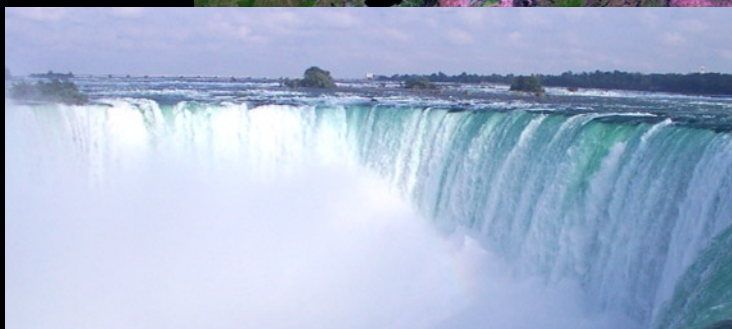


40

TRANSBOUNDARY WATER RESOURCES MANAGEMENT: The Role of International Watercourse Agreements in Implementation of the CBD



Convention on
Biological Diversity



CBD Technical Series No. 40

**Transboundary water resources
management: the role of international
watercourse agreements in
implementation of the CBD**

SABINE BRELS, DAVID COATES AND FLAVIA LOURES

Published by the Secretariat of the Convention on Biological Diversity. ISBN: 92-9225-092-2.
Copyright © 2008, Secretariat of the Convention on Biological Diversity

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the Convention on Biological Diversity concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views reported in this publication do not necessarily represent those of the Convention on Biological Diversity.

This publication may be reproduced for educational or non-profit purposes without special permission from the copyright holders, provided acknowledgement of the source is made. The Secretariat of the Convention would appreciate receiving a copy of any publications that use this document as a source.

Citation

Brels, S., Coates, D., and Loures, F. (2008). Transboundary water resources management: the role of international watercourse agreements in implementation of the CBD. CBD Technical Series no. 40, 48 pages. Secretariat of the Convention on Biological Diversity, Montreal, Canada.

For further information, please contact:

Secretariat of the Convention on Biological Diversity

World Trade Centre

413 St. Jacques Street, Suite 800

Montreal, Quebec, Canada H2Y 1N9

Phone: (514) 288 2220

Fax: (514) 288 6588

E-mail: secretariat@cbd.int

Website: <http://www.cbd.int>

Cover Photos (top to bottom):

Khone Falls, Mekong River, southern Lao PDR: bordering Cambodia—of immense biodiversity significance, being a corridor for transboundary fish migrations between Viet Nam, Cambodia, Lao PDR, Thailand, Myanmar and China (credit David Coates). Lake Tanganyika (Envisat, 11 April 2002): its waters lap Tanzania, Burundi, Congo DR and Zambia, the longest fresh water lake in the world and the second deepest after lake Baikal in Russia (credit European Space Agency. All rights reserved). Niagara Falls: bordering Canada and the U.S.A. (credit David Coates).

ACKNOWLEDGEMENTS

This document has been produced with the financial assistance of WWF International.

FOREWORD

Freshwater is our most precious natural resource. Its wise management and sharing are essential to the achievement of sustainable development. Despite this importance, globally we continue to abuse it. The excesses of our activities on land, through for example soil degradation, pollution and unsustainable chemical use, impact freshwaters. We over use water and continue to convert freshwater habitats to less productive uses. Unsurprisingly, this has resulted in the rate of biodiversity loss from freshwater ecosystems exceeding that from any other major biome by a considerable margin. Yet the world is faced with increasing water needs as populations rapidly grow. The impacts of climate change will be felt, and are already evident, mainly through impacts on the water cycle. Water will become either more scarce or over abundant in many areas resulting in more extreme and frequent droughts and floods. The future scenario is for rapidly increasing demands for water under rapidly changing conditions. Based on current trends we are not doing well in responding to the challenges we face. There is an urgent need for better allocation and management of water if aquatic ecosystems are to be used wisely to achieve sustainable human development.

Against this background, water issues in transboundary freshwater ecosystems too often continue to be a source of major contention between riparian States. To quote Mark Twain “Whiskey is for drinking; water is for fighting over”. There is a better way—to work together towards common goals, to communicate and cooperate, to not only avoid harm to others but to benefit each other. This indeed is the essence of Article 5 on cooperation of the Convention on Biological Diversity.

This document explains why biodiversity conservation and sustainable use present a powerful argument to manage transboundary waters better, how regulatory frameworks to achieve this can be improved and why doing so fulfils commitments made under the Convention on Biological Diversity.

Against this background, and in contradiction of Mark Twain’s observation, the adoption of decision IX/19 by the ninth meeting of the Conference of the Parties to the Convention on Biological Diversity, Bonn, Germany, 19–30 May 2008, represents a historical milestone. This decision urged Parties to strengthen international cooperation regarding the allocation and management of water, including ratifying and implementing international watercourse agreements, as a means to implement the provisions of the CBD in this area. This adds considerable legal and political weight to ongoing efforts to improve regulatory frameworks for international cooperation regarding water. It also broadens the arguments for such cooperation by highlighting linkages between transboundary watercourse management, biodiversity conservation and sustainable use and human well-being. It enhances international dialogue and consensus building. Full and effective implementation of this decision will be a major contribution to reversing the trend in freshwater biodiversity loss and with it helping to sustain these important ecosystems and their role in human development.

Water associates us with our neighbours in complex ways, more deep than any other. This document has been produced to assist those that wish to know more and to help them further promote good neighbourliness.



Ahmed Djoghla
Executive Secretary
Convention on Biological Diversity

EXECUTIVE SUMMARY

The equitable and sustainable allocation and management of water are crucial for maintaining the ecological function of freshwater water ecosystems. These functions sustain the significant services that these ecosystems provide to support human well-being; biodiversity underpins the functioning of these ecosystems and therefore the services provided. Loss of biodiversity, therefore, translates into a threat to sustained human well-being. Globally, these ecosystems are in serious decline due largely to the pressures placed upon water by its various users, and the rate of loss of biodiversity in them surpasses that from other major biomes by a considerable margin.

Indisputably, the major impact of climate change is on the hydrological cycle, and therefore on freshwater ecosystems and the services they provide, and these systems need to be managed better in order to meet the challenges of climate change. The future scenario is for rapidly increasing demands for water in order to supply escalating human needs under rapidly changing conditions. These factors urgently call for better allocation and management of water if aquatic ecosystems are to be used wisely to achieve sustainable human development. Where water is shared between two or more countries, cooperation between the States concerned for enabling transboundary integrated water resources management has a critical role to play. This has been clearly recognised in a number of important undertakings or commitments, including the 2006 Hashimoto Action Plan supporting the achievement of the Millennium Development Goals, the World Summit on Sustainable Development, and the 2005 World Summit Outcome.

The provisions of the CBD already address the broader issues and needs, particularly through the programme of work on the biological diversity of inland water ecosystems adopted by decision VII/4, annex. But these general provisions need strengthened regulatory frameworks to assist in their implementation at national and international level. In this context, we investigate the role of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (UN Watercourses Convention) and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Watercourses Convention) for supporting and strengthening the implementation of the CBD towards the conservation, sustainable use and equitable sharing of biological resources, in particular in regards to the CBD programme of work on the biological diversity of inland water ecosystems.

The UN Watercourses Convention is a global and flexible framework instrument prepared and negotiated under the auspices of the United Nations to govern the use, management, and protection of international watercourses. The UN Watercourses Convention was adopted by an overwhelming majority and under the sponsorship of 38 States at the UN General Assembly in May 1997. The convention is open for accession by all States and regional economic organizations. Counting the current 16 contracting States, Article 36 of the convention requires the deposit of 35 instruments of ratification or accession for its entry into force. Once in force and widely implemented, the UN Watercourses Convention will reinforce inter-State cooperation at the basin level, significantly improving global water governance, and thus enhance the legal regime under the CBD for conserving and sustainably using inland water biodiversity.

The UNECE Water Convention was adopted in 1992 among the States that are members of the United Nations Economic Commission for Europe (UNECE) and became effective four years later. As the convention stands today, only UNECE Member States can become Parties to it; 35 of the 56 Member States, plus the European Community, have done so. In 2003, the Parties to the convention adopted amendments opening it for accession by non-UNECE Member States. The amendments, however, are not yet in effect. The convention sets out keystone principles and provisions for the protection and sustainable use of transboundary waters and their resources. In creating a consistent and detailed legal framework

with high-level standards and stringency for transboundary water management, the UNECE Water Convention has made an important contribution to the codification and progressive development of international law in this field. Its 2006 recommendations on payments for ecosystem services (PES) in integrated water resources management (IWRM) are an example of the convention's important linkages and synergies with the CBD, especially with respect to the implementation of the ecosystem approach in the context of shared water resources.

Using such regulatory frameworks to improve international cooperation and coordination regarding transboundary watercourses can provide significant co-benefits for riparian States. In this process the conservation and sustainable use of biodiversity is not just an end in itself, but best regarded as a means to sustain ecosystem service provision for the equitable benefit of all. For lakes, all riparian States tend to suffer from unsustainable land use practices no matter where they occur in the catchment (e.g., land erosion/siltation and excessive nutrient loading/eutrophication lead to reduced water quality to the detriment of all). For rivers, due to their more linear (upstream-downstream) nature, riparian States may have different interests but they are not independent. For example, States need to cooperate over managing the impacts of water use, such as water extraction and dam building, on fisheries, including for species migrating between States and to sustain inter-State food dependency; collaboration is required regarding sustaining water quality (poor water quality is a major driver of biodiversity loss); and agriculture needs to become more sustainable by, for example, maintaining the ability of wetlands to recycle excessive nutrient inputs (particularly nitrogen). The latter is a good example of how, for rivers, downstream States can provide ecosystem services for upstream States, demonstrating the interdependency of States and the need to manage these ecosystems holistically. Similarly, upstream States can improve service provision to downstream States by, for example, rehabilitating watersheds to improve water quality. Naturally, there are complex economic and political issues regarding inter-State payments for these services. But these challenges can be best met through improved regulatory frameworks in the manner suggested.

The UN Watercourses Convention and the UNECE Water Convention share common goals with the CBD. All three conventions promote international cooperation as a crucial prerequisite for Parties to achieve their goals. However, the CBD lacks specific rules and principles governing cooperation between watercourse States and promoting the equitable and reasonable use and management of international watercourses. This represents a problem for aquatic biodiversity conservation in transboundary watersheds and the UN Watercourses Convention and the UNECE Water Convention could help address that regulatory gap.

Biodiversity considerations add significant weight to the case for the wider adoption and implementation of the UN Watercourses Convention and the UNECE Water Convention and both are mutually supportive of the CBD. Moreover, the entry into force of the UN Watercourses Convention and of the 2003 Amendments to the UNECE Water Convention would be important contributions to the CBD target, to significantly reduce the rate of loss of biodiversity by 2010 for the benefit of all life on earth, during the International Decade for Action "Water for Life" 2005-2015.

CONTENTS

I. INTRODUCTION	9
II. WATER ALLOCATION, MANAGEMENT AND ECOLOGICAL FUNCTIONS	10
(i) Freshwater availability, allocation and management	10
(ii) The urgency of improved water allocation and management	11
(iii) Relationship between water allocation and management, the conservation and sustainable use of biodiversity, and human development	12
(iv) Existing guidance on water allocation and management at the national level	13
III. WATER ALLOCATION AND TRANSBOUNDARY WATERS UNDER UNITED NATIONS PRIORITIES	14
(i) The Millennium Development Goals	14
(ii) The 2002 World Summit on Sustainable Development	15
(iii) UN-Water and the UN Water Decade	16
(iv) The 2005 World Summit outcome	17
IV. WATER ALLOCATION AND MANAGEMENT, TRANSBOUNDARY WATER ISSUES AND THE CBD	17
(i) Attention to water allocation and management and cooperation between States under the CBD	17
(ii) The role of watercourse conventions	18
(iii) Other guidance for transboundary water allocation and management	20
V. THE UN WATERCOURSES CONVENTION AND THE CBD	21
(i) Relevant provisions of the UN Watercourses Convention	21
<i>Scope</i>	21
<i>Ecosystem Approach and protection/restoration of ecosystems</i>	22
<i>Sustainable Development</i>	24
<i>Obligation not to Cause Significant Transboundary Harm</i>	24
<i>Prevention, Control and Reduction of Pollution</i>	25
<i>Protection of Living Resources: Invasive Alien Species and Transboundary Migratory Species</i> ..	25
<i>Procedural Rules Applicable to Major Planned Measures</i>	26
<i>Dispute Settlement Procedures</i>	27
(ii) Relation between the River Basin Initiative and the UN Watercourses Convention	28
VI. THE UNECE WATER CONVENTION AND THE CBD	28
(i) Relevant Provisions of the UNECE Water Convention	29
<i>Scope</i>	29
<i>Ecosystem approach: conservation and restoration</i>	29
<i>Principles of Environmental Law</i>	30
<i>Obligation Not to Cause Transboundary Impact</i>	30
<i>Prevention, Control and Reduction of Pollution</i>	31
<i>Procedural Rules Applicable to Planned Measures and Joint Bodies</i>	31
(ii) Recommendations on Payments for Ecosystem Services (PES) in Integrated Water Resources Management (IRWM)	32
(iii) Protocols under the UNECE Water Convention	32
<i>The Protocol on Water and Health</i>	32
<i>The Protocol on Civil Liability</i>	33

VII. COMPARISON OF THE UN WATERCOURSES CONVENTION AND THE UNECE WATER CONVENTION	33
VIII. CONCLUSIONS	35
ANNEX I	
Ecosystem services provided by inland waters (as per the millennium ecosystem assessment) which can be affected by inappropriate water allocations and unsustainable water use and some of their implications for poverty reduction, sustainable livelihoods and the millennium development goals.....	37
ANNEX II	
The status of ratification of the UNECE and UN Conventions.....	43
ANNEX III	
Some similarities between the Convention on Biological Diversity, the UNECE Water Convention and the UN Watercourses Convention.....	47

I. INTRODUCTION

The ninth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD), Bonn, Germany, 19–30 May 2008, adopted decision IX/19 which strongly supported the need for strengthened international cooperation regarding the allocation and management of water, including urging Parties to ratify and implement international watercourse agreements, as a means to implement the provisions of the CBD in this area. This recent decision adds considerable legal and political weight to ongoing efforts to improve regulatory frameworks for international cooperation regarding water. It also broadens the arguments for such cooperation by highlighting linkages between transboundary watercourse management, biodiversity conservation and sustainable use and human well-being.

This volume of the CBD Technical Series has been prepared to provide expanded background information on this topic. It assesses the role and relevance of the UN Watercourses Convention and the UNECE Water Convention for supplementing and strengthening the regulatory framework under the CBD governing water allocation and management, as well as transboundary water issues. The UN Watercourses Convention codifies minimum substantive and procedural standards of transboundary water cooperation and clarifies the fundamental principles and rules governing the rights and duties of watercourse States. The UNECE Water Convention is a pioneering regional instrument that, in the future, could benefit the entire world with a well-developed and appropriate set of rules governing transboundary water systems, if the 2003 amendments opening the convention for accession by non-UNECE Member States become effective.

In that context, section II explains the importance of, and need for, improved water allocation and management. It highlights the need and opportunity for better understanding the links between water allocation and management, the conservation and sustainable use of biodiversity, and human development. This section also explains existing guidance on this subject, particularly that of the Ramsar Convention. Section III places discussions within the broader context of United Nations priorities in the fields of water allocation and transboundary waters. Section IV explores how the CBD has addressed the problems of water allocation and management, as well as transboundary water issues. This section then introduces the roles of the UN Watercourses Convention and the UNECE Water Convention for supporting and strengthening the implementation of the CBD and this programme of work. The section also analyses how each convention governs international cooperation and assesses the adequacy of existing guidance on transboundary water cooperation on water allocation and management. Section V discusses the relationship between the UN Watercourses Convention and the CBD. It analyses the most relevant provisions of the convention in the context of the CBD and how the UN Watercourses Convention might contribute to CBD's River Basin Initiative. Section VI focuses on the UNECE Water Convention and on the guidance and instruments on transboundary water cooperation that have resulted from its implementation. The two conventions are briefly compared in section VII, and conclusions are drawn in section VIII.

Annexes are provided on: (i) some ecosystem services provided by inland water ecosystems that are impacted by water allocation and management activities; (ii) the status of ratification of the two relevant international watercourse conventions; and (iii) similarities between the CBD and the two international watercourse conventions to illustrate how they are mutually supportive.

II. WATER ALLOCATION, MANAGEMENT AND ECOLOGICAL FUNCTIONS

(i) Freshwater availability, allocation and management

Inland water ecosystems, including lakes, rivers, estuaries, wetlands and aquifers, provide numerous services upon which human activities depend. Such services include, for example, the maintenance of fish-stocks, water purification for human consumption, energy supply, and even climate regulation. A list of examples of services provided is given in annex I. The services provided by inland water ecosystems are greatly undervalued. Also often neglected is the role of water availability, in adequate quantity and quality, for sustaining inland water ecosystem functions and maintaining their capacity to provide those valuable services. Changes in water availability affect the functionality of aquatic ecosystems, thereby compromising the delivery of ecosystem services.

If the functions of inland water ecosystems depend upon the availability of water, it is simple to conclude that moving water away from “natural” inland water ecosystems causes changes in those systems. Usually such changes are negative and can result in the loss of species and of related services supplying local populations and dependent water uses. Those changes may also affect river estuaries and coastal regions. Reductions in freshwater flows, or changes in flow regimes, usually accompanied by increased pollution, eutrophication and sedimentation, can lead to significant loss of estuarine/coastal ecological functions and related ecosystem services.

In this context, “water allocation” refers to the decision-making process by which one determines the fate of fresh water available to be extracted or diverted from, or maintained within, inland water systems. Water can be allocated among numerous types of human-related water uses. *Offstream* water uses include irrigation, as well as urban and domestic water supplies and sanitation. Examples of *instream* water uses are tourism and recreational uses, as well as environmental flows to sustain other instream environmental services (e.g., fisheries, flood mitigation). Hydropower is a special type of instream water use that, while not involving water extractions, may entail considerable water diversions and affect significantly the natural flows of river systems.

Water allocation is relevant for biodiversity conservation and human development in the sense that all ecosystem functions and services provided by inland waters are vulnerable to unsustainable water use resulting from inappropriate water allocation. In order to address that vulnerability, water can be “allocated” to the “environment”, either by keeping it in, or returning it to, its natural place. Water can also be diverted to areas where it is needed to restore aquatic ecosystems (for example, artificial recharge of aquifers). Environmental allocations should be regarded as *indirect* human uses. They are necessary not only to conserve inland water biodiversity but also to sustain ecosystem functions that support human needs. For example, environmental flows may benefit people and livelihoods by sustaining cultural, socio-economic, aesthetic and recreational water uses.

Sustainable water allocation must take into account the hydrological cycle (Fig. 1). For example, water allocation decisions must consider upstream-downstream interconnectedness and the linkages between surface and underground waters. Hence, altering surface water allocations can modify the flow of a river and affect users downstream. Such alterations can also cause changes in hydraulically connected aquifers, if the river feeds into a groundwater system. Similarly, over-allocating an aquifer can have impacts on surface waters into which such an aquifer discharges. An added dimension is the variability of rainfall over space and time (seasonally, within years, and between years). Because of such interconnections, changing the use (and thus the availability) of water in one area (i.e., “re-allocating” it) may cause not

only local changes but also produce consequences in a larger scale and over long distances, including harmful effects across national and international political borders. Where water allocation is capable of resulting in transboundary effects, international law applies to require and support cooperation and peaceful relations between the States concerned.

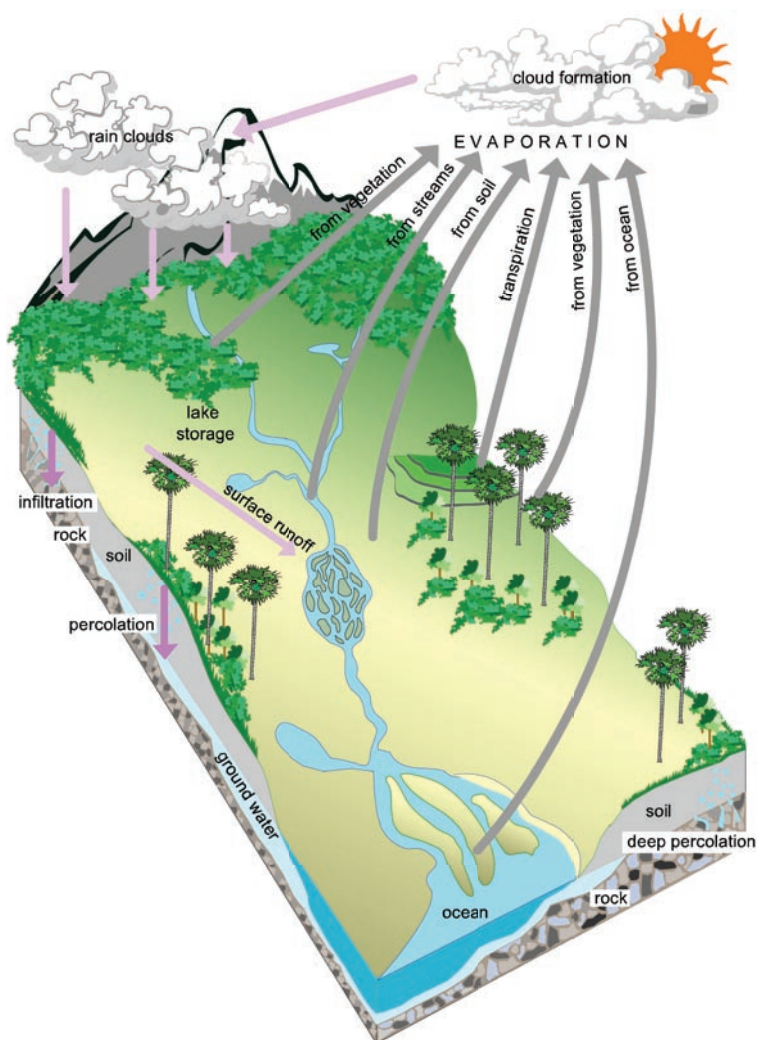


FIGURE 1: Schematised drawing of the hydrological cycle. Human-induced changes to the flow of water, either on the surface or underground, potentially cause changes in other parts of the inland water system (courtesy of the Mekong River Commission, Vientiane, Lao PDR, from the Mekong River Awareness Kit, Inter-Active Self-Study cd-ROM, 2002).

(ii) The urgency of improved water allocation and management

The sound allocation and management of water are today among the most urgent and critical global issues for the conservation and sustainable use of biodiversity. Not only is the rate of loss of inland water biodiversity the fastest of all the major biomes, but the unsustainable use of water is a major driver of freshwater biodiversity loss.¹ Water is already scarce in many regions (Fig. 2), which represents a major challenge to biodiversity conservation and to some of the most pressing human development needs. For

¹ Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Biodiversity Synthesis*, p. 44 (2005); Secretariat of the Convention on Biological Diversity, *Global Biodiversity Outlook 2*, (2006) p. 2.

example, it is estimated that over 1.4 billion people currently live in river basins with high environmental water stress, covering over 15% of the world's land surface.²

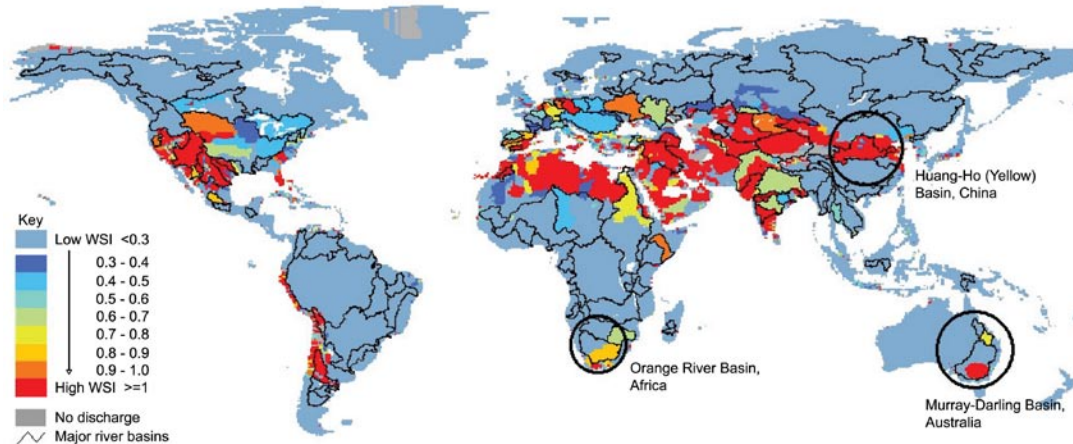


FIGURE 2: Current water stress in major river basins of the world. As demands for water escalate, water-stressed river basins will increase in both number and severity (Source: V. Smakhtin, C. Revenga and P. Döll. 2004. Taking into account environmental water requirements in global-scale water resources assessments. Comprehensive Assessment Research Report 2. Colombo, Sri Lanka: Comprehensive Assessment Secretariat.)

The main impacts of climate change will be on the earth's hydrological cycle.³ Climate change, therefore, increases significantly the urgent need for users to manage and allocate water sustainably for maintaining the ecological functions of inland water ecosystems. The linkages between water, aquatic ecosystems, biodiversity and climate change need to be considered fully in water allocation decisions.⁴

(iii) Relationship between water allocation and management, the conservation and sustainable use of biodiversity, and human development

In view of the rising demands placed upon water for human development, it is unlikely that the need for "biodiversity conservation" (in the narrow sense) will, alone, foster the promotion of sustainable water use, particularly in water-scarce developing countries. Where exceptions occur, usually for endangered charismatic fauna such as freshwater cetaceans, conservation efforts are usually reactive in nature and of secondary importance. It is thus necessary to explore and demonstrate the role of balanced aquatic ecosystems and their biodiversity in sustaining ecological functions and service delivery. Such linkages show that managing inland water biodiversity in a sustainable manner has crucial implications for the achievement of the Millennium Development Goals.

In this sense, the Millennium Ecosystem Assessment brings to light the links between internationally agreed development and environmental goals. The synthesis chapter of the Ramsar Convention,

² International Water Management Institute (IWMI) webpage, http://www.iwmi.cgiar.org/Research_Impacts/Research_Themes/WaterManagementandEnvironment/WAEF/lessons.aspx (last visited 17 Mar. 2008).

³ Intergovernmental Panel on Climate Change, *Climate Change Synthesis Report* (2007).

⁴ See S. Brels and D. Coates, Water, wetlands, biodiversity and climate change, in *Basins and Coasts*, Vol. 1, Issue 3, pp 7-8 (2007), available at: <http://www.imcfs.org/coastsheds/issues/Vol1Issue3.swf>.

“Wetlands and Water Synthesis,”⁵ looked at the implications of different strategic policy options for achieving intergovernmental commitments, such as carbon mitigation under the Kyoto Protocol, poverty and hunger reduction under the Millennium Development Goals, and wetland conservation under the Ramsar Convention and the CBD. Although the actual trade-offs between different approaches may differ in specific locations, overall progress is generally slower when those goals are addressed individually than when they are addressed jointly. This implies that focussing exclusively on the conservation and sustainable use of inland water biological diversity will not necessarily be sufficient to ensure reductions in biodiversity loss. Neither will the pursuit of development targets in an isolated manner contribute effectively to poverty reduction and sustainable livelihoods.

The linkages between inland water biodiversity conservation and human development are complex. The tradability of water between various water uses allows policy-makers and managers to manipulate the delivery of ecosystem services and the use of biological resources to the benefit (or perceived benefit) of particular stakeholder groups. In water-scarce conditions, real conflicts may occur between different water users and water needs. Nonetheless, the conservation of biodiversity and socioeconomic growth are by no means incompatible with each other when planned within the framework of sustainable development. In fact, conflicts can often be addressed through benefit-sharing approaches that explore synergies and produce win-win outcomes.

(iv) Existing guidance on water allocation and management at the national level

Guidance regarding water allocation and management is widely available, particularly through the Ramsar Convention. Considerable technical work has been done by the Ramsar Scientific & Technical Review Panel (STRP) and its major partners. The Ramsar Convention’s *Handbooks for the Wise Use of Wetlands*⁶ are of particular importance in this context. Handbook 3 (Laws and Institutions) provides guidance on reviewing laws and institutions to promote the conservation and wise use of wetlands. Handbook 6 (Water-related Guidance) explains the linkages between the allocation and management of water and the functioning of wetlands. Handbook 7 (River Basin Management) explores the role of water management in the context of river basin management. Handbook 8 (Water Allocation and Management) provides extensive policy and management guidance for allocating and managing water resources.

A related subject is the management of environmental flows—a methodological approach that incorporates environmental concerns into the process of allocating water rights among different uses. Two relevant technical reports are in preparation by the STRP: (i) methodologies for assessing the vulnerability of wetlands to change in their ecological character, and (ii) reviews of environmental flow methodologies for rivers, estuaries and near-shore environments, and non-riverine inland wetlands. The STRP work-plan (2006-2008) involves developing additional guidance on the implementation of environmental water requirements, the review of water and environmental laws with respect to environmental flows, and the impacts of dams on wetlands and river systems. In addition, IUCN has provided its members with technical advice in the form of legal analyses and legislative drafting. IUCN’s Water and Nature Initiative (WANI)⁷ focuses on mainstreaming an ecosystem approach into catchment policies, planning and management. The results of this initiative are being compiled in the WANI toolkit series. These publications are guides to cutting-edge water governance themes that address practitioners as their key

5 Millennium Ecosystem Assessment, *Ecosystem Services and human well-being: Wetlands and Water Synthesis* (2005).

6 Ramsar Convention, *Handbooks for the Wise Use of Wetlands* (2007, 3rd ed.), available at http://www.ramsar.org/lib/lib_handbooks2006_e.htm. See also C. Shine & C. de Klemm, *Wetlands, Water and the Law* (1999), available at <http://www.iucn.org/themes/law/info04.html>.

7 See WANI webpage for further information on the initiative, <http://www.iucn.org/themes/wani/>.

audience. Furthermore, legal guidance is available through useful IUCN publications.⁸ Finally, IUCN has prepared a number of brief issue papers introducing to non-lawyers the role of law in supporting integrated water resources management.⁹

III. WATER ALLOCATION AND TRANSBOUNDARY WATERS UNDER UNITED NATIONS PRIORITIES

Any call on countries to improve water allocation and management, with a view to protecting and conserving ecosystem functions, cannot ignore the highly sensitive and politicised nature of water. As Mark Twain said “Whiskey is for drinking—water for fighting over.” But experience has shown that cooperation over water issues often resolves conflicts.

Where rivers or lakes are shared between countries, transboundary water allocation and management remain a major challenge to the conservation of inland water ecosystems. Unilateralism and lack of collaboration between co-basin States often affect water availability, producing harmful consequences to inland water biodiversity and thus to human activities, vital human needs, and livelihoods. For example, reductions in river flows due to diversions upstream can increase the concentrations of pollutants above safe levels; water diversions from one basin to another can relocate entire aquatic faunas, resulting in significant problems with invasive alien species. Not only downstream States should be concerned about uncooperative neighbours. Transboundary harm may also flow upstream. This could be the case, for example, of a dam built downstream that prevents migratory species from swimming back upstream, where they reproduce and repopulate fisheries of biological, social, and economic relevance across the border.

Furthermore, the relevance of shared inland water systems for achieving the CBD 2010 target for inland water biodiversity should not be overlooked. Those systems generate around 60% of global freshwater flow and represent 45% of the world’s land surface—an area occupied by nearly 40% of the world’s population.¹⁰ Meeting the 2010 target, therefore, will depend on improved, ecosystem-based international cooperation within transboundary watersheds. Therefore, it is crucial that co-riparians agree on mechanisms of collaboration and dialogue that enable the integrated management of transboundary inland water systems. In most situations, especially where different types of water uses compete with one another, such management will depend on the establishment of *agreed substantive and procedural rules and principles governing water allocation and management across international borders*.

In that respect, the Convention text stresses “the importance of, and the need to promote, international, regional and global cooperation among States” (paragraph 14 of the preamble). The CBD also requires Parties to, “*as far as possible and as appropriate, cooperate with other Contracting Parties ... on ... matters of mutual interest, for the conservation and sustainable use of biological diversity*” (article 5).

(i) The Millennium Development Goals

In 2000, during the United Nations Millennium Summit, the world’s Governments and leading development institutions agreed to the Millennium Development Goals (MDGs)—a blueprint of timebound and

8 IUCN, PAY—Establishing payments for watershed services (2006), available at http://www.iucn.org/themes/law/pdfdocuments/DEV03_Pay.pdf.

9 See, e.g., Conservation and Integrated Water Resources Management (2003), available at http://www.iucn.org/themes/law/pdfdocuments/WaterLawSeries-Issue_4.pdf.

10 UNEP et al., Atlas of International Freshwater Agreements, p. 2 (2002).

measurable goals and targets for combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women.¹¹ Under goal 7, ensure environmental sustainability, is the reduction by half, by 2015, of the proportion of people without sustainable access to safe drinking water and basic sanitation. Improved water management and allocation are necessary for maintaining ecosystem functions and thus for enhancing conditions of access to water and sanitation worldwide. Equitable and sustainable water allocation has implications for the achievement of other MDGs too, e.g., poverty and hunger eradication, reduction of child and maternal mortality, and control of major diseases.

With a view to accelerating progress towards the MDGs, the UN Secretary-General established in 2004 his Advisory Board on Water and Sanitation (UNSGAB)—an independent body comprising water leaders from around the world and representing a variety of technical and political backgrounds. In 2006, UNSGAB launched the Hashimoto Action Plan, which points out a number of key actions that Governments should take in pursuing the MDG targets on water and sanitation. Among such actions, countries are called to give due regard to transboundary integrated water resources management, particularly by ratifying and implementing the UN Watercourses Convention (explained in full in section IV). The Board, in turn, will urge countries to ratify that convention and communicate its importance to relevant actors.

As part of UNSGAB's activities for promoting the UN Watercourses Convention, the Board, the German Technical Cooperation Agency (GTZ), the Italian Government, IUCN and WWF co-hosted an information meeting in April 2008 during the 118th Session of the Inter-Parliamentarian Union, in Cape Town, South Africa. During the Assembly, His Royal Highness the Prince of Orange, speaking to the Plenary as UNSGAB's Chair, underlined once again the relevance of the entry into force and implementation of the UN Watercourses Convention for the achievement of the MDGs.

(ii) The 2002 World Summit on Sustainable Development

In 2002, 20 years after the Rio Conference, the world's nations gathered during the World Summit on Sustainable Development.¹² The Plan of Implementation of the 2002 World Summit¹³ emphasizes the importance of integrated natural resources management to sustain economic and social development, as well as the need to promote institutional coordination on water-related issues. In particular, the Implementation Plan called on countries to prepare, by 2005, integrated water resources and efficiency plans, including national/regional strategies, plans and programmes for the integrated management of river basins and aquifers. Attention to the allocation and management of water should be a critical component of those strategies, in order to ensure the efficient use of water resources, due regards to vital human needs, and the adequate balancing between social, economic and environmental interests. Countries are also to develop programs to address the prevention and mitigation of the effects of extreme water-related events. The Implementation Plan also mentions that water management must occur at the river basin, national, and regional levels.

Progress towards the preparation of integrated water resources and efficiency plans has been slow. In 2003, the Global Water Partnership conducted an "informal stakeholder baseline survey"¹⁴ in 108 countries to assess where they stood in terms of adapting and reforming their water governance systems towards more sustainable water management practices. The preliminary results showed that, among the countries

11 See United Nations, *Implementing the Millennium Declaration Factsheet* (2002), available at <http://www.un.org/millenniumgoals/MDGs-FACTSHEET1.pdf>.

12 See the official webpage of the Summit, available at <http://www.un.org/events/wssd/>, for more information.

13 See Johannesburg Declaration on Sustainable Development, UN Doc. A/Conf.199/L.6/Rev.2 (2002).

14 See GWP webpage, <http://www.gwpforum.org/gwp/library/IWRMSurvey.pdf>.

surveyed, around 10% had made good progress towards more integrated approaches; 50% had taken some steps in that direction, but needed to increase their efforts; and the remaining 40% were still at the initial stages of the process. A similar survey conducted in 2005¹⁵ indicated that approximately 21% of the countries concerned had strategies/plans in place or well underway; a further 53% had initiated a process for the formulation of an IWRM strategy/plan. In those countries, the IWRM approach appeared to be accepted as the way forward for better water resources management and use. The remaining 26% had made only limited progress and, in many cases, had expressed a wish to move forward, but needed external support in carrying out the necessary governance reforms. Those surveys are not directly comparable as they included different countries and used different questionnaires. However, they indicate an increase from 60% to 74% in the countries that have adopted and are implementing IWRM.

The Plan of Implementation also addresses the links between inland water and the coastal and marine environments, for which water allocation may also have important implications, as discussed above. The Plan encourages the application of the ecosystem approach, which highlights the importance of integrating the management of freshwater, coastal and marine ecosystems; calls on States to give due regard to relevant international instruments (e.g., the Ramsar Convention, the CBD, and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities); and highlights the importance of proper watershed planning and the protection of wetland ecosystems in coastal zones.

(iii) UN-Water and the UN Water Decade

In 2003, UN-Water became the official United Nations mechanism to coordinate and integrate the activities of the 24 UN agencies, programs, and funds in charge of water matters. Among the member programs, UNEP and UNDP, under the oversight of the Global Environment Facility (GEF), implement the focal area “International Waters.” This focal area covers programmes and projects aimed at improving the management of the world’s shared water resources, with the ultimate goal of supporting the achievement of the MDGs.

UNEP, specifically, coordinates the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), adopted in 1995. Under this programme, 108 countries and the European Commission endeavour to protect and preserve the marine environment from the adverse impacts of land-based activities. The threats in question often reach the sea through rivers, e.g., through municipal sewage, chemical discharges from industrial facilities, and fertilizer run-off from agricultural activities. Physical changes in the coastal zone, such as the construction of dams, may also have an impact on the marine environment and dependent activities. Improved water management should thus be the core of the GPA. In this sense, article 23 of the UN Watercourses Convention requires States to, “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, taking into account generally accepted international rules and standards.”

In addition, the UNESCO initiative “From Potential Conflict to Cooperation Potential (PCCP)” facilitates multi-level and interdisciplinary dialogue in order to foster peace, cooperation and development through the management of shared water resources. The PCCP addresses situations where water users need support to manage transboundary waters in a peaceful and equitable manner.

UN-Water also works to improve links with external partners, assesses and reports on the state of the world’s water systems, and oversees the implementation of the water- and sanitation-related targets

15 See GWP webpage, <http://www.gwpforum.org/gwp/library/IWRMSurvey-finpara.pdf>.

under the Millennium Development Goals, as well as of all relevant decisions reached at the 2002 World Summit on Sustainable Development.

Under UN-Water, 2003 was proclaimed the International Year of Freshwater. In 2004, the UN released “Water Without Borders,” a two-page background on transboundary water issues that refers to the UN Watercourses Convention when highlighting that more needs to be done to ensure that countries share water equitably, in preparation for the period between 2005 and 2015, declared as the “UN International Decade for Action: Water for Life.”¹⁶ UN-Water has also established a Task-Force to plan and carry out activities on the topic of transboundary waters, with a view to supporting cooperation among copriarians.

(iv) The 2005 World Summit outcome

In 2005, nations gathered to identify themes and issues on which the international community and the UN System should focus in coming years. The document, entitled “2005 World Summit Outcome,” reiterates earlier internationally agreed Government commitments and calls on countries to a) work together to prevent armed conflict, including disputes over scarce transboundary environmental resources; b) cooperate to build an effective and efficient collective security system, of which equitable access to freshwater resources must be an integral part; and c) maintain international peace and security through the cultivation of friendly relations among States, which can be fostered and strengthened through transboundary water cooperation and equitable water allocation.¹⁷

IV. WATER ALLOCATION AND MANAGEMENT, TRANSBOUNDARY WATER ISSUES AND THE CBD

(i) Attention to water allocation and management and cooperation between States under the CBD

Water availability plays a critical role in sustaining healthy aquatic ecosystems. Changing the allocation and management of water in rivers may change all aspects of ecosystem functioning. For example, reducing flow rates in rivers can increase the concentration of pollutants and the deposition of sediments. It can also alter river habitat and result in changes in, and loss of, adjacent floodplains. Moreover, water transfers from one basin to another change the hydrological regime of each system and can lead to the widespread introduction of alien species. Significant changes in hydrological regimes may also have serious consequences for the ecology of estuaries. Consequently, water allocation and management are crucial for most sections of the CBD programme of work on inland waters biodiversity.

Numerous goals and activities of the programme of work on the biological diversity of inland water ecosystems refer to water allocation and management, directly or indirectly. For example, under goal 1.1, objective (b) refers to the adoption of integrated river basin management strategies, aimed at restoring or improving the quality, supply, functions and values of inland water resources. Activities 1.1.2 (for Parties) and 1.1.10(a) (for SBSTTA) relate to the development of management strategies for inland water ecosystems that aim to secure the environmental flows required for maintaining ecosystem functioning and integrity. In so doing, Parties are to take into account the possible effects on those ecosystems of climate change and desertification, and incorporate the corresponding measures to mitigate and adapt to

16 International Decade for Action, ‘Water for Life’, 2005-2015, G.A. Resolution 58/217, UN Doc. A/res/58/217 (9 Feb. 2004).

17 2005 World Summit Outcome, U.N. Doc. A/res/60/1(SUPP.) (24 Oct. 2005).

such effects in their planning process. In support of this activity, SBSTTA is requested to review existing information, guidance and technical papers relating to water allocation, and advise the Conference of the Parties accordingly, in conformity with activity 1.1.10.

The programme of work also explicitly addresses transboundary waters. Objective (a) of goal 1.1 refers to the adoption of integrated land and catchment approaches that incorporate the ecosystem approach, as well as the conservation and sustainable use of inland water ecosystems, including transboundary watersheds. Activity 1.1.12(b) invites the Ramsar Secretariat to provide information on model approaches to transboundary river basin management that can demonstrate effective interstate cooperation mechanisms. Under activity 3.1.1, Parties are to encourage and, where possible, support, applied research to gain an improved understanding of the status, trends, taxonomy and uses of biological diversity in inland water ecosystems, including transboundary basins. Activity 3.2.1 calls on Parties to take fully into account the transboundary nature of many inland water ecosystems when preparing national assessments of freshwater biodiversity, of threatened habitats and species, and of alien species. That activity also recognizes that it may be appropriate for relevant regional and international bodies to contribute to such assessments. Specifically for transboundary inland water ecosystems, activity 3.3.3 calls on Parties to undertake, where feasible and appropriate and by agreement between the Parties concerned, collaborative impact and environmental flow assessments.

This brief analysis shows that, although the relevant CBD programme of work takes into account both water allocation/management and transboundary waters, it lacks specific principles and rules governing *transboundary water allocation and management*. Such are clearly necessary where activities in one country have impacts in another, either upstream (e.g., blocking migratory routes of fish), or downstream (e.g., impacts of upstream sources of water pollution on water quality downstream). Here is where international cooperative agreements, in particular the UN Watercourses Convention and the UNECE Water Convention, could supplement and strengthen the CBD programme of work on the biodiversity of inland water ecosystems.

(ii) The role of watercourse conventions

The United Nations Watercourses Convention was adopted by an overwhelming majority and under the sponsorship of 38 States at the United Nations General Assembly in May 1997. A global and flexible framework instrument, its purpose is to govern the use, management, and protection of international watercourses. The convention is open for accession by all States and regional economic organizations. It currently has 16 contracting States and requires the deposit of a total of 35 instruments of ratification or accession for its entry into force (article 36) (see annex II for the detailed status of ratification of the UN Watercourses Convention and the UNECE Water Convention).

With its focus on shared water resources, the UN Watercourses Convention highlights in its preamble the importance of international cooperation and good neighborliness for the “utilization, development, conservation, management and protection of international watercourses and the promotion of the optimal and sustainable utilization thereof.” In addition, it requires States to “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” (article 8(1)). Furthermore, the convention *encourages* the adoption of watercourse agreements and the harmonization of existing treaties with the convention, as well as the establishment of joint mechanisms and commissions (articles 3(3)-(4) and 8(2)).

The UNECE Water Convention was adopted in 1992 among the States that are members of the United Nations Economic Commission for Europe (UNECE) and became effective four years later. As the

convention stands today, only UNECE Member States can become Parties to it; 35 of the 56 Member States, plus the European Community, have done so. In 2003, the Parties to the convention adopted amendments opening it for accession by non-UNECE Member States. The amendments, however, are not yet in effect.

The UNECE Water Convention is more specific on the subject of international cooperation than the equivalent provision of the UN Watercourses Convention. It goes as far as to determine the basis on which that cooperation is to occur. The provision requires that States, “on the basis of equality and reciprocity, enter into bilateral or multilateral agreements or other arrangements, where these do not yet exist, or adapt existing ones, where necessary to eliminate the contradictions with the basic principles of this Convention, in order to define their mutual relations and conduct regarding the prevention, control and reduction of transboundary impact... The agreements or arrangements ... shall provide for the establishment of joint bodies” (article 9(1)-(2)).

Therefore, all three conventions require international cooperation as a major requisite for advancing their respective interlinked objectives on the equitable and sustainable use and protection of international watercourses and biodiversity. Arguably, cooperation between watercourse States would be a specific application of the general duty to cooperate under Article 5 of the CBD. However, it could also be argued that the CBD leaves too much room for the discretion of watercourse States when only requiring cooperation “as far as possible and as appropriate.”

The key difference between the two water conventions and the CBD seems to be that the UN Watercourses Convention and the UNECE Water Convention not only require cooperation, but develop a complete and detailed set of rules and mechanisms for enabling that cooperation to unfold. The CBD, on the other hand, has emphasized the need for States to address transboundary river basin management issues, but still lacks principles and specific provisions governing and guiding cooperation between watercourse States. The rules and mechanisms of the UN Watercourses Convention and the UNECE Water Convention, therefore, have much to offer for supplementing the relevant CBD regulatory framework and even for contributing to the development of specific guidance under the CBD.

In sum, although the *CBD recognizes the need for international cooperation in its implementation*, that convention *lacks appropriate provisions* dealing specifically with the rights and duties of co-basin States for sharing waters equitably and sustainably. This is a *regulatory gap that will eventually need to be addressed* by CBD Parties if they are serious about achieving the *goal of conserving inland water biodiversity in transboundary water systems*.

The entry into force and widespread implementation of the UN Watercourses Convention and of the 2003 amendments to the UNECE Water Convention would represent important steps in that direction. Arguably, as effective *global* legal frameworks dealing specifically with the conservation and management of transboundary watersheds, those conventions would foster and support the adoption and implementation of watercourse agreements at the *basin level*. They incorporate a number of rules and principles that are consistent with and would advance the implementation of the CBD. Examples include the duties to cooperate and negotiate in good faith, to exchange information regularly, to prevent significant transboundary harm, and to use and protect international watercourses and their ecosystems in an equitable and reasonable manner. Such principles supplement key CBD provisions (i.e., article 5, on international cooperation; article 13(1)(c), on information exchange and interstate consultations; and article 18(1), on technical and scientific cooperation). In order to address this need, co-basin States have come together through multilateral and bilateral treaties that establish formal management institutions and other col-

laborative mechanisms in transboundary watersheds (“watercourse agreements”).¹⁸ Many such treaties offer important guidance for States to coordinate with each other when allocating water rights and even to make joint decisions.

Over 150 watercourse agreements have been adopted since 1950.¹⁹ Some of those instruments address the conservation of inland water ecosystems in a direct way, particularly the newest ones, whereas others do so only indirectly. Some also address pollution, the introduction of invasive alien species, or the interfaces between freshwater and marine ecosystems. Nonetheless, only half of those agreements contain monitoring provisions and 80% lack or have inadequate enforcement mechanisms.²⁰ Furthermore, around 60% of international watercourses are not governed by agreements, and 80% of the existing agreements do not involve all co-riparians.²¹

The international community has already recognized the need to support and reinforce national efforts towards achieving agreed water goals and targets through the establishment of good governance mechanisms at the international level²².

Sections V and VI, respectively, investigate in further detail how the UN Watercourses Convention and the UNECE Water Convention can contribute to the implementation of the relevant provisions of the CBD and its programme of work on the biological diversity of inland water ecosystems by improving the regulatory framework governing the allocation and management of water to sustain ecological functions. The two watercourse conventions are compared in these regards in section VII.

(iii) Other guidance for transboundary water allocation and management

Abundant guidance on water allocation at the national level is readily available. There is, however, a significant need to improve the understanding and governance of technical and policy issues relating to the management of *transboundary* inland water systems.

Some important work has been done in this sense under the auspices of the Ramsar Convention. Similarly to the CBD, the Ramsar Convention requires cooperation between Parties on matters of mutual interest and highlights the urgent need to improve the allocation and management of water within transboundary inland water systems. While the CBD has incorporated concerns with transboundary waters into its programme of work on inland water ecosystems, the Ramsar Convention has adopted important guiding tools dealing specifically with interstate cooperation for managing transboundary wetlands. For example, Handbook 17 (International Cooperation) guides Parties in identifying their shared wetland systems and in cooperating with their respective neighbours for managing those systems in an integrated fashion. The Handbook shows how this cooperation may involve formal joint management institutions or *ad hoc* collaboration, e.g., for developing and implementing management plans and strategies.

18 See UN Watercourses Convention, Article 3(3), defining the expression “watercourse agreements.”

19 See, e.g., International Water Governance: Conservation on Freshwater Ecosystems, Vol. 1, International Agreements—Compilation and Analysis, Environmental Policy and Law Paper No. 55 (Alejandro Iza ed.) (2004), available at <http://www.iucn.org/themes/law/pdffdocuments/EPLP55EN.pdf>.

20 See UNDP, *Protecting International Waters—Sustaining Livelihoods* (2004), available at http://www.undp.org/gef/05/documents/publications/intlwaters_brochure2004.pdf

21 UNEP et al., Atlas of International Freshwater Agreements, p. 2 (2002), available at <http://www.transboundarywaters.orst.edu/publications/atlas/>.

22 See 13th Session of the Commission on Sustainable Development, New York City, U.S., Apr. 30, 2004 & Apr. 11-22, 2005, *Report on the 13th Session, Policy options and practical measures to expedite implementation in water, sanitation and human settlements*, p.5, Resolution 13/1, UN Doc. E/2005/29, E/CN.17/2005/12, <http://daccessdds.un.org/doc/UNDOC/GEN/N05/382/16/PDF/N0538216.pdf?OpenElement>.

The useful work developed under the auspices of the Ramsar Convention for improving guidance in the field of transboundary water cooperation is highly commendable. However, practice shows that, not simply guidance, but *clear procedural and substantive binding rules* are necessary for governing international watercourses and thus enabling interstate cooperation even in situations of water-related conflict across international borders.

V. THE UN WATERCOURSES CONVENTION AND THE CBD

The CBD lays down principles, and to some extent activities, to address the need for cooperation between Parties regarding the allocation and management of transboundary inland waters for maintaining ecological functions, as discussed above. However, the CBD does not contain sufficiently developed rules and principles focused specifically on guiding, informing, and supporting cooperation between co-basin States. The CBD alone is thus an inadequate framework for ensuring the conservation and sustainable use of inland water biodiversity in transboundary river basins. This has been recognized in more general terms in the convention text, which refers to the “lack of appropriate policies and laws” as an obstacle to CBD implementation (CBD decision VIII/8, annex, list B,²³).

A likely further impediment is lack of awareness of the relevance of watercourse agreements and of international water law more generally for supplementing the CBD. In the absence of appropriate or insufficient watercourse agreements, the UN Watercourses Convention and the UNECE Water Convention govern transboundary water-related management issues, which include the protection of the ecosystems of international watercourses. For many States, biodiversity conservation and sustainable use may not be the primary motivation for acceding to those conventions. Yet, their widespread implementation would set in motion the conditions for cooperation between watercourse States to develop progressively into more detailed and broader frameworks addressing benefit-sharing, joint water management, and the transboundary protection of related biological resources. (See annex III for a detailed comparison between the CBD, UN Watercourses Convention and UNECE Water Convention.)

(i) Relevant provisions of the UN Watercourses Convention

This subsection provides an overview of the UN Watercourses Convention, particularly of its provisions that may be relevant to the allocation and management of water and other biodiversity-related considerations. The goal is to identify how those provisions could supplement and strengthen the regulatory framework of the CBD. The CBD recognizes that *watersheds* are an appropriate biogeographic unit for applying the ecosystem approach towards the conservation and sustainable use of inland water biodiversity. We thus examine here whether the UN Watercourses Convention could be an appropriate policy framework for better enabling the implementation of the relevant provisions and related programmes of work of the CBD across international borders.

Scope

The UN Watercourses Convention aims to deal with “the problems affecting many international watercourses resulting from, among other things, increasing demands and pollution” (paragraph 4 of its preamble). The convention “applies to uses of international watercourses and of their waters for purposes other than navigation and to measures of protection, preservation and management related to the uses of those

23 Eighth meeting of the Conference of the Parties to the Convention on Biodiversity, decision VIII/8, available at <http://www.cbd.int/decisions/?m=COP-08&id=11020&lg=0>.

watercourses and their waters”(article 1(1)) Therefore, just as much as water allocation, water protection, preservation, and management, including pollution control, are key issues under this convention.

The UN Watercourses Convention applies to all non-navigational uses of international watercourses,²⁴ including environmental ones. The convention determines that, “in the absence of agreement or custom to the contrary, no use of an international watercourse enjoys inherent priority over other uses” (article 10(1)). Hence, the UN Watercourses Convention considers instream water uses just as important as other types of water utilization. That convention is thus in perfect harmony with the CBD and in direct line with the premise that biodiversity conservation must be “a critical demand for freshwater use and managed in coordination with other demands.”²⁵

The scope of the UN Watercourses Convention is further determined by its definition of “international watercourses.” The convention defines a *watercourse* as “a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus” (article 2(a)). This terminology expresses the nature of watercourses in terms of the hydrological cycle, looking at international watercourses (or river *systems*) as an ecological whole, made up of interlinked functioning parts, such as the main river and its tributaries, aquifers, lakes and even glaciers. The convention thus recognizes that the intimate relationship among those different components of a hydrological system requires that States utilize and manage international watercourses as a “unitary whole.” It is then for States to discuss and reach an agreement as to how to accomplish this.

Ecosystem Approach and protection/restoration of ecosystems

The UN Watercourses Convention takes into account and promotes the ecosystem approach in the utilization, management, and protection of international watercourses. This is of great importance here, since the Conference of the Parties to the CBD has recognized the ecosystem approach as the cornerstone for guiding and framing the convention’s implementation. The CBD requires Parties to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies (article 6(b)). In conformity with that provision, the second Conference of the Parties adopted the ecosystem approach as the primary framework for action under the CBD (decision II/8, paragraph 1). The ecosystem approach was reaffirmed by the Conference of the Parties in 2000 (decision V/6). The interpretation and application of the ecosystem approach have since been further detailed, and are now incorporated into all CBD programmes of work (decision VII/11).

In this sense, the UN Watercourses Convention codifies the general obligation for watercourse States to “*individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses*” (article 20). Furthermore, the convention requires the reasonable and equitable utilization of international watercourses to be consistent with the adequate protection of those watercourses (article 5(1)). In this sense, natural conditions, transboundary environmental effects, and the conservation and protection of water resources are all among the factors that watercourse States must consider in the promotion of reasonable and equitable use of shared water resources.²⁶

Through the above provisions, the UN Watercourses Convention arguably incorporates an ecosystem approach. “Since the integrated management of interconnected natural resources is necessary to conserve freshwater ecosystems, a concern with land-based activities taking place within the river basin that might

²⁴ Nonetheless, navigational uses of international watercourses do fall under the scope of the convention, “insofar as other uses affect navigation or are affected by navigation.” UN Watercourses Convention, Article 1(2).

²⁵ Extracted from CBD webpage, <http://www.biodiv.org/programmes/areas/water/default.asp>.

²⁶ Id. Article 6.

affect the environmental conditions of an international watercourse is implicit in the convention.”²⁷ Indeed, the consideration of the links between the management of land and water resources is at the core of the ecosystem approach.

Also in line with the ecosystem approach, the UN Watercourses Convention integrates the management of water quality and quantity, by making clear that environmental concerns and ecosystem protection are under its scope just as much as the utilization of international watercourse is.²⁸ This is a sound policy. Since environmental protection and human health and well-being depend on both water quality and quantity issues, water management must deal with water quantity and quality in an integrated manner. Among many developing countries, water scarcity—and thus the need for adequate transboundary water allocation—remains at the centre of discussions. Of course, water quality problems also exist in the developing world and, in many places, are increasing in gravity and proportion.

Therefore, as a global framework dealing specifically with international water law and policy, the UN Watercourses Convention would better enable the application of the ecosystem approach in the context of interstate cooperation on the development and management of international watercourses.

Also related to the ecosystem approach is the conservation of ecosystems, one of the CBD’s three main objectives (article 1). The obligation to “rehabilitate and restore degraded ecosystems” is a more specific obligation (article 8(f)). Restoration of inland water ecosystems is also specifically mentioned as a priority activity (annex to decision VII/4).

The UN Watercourses Convention codifies an obligation to protect and preserve ecosystems. The convention, however, does not contain an explicit requirement for States to restore aquatic ecosystems *already* degraded at the time of their accession to the convention. Still, it seems that “restoration” would not be completely beyond the convention’s scope. In some cases, ecosystem rehabilitation might be the only or most reasonable option for protecting and preserving certain ecosystems. In that sense, the convention establishes 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” (article 5(2)). Moreover, once States become Parties to the convention, they are subject to the following: “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 (article 7(2)).

The flexible approach of the UN Watercourses Convention seems to be consistent with its global character. The restoration of ecosystems, particularly aquatic ones, may require significant material and financial resources not always available in developing countries. As the obligation to protect and preserve ecosystems is framed in general terms under the UN Watercourses Convention, Parties can agree to cooperate with a view to restoring degraded watercourses, but are not legally obliged to do so.

27 Joseph Dellapenna & Flavia Loures, *Forthcoming developments in international groundwater law: proposals for the way ahead*, in *Water21* (Aug. 2007).

28 See Attila Tanzi & Maurizio Arcari, *The United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, pp. 54-56 (2001).

Sustainable Development

Sustainable development has been a keystone principle of environmental law since the publication of the Brundtland Report in 1987.²⁹ Also incorporated into the Rio Declaration,³⁰ the principle of sustainable development guides both the CBD and the UN Watercourses Convention. The CBD states its Parties' determination "to conserve and sustainably use biological diversity for the benefit of present and future generations" (paragraph 23 of the preamble).

In turn, the UN Watercourses Convention 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 for present and future generations" (paragraph 5 of the preamble).

Also of relevance to sustainable development is the CBD's recognition that "special provision is required to meet the needs of developing countries, including the provision of new and additional financial resources and appropriate access to relevant technologies"³¹ (paragraph 16 of its preamble).

In harmony with that approach, the UN Watercourses Convention expressly acknowledges "the special situation and needs of developing countries" (paragraph 7 of the preamble). In addition, it requires States to "utilize an international watercourse in an equitable and reasonable manner . . . , with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse" (article 5(2)). Hence, the UN Watercourses Convention places *sustainability concerns at the core of the principle of reasonable and equitable use*—the convention's cornerstone, which will guide its application and the interpretation of all its provisions.

Obligation not to Cause Significant Transboundary Harm

The CD and the UN Watercourses Convention are aligned with each other in regards to how they approach the issue of significant transboundary harm. The CBD codifies the general responsibility of States "to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction" (article 3). Furthermore, it requires Parties to, "where a significant adverse effect on biological diversity has been determined pursuant to Article 7, regulate or manage the relevant processes and categories of activities" (article 8(1)).

The UN Watercourses Convention simply adjusts those obligations to the special case of international watercourses, requiring that States, "in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States." (article 7(1)). It goes on to state that "where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation" (article 7(2)).

29 See World Commission on Environment and Development, "Our Common Future" (1987), UN Doc. A/42/427, Development and International Co-operation: Environment (2 Aug. 1987).

30 See *Rio Declaration on Environment and Development* (1992), in *Report of the United Nations Conference on Environment and Development*, Rio de Janeiro, 3-14 June 1972, Principle 3.

31 See *id.*, Principle 6.

Prevention, Control and Reduction of Pollution

The CBD requires Parties to regulate or manage the relevant processes and categories of activities that are significantly harmful to biodiversity (article 8(l)). Pollution could be among those activities. In pursuance of that provision, CBD Parties should “identify and remove the sources, or reduce the impacts, of water pollution” on inland water ecosystems (activity 1.1.3 of the programme of work).

Dealing specifically with *transboundary* water pollution, the UN Watercourses Convention establishes as follows:

“Watercourse States *shall* 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” (article 21(2)).

Furthermore, States must, “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: (a) setting joint water quality objectives and criteria; (b) establishing techniques and practices to address pollution from point and non-point sources; (c) establishing lists of substances the introduction of which into the waters of an international watercourse is to be prohibited, limited, investigated or monitored” (article 21(c)).

The above requirements of the UN Watercourses Convention could add to the applicable CBD regulatory framework. The CBD does not specifically address transboundary water pollution, even though that problem represents a critical issue for biodiversity.

Protection of Living Resources: Invasive Alien Species and Transboundary Migratory Species

The CBD requires States to “prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species” (article 8(h)). The inland waters programme of work emphasizes the importance of considering the topic in the context of inland waters. Moreover, the related cross-cutting CBD work programme proposes specific strategies for addressing invasive species.

The UN Watercourses Convention requires States to “prevent the introduction of species, alien or new, into an international watercourse” (article 22). Although it does not expressly include the duties to control or eradicate alien species, this provision would still be important to add to the CBD a clear consideration of the transboundary dimension of the problem, where river systems are shared between two or more countries. Besides, in many cases, control and eradication of invasive species may be required under the UN Watercourses Convention (article 20), which deals with the protection and preservation of the ecosystems of international watercourses. Probably for this reason, the CBD, in its programme of work on invasive alien species (decision VIII/27), urges the world’s nations to become Parties to the UN Watercourses Convention.

As for migratory species, States actually share transboundary aquatic biological resources that move across international boundaries. Those species are extremely important and vulnerable to both system-wide disturbances (e.g., pollution) and to point-source disturbances dispersed over large distances (e.g., dams blocking migratory routes). Freshwater-dependent fishes and cetaceans, including those migrating within the river and to/from the sea, are particularly important groups. The UN Watercourses Convention

considers water itself to be the resource that is actually shared between States, whilst still requiring the ecosystems of international watercourses to be protected and preserved. The convention does not explicitly refer to migratory species, although it does not foreclose the possibility that Parties may establish a joint fisheries management regime in the context of watercourse agreements.

So, in what ways could the UN Watercourses Convention support the implementation of relevant provisions of the CBD and the Convention on Migratory Species (CMS), the intergovernmental UN treaty that aims to conserve migratory species? Assessing the links with the latter convention falls outside the purposes of this study. However, it is worth examining briefly how migratory species could fall under the scope of the UN Watercourses Convention.

As mentioned above, article 20 of the UN Watercourses Convention requires States to protect and preserve the ecosystems of international watercourses. Migratory species are an integral part of those ecosystems and so are also entitled to protection under that provision.

In addition, migratory species are under the protection of the UN Watercourses Convention, which requires States to take all appropriate measures to prevent significant transboundary harm (article 7). This duty of prevention would encompass, for example, direct or indirect harm to transboundary fish stocks or aquatic ecosystems, with cross-border effects on living resource populations. Finally, the convention governs the introduction of invasive species and the protection of the marine environment—topics of obvious relevance for the protection of migratory species.

The Convention on Migratory Species illustrates the usefulness and applicability of global conventions governing *shared* natural resources as effective means for tackling transboundary biodiversity issues that require interstate cooperation. The CMS also shows that support for such conventions from a large and diverse base of Parties can be mobilized. The general approach for implementation of the CMS is similar to that of the UN Watercourses Convention. In both cases, Parties sign up to general principles and operational guidance and are called upon to enter into specific agreements focusing, respectively, on a given migratory species or on an international watercourse.

Procedural Rules Applicable to Major Planned Measures

The CBD generally requires States to, “as far as possible and as appropriate, promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate” (article 14(1)(c)).

The UN Watercourses Convention reiterates the general obligation of notification and interstate consultations in the case of planned measures. However, it goes a step further by incorporating a detailed body of procedural rules regarding cooperation and conflict prevention that apply in the case of major planned measures capable of affecting international watercourses and thus resulting in significant transboundary harm. In line with the CBD, those rules involve exchange of information, notification, consultations, and negotiations.

The UN Watercourses Convention stipulates that co-riparians have a duty to “exchange information and consult each other and, if necessary, negotiate on the possible effects of planned measures on the condition of an international watercourse” (article 11). When planned measures may cause significant transboundary impact through harmful effects on an international watercourse, the convention re-

quires the implementing state to notify the other States concerned (article 12). That notification must include any available technical data and information, including the results of any environmental impact assessment.

On this topic, the CBD would supplement the UN Watercourses Convention. It expressly mandates Parties to “introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures” (article 14(1)(a)). The CBD inland waters programme of work highlights the importance of considering and undertaking environmental impact assessment specifically in regards to inland water ecosystems. Finally, the work programme on impact assessment details activities and objectives in that field.

The rules and principles of the UN Watercourses Convention offer predictable and pragmatic guidelines, based on which States can negotiate with one another and draft new or revised watercourse agreements. This is especially important for riparian States in an international watercourse for which no agreement exists or for which the existing agreement does not involve all co-watercourse States or simply lacks equivalent rules and principles. In that sense, the UN Watercourses Convention’s dispute prevention mechanisms applicable to planned measures would supplement the very general provisions that exist under the Convention on Biological Diversity.

The CBD programme of work on inland waters biodiversity recommends that Parties “use, where appropriate, all available information on dams in order to ensure that biodiversity considerations are fully taken into account in decision-making on large dams” (activity 1.1.8). In that regard, the CBD requires Parties to “facilitate the exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity” (article 17).

The UN Watercourses Convention, however, not only codifies a duty related to the regular exchange of data and information, as the CBD does, but also details its implementation (article 9). The convention determines the nature of the minimum information to be exchanged, establishes how often information must be exchanged, governs rights and obligations related to data not readily available, and clarifies the minimum requirements for the collection and processing of data. Therefore, the UN Watercourses Convention could aid in the implementation of the CBD by more strongly fomenting the generation and exchange of data necessary to ensure the sound management of international watercourses.

Dispute Settlement Procedures

Under the CBD, dispute settlement takes place through the ordinary mechanisms of negotiation; good offices of, or mediation by, a third party; conciliation; arbitration; and submission of the dispute to the International Court of Justice (article 27).

The UN Watercourses Convention governs the settlement of disputes that may arise between co-watercourse States, incorporating mechanisms similar to those contained under the CBD (article 33). There is one particular dispute settlement alternative, however, that could better aid in disputes between watercourse States involving biodiversity in international watercourses. According to the convention, if the Parties concerned fail to reach an agreement within six months of the initial request for negotiations, any of the States in question may request the establishment of a fact-finding commission. This impartial commission has the power to investigate and inspect, but remains a consultative commission that may only formulate *recommendations* for an equitable resolution of the dispute. The commission’s report is not binding on Parties, but Parties must consider it in good faith.

(ii) Relation between the River Basin Initiative and the UN Watercourses Convention

As mentioned above, both the UN Watercourses Convention and the CBD codify a general duty regarding information exchange, with the former also detailing the implementation of that duty. In addition, the CBD has relied on the River Basin Initiative (RBI) to assist States in implementing their data-sharing obligation.

The RBI consists of a web-portal³² maintained as part of the joint work-plan between the Ramsar Convention and the CBD.³³ The RBI establishes a global network for the sharing of information and experience, which also links and supports activities applying an integrated approach to the management of biodiversity, wetlands, and river basins. The initiative's aim is to improve the flow of data, information, and expertise between sectors involved in basin-scale water and wetland management, both within and between basins, and to enhance in-country capacity for river basin management. The RBI does not directly develop or implement on-the-ground basin management projects, as there are already a large number of players doing so. The RBI, however, may stimulate or assist implementing organizations and endorse projects contributing to the initiative's goals.

The portal devotes considerable attention to the allocation and management of water in river basins. Transboundary matters and international cooperation are addressed under the sub-topic "Integrated River Basin Management." In that regard, the RBI focuses on the compilation of case studies, the exchange of information on community involvement, demonstration projects, hydrological monitoring, planning procedures, ecosystem restoration, policies and legal instruments, transboundary and international cooperation, and education and public awareness.

As noted above, the UN Watercourses Convention gives considerable weight to the exchange of relevant information (article 9). The availability of accurate, complete, and up-to-date data is a main requirement for the equitable sharing of international watercourses. Hence, the implementation of the UN Watercourses Convention could contribute to the RBI by improving dialogue and data-sharing between watercourse States, further contributing to the generation, processing and dissemination of data potentially useful to feed into that initiative. The RBI, in turn, can be a medium for advocacy and awareness-raising about the importance of the UN Watercourses Convention, as well as for the dissemination of relevant CBD decisions and recommendations.

VI. THE UNECE WATER CONVENTION AND THE CBD

This section provides an overview of the UNECE Water Convention, its protocols and recommendations that might support CBD implementation.

Environmental protection is a main concern of the UNECE Water Convention. Right from its preamble, the "conservation of water resources and environmental protection" are among its major goals. Parties must ensure that transboundary waters "are used with the aim of ecologically sound and rational water management, conservation of water resources and environmental protection," "in a reasonable and equitable way" (article 2(2)(b)-(c)). In this sense, the convention directly supports CBD considerations.

32 CBD, River Basin Initiative webpage, available at <http://www.riverbasin.org/>.

33 The Initiative was endorsed by the fifth Conference of Parties of CBD in May 2000 through decision V/2.

The UNECE Water Convention creates a consistent and detailed operational legal framework to support States in the implementation of activities and actions related to the protection, ecologically sound management, and sustainable use of surface and underground transboundary waters, as well as the conservation and restoration of associated or dependent ecosystems. The convention also includes provisions for monitoring, research and development, consultations, warning and alarm systems, mutual assistance, institutional arrangements, data-sharing, and public access to information, in fashions similar to those of the UN Watercourses Convention.

The provisions of the UNECE Water Convention are characterized by a high level of stringency, as indicated by the use of superlative terminology. For example, it requires Parties to apply the “best available technology” and the “best environmental practices” (article 3(f) and (g)). Many European river basin agreements draw from the provisions of the UNECE Water Convention, which has been the framework for co-basin States in the region to implement transboundary cooperation. The EU Water Framework Directive, for example, is a more specific and detailed regulatory framework for water resources management applicable among the EU Member States. The directive was influenced greatly by the work carried out under the UNECE Water Convention.

(i) Relevant Provisions of the UNECE Water Convention

Scope

The UNECE Water Convention has a broader scope than the UN Watercourses Convention. The former applies not only to international watercourses, but to all *transboundary waters*, defined as “any surface or ground waters which mark, cross or are located on boundaries between two or more States; wherever transboundary waters flow directly into the sea, these transboundary waters end at a straight line across their respective mouths between points on the low-water line of their banks.”

In addition, while equitable and reasonable utilization lies at the centre of the UN Watercourses Convention, the fundamental duty under the UNECE Water Convention relates to the adoption of appropriate measures for the prevention, control, and reduction of any transboundary impact.³⁴

Ecosystem approach: conservation and restoration

As mentioned above, the ecosystem approach is the primary framework for action under the CBD. The ecosystem approach also receives considerable attention under the UNECE Water Convention as a fundamental method for preventing, controlling, and reducing transboundary impact. In this sense, it establishes that, in order “to prevent, control and reduce transboundary impact, the Parties shall develop, adopt, implement and, as far as possible, render compatible relevant legal, administrative, economic, financial and technical measures, in order to ensure, *inter alia*, that ... sustainable water-resources management, including the application of the ecosystems approach, is promoted” (article 3(2)(i)).

Parties to the UNECE Water Convention must also take all appropriate measures to ensure the conservation and, where necessary, restoration of ecosystems (article 2(2)(d)). This provision is in harmony with the CBD, which addresses the conservation of ecosystems as one of its main objectives. The CBD also incorporates an obligation related to the rehabilitation and restoration of degraded ecosystems (article 8(f)). The programme of work also refers to restoration of inland water ecosystems as a priority activity.

³⁴ See UNECE Water Convention, Article 2(1).

Another aspect of the ecosystem approach, as applied to water resources, relates to the integration between water quality and quantity issues. In that regard, “one may detect language suggesting that the primary focus of the UNECE Water Convention is water quality issues,”³⁵ given that the convention’s provisions deal mainly with transboundary impacts caused by pollution. Nonetheless, the convention does take into account water quantity requirements. For example, the convention requires States “to elaborate joint monitoring programmes concerning water quality and quantity” (article 9(2)(b)). Moreover, the prevention, control, and reduction of transboundary impacts are the central goals of the convention (article 2(1)). When defining the expression *transboundary impact*, the convention not only addresses harm to water quality, but is flexible enough to encompass injuries of both a quantitative and qualitative nature (article 1(2)). Finally, the convention incorporates a general requirement for States to “ensure that transboundary waters are used in a reasonable and equitable way” (article 2(2)(c)).

Principles of Environmental Law

The UNECE Water Convention codifies three key principles of environmental law: precautionary principle, polluter-pays principle, and sustainability. The precautionary approach establishes that “action to avoid the potential transboundary impact of the release of hazardous substances shall not be postponed on the ground that scientific research has not fully proved a causal link between those substances, on the one hand, and the potential transboundary impact, on the other hand” (article 2(5)(a)). The precautionary principle goes beyond mere prevention and anticipates risks, even if such risks are only potential. In harmony with that provision, the preamble to the CBD states that Parties are “aware of the general lack of information and knowledge regarding biological diversity and of the urgent need to develop scientific, technical and institutional capacities to provide the basic understanding upon which to plan and implement appropriate measures.”

The convention codifies the polluter-pays principle, “by virtue of which costs of pollution prevention, control and reduction measures shall be borne by the polluter” (article 2(5)(b)). The OECD has underlined that “the uniform application of this principle (...) would encourage the rational use and the better allocation of scarce environmental resources.”³⁶ Therefore, this principle is in direct line with the CBD goals towards the sustainable use and allocation of water resources. Yet, the CBD does not contain language about that principle. Hence, this example illustrates the role of the UNECE Water Convention for strengthening the regulatory framework of the CBD.

Finally, sustainable development guides both the CBD and the UNECE Water Convention. The preamble to the CBD states its Parties’ determination “to conserve and sustainably use biological diversity for the benefit of present and future generations.” The UNECE Water Convention, in turn, requires water resources to be “managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs” (article 2(5)(c)).

Obligation Not to Cause Transboundary Impact

The UNECE Water Convention establishes the general obligation for its Parties to “take all appropriate measures to prevent, control, and reduce any transboundary impact” (article 2(1)). The convention defines the expression *transboundary impact* as “any significant adverse effect on the environment result-

35 Attila Tanzi, *The Relationship between the 1992 UNUN/ECE 92 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the 1997 UN 97 Convention on the Law of the Non Navigational Uses of International Watercourses*, Report of the UNECE Task Force on Legal and Administrative Aspects Geneva, February 2000.

36 OECD, “The Implementation of the Polluter-Pays Principle, Recommendation adopted on 14 Nov. 1974, C(74)223, available at <http://sedac.ciesin.columbia.edu/entri/texts/oecd/OECD-4.09.html>.

ing 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” (article 1(2)).

Moreover, the UNECE Water Convention contains a list of legal, administrative, economic, financial, and technical measures which Parties are expected to develop, adopt, implement, and, as far as possible, render compatible, with a view to preventing, controlling, and reducing transboundary impact. Those measures include a) prior licensing, monitoring, and control of waste-water discharges, b) monitoring of the conditions of transboundary waters, c) research and development, d) environmental impact assessments, and e) contingency planning.

Specifically in regards to responsibility and liability, the UNECE Water Convention requires Parties to “support appropriate international efforts to elaborate rules, criteria and procedures in the field of responsibility and liability” (article 7).

Hence, the UNECE Water Convention would provide valuable guidance for the implementation of article 3 of the CBD, codifying the general obligation of Parties not to cause transboundary damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Prevention, Control and Reduction of Pollution

Pollution is a major concern under the UNECE Water Convention, which requires Parties to “take all appropriate measures to prevent, control, and reduce pollution of waters causing or likely to cause transboundary impact” (article 2(2)(a)). In addition to enunciating that general duty, the convention details measures for its sound implementation. For example, the convention specifies that measures addressing pollution should be taken preferably at source and prohibits cross-media pollution.

In addition, the convention refers to numerous measures for States to adopt, with a view to tackling pollution problems. Those measures may include the application of low- and non-waste technology; minimization of risk of accidental pollution; best available technology for discharges of hazardous substances; treatment of municipal waste water; and best environmental practices to address diffuse sources.

The UNECE Water Convention also recognizes pollution as a main issue for joint bodies to address when implementing watercourse agreements. For example, joint bodies are to collect, compile and evaluate data in order to identify pollution sources and draw up inventories; elaborate emission limits for waste water and evaluate the effectiveness of control programmes; and elaborate joint water-quality objectives and criteria; develop concerted action programmes for the reduction of pollution loads.

In turn, the CBD generally requires Parties to deal with activities that are significantly harmful to biodiversity, which would include pollution sources (article 8(1)). The CBD contains no specific requirement or guidance on water pollution, except for a brief reference in the programme of work on inland waters biodiversity to the identification of pollution sources and the reduction of pollution impacts. Hence, the UNECE Water Convention has much to add to the implementation of the CBD in regards to water pollution and to transboundary cooperation to prevent, control, and mitigate its harmful effects.

Procedural Rules Applicable to Planned Measures and Joint Bodies

The UNECE Water Convention requires States sharing transboundary waters to adopt watercourse agreements and establish joint bodies for implementing those agreements (article 9(1)-(2)). The conven-

tion defines a joint body as “any bilateral or multilateral commission or other appropriate institutional arrangements for cooperation between the Riparian Parties” (article 1(5)).

In this sense, the UNECE Water Convention does not create a detailed procedure for interstate consultations on planned measures, such as that in the UN Watercourses Convention. Instead, the UNECE Water Convention recognizes the role of joint water management bodies 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 impact” (article 9(2)(h)).

(ii) Recommendations on Payments for Ecosystem Services (PES) in Integrated Water Resources Management (IWRM)

The UNECE Water Convention is operational and has a Secretariat, working groups, and Meetings of Parties implementing a work programme. The convention’s implementation has resulted in numerous publications and guidelines, which support States in carrying out activities thereunder.

Among those guidelines, the PES recommendations, adopted in 2006, are a pioneering policy instrument. They are the first example of international guidance on PES in IWRM not only at the local and national levels but also at the transboundary level. As the recommendations are not legally binding, they do not supersede the legal obligations arising from the UNECE Water Convention or other agreements on transboundary waters. Furthermore, Governments and other actors are encouraged to apply the recommendations according to their needs and conditions.

The main objective of these recommendations is to provide guidance on the establishment and use of PES to implement IWRM through the promotion of the protection, restoration and sustainable use of water-related ecosystems. The recommendations provide guidance for the establishment of well-designed PES schemes that succeed in facilitating the integration of relevant policies at all levels; contributing to the establishment of markets for ecosystem services; and broadening and diversifying the financial basis for ecosystem protection, restoration and sustainable use.

The PES recommendations could contribute significantly to the ongoing work under the CBD on economics, trade and incentive measures. In particular, the recommendations could inform the development of specific guidance on payments for ecosystems services under the CBD.

(iii) Protocols under the UNECE Water Convention

Two protocols have been adopted under the Convention in order to provide a more detailed framework on crucially important subjects. The Protocol on Water and Health was adopted in London on 17 June 1999, has been ratified by 21 countries and entered into force on 4 August 2005. The Protocol on Civil Liability was adopted in Kiev on 21 May 2003, has been signed by 24 countries and ratified only by one. It will need 15 additional ratifications to achieve the 16 needed for its entry into force.

The Protocol on Water and Health

In 1999, the Parties to the UNECE Water Convention adopted the Protocol on Water and Health. The protocol entered into force in 2005 and aims to protect human health and well-being through better water management, protection of aquatic ecosystems, and the prevention, control and reduction of water-related diseases. In a world where improving water supply and sanitation is fundamental for breaking the vicious cycle of poverty, the protocol is the first international agreement of its kind. The Protocol on

Water and Health introduces a social component into cooperation on water management, linking water resources management, social and economic development, and the protection of natural ecosystems. It was adopted specifically to attain an adequate supply of safe drinking water and adequate sanitation for everyone, and to protect sources of drinking water. In this sense, the protocol is a direct contribution to the achievement of the Millennium Development Goals and has much to contribute to the implementation of the CBD and its programme of work.

The Protocol on Civil Liability

In 2003, the Parties to the UNECE Water Convention adopted a second instrument: the Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters. The protocol is still not in effect, but it is open to all United Nations Member States, upon approval by the Meeting of the Parties. The Protocol provides for a comprehensive civil liability regime, under the polluter-pays principle, in order to ensure the availability of adequate and prompt compensation, in the case of damage caused by the transboundary effects of industrial accidents to international waters.

The Protocol on Civil Liability advances the CBD work on liability and redress. The protocol could be a useful tool for enhancing CBD activities in this field. It also sets a good example of how liability and redress can be developed within the framework of international conventions. The protocol represents a good case study under decision VIII/29, paragraph 2, on the same subject.

VII. COMPARISON OF THE UN WATERCOURSES CONVENTION AND THE UNECE WATER CONVENTION

This section compares the UN Watercourses Convention and the UNECE Water Convention in the context of water allocation and management and the CBD. As explained below, both treaties may in time become effective *global* conventions governing transboundary inland water systems.

The UN Watercourses Convention was drafted, negotiated, and adopted in 1997 as a universal instrument resulting from a global effort to codify and develop the law of the non-navigational uses of international watercourses under the auspices of the United Nations. For its part, the UNECE Water Convention was negotiated and ultimately adopted in 1992 exclusively among the States that are members of the United Nations Economic Commission for Europe (UNECE). While the UN Watercourses Convention and general international water law operate on a global scale, the management of transboundary water systems is also governed at the basin or sub-basin levels, through specific watercourse agreements, and at the regional level, usually under the auspices of regional integration organizations. In this sense, the UNECE Water Convention is a *regional* instrument applicable within Europe and neighbouring countries.

The UN Watercourses Convention recognizes the importance of multilateral agreements, such as the UNECE Water Convention, governing the non-navigational uses of international watercourses (paragraph 9 of its preamble). The former convention also recalls the work of international organizations, such as the UNECE, contributing to the codification and progressive development of international law in this field (paragraph 10 of its preamble).

The UN Watercourses Convention and the UNECE Water Convention are in harmony with each other, with the provisions of the latter being generally more stringent than those of its global counterpart.³⁷ Regional instruments tend to attract a greater degree of detail, because the negotiating Parties often share more similar values.³⁸ For example, while the UNECE Water Convention *obliges* Parties to enter into watercourse agreements or arrangements that implement its provisions, the UN Watercourses Convention is more flexible, only *encouraging* countries to adopt those agreements.

As adopted, the UNECE Water Convention was meant to be applied only at the regional level. Accordingly, at the moment, only UNECE Member States can become Parties to it.³⁹ In 2003, the Parties to the convention adopted amendments opening it for accession by non-UNECE Member States. Through those amendments, the Parties to the UNECE Water Convention have implicitly recognized the need for a legal and policy framework at the global level that would play the role their own convention has fulfilled regionally. However, the Meeting of the Parties will only consider requests by non-UNECE Member States to accede to the UNECE Water Convention if those amendments become effective for all Parties, plus the European Community, that were Parties to the convention when the amendments were first adopted. Currently, the 2003 amendments are not yet in force, having been accepted by only eight States. The short-term prognosis is that it is unlikely that the UNECE Water Convention will become more widely accessible in the near future.

In view of the aforementioned amendments, the UNECE Water Convention may, in the future, benefit the entire world with a well-developed and appropriate set of rules governing the use, protection, and management of transboundary waters. The entry into force of the 2003 amendments is of crucial importance for giving the opportunity to countries outside the UNECE region to accede to and implement the UNECE Water Convention and benefit from the activities and guidance developed through the convention's bodies. This could be an important contribution to enhance CBD implementation.

It is important to keep in mind, however, that developing countries may be reluctant to accept the stricter and more detailed provisions of the UNECE Water Convention or simply be unable to comply with them. As Wouters explains, "the often suggested imposition of the same requirements on developing nations will in practice make them non-implementable, which will defeat the very objective of the proposed regime."⁴⁰

Furthermore, from a practical viewpoint, even after the 2003 amendments to the UNECE Water Convention become effective, accession by non-UNECE Members is conditioned upon approval by the Meeting of the Parties. The criteria for such approval have not been determined yet. Because of the veto power of the Meeting of the Parties, there is no guarantee that all UN Member States outside the UNECE region would have access to the UNECE Water Convention.

Until the amendments to the UNECE Water Convention come into force, the UN Watercourses Convention could be a stepping stone towards the adoption of more detailed watercourse agreements. Entry into force and implementation of the UN Watercourses Convention would support CBD imple-

37 See Attila Tanzi, *The Relationship between the 1992 UNUN/ECE 92 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the 1997 UN 97 Convention on the Law of the Non Navigational Uses of International Watercourses*, Report of the UNECE Task Force on Legal and Administrative Aspects Geneva, February 2000.

38 See Alistair S Rieu-Clarke, Patricia Wouters, Flavia Loures, "The role and relevance of the UN Convention on the law of the non-navigational uses of international watercourses to the EU and its member States", UNESCO Centre for Water Law, Policy and Science, University of Dundee, p.3 (2007).

39 See *infra* Annex III, for the status of ratification of the UNECE Water Convention.

40 See Patricia Wouters, *The Legal Response to International Water Scarcity and Water Conflicts: The UN Watercourses Convention and Beyond*, 42 German Yearbook of Int'l Law 293 (1999), available at <http://www.dundee.ac.uk/water/Documents/Publications/GYIL.pdf>, at 39.

mentation, as discussed above, and plant the seeds for future universal accession to the UNECE Water Convention.⁴¹

Moreover, in implementing the UNECE Water Convention, its Parties have acquired considerable experience in the field of transboundary waters and developed a considerable number of implementing guidelines and recommendations through the convention's bodies. For example, the Meeting of the Parties has adopted joint monitoring guidelines and followed the execution of pilot projects. The UNECE Water Convention thus provides good examples for illustrating the future implementation of the more general provisions of the UN Watercourses Convention globally.

Therefore, both the UN Watercourses Convention and the UNECE Water Convention are valuable. The entry into force of the UN Watercourses Convention would provide a broader, more flexible instrument to deal with transboundary water issues at the global level. The same convention is likely to be accepted by a larger number of States. In addition, the convention's flexible provisions are likely to be better implemented as they are more easily adjustable to varying circumstances, drafted as they were in the context of a global convention. While a more stringent and more detailed regulatory framework, such as that provided by the UNECE Water Convention, may be desirable in the longer term, the immediate priority, however, is to make progress in international water resources cooperation at all levels. The UN Watercourses Convention seems better suited to contribute to this goal in the near future, by better reflecting the needs of developing countries, where capacity and resources are limited.

Both conventions could exist at the global level and supplement each other, with the ultimate goal of improving global freshwater governance. A strong case can be made for States to support both the UN Watercourses Convention and the UNECE Water Convention. Good precedents exist of States that ratified two multilateral environmental conventions on the same subject matter: for example, all Parties to the Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979, are also Parties to the Convention on Biological Diversity. In fact, Finland, Germany, Portugal, Hungary, The Netherlands, and Sweden have ratified both water conventions; the latter three countries have also ratified the 2003 amendments to the UN-ECE Water Convention. In addition, these States are also subject to the EU Water Framework Directive, thereby indicating that multiplicity in water related agreements and frameworks can be both workable and beneficial.

Parties to the UNECE Water Convention that also became a Party to the UN Watercourses Convention would remain subject to the more stringent provisions of the former. The UN Watercourses Convention clearly preserves the validity of agreements in force for States that later decide to accede to it (article 3(1)). Likewise, for countries that become Parties to both the CBD and the UN Watercourses Convention, the latter would also preserve the normative force of CBD provisions.

VIII. CONCLUSIONS

Where rivers, lakes, or aquifers are shared between countries, transboundary water allocation and management issues remain a major challenge to the sustainability of inland water ecosystems. Overcoming this challenge requires improved international cooperation among all States within a water system, in conformity with the ecosystem approach.

41 See Alistair S Rieu-Clarke, Patricia Wouters & Flavia Loures, "The role and relevance of the UN Convention on the law of the non-navigational uses of international watercourses to the EU and its Member States". UNESCO Centre for Water Law, Policy and Science, University of Dundee, p. 37 (2007) (on file).

For this reason, frameworks for international cooperation regarding water allocation and management are necessary to operationalise the provisions of the CBD. The more widespread use of existing international watercourse agreements is a sensible way forward. Despite, however, the proliferation of agreements on transboundary water management, there are still numerous watercourses without an adequate, basin-wide, legal framework for cooperation. Furthermore, existing agreements are not always effective.

The UN Watercourses Convention and the UNECE Water Convention aim to support and improve dialogue and cooperation among riparian States and, therefore, to improve transboundary water governance. In this sense, both conventions provide a framework for governing interstate relations and for enhancing cooperation at the basin level among CBD Parties and other Governments.

The CBD has emphasized the need for States to address transboundary river basin management issues, but still lacks principles and specific provisions guiding cooperation between watercourse States.⁴² The rules and mechanisms of the UN Watercourses Convention and the UNECE Water Convention, therefore, have much to offer for supplementing the relevant CBD regulatory framework and even for contributing to the development of specific guidance under the CBD.

Once in force and widely implemented, the UN Watercourses Convention would enhance interstate cooperation in the use and management of international watercourses, thereby contributing to the implementation of the CBD. The UN Watercourses Convention provides States with a well-developed framework of substantive and procedural rules. Such a framework is needed in the context of CBD goals to enable sound water allocation across borders and to promote the cooperative management of international watercourses. The UN Watercourses Convention sets a clear policy framework backed by appropriate dispute settlement mechanisms and substantive provisions to ensure the conservation and sustainable use of international watercourses and related aquatic ecosystems and their living resources. Moreover, the convention is flexible enough to adapt to the special situation and needs of developing countries, to accommodate the interests of all watercourse States, and to adjust to the different circumstances in each transboundary watershed.

Similarly, the good progress made so far under the UNECE Water Convention illustrates its potential value to support CBD implementation at the global level, once the 2003 amendments become effective. The entry into force of the UN Watercourses Convention and of the amendments to the UNECE Water Convention would enable those conventions to function in parallel at the global level and to supplement each other, with the ultimate goals of facilitating and informing the adoption and implementation of more specific water-related agreements. Through their widespread implementation, those two conventions would support and strengthen the CBD regulatory framework governing inland water biodiversity in transboundary rivers, lakes, and aquifers.

42 See CBD decision VII/4, annex II.

ANNEX I

ECOSYSTEM SERVICES PROVIDED BY INLAND WATERS (AS PER THE MILLENNIUM ECOSYSTEM ASSESSMENT) WHICH CAN BE AFFECTED BY INAPPROPRIATE WATER ALLOCATIONS AND UNSUSTAINABLE WATER USE AND SOME OF THEIR IMPLICATIONS FOR POVERTY REDUCTION, SUSTAINABLE LIVELIHOODS AND THE MILLENNIUM DEVELOPMENT GOALS

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
Provisioning services			
<i>Food</i>	Production of fish, wild game, fruits, grains, etc.	Direct consumption of foods to support livelihoods. Trading of food products for income generation. Food is of course very relevant to poverty and livelihoods. The biological resources derived from inland waters are very important in many areas particularly for poor rural communities. The dependency of people on this resource is generally seriously underestimated.	G1, T1, T2 G4, T5 G5, T6

Fish and fishery products are particularly important ecosystem services derived from inland waters. Inland fisheries are of particular importance in developing countries as they are sometimes the primary source of animal protein to which rural communities have access. For example, people in Cambodia obtain about 60–80% of their total animal protein from the fishery in Tonle Sap and associated floodplains; in Malawi, 70–75 % of the total animal protein for both urban and rural low-income families comes from inland fisheries. A large proportion of the recorded inland fisheries catch comes from developing countries, and the actual catch is thought to be several times the official 2001 figure of 8.7 million tonnes, as much of the inland catch is underreported. An estimated 2 million tonnes of fish and other aquatic animals are consumed annually in the lower Mekong Basin alone, with 1.5 million tonnes originating from natural wetlands and 240,000 tonnes from reservoirs; the total value of the catch is about \$1.2 billion. In Africa, fishing and harvesting of aquatic plants from the large floodplains and swamps associated with major lakes are a significant source of subsistence and income for local communities. Furthermore, as floodwaters recede, floodplains become available for agriculture (both crops and livestock grazing).

<i>Fresh water*</i>	Storage and retention of water for domestic, industrial and agricultural use	Access to clean potable water is an indicator of human development. Deprivation of freshwater is an indicator of poverty.	G4, T5 G5, T6 G7, T10, T11
---------------------	--	---	----------------------------------

The principal supply of renewable fresh water for human use comes from an array of inland ecosystem types, including lakes, rivers, swamps, and shallow groundwater aquifers. The renewable resource base expressed as long-term mean runoff has been estimated to fall between 33,500 and 47,000 km³ per year. By one estimate one-third of global renewable water supply is accessible to humans, when taking into account both its physical proximity to population and its variation over time, such as when flood waves pass uncaptured on their way to the ocean. Inland waters and mountains provide water to two thirds of the global population and that within drylands to one-third. Inland wetlands serve twelve times as many people downstream through river corridors as they do through locally-derived runoff.

Groundwater. Groundwater, often recharged through wetlands, plays an important role in water supply, providing drinking water to an estimated 1.5 to 3 billion people. It also serves as the source water for 40% of industrial use and 20% of irrigation. Despite its importance, groundwater has often not been sufficiently supported through appropriate pricing and management action.

Reservoirs. Another important water supply is represented by the widespread construction of artificial impoundments that stabilize river flow. Today, approximately 45,000 large dams (more than 15 meters in height, or more than 5 meters and holding 3 million cubic meters) and possibly 800,000 smaller dams have been built for municipal, industrial, hydropower, agricultural and recreational water supply, and for flood control. Recent estimates place the volume of water trapped behind documented dams at 6,000 to 7,000 cubic kilometers. Although reservoirs provide significant benefits to people with access to the services they provide, their construction and management regimes can often significantly reduce other ecosystem services downstream, particularly fisheries.

Water scarcity and declining access to fresh water is a globally significant and accelerating problem for 1–2 billion people worldwide, leading to reductions in food production, human health, and economic development. With population growth and the overexploitation and contamination of water resources, the gap between available water and water demand is increasing in many parts of the world. Scarcity of water will affect all businesses either directly or indirectly, just as increases in the price of petroleum impact the state of the global economy. Governments will be called upon to allocate supplies and adjudicate water rights. This will require trade offs between different ecosystem services provided by inland waters.

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
<i>Fibre & Fuel</i>	Production of logs, fuel wood, peat, fodder	As for food. Provisioning of shelter and energy, including trading in fibre and fuel.	G1, T1 G4, T5 G5, T6
<i>Biochemical</i>	Extraction of medicines and other materials from biota	Direct use of local and traditional medicines by poor communities. Potential provision of new commercial drugs to treat diseases.	G6, T8 G8, T17
<i>Genetic materials</i>	Genes for resistance to plant pathogens, ornamental species, etc.	Contributions of inland water biological resources to sustainable agriculture, forestry and fisheries. Adaptation to climate change. Improved varieties for the benefit of poor communities.	G1, T1, T2 G4, T5 G5, T6

Regulating services

<i>Climate regulation</i>	Source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climatic processes.	Poor communities are particularly vulnerable to climate change. The impacts of human-induced extreme climatic events are a significant driver of poverty and vulnerability. Poorly managed peatlands, for example, are a major source of carbon emissions.	Most
---------------------------	---	--	------

Inland water ecosystems play an important role in the regulation of global climate by sequestering and releasing significant amounts of carbon. Inland water systems play two critical, but contrasting roles in mitigating the effects of climate change: the regulation of greenhouse gases (especially carbon dioxide) and the physical buffering of climate change impacts. Inland water systems have been identified as significant storehouses (sinks) of carbon as well as sources of carbon dioxide (e.g., boreal peatlands), as net sources of carbon sequestration in sediments, and as transporters of carbon to the sea. Although covering an estimated 3-4% of the world's land area, peatlands are estimated to hold 540 Gt of carbon, representing about 1.5% of the total estimated global carbon storage and about 25-30% of that contained in terrestrial vegetation and soils. Inland waters also contribute to the regulation of local climate.

Climate change impacts the poorest and most vulnerable sections of society and is a significant threat to sustainable livelihoods amongst them. Sustaining the climate regulation services provided by inland water ecosystems is a critical requirement for mitigating the impacts of climate change on the poor.

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
<i>Water regulation (hydrological flows)</i>	Groundwater recharge/discharge	Unsustainable groundwater use is a significant driver of poverty	Most
	Wetland hydrological functioning	Impacts most other ecosystem services and therefore most other linkages with poverty/livelihoods	

Inland water ecosystems have a significant influence on the water (hydrological) cycle and hence the supply of water for people and the many uses they make of water, including for irrigation, energy, and transport. The water cycle is the movement of water between all parts of Earth in its different forms (vapour, liquid, and solid) and throughout the broader biophysical environment (atmospheric, marine, terrestrial, aquatic, and subterranean). Water resources, via water itself, are linked to all aspects of this broader environment.

The global water cycle plays a fundamental role in supporting inland water ecosystems, while at the same time these ecosystems have a significant influence on the hydrological cycle itself. Wetlands can either increase or decrease particular components of the water cycle. Although there is insufficient information on wetland hydrology to fully meet the needs of decision-makers, there is a progressive decline in the investment in generating new hydrological data or enhancing the quality of existing information at global, national, and local levels, particularly in developing countries.

Maintenance of the key hydrological services performed by inland water ecosystems enables them to continue to deliver a wide range of critical and important (regulatory and provisioning) ecological services to humans. Historically, it is well-established that the maintenance, protection, and even restoration of inland waters have often been encouraged because of the manifold hydrological services they perform. However, while some of these hydrological services, such as water storage, flood attenuation, and the augmentation of dry season flows, are likely to be seen as favourable for human well-being, others that are essential to maintain ecological character (such as flooding and evaporation from wetland vegetation) may complicate water management efforts aimed at balancing differing needs between cities, navigation, agriculture, and wetlands.

Maintaining the hydrological regime of inland waters and its natural variability are necessary to maintain the ecological characteristics of the ecosystem, including its biodiversity. Hydrological regime and topography are generally the most important determinants of the establishment and maintenance of specific types of inland water ecosystem processes, creating the unique physicochemical conditions that make wetlands different from both deepwater aquatic systems and well-drained terrestrial systems. Hydrological conditions affect numerous abiotic factors, including nutrient availability, soil anoxia, and salinity in both coastal and inland wetlands, which in turn determine the biota that establish in a wetland. These biotic components can alter the hydrology and other physicochemical features of the wetland.

Changes in hydrology therefore impact biodiversity, and the livelihoods which it supports. But changes in hydrology are often justified in terms of contributing to poverty reduction (e.g., diverting water to irrigated agriculture). Relationships are therefore complex, as are the outcomes for poverty.

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
<i>Water purification and waste treatment</i>	Retention, recovery and removal of excess nutrients and other pollutants	Sustainable water resources for agriculture, drinking and sanitation. Reductions in pollutants mitigate toxic effects on poor communities.	Most

Inland water ecosystems provide an important service by treating and detoxifying a variety of waste products.

Water flowing through a wetland area may be considerably cleaner upon its exit from a wetland. Some wetlands have been found to reduce the concentration of nitrate by 90%. Some artificially constructed wetlands have been developed specifically to treat nitrogen-rich sewage effluents. Metals and many organic compounds may be adsorbed to the sediments (that is, accumulated on the surface of the sediments) in the wetlands. The relatively slow passage of water through wetlands provides time for pathogens to lose their viability or be eaten by other organisms in the wetland ecosystems. Organic chemicals and metals may adsorb to the wetland sediments so that the concentrations in the water exiting the wetland are reduced. However, the wetlands can become a “hot-spot” of contamination—these wastes can build up to high enough concentrations to have detrimental effects on the wetland functions. Unfortunately the threshold between where loadings are tolerated and where they will do damage to wetlands is not easily determined.

Vegetation along the edge of Lake Victoria, East Africa, was found to retain 60–92% of phosphorus. In West Bengal, India, water hyacinth is used to remove heavy metals, and other aquatic plants remove grease and oil, enabling members of a fishermen’s cooperative to harvest one tonne of fish per day from ponds that receive 23 million litres of polluted water daily from both industrial and domestic sources. However, excessive loads of domestic sewage or industrial effluent can degrade inland waters, with a loss of both biota and services. The costs of reversing damages to waste-degraded ecosystems are typically large; in some cases rehabilitation is effectively impossible.

Declines in water quality particularly affect the poor and vulnerable, who are often the most directly reliant upon untreated water.

Global nitrate level in freshwaters is one indicator of progress towards the 2010 target.

<i>Erosion regulation</i>	Retention of soils and sediments	Contributes to sustainable agriculture and food security for the rural poor.	G1, T1, T2 G4, T5, G5, T6
---------------------------	----------------------------------	--	------------------------------

Where erosion has increased as a consequence of wide-scale vegetation clearing, many shallow water bodies have trapped high levels of sediment that would otherwise be transported downstream and deposited in coastal areas or on nearby reefs to the detriment of sustainable livelihoods in those regions.

<i>Natural hazard regulation</i>	Flood control, storm protection	Poor communities are extremely vulnerable to natural (and human-induced) hazards.	Most
----------------------------------	---------------------------------	---	------

Inland water ecosystems, such as their floodplains, lakes, and reservoirs help to attenuate floods. Flood attenuation potential can be estimated by the “residence time” of water in rivers, lakes, reservoirs, and soils. Residence time is defined as the time taken for water falling as precipitation to pass through a system: the longer the residence time, the larger the buffering capacity to attenuate peak flood events. Larger rivers (such as the Congo and the Amazon) have a greater attenuation capacity than smaller rivers. Nearly 2 billion people live in areas with a residence time of one year or less and are thus located in areas of high flood risk with low attenuation potential. Most of these people live in northern South America, highly populated regions of northern India and South East Asia, Central Europe, and the Southwest coast of Africa. Large and extreme flood events have high costs both in terms of human life, and expenditure on mitigation and recovery measures. However, floods also play an important role in maintaining the productivity of inland water ecosystems (and agriculture in floodplains) since they transport dissolved or suspended sediments and nutrients to the floodplains. The presence of a natural flood regime thus contributes to the livelihoods of millions of people, particularly those who depend on floodplains for flood recession agriculture and pasturage and for fish production.

A number of regions in the world have been seriously affected by severe fires in wetlands, especially peatlands, and such fires and associated smoke-haze affect the lives of millions of people and cause major environmental, social, and economic impacts. The negative impacts associated with natural phenomena may also be exacerbated by different human activities such as drainage. Wetlands can continue to deliver their many benefits/services, including, *inter alia*, water retention and purification, groundwater recharge, and the provision of water, food and fiber for people and for the maintenance of global biological diversity, and this need is particularly high in a post-disaster phase.

Resolution IX/9 of the Contracting Parties to the Ramsar Convention, for example, urges Contracting Parties to maintain or restore Ramsar sites, other wetlands, and associated ecosystems to reduce their vulnerability to natural disasters in accordance with their natural hydrological regimes.

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
<i>Pollination</i>	Habitat for pollinators	Inland water dependent pollinators contribute to sustainable agriculture and food security for the rural poor.	G1, T1, T2

Cultural services

<i>Spiritual and Inspirational</i>	Source of inspiration and cultural heritage/identity.	Many religions attach spiritual and religious values to aspects of wetland ecosystems. Religion is one source of social and community stability. Loss of cultural identity can lead to social unrest and livelihood insecurity.	Most
------------------------------------	---	---	------

Although spiritual and inspirational services do not provide physical benefits for the livelihoods of the poor, the maintenance of these cultural services contributes significantly to social adhesion, identity, and “social capital”, which all contribute to sustainable livelihoods. Social and cultural security is essential for sustainable livelihoods. Such services are therefore relevant to most if not all the MDGs and their targets.

<i>Recreational</i>	Opportunities for recreational activities	Revenue from recreational activities (undertaken by the more affluent), e.g., recreational fisheries, accruing to poor communities. “Recreation” is also important for poor communities by providing relaxation and social cohesion. Inland waters often provide zero-cost recreational activities for poor communities (e.g, fishing, swimming).	Most
---------------------	---	---	------

Inland water ecosystems are important tourism destinations because of their aesthetic value and the high diversity of the animal and plant life they contain. In some locations tourism plays a major part in supporting rural economies, although there are often great disparities between access to, and involvement in such activities. Recreational fishing can generate considerable income. The negative effects of recreation and tourism are particularly noticeable when they introduce inequities and do not support and develop local economies, and especially where the resources that support the recreation and tourism are degraded and consequently provide reduced services to local communities.

Ecosystem Service provided	Some examples of the services provided	Examples of linkages to poverty reduction and sustainable livelihoods	Some directly relevant MDGs (G) and Targets (T)
<i>Aesthetic</i>	Many people find beauty or aesthetic value in aspects of wetland ecosystems	See“spiritual and inspirational”.	Most
<i>Educational</i>	Opportunities for formal and informal education and training	The value of traditional and local knowledge of the biological diversity of inland water ecosystems for long-term human well-being, particularly for sustainable agriculture, forestry and fisheries. Knowledge required to achieve food security (e.g., how to exploit biological resources in times of crisis).	Most

Supporting services

Soil formation	Sediment retention and accumulation of organic matter	Sustainable agriculture (and food security) for the rural poor.	G1, T1, T2
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	Sustainable goods and services (e.g., food, fibre, construction materials) for the poor. Also related linkages to the provision of clean drinking water and sanitation (recycling human wastes). See also under “water purification and waste treatment”, above.	G4, T5 G5, T6 G7, T 10, T11

* While fresh water was treated as a provisioning service within the Millennium Ecosystem Assessment, it is recognised that it is also regarded as a regulating sector.

ANNEX II

THE STATUS OF RATIFICATION OF THE UNECE AND UN CONVENTIONS

A: The United Nations Economic Commission for Europe Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki, 17 March 1992 (the “UNECE Watercourses Convention”) (as of 29 April 2008, source http://www.unece.org/env/water/status/lega_wc.htm)

The Convention entered into force on 6 October 1996. It has 36 Parties:

Country/regional economic integration organization	Date of signature	Date of ratification, acceptance, approval or accession	Signed (S); or ratification, acceptance, approval or accession (R) to:		
			Amendments	Protocol on water and health	Protocol on civil liability
Albania	18-Mar-1992	5-Jan-1994		S R	
Andorra					
Armenia				S	S
Austria	18-Mar-1992	25-Jul-1996			S
Azerbaijan		3-Aug-2000		R	
Belarus		29-May-2003			
Belgium	18-Mar-1992	8-Nov-2000		S R	S
Bosnia and Herzegovina					S
Bulgaria	18-Mar-1992	28-Oct-2003		S	S
Canada					
Croatia		8-Jul-1996		S R	
Cyprus				S	S
Czech Republic		12-Jun-2000	R	S R	
Denmark	18-Mar-1992	28-May-1997			S
Estonia	18-Mar-1992	16-Jun-1995		S R	S
Finland	18-Mar-1992	21-Feb-1996		S R	S
France	18-Mar-1992	30-Jun-1998		S R	
Georgia				S	S

Country/regional economic integration organization	Date of signature	Date of ratification, acceptance, approval or accession	Signed (S); or ratification, acceptance, approval or accession (R) to:		
			Amendments	Protocol on water and health	Protocol on civil liability
Germany	18-Mar-1992	30-Jan-1995		S R	
Greece	18-Mar-1992	6-Sep-1996			S
Hungary	18-Mar-1992	2-Sep-1994	R	S R	S R
Iceland				S	
Ireland					
Israel					
Italy	18-Mar-1992	23-May-1996		S	
Kazakhstan		11-Jan-2001			
Kyrgyzstan					
Latvia	18-Mar-1992	10-Dec-1996		S R	S
Liechtenstein		19-Nov-1997			
Lithuania	18-Mar-1992	28-Apr-2000		S R	S
Luxembourg	20-May-1992	7-Jun-1994	R	S R	S
Malta				S	
Moldova		4-Jan-1994	R	S R	S
Monaco				S	S
Montenegro					
Netherlands	18-Mar-1992	14-Mar-1995	R	S	
Norway	18-Sep-1992	1-Apr-1993		S R	S
Poland	18-Mar-1992	15-Mar-2000	R	S	S
Portugal	9-Jun-1992	9-Dec-1994		S R	S
Romania	18-Mar-1992	31-May-1995	R	S R	S
Russian Federation	18-Mar-1992	2-Nov-1993		S R	
San Marino					

Country/regional economic integration organization	Date of signature	Date of ratification, acceptance, approval or accession	Signed (S); or ratification, acceptance, approval or accession (R) to:		
			Amendments	Protocol on water and health	Protocol on civil liability
Serbia					
Slovakia		7-Jul-1999		S R	
Slovenia		13-Apr-1999		S	
Spain	18-Mar-1992	16-Feb-2000		S	
Sweden	18-Mar-1992	5-Aug-1993	R	S	S
Switzerland	18-Mar-1992	23-May-1995		S R	
Tajikistan					
The Former Yugoslav Republic of Macedonia					
Turkey					
Turkmenistan					
Ukraine		8-Oct-1999		S R	S
United Kingdom	18-Mar-1992			S	S
United States					
Uzbekistan		4-Sep-2007			
European Community	18-Mar-1992	14-Sep-1995			

B: The United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 21 May 1997 (the “UN Watercourses Convention”) (as of 09 January 2008, source http://www.internationalwaterlaw.org/intldocs/watercourse_status.html)

Country/regional economic integration organization	Date of signature	States that ratified (r), accepted (A), approved (AA), acceded to the convention (a), or are in the process of becoming a Party (p)
Côte d'Ivoire	25 Sep 1998	
Finland	31 Oct 1997	23 Jan 1998 A
Germany	13 Aug 1998	15 Jan 2007 r
Hungary	20 Jul 1999	26 Jan 2000 AA

Country/regional economic integration organization	Date of signature	States that ratified (r), accepted (A), approved (AA), acceded to the convention (a), or are in the process of becoming a Party (p)
Iraq		9 Jul 2001 a
Jordan	17 Apr 1998	22 Jun 1999 r
Lebanon		25 May 1999 a
Libyan Arab Jamahiriya		14 Jun 2005 a
Luxembourg	14 Oct 1997	
Namibia	19 May 2000	29 Aug 2001 r
Netherlands	9 Mar 2000	9 Jan 2001 A
Norway	30 Sep 1998	30 Sep 1998 r
Paraguay	25 Aug 1998	2006 p
Portugal	11 Nov 1997	22 Jun 2005 r
Qatar		28 Feb 2002 a
South Africa	13 Aug 1997	26 Oct 1998 r
Sweden		15 Jun 2000 a
Syrian Arab Republic	11 Aug 1997	2 Apr 1998 r
Tunisia	19 May 2000	
Uzbekistan		4 Sep 2007 a
Venezuela (Bolivarian Republic of)	22 Sep 1997	
Yemen	17 May 2000	

ANNEX III

SOME SIMILARITIES BETWEEN THE CONVENTION ON BIOLOGICAL DIVERSITY, THE UNECE WATER CONVENTION AND THE UN WATERCOURSES CONVENTION

Similarities & Common goals	CBD	UNECE Water Convention	UN Watercourses Convention
SCOPE			
Subject matter	Biodiversity: variability among “living organisms from (...) aquatic ecosystems” (art.2-1)	Transboundary waters (art.2-2) b) and “water Resources”(art.1(1))	International Watercourses (art.2,b) water/ living resources” (arts.6,f), 21-2)
Main objectives	Conservation, sustainable use and equitable sharing of biodiversity (art.1)	“conservation of water resources” (art.2-2, b), “reasonable and equitable use of transboundary waters” (art. 2-2, c)	“Conservation (...) of the water resources” (art.6,f), utilization of international watercourses in an “equitable and reasonable manner” (art.5-1)
OBLIGATIONS			
Prevention, control and reduction of pollution	Preamb, para.8: obligation to “anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source” Art.8(l): “regulate or manage the relevant processes and categories of activities”	Art.3(1)(a): “The emission of pollutants is prevented, controlled and reduced at source”	Art.21(2): Obligation to “prevent, reduce and control the pollution of an international watercourse that may cause significant harm to (...) the living resources”
Conservation and/ or restoration of aquatic ecosystems	Art.1: “conservation...of... Ecosystems” Art.8, f) : “Rehabilitate and restore degraded ecosystems”	Art.2(2)(d): Obligation to “ensure conservation and, where necessary, restoration of ecosystems”	Art.20: Obligation to “protect and preserve the ecosystems of international watercourses”
Environmental impact assessment	Art.14(1)(a): Obligation to “Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity”	Art. 3(1)(h): “Environmental impact assessment and other means of assessment are applied”	Art.12: “Before a watercourse State implements or permits the implementation of planned measures which may have a significant adverse effect upon other watercourse States, it shall provide (...) environmental impact assessment”
Invasive alien species	Art.8(h): Obligation to “Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species”	Art.2: Obligation to “prevent, control and reduce any transboundary impact”	Art.22: Obligation to “prevent the introduction of species, alien or new, into an international watercourse”

Similarities & Common goals	CBD	UNECE Water Convention	UN Watercourses Convention
PRINCIPLES			
International cooperation	Art.5: Obligation to “cooperate (...)for the conservation and sustainable use of biological diversity”	Art.9: Bilateral and multilateral cooperation through “agreements” establishing “joint bodies”	Art.8: Obligation to cooperate for the “optimal utilization and adequate protection”
Not cause trans-boundary harm/ damage (good-neighbourliness)	Art.3: Obligation to “not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”	Art.2: Obligation to “prevent, control and reduce any transboundary impact”	Art.7: Obligation to : “prevent the causing of significant harm to other watercourse States”
Sustainable development	Pream., para.23: “Determined to conserve and sustainably use biological diversity for the benefit of present and future generations”	Art.2-5, (c): “Water resources shall be managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs”	Pream., para.5: “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 for present and future generations” Art. 5(1): “1. Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner[...], with a view to attaining optimal and sustainable utilization thereof and benefits therefrom”