other Party.”

As already discussed in Chapter 4, the PCA has distinguished the “maintenance of the physical condition of the channels of the rivers [from] maintenance of the volume and timing of the flow of water in these channels” as the term “channel” was taken to “denote the bed of the river, which may or may not be filled with water.”¹⁵⁸⁰ It mandates preservation of the natural paths of the rivers in an effort to conserve the river’s capacity to carry water,¹⁵⁸¹ but does not extend to

¹⁵⁷⁵ Concannon, above n 890, at 74.

¹⁵⁷⁶ James L Wescoat Jr “Managing the Indus River Basin in Light of Climate Change: Four Conceptual Approaches” (1991) 1 Global Environmental Change 381.

¹⁵⁷⁷ Miner, above n 552, at 211.

¹⁵⁷⁸ Indus Waters Treaty; Article IV(10).

¹⁵⁷⁹ Indus Waters Treaty; Article IV(6).

¹⁵⁸⁰ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 373.

¹⁵⁸¹ *Ibid.*

minimum environmental flows.¹⁵⁸² The PCA further clarified that the Article does not require the maintenance of the condition of the channels so as to avoid any type of riverbed degradation, but bears more precisely on the avoidance of any obstruction to the flow in these channels.¹⁵⁸³ Thus, given that the Treaty does not have any other provisions on environmental protection, preservation and management (unlike the UN Watercourses Convention and the UNECE Water Convention); hence it does not address ecological flows either.

Obligations with Regards to Floods and Droughts

In terms of dealing with floods, all the Treaty provides for is independent action: “In executing any scheme of flood protection or flood control each Party will avoid, as far as practicable, any material damage to the other Party.”¹⁵⁸⁴ It further provides that “Each Party agrees to communicate to the other Party, as far as practicable, any information it may have in regard to such extraordinary discharges of water from reservoirs and flood flows as may affect the other Party.”¹⁵⁸⁵ This means that apart from the obligation to notify, the Parties do not have any joint contingency plans for rapidly responding to floods. A practical solution based on the Columbia River Basin Treaty between Canada and America¹⁵⁸⁶ is that India, under the Indus Waters Treaty, is already permitted to

¹⁵⁸² This was one of the major considerations in the recent *Kishenganga Arbitration* in which Pakistan requested the PCA to fix a minimum flow which India has to maintain downstream from its Kishenganga Hydroelectric project plant (details in the dispute resolution part of this Section). See *Indus Waters Kishenganga Arbitration (India/Pakistan) (Final Award)*, above n 166.

¹⁵⁸³ *Indus Waters Kishenganga Arbitration (India/Pakistan) (Partial Award)*, above n 165; para 374.

¹⁵⁸⁴ Indus Waters Treaty; Article IV(2).

¹⁵⁸⁵ Indus Waters Treaty; Article IV.

¹⁵⁸⁶ The Columbia River Basin Treaty stipulates that Canada (the upstream Party) will adjust its operation of hydro-electric dams to mitigate flooding in the USA. The Treaty requires Canada to provide 15.5 MAF of storage for improving the flow of the Columbia River; Article II(1), through the construction of 3 dams; Article II(2), in return for a one-off payment of US\$64.4 million;

construct storage works on the Western Rivers with a total maximum storage capacity of 3.6 MAF for general, power and flood storages¹⁵⁸⁷ in addition to what it can construct on the Eastern Rivers. Pakistan, just like the America has with Canada, could have an agreement with India to store water in existing storage works for which it can compensate India or they could jointly construct and maintain storage works with the purpose of regulating water flows and/or generating more hydro-electric power or a combination of all three. This way both Parties can benefit ecologically as well as economically.

Additionally, the Treaty provides that “Each Party agrees to establish such discharge observation stations and make such observations as *may be considered necessary* by the [Indus Waters] Commission for the determination of the component of water available for the use of Pakistan”¹⁵⁸⁸ [emphasis added]. Pakistan, being the downstream State, is already suffering due to low flows in its Western Rivers and flash floods. Given the inventory of disputes between India and Pakistan (as highlighted in Chapter 4),¹⁵⁸⁹ climate change induced disputes will only add to this list. In order to address this, the Parties not only need to undertake monitoring and assessments to study climate change-induced flow variations and to undertake flood and drought risks assessments but it is also imperative that the Treaty is amended and a Protocol introduced. The Indus Waters Treaty does allow that its provisions “may from time to time be modified by a duly ratified treaty concluded for that purpose between the two Governments.”¹⁵⁹⁰ Not only should India and Pakistan take an ecological approach to climate change adaptation but also develop contingency plans to respond to extremes of floods and droughts through joint efforts.

Article VI(1) (and the additional power, which is generated in the U.S. and results from Canadian storage, is equally shared between the two countries; Article V).

¹⁵⁸⁷ Indus Waters Treaty; Annexure E, Article (7).

¹⁵⁸⁸ Indus Waters Treaty; Article III(3).

¹⁵⁸⁹ See Akhtar, above n 192.

¹⁵⁹⁰ Indus Waters Treaty; Article XII(3).

Therefore, currently the Treaty does not have the flexibility to adapt to changes of the magnitude predicted by the IPCC. The Treaty's close fit to the conditions in the Basin would require the Parties to make revisions of its terms as global climate change, changes the climatic and hydrological conditions to which the Indus Waters Treaty conforms.¹⁵⁹¹ Given that the Indus Basin's flow is uniquely dependent on the seasonal runoff from shrinking Himalayan glaciers, this poses new challenges for cooperation under the Indus Waters Treaty and efforts will be needed at all levels to ensure its continued effectiveness. As has already been voiced by John Briscoe, a former World Bank senior advisor, that with India's planned projects, the Treaty "will come crashing into conflict sooner rather than later" in view of the added pressure posed by climate change.¹⁵⁹²

Collaboration Outside the Treaty

In 2011, India and Pakistan through collaboration with the Stimson Centre of the United States had formed an Indus Basin Working Group, who have recently released a report titled 'Connecting the Drops: An Indus Basin Roadmap for Cross-Border Water Research and Policy Coordination.'¹⁵⁹³ Among other matters, this Report addresses the stress of climate change on the Indus River Basin. In order to "develop a comprehensive knowledge base on emerging climate change impacts and mounting environmental pressures on the basin's hydrological health, and create a cooperative framework for safeguarding the region's ecological health," the Working Group has made a number of policy and research recommendations, including:¹⁵⁹⁴

- Conduct a joint research study evaluating the cumulative environmental impact of multiple dams on a single waterway and its relationship with river basin hydrology and climate change

¹⁵⁹¹ Concannon, above n 890, at 57.

¹⁵⁹² William Wheeler "The Water's Edge" *Pulitzer Center on Crisis Reporting* (13 July 2009) <http://pulitzercenter.org/articles/water%E2%80%99s-edge>

¹⁵⁹³ Indus Basin Working Group, above n 882.

¹⁵⁹⁴ At 37–41.

- Increase the knowledge base on monsoon variability trends
- Develop a digitized online model of the Indus Basin to foster regional network building and deepen hydrological modelling capacities
- Explore pathways for improved data sharing on precipitation trends and meteorological forecasting
- Conduct joint research to better understand the role agricultural and industrial pollution play in limiting water availability

Thus, the focus at this stage is on research and data compilation. As proposed by the UNEP, that any climate change adaptation strategy for the Indus Basin will have to be modelled on an ‘Ecosystem based adaptation in a mountain ecosystem’¹⁵⁹⁵ given the geographical location of the Basin, unlike the arid to semi-arid climatic conditions of the Jordan and the Nile Basins.

Unilateral Actions

In 2012, Pakistan adopted the National Climate Change Policy,¹⁵⁹⁶ which not only established the world’s first National Ministry of Climate Change but the policy addresses adaptation to climate change, disaster preparedness as well as international and regional cooperation. This includes: facilitating exchange of real time hydrological data in the region for improved flood forecasting and warning services; encouraging exchange of results from simulation modelling experiments for inter-annual and decadal climatic projections, seasonal forecasts, and predictions of climate extremes in the region; and helping establish institutional linkages among national institutions in the South Asian region to facilitate sharing

¹⁵⁹⁵ See United Nations Environment Programme *Ecosystem Based Adaptation in Mountain Ecosystems* (UNEP, December 2010). Available at <http://www.unep.org/climatechange/adaptation/EcosystemBasedAdaptation/EcosystemBasedAdaptationinMountainEcosystems/tabid/51980/Default.aspx>

¹⁵⁹⁶ Government of Pakistan, Ministry of Climate Change *National Climate Change Policy* (Ministry of Climate Change, 2012).

of knowledge, information and capacity building programs in climate change related areas.¹⁵⁹⁷

India's National Action Plan on Climate Change,¹⁵⁹⁸ as relevant to the Indus Basin, seeks to sustain the Himalayan ecosystem. For this purpose, its "Mission" would seek to understand whether, and the extent to which, the Himalayan glaciers are in recession and how the problem could be addressed. It also recognizes the need for appropriate forms of scientific collaboration and exchange of information with other South Asian countries and with countries sharing the Himalayan ecology in order to enhance understanding of ecosystem changes and their effects.¹⁵⁹⁹

It is also noteworthy that Pakistan has been having dialogue with Afghanistan since 2003¹⁶⁰⁰ with regards to having an agreement with it based on the model of the Indus Waters Treaty for the utilization of the Kabul River;¹⁶⁰¹ a major tributary of the Indus River which runs through Afghanistan and Pakistan. While there is no such dialogue taking place between India and China or China and

¹⁵⁹⁷ At 34–35.

¹⁵⁹⁸ Government of India, Prime Minister's Council on Climate Change *National Action Plan on Climate Change* (Prime Minister's Council on Climate Change, 2008).

¹⁵⁹⁹ At 4 and 34.

¹⁶⁰⁰ International Union for Conservation of Nature *Towards Kabul Water Treaty: Water Cooperation for Managing Shared Water Resources - Policy Issues and Options* (IUCN Pakistan, Karachi, 2013) at 3. Available at http://cmsdata.iucn.org/downloads/ulr_towards_kabul_water_treaty_water_cooperation_fpr_managing_shared_water_resour.pdf; Also see Khalid Aziz *Need for a Pak-Afghan Treaty on Management of Joint Watercourses* (Regional Institute of Policy Research and Training Peshawar, 2007). Available at [http://www.riport.org/update/downloads/NEED%20FOR%20A%20Pak-%20Afghan%20Water%20Treaty%2003%20May%2007\[1\].pdf](http://www.riport.org/update/downloads/NEED%20FOR%20A%20Pak-%20Afghan%20Water%20Treaty%2003%20May%2007[1].pdf)

¹⁶⁰¹ Anonymous "Ministry Suggests Water Treaty With Kabul to Avoid Dispute" *The Express Tribune* (22 June 2011) <http://tribune.com.pk/story/193655/ministry-suggests-water-treaty-with-kabul-to-avoid-dispute/>

Pakistan,¹⁶⁰² all four riparians are members of the International Centre for Integrated Mountain Development (“ICIMOD”). One of ICIMOD’s strategic goals is to improve integrated river basin management in order to achieve actionable proposals for integrated water resource management practices and policies, including measures for risk management.¹⁶⁰³

Thus, bilateral cooperation between India and Pakistan under the Indus Waters Treaty does not deal with aspects of climate change adaptation because it does not take an ecological approach to water governance. Apart from preventing harm to the other Party and the obligation of notification, it does not provide for obligations to prevent and mitigate floods and droughts by undertaking monitoring and assessments for risks and does not address disaster preparedness and response either. Therefore, climate change adaptation is limited under the Treaty and the Parties would need to strategize their actions in order to deal with the impact of climate change on the Indus River Basin by providing for ecological flows and undertaking of floods and droughts risks assessments in order to prevent, mitigate and prepare for response. Pending that, unilateral actions providing for regional and international cooperation are also a step in the right direction as this will enhance their understanding and build their knowledge base as far as uncertainties of climate change impact in the Himalayan region is concerned.

5.6 Conclusion

Climate change is a threat to international rivers in terms of not only flow variability but uncertainties associated with extremes of floods and droughts. In order to enhance adaptation of river systems to build resilience to the changing climate, the governance regime requires taking an ecosystem approach, central to which is the concept of ecological flows/water accounting. Additionally, it

¹⁶⁰² See Senge H Sering “China Builds Dam on Indus Near Ladakh” (2010) 4 Journal of Defence Studies 136.

¹⁶⁰³ International Centre for Integrated Mountain Development *A Strategy and Results Framework for ICIMOD* (ICIMOD, 2012) at 13. Available from www.icimod.org/resource/9311

requires taking measures to prevent, mitigate, prepare and respond to floods and droughts. This requires ongoing monitoring and assessments as well as reporting. It also requires the building of scientific knowledge as well as establishing warning and alarm systems.

The UN Watercourses Convention does not specifically provide for ecological flows though it can be read into the provision dealing with regulation of flows together with provisions dealing with the protection, preservation and management of international watercourses. Given that ecological flows are not specifically addressed, how they are to be calculated is also not indicated. Given that ecological flows are important to build resilience of international watercourses, it is recommended that a set of guidelines be established. Guidance for doing this can be taken from the European Commission which is in the process of developing one.

The UN Watercourses Convention also does not provide any guidance as to how watercourse States are to go about preventing and mitigating the risks of floods and droughts. Even though the Berlin Rules offer some guidance, the work of the EU under the Water Framework Directive is very helpful in this regard. Collectively, the risk-based assessment framework shows how through initial and ongoing assessments, mapping, monitoring and reporting can help watercourse States to not only prevent and mitigate the risks of floods (and droughts) but also prepare and respond to emergency situations as well. The EU-wide information collecting and warning system will provide a strong base for member States in dealing with all aspects of climate change given the uncertainties inherent in it. It is therefore recommended that the UN Watercourses Convention also prescribes watercourse States to undertake vulnerability assessment with regards to floods and droughts and that it is also recommended that in addition to providing for ecological flows, that the allocations are also flexible enough to accommodate variability in river flows.

Since the European regional framework has been largely used as a best practical example in this study, no recommendations are being made to its various legal

instruments as that has not been a purpose of this thesis though suggestions for amendments to certain texts have been suggested in certain parts of this thesis.

For the Jordan River Basin, but for the JWC of Israel and Jordan, the Jordan Basin States are not in a position to currently deal with all aspects of climate change in the Jordan River Basin. The whole basin needs to be governed taking an ecological approach especially given that it is a closed basin. An ecological flow has to be provided for which is currently only possible between Israel and Jordan but which can be agreed upon by Jordan and Syria through the negotiation of a new agreement that takes climate change into account. However, this would mean that Israel and Jordan would have to have an 'escape clause' given that their shares in the Basin waters are fixed. Given that Lebanon and the Palestinian people of the West Bank are not accessing the Jordan waters, both Israel and Jordan, and Jordan and Syria should seek to ensure ecological flows in the Basin and adopt ways to prevent, mitigate, prepare and respond to droughts (floods not being a foreseeable symptom of climate change at this stage of scientific assessment). The EU practices related to monitoring, assessments, reporting, building knowledge base and warning systems ought to be employed as well.

As for the Nile Basin, the current legal regime constitutes of the Nile Waters Agreement 1959. While this Agreement deals with allocation adjustability during floods and droughts, its workability is questionable. The Cooperative Framework Agreement, on the other hand, does provide for an ecological approach to the utilization of the Nile waters. Additionally, it obliges the Nile Basin States to keep their water use under review. It also provides for the Nile Basin States to prevent and mitigate floods and droughts as well as to take *all practical measures* during emergency situations. It does not, however, oblige the Nile Basin States to undertake floods and droughts vulnerability assessments. While the Nile River Basin Commission and the Technical Advisory Committee will be entrusted to guide the Nile Basin States in aspects of climate change adaptability and the EU governance framework will provide ample guidance in this area, it is recommended that the Cooperative Framework Agreement be amended to include climate change adaptability as one of its guiding principles under the Framework

given the vulnerability of the Nile Basin to climate change as well as to provide for ecological flows and vulnerability assessments and exchange of information and building of knowledge base for climate change variability and adaptation.

In the Indus Basin, the Indus Waters Treaty, the only governing document which is between India and Pakistan, does not take an ecological view to water utilization and thus does not provide for ecological flows or allocation adjustments during flow variability. While it provides for both Parties to prevent harm to the other from floods, notify about thereof and have unilateral contingency plans, it does not oblige the Parties to prevent and mitigate floods and droughts and to prepare and help the other during emergency situations. While both Parties have started taking initiatives towards building the requisite knowledge base to adapt to climate change and variability, they must take advantage of the modification provision to provide for ecological flows and vulnerability assessments and preparedness and response. Additionally, they should take advantage of setting up the joint observation stations that has also been provided for under the Treaty. This will help them to not only build their knowledge base but also maybe extend that into a joint warning and alarm system as well.

As stated in the European Commission's Blueprint for its Water Resources, "Adequate governance and sustainable water management at regional and transboundary levels also contribute to ensure peace and political stability via the water and security nexus."¹⁶⁰⁴ This is what, it is hoped, climate change adaptation strategies in these river basins will achieve.

¹⁶⁰⁴ European Commission, above n 351, at 19.

6 Recommendations



“Ecosystems are vital to sustaining the quantity and quality of water available within a watershed, on which both nature and people rely. Maintaining the integrity of ecosystems is essential for supporting the diverse needs of humans, including domestic, agricultural, energy and industrial water use, and for the sustainability of ecosystems, including protecting the water provisioning services they provide.”¹⁶⁰⁵

6.1 Introduction

The preceding thematic chapters have identified a number of gaps in the UN Watercourses Convention. Now that the UN Watercourses Convention has entered into force, this chapter seeks to sum up the recommended amendments to the UN Watercourses Convention that are required in order to strengthen international law governing international river basins by taking it beyond equitable utilization. The idea is to better promote the principle of sustainable use as well as an ecosystem approach to integrated river basin governance so that watercourse States are under a greater obligation to prioritise and effectively address the four main threats of over-extraction, pollution, damming and infrastructural development as well as climate change to international river basins globally.

The recommendations are followed by a summary of actions, be it through amendments to existing agreements or formulation of new ones, which are needed in order to strengthen the legal governance regime in the Jordan, the Nile and the Indus River Basins, respectively. These will enable the four main threats to be effectively addressed, which if not, is only going to exacerbate the already existing water security concerns in these river basins.

¹⁶⁰⁵ UN-Water, above n 3, at vii, 17-19.

6.2 The UN Watercourses Convention

Currently, the UN Watercourses Convention places paramount importance on the principle of equitable and reasonable use. The reality is that this principle can only be realised effectively if sustainability is attributed as the first and foremost priority. Sustainability will rightly place the value on ecological integrity that it deserves and which is currently understated under the Convention. As already stated, the Berlin Rules postulate a duty for States to protect ecological integrity acknowledging that “without a commitment to ecological integrity, sustainability is impossible.” Thus, as a matter of priority, it is recommended that the Convention be amended to include the concept of sustainable use as paramount, placing greater acknowledgment and importance on the concept of ecological integrity before the principle of equitable and reasonable use is promoted.¹⁶⁰⁶

The UN Watercourses Convention deals with the threat from over-extraction of water resources of international rivers through the principle of sustainable use, the right to an equitable share and reasonable use of freshwater resources, the obligation not to cause significant harm to other watercourse States, the obligation to prevent and mitigate harm to the river basin in general, to regularly exchange data and information including those relating to the hydrology of the river basin and withdrawals as well as the obligation to protect and preserve the ecosystem.

¹⁶⁰⁶ While it is appreciated that amendments to its text have not been provided for under the UN Watercourses Convention and that it can be quite a challenge introducing any amendments given that the formulation and entry into force of the Convention itself have taken a number of decades, it may be that a new Water Convention incorporating these suggestions may be a better option. See Joseph W Dellapenna “Thinking about the Future of Global Water Governance” in Laura Westra, Prue Taylor, Agnès Michelot (eds) *Confronting Ecological and Economic Collapse: Ecological Integrity for Law, Policy and Human Rights* (Routledge, Oxon, New York, 2013) at 120-131; Alistair Rieu-Clarke “A Cure or a Curse? Entry into Force of the UN Watercourses Convention and the Global Opening of the UNECE Water Convention” (2014) 8 *Questions of International Law* 3-17, who has suggested that despite the lack of formal arrangements for its amendments under the Convention, informal arrangements could be put in place by individual, groups of parties as well as NGOs to promote the implementation of the Convention in the short term and gathering international support to secure its amendments in the long run.

While the concept of ecological flows can be read into the provisions dealing with the obligation to protect and preserve the ecosystem, this has to be amended to have it expressly stated given that ecological flows is absolutely crucial to dealing with not just the threat of over-extraction but damming and infrastructural development as well as climate change. Also, it is important to prescribe or offer guidance as to how ecological flows can be calculated, especially the sort of factors that need to be taken into account, just like for the exercise of the right to an equitable and reasonable share in the basin waters. These would include quantity, quality and timing for sustaining the health of the river and its aquatic ecosystems and balancing that against economic and social values of maintaining what would be an appropriate ecological flow.¹⁶⁰⁷ While the Murray-Darling Basin Plan is one example, the EU guidelines on ecological flow, integrated with guidance on water accounts, should be of assistance as well.

It is also recommended that the provision dealing with the right to an equitable and reasonable use be calculated as a percent and not as a fixed quantitative figure given that the calculation of ecological flows will vary as environmental factors change over time, including in light of climate change. Thus, the aim is to keep this substantive rights' provision not only flexible but also under review as has been provided for under the Cooperative Framework Agreement 2010.

The UN Watercourses Convention deals with the threat from pollution by providing for unilateral as well as joint actions to prevent, reduce and control pollution of international river basins to the extent that an activity or project “may cause significant harm” to another watercourse State or to its environment, a principle that has been endorsed by the ICJ as customary international environmental law. In doing so, this provision supports the application of the precautionary principle, the best available technology and best environmental practices. While the Convention currently seeks to prevent, reduce and control pollution which would equate to priority substances, what is required is that it expressly deals with hazardous substances.

¹⁶⁰⁷ See Dyson, above n 566, at 19.

While there are international agreements dealing with movements of hazardous substances across borders specifically such as the Basel Convention, the Rotterdam Convention and the Stockholm Convention, the UN Watercourses Convention does not expressly impose an obligation on watercourse States to eliminate pollution from substances that are toxic, persistent or of bioaccumulative characteristic. Although this can be read into the text under pollution control, given the extent of threat from pollution on international rivers and the evolving nature of pollutants which is only going to continue to affect the quality of available freshwater resources, it is recommended that the Convention be amended to reconcile with existing and new conventions to provide for the elimination of pollution from substances that are considered to be hazardous. For this purpose, the Convention would also need to establish a criteria as to what would constitute hazardous, namely if a substance is of toxic, persistent or of bioaccumulative characteristic. It should also provide that the list for hazardous substances be revised periodically so that watercourse States can continue to work towards ceasing or phasing out substances that meet the requisite criteria.

Damming and infrastructural development is another threat to international rivers which the UN Watercourses Convention deals with. In addition to substantive rights and obligations, such that the right to an equitable and reasonable use and the obligation not to cause significant harm, it provides that certain procedural obligations are observed. These are namely with regards to notification entailing environmental impact assessment (if available), consultations as well as negotiations aiming for an equitable and sustainable resolution if it results in a dispute. What is lacking under the Convention, but which is present in international policy and endorsed by international cases and arbitration decisions and is required by customary international law, is the *obligation* of riparian States *to undertake environmental impact assessments* of planned projects. Given that such assessments play such a crucial role in ascertaining the impact of a development project on the ecology of a river basin, it is thus strongly recommended that strategic environmental impact assessments be not just included as a principle but be undertaken by watercourse States as an obligation during the proposal formulation of a planned project stage as well as prior, during

and post-implementation (or audit, as called under the Cooperative Framework Agreement 2010) of any planned project on an international watercourse. This means that the obligation to notify *must* be fulfilled with the disclosure of the most recent environmental impact assessment report that is available (currently optional). In order to ensure that the obligation to undertake an environmental impact assessment is meaningful, it has to comply with the prescribed criteria to be agreed upon between watercourse States. However, the UN Watercourses Convention must outline a guideline as to what minimum criteria would comprise of in order to ensure that it is nevertheless comprehensive enough to be meaningful.

Given the projected adverse impacts of climate change on large river systems, climate change has also been identified as a threat to international rivers. In order to enhance adaptation of river systems to build resilience to the changing climate, the governance regime requires taking an ecosystem approach, central to which is the concept of ecological flows. Also important is that the right to an equitable and reasonable use of the water resources of international watercourses be exercised flexibly in light of flow variations. Additionally, this requires taking measures to prevent, mitigate, prepare and respond to floods and droughts. The Convention does not specifically address climate change and its impact on international watercourses but addresses aspects of it as outlined in Chapter 5.

While ecological flows and the requirement that the right to an equitable and reasonable use be exercised flexibly and kept under review, what is lacking is that the Convention also does not provide any guidance as to how watercourse States are to go about preventing and mitigating the risks of floods and droughts. For this purpose, it is recommended that an amendment include the risk-based assessment framework (based on the European framework) which would require ongoing forecasting and assessments, incorporating the newly emerging principle of best available knowledge so that watercourse States can be better prepared and respond in a timely manner.

The Convention also does not guide watercourse States actions for preparedness and response during a drought situation. For this it is recommended that watercourse States be required to prepare contingency plans, unilaterally and where possible jointly, as well as be under an obligation to take all practical measures to alleviate the stress of drought on other watercourse States based on the principle of good neighbourliness. ‘Practical measures’ do not require a definition and States can be left to work through their own joint institutions to arrive at mutually acceptable drought relief plans.

Finally, it is recommended that the UN Watercourses Convention incorporate the principle of integrated river basin management and make it obligatory for watercourse States to establish basin-wide governance mechanisms such as joint river basin institutions to enable the integrated river basin management principle to be realized. Under this heading, it should be obligatory of watercourse States to undertake unilateral but coordinated or joint monitoring, assessments and reporting on the status of their waters against prescribed environmental objectives, in terms of both quantity and quality, which then has to be reported to the joint river basin institute. The establishment and functions of the joint basin institute is essential to overseeing that all the four main threats (as a minimum) are being monitored and addressed because as already stated, threats to international river basins do not respect territorial boundaries.

The UN Watercourses Convention entered into force on 17 August 2014, having gained the requisite number of signatures in May 2014. However, this is 17 years after it was adopted by the international community back in 1997. Water security concerns and threats to international rivers have only grown since then. In order to strengthen this new piece of binding international Convention, the time is right for these amendments to be incorporated. While it would not be an easy task given that the Convention in its present form has taken so long to enter into force, the hope is that with the UNECE Water Convention gaining a status as an international instrument as well, that States party to the UN Watercourses

Convention will not only start dealing with the threats identified in this thesis as a matter of priority but support each other in addressing them effectively as well.¹⁶⁰⁸

6.3 *Jordan River Basin*

In the Jordan River Basin, both Israel and Jordan (through the Peace Treaty) and Jordan and Syria (through the Yarmuk Waters Agreement 1987) have allocated and diverted the Jordan waters but without accounting for ecological flows hence the resultant Basin closure. In order to deal with the issue of over-extraction, it is recommended that all the Parties become obliged to maintain ecological flows. In addition, while Jordan and Syria's shares in the Yarmouk are not in specified volumetric figures, Israel and Jordan's "rightful allocations" of the Jordan waters are fixed in quantified numbers. It is therefore recommended that either: (1) Israel and Jordan keep their allocations fixed but include an escape clause to cope with the fluctuating flows or (2) renegotiate to have it as a certain percentage of the utilizable flow in order to keep it flexible.

As for pollution, while Israel and the Palestinian people of the West Bank have a comprehensive framework to deal with the issue of pollution, Israel and Jordan have not addressed pollution from hazardous substances and have only agreed to abate pollution specifically from brine. Thus they need to undertake to address pollution from hazardous substances. Additionally, they need to establish mutually acceptable measures and methods for joint water quality assessment and reporting, establishing best available techniques and best environmental practices to address pollution from point and non-point sources. In doing so, the Parties can take full advantage of the JWC that is already established under the Peace Treaty. In contrast, though Jordan and Syria have established a joint institute under the Yarmuk Waters Agreement 1987, no pollution control provisions have been provided for. Thus, it is recommended that both Jordan and Syria make a new agreement that will seek to address all aspects of pollution on the Yarmouk River—from prevention to elimination of certain types of pollutants.

¹⁶⁰⁸ See Alistair Rieu-Clarke, above n 1602.

As for damming and development, only Israel and Jordan have some procedural measures under the Peace Treaty for further development which is subject to ‘mutual agreement’ between the two Parties. There is no provision which requires environmental impact assessments at any stage of the project. Given that upstream diversions have directly contributed to basin closure downstream, it is imperative that Israel and Jordan review the Peace Treaty and impose an obligation to strategically assess the impact of dams and diversion structures during all stages of such development. Since Syria’s development is also causing problems for Jordan in terms of reduced flows and contributing to basin closure, Jordan should press to have a new agreement with Syria, which not only provides for further development to help alleviate the problem of reduced flows but also monitors the ongoing impact of such development on the ecology of the Jordan Basin through strategic environmental impact assessment.

But for the JWC of Israel and Jordan, the Jordan Basin States are not in a position to currently deal with all aspects of climate change in the Basin. The whole basin needs to be governed taking an ecological approach especially given that it is a closed basin. An ecological flow has to be provided for which is currently only possible between Israel and Jordan but which can be agreed upon by Jordan and Syria through negotiation of a new agreement that takes climate change into account. Whilst Lebanon and the Palestinian people of the West Bank are currently not exercising their right to the Jordan waters, since the rest of the riparian States are, both Israel and Jordan as well as and Jordan with Syria, should seek to adopt agreements to prevent, mitigate, prepare and respond to droughts (floods not being a foreseeable symptom of climate change at this stage of scientific assessment), based on the existing and recommended changes to the UN Watercourses Convention.

6.4 Nile River Basin

In the Nile Basin, there are competing Agreements for water utilization for the whole of the Nile – that between Egypt and Sudan (under the Nile Waters Agreement 1959) and for all the Nile Basin States (under the Cooperative Framework Agreement 2010). Under both Agreements, ecological flows have not

expressly been provided for and the issue of over-extraction has led to basin closure. While under the Cooperative Framework Agreement, the right to an equitable share will be calculated taking into account including, but not limited to, ecological factors, under the Nile Waters Agreement 1959, Egypt and Sudan's fixed quantified shares are based on what is considered to be the utilizable portion of the total mean flow which, as already stated, varies as ecological conditions change.

Although the allocation provisions enjoy flexibility, as the Basin States move towards implementing the Cooperative Framework Agreement, the Nile Basin States would need to ensure that ecological flows are calculated before their equitable shares are determined. This will prove problematic if the Egypt and Sudan continue to utilize the Nile waters outside the Cooperative Framework Agreement. However, the rest of the Nile Basin States have the advantage of being the upper riparians who can pressure Egypt and Sudan to work within the new framework which serves the interests of all the riparian States in the Nile Basin. This will not only ensure that ecological flows are accounted for but that the Parties also get to realise their equitable share in the Nile waters, which is recommended be flexible in light of challenges such as climate change.

For pollution, the Nile Waters Agreement 1959 does not address it at all and the issue is currently being dealt with through the subsidiarity action programmes of the NBI. However, a strong legal regime is required given the challenges associated with the problem of pollution as is demonstrable by the EU governance framework. Thus, it is hoped that once the Cooperative Framework Agreement is ratified by all the Nile Basin States and the Nile River Basin Commission is established together with the Technical Advisory Committee, that the Nile Basin States can work towards protecting and improving the *water quality* within the Nile River Basin. Even though the pollution control regime under the Cooperative Framework Agreement is unspecified, it is envisaged that the Basin Commission and the Technical Advisory Committee will perform similar functions to that of the EC by publishing guidelines, monitoring States' compliance and making recommendations for improvement. It is recommended that such guidelines for

the Nile Basin deals with the problem of pollution by identifying priority substances for which the Nile Basin States would be under an obligation to prevent, reduce and control and formulate a list of hazardous substances with the aim to eliminate pollution from thereof. For this purpose, the Basin Commission would have to pronounce environmental objectives, and keep priority and hazardous substances lists under review as the nature of pollutants evolve over time.

As for damming and infrastructural development, while the Nile Waters Agreement 1959 has provided for the current infrastructure as well as future development, it has not taken the ecological impact of such development into consideration. Hence there is no requirement for assessment of either the present infrastructure or for future development projects. On the other hand, once the Nile River Basin Commission is established, the Cooperative Framework Agreement will be the first legal instrument in these case studies to have not only proper procedural requirements for damming and development but be the first to require ongoing audit of such developments, and in doing so, upholding the principle of sustainable development as is aspired by international law and policy with regards to development of international rivers.

In dealing with climate change, while the Nile Waters Agreement 1959 provides for allocation adjustability during floods and droughts, its workability is questionable as already discussed. The Cooperative Framework Agreement, on the other hand, does provide for an ecological approach to utilization of the Nile waters. Additionally, it obliges the Nile Basin States to keep their water use under review. It also provides for the Nile Basin States to prevent and mitigate floods and droughts as well as to take *all practical measures* during emergency situations. It does not, however, oblige the Nile Basin States to undertake floods and droughts vulnerability assessments. While the Nile River Basin Commission and the Technical Advisory Committee will be entrusted to guide the Nile Basin States in aspects of climate change adaptability and the EU governance framework will provide ample guidance in this area, it is recommended that the Cooperative Framework Agreement be amended to include climate change

adaptation strategy as one of its guiding principles under the Framework, given the level of vulnerability of the Nile Basin to climate change, as well as the principle of best available knowledge. It should also be revised to provide for ecological flows, vulnerability assessments and incorporate forecasting under the obligation to exchange information. This is so that the knowledge base for climate change variability and adaptation can be expanded and responded to accordingly.

6.5 *Indus River Basin*

In the Indus Basin, only India and Pakistan are Party to the only governing legal instrument – the Indus Waters Treaty. The Treaty does not take ecological factors into consideration, including the most important aspect; ecological flows. Simply dividing half of the 6 tributaries between both Parties means that being the lower riparian, any disruption to the ecological flows upstream is going to directly impact Pakistan's share of waters. The fact that the Basin is experiencing closure is indicative that there is over-extraction of the Indus waters. Thus, the Treaty needs to be amended to provide for an obligation to maintain ecological flows.

Given that allocation is by separation of the tributaries and only Pakistan has conceded by allowing India to develop on its Western Rivers, in order to ensure that Pakistan is able to enjoy its equitable shares, it is recommended that as per the Treaty's "spirit of goodwill and friendship" that India also concedes by being under an obligation to maintain minimum flows entering each of the Western Rivers which currently it is only under an obligation to maintain downstream from the Kishenganga Hydro-Electric Project plant. In this spirit, it is also recommended that Pakistan too undertakes to ensure that the minimum ecological flows are maintained on the estuaries of the Basin so as to rehabilitate and address the issue of Basin closure overall.

For the sake of completeness, if Pakistan is successful in negotiating a Kabul Waters Treaty with Afghanistan, modelled on the Indus Waters Treaty, then at least the above-stated recommendations will ensure that Afghanistan's use also takes an ecological approach to the utilization of the Indus waters. Otherwise, while equitable shares will be submitted through a Treaty, the issue of Basin

closure will likely aggravate if ecological considerations are not factored into the Treaty.

For dealing with pollution, the Indus Waters Treaty provides for pollution control from sewage and industrial wastes, but not from agricultural effluents even though this is the largest polluter of the Indus waters. Moreover, India and Pakistan are under an obligation to prevent ‘undue pollution’ from these sources and that too if it “materially affects” the other Party. Given that pollution is a problem in the Indus waters, the Treaty needs to be amended in order to impose an obligation on both Parties to prevent, reduce and control pollution from all domestic, industrial and agricultural sectors which *may* cause “significant harm” to not only the other Party but to the Basin itself. Moreover, the Treaty needs to introduce water quality objectives given that ‘undue’ is too vague a standard to work with, and have proper monitoring, assessment and reporting requirements in place so that pollution levels can be monitored and dealt with effectively. The Parties are also recommended to identify and introduce ways to deal with hazardous substances in the Indus Basin given that water availability, especially for Pakistan, is already a matter of concern and quality issues will only add to the water security concern overall.

As per matters pertaining to damming and infrastructural development, India’s right to further development is now constrained by its obligation to maintain a minimum downstream flow in Pakistan’s favour at least from the Kishenganga project. However, given the inventory of disputes between them and lack of requirement for environmental impact assessments and ongoing audits under the Treaty, the Parties will likely see this list of disputes growing unless they agree that it is now time to revise the Treaty and incorporate the ecological considerations missing in it, especially with regards to ecological flows. Maintaining minimum flows entering the Western Rivers will help reduce some, if not all, of the development-related disputes between them as all essentially concern the cumulative impact of such development on Pakistan’s shares of the Indus waters. Not only it is recommended that India be under an obligation to maintain minimum flows entering the Western Rivers but both Parties should also

introduce the principle of environmental impact assessments and undertake such assessments strategically at all stages of development. This will ensure that environmental factors have been taken into account, Pakistan's shares do not suffer substantial harm and that the issue of Basin closure does not deteriorate any further.

In terms of dealing with the impacts of climate change in the Basin, the Indus Waters Treaty does not take an ecological view to water utilization and thus does not provide for ecological flows or allocation adjustments during flow variability. These flow variability aspects have already been covered as they also cut across issues pertaining to over-extraction as well as damming and infrastructural development.

While the Treaty provides for both Parties to prevent harm to the other from floods, notify about thereof and have unilateral contingency plans, it does not oblige the Parties to prevent and mitigate floods and droughts and to prepare and help the other during emergency situations. While both Parties have started taking initiatives towards building the requisite knowledge base to adapt to climate change and variability, they must take advantage of the modification provision to provide for vulnerability assessments and preparedness and response. To this end, they should not only adopt the principle of best available knowledge but additionally, they should take advantage of setting up the joint observation stations that has already been provided for under the Treaty. In addition to this, they should start using the Permanent Indus Commission to monitor, map, assess and report on the impact of climate change on the Basin on an ongoing basis. This will help them not only to build knowledge base but prepare for response based on the findings of the vulnerability assessments.

6.6 Concluding Remarks

Strengthening the governance of international rivers, by revising or creating new freshwater agreements incorporating the principle of sustainable use, the obligation to prevent, control and reduce pollution, and undertaking EIAs of damming and infrastructural development as well as taking an ecosystem approach towards governance, is one of the ways that global water security can be achieved. While the proposed amendments to the UN Watercourses Convention will add strength to the global framework by addressing the four main threats to international rivers globally, improving the legal governance regime in the Jordan, the Nile and the Indus River Basins will help ease some of the growing pressures in the decades' long water disputes in these three conflict prone basins. It is hoped that as international law governing international watercourses continues to get support, that through the multi-stakeholder approach, the international community will also get closer to realizing its goal of securing 'water for all.'

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