

FOREWORD

Transboundary waters play a key role in the United Nations Economic Commission for Europe (UNECE) region. Their basins cover more than 40% of the European and Asian surface of the UNECE region and are home to more than 50% of the European and Asian population of UNECE.

The Second Assessment of Transboundary Rivers, Lakes and Groundwaters is the most comprehensive, up-to-date overview of the status of transboundary waters in the European and Asian parts of the UNECE region. It has been prepared upon request by the Sixth “Environment for Europe” Ministerial Conference as an input for the Seventh Ministerial Conference in Astana in September 2011. It has been carried out under the auspices of the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), and under the overall leadership of Finland.

The Second Assessment presents a broad analysis of pressures, quantity and quality status, transboundary impacts, as well as responses and future trends of our transboundary water resources. It highlights regional differences, specificities and vulnerabilities.

The overall picture that emerges from the Second Assessment is two-fold.

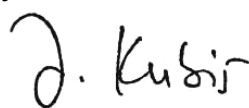
On the one hand, many efforts have been made to reduce transboundary impacts. The Second Assessment provides evidence that such efforts are bearing fruit and that in many parts of our region the status of transboundary waters is improving.

On the other hand, transboundary water resources are still under great stress as a result of poor management practices, pollution, overexploitation, unsustainable production and consumption patterns, hydromorphological pressures, inadequate investment in infrastructure and low efficiency in water use. The degradation and loss of ecosystems, and in particular wetlands, is a threat. Competition — and in some cases even conflicts — between different water uses, often in different riparian countries, is also a challenge. Climate change impacts are expected to further aggravate these problems. The need for stronger water and environmental governance, sound land management policies and, above all, integration of sectoral policies so that improvements in water management are not compromised by policies in other sectors, is as pressing as ever.

With regard to transboundary water cooperation, the message is also mixed. Globally, the UNECE region is the most advanced in terms of cooperation on transboundary waters. Almost all concerned UNECE countries have taken measures to establish transboundary water cooperation on their shared waters. Much of this progress has been facilitated by the Water Convention. However, the level and effectiveness of cooperation varies greatly: in some major transboundary rivers, a basin-wide framework for cooperation is still missing, in other cases, the level of cooperation is weak and not suited to respond to the complex challenge of balancing competing interests. These gaps and weaknesses underscore the importance of the Water Convention in supporting UNECE countries to improve transboundary cooperation.

The Second Assessment gives prominence to the challenges we face today and which we have to address together. It also describes some of the ways in which countries and joint bodies have dealt with these challenges, providing options for consideration in other parts of the region. I hope that the Second Assessment will stimulate Governments, river basin organizations and international and non governmental organizations to improve the status of transboundary waters and related ecosystems.

Ján Kubiš



Executive Secretary
United Nations Economic Commission for Europe



PREFACE

In 2003, the Parties to the Water Convention decided to regularly carry out regional assessments in order to keep the status of transboundary waters in the UNECE region under scrutiny, to benchmark progress and to provide the basis for continuous bilateral and multilateral work under the Water Convention. The Parties to the Convention mandated its Working Group on Monitoring and Assessment to prepare these assessments.

The First Assessment of Transboundary Rivers, Lakes and Groundwaters in the UNECE region was released at the Sixth “Environment for Europe” Ministerial Conference (Belgrade, October 2007), which requested the Meeting of the Parties to the Water Convention to prepare a second edition for the Seventh Ministerial Conference in Astana in September 2011.

While building on the results and lessons learned from the first edition, the Second Assessment is broader in scope and presents a number of novel features.

First of all, it has a strong focus on integrated water resources management (IWRM) and highlights achievements and challenges in managing waters in an integrated manner on the basis of the river basin, both at the national and transboundary levels. Consequently, transboundary surface waters and groundwaters are assessed together, at the level of the transboundary basins. The importance of water resources in supporting different economic sectors is also highlighted.

Moreover, the geographical scope regarding groundwaters has expanded. While the First Assessment only covered transboundary aquifers in South-Eastern Europe, the Caucasus and Central Asia, in the second edition transboundary groundwaters in Western, Central, Eastern and Northern Europe are also assessed. This has unveiled information gaps and the need for stronger legal and institutional bases for groundwater management and for better integration with surface waters.

Legal, institutional and socio-economic issues have a prominent place in the Second Assessment, given their crucial importance for transboundary water cooperation. As national frameworks strongly influence water management and cooperation at the transboundary level, the Second Assessment also provides information on national institutional settings for water management. The legal basis for transboundary cooperation is also examined: bilateral and river basin agreements on transboundary waters, as well as relevant multilateral environmental agreements entered into by UNECE countries and their neighbours, are inventoried.

IWRM entails an ecosystem approach to water management. Therefore, specific attention is devoted to ecological issues, notably through the assessment of selected Ramsar Sites and other wetlands of transboundary importance, prepared by the secretariat of the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) in close cooperation with experts on those sites. Such assessments underline the importance of water-dependent ecosystems in transboundary basins, not least through the various services that they provide. These case studies also show the interlinkages between transboundary wetland management and management of transboundary waters.

The Second Assessment recognizes the threats from climate change and seeks to provide a picture of the predicted impacts on transboundary water resources, as well as the measures planned or in place to adapt to climate change. The challenges deriving from climate change clearly demonstrate the value of long-term monitoring: only when reliable, consistent time series exist can the slowly evolving changes be detected, their causes analysed and the effectiveness of management interventions verified to guide further policy. Still, in many countries of the region the commitment to monitoring is not firm.

The UNECE region is highly diverse in terms of availability of water resources, pressures, status and responses, as well as with regard to the economic and social conditions that strongly influence both the pressures on and the status of water resources, as well as the capacity of countries to implement management responses. Therefore, the Second Assessment has a strong subregional focus and highlights characteristics and specificities of five, partly overlapping, UNECE subregions which were defined for the purposes of the Assessment. The criteria for their delineation are not based on political boundaries, but rather with a view to taking into account similarities of water management issues in the transboundary basins. Yet, even within these subregions big differences are observed.

The Second Assessment is an example of international cooperation at its best. More than 250 experts from some 50 countries were involved in its preparation, providing data and information, and engaging in the exchanges at the workshops. Most remarkably, not only the Parties to the Water Convention, but also UNECE members not Parties have contributed to the Second Assessment. Moreover, experts from countries outside the UNECE region and sharing waters with UNECE countries — namely Afghanistan, China, the Islamic Republic of Iran and Mongolia — also participated in the process. I would like to thank all the experts for their invaluable contribution. I would also like to thank the many international and national partners that joined forces in the preparation of the Assessment: the Global Water Partnership Mediterranean; the International Water Assessment Centre (the Water Convention collaborative centre hosted by the Slovak Hydrometeorological Institute); the secretariat of the Ramsar Convention; the secretariats of the international commissions for the Danube, Elbe, Meuse, Moselle and Saar, Oder, Rhine, Sava and Scheldt; the Global Resource Information Database Europe of the United Nations Environment Programme (UNEP/GRID-Geneva); and the International Groundwater Resources Assessment Centre. Finally, I would like to thank the Governments of Finland, Switzerland, Sweden, Germany, Hungary, the Netherlands and Georgia for their financial support to the Second Assessment. And last, but not least, my sincere thanks go to the UNECE secretariat of the Water Convention, in particular to Annukka Lipponen, coordinator and main author of the Second Assessment, and to Francesca Bernardini, Secretary to the Convention. Without their expertise, commitment and dedication the Second Assessment could not have been realized.

The future economic and social development of the UNECE region will very much depend on how we manage our waters. All living organisms are dependent on water. Water is a cornerstone

for societies: water-related ecosystem services are necessary for agriculture and forestry, but also a precondition for industry and service activities, as raw material and as a source of renewable energy. Under growing pressures and demands from all sectors of society — in particular agriculture, energy, transport, urban development and tourism — water has become a critical and, in some cases limiting, factor for sustainable development. Green economy, today high on the agenda of most countries, can only be realized when water is recognized as an integral part of all sectoral policies, and sound policies and measures for the protection and sustainable use of this precious resource are in place.

The Second Assessment abounds with information that can serve as a firm foundation for future efforts towards sustainable growth in our region. It reviews persistent environmental problems and emerging issues and it lays out challenges and opportunities to support informed decision-making on the management of shared water resources. Its aim is to spur further action by Governments, river basin organizations and international and non-governmental organizations to improve the status of transboundary waters and related ecosystems.

Lea Kauppi



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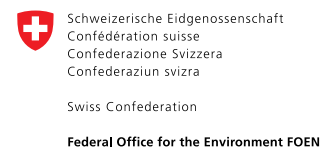
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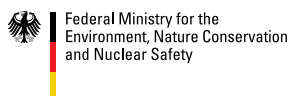
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LIST OF COUNTRY CODES

Afghanistan	AF	Greece	GR	Poland	PL
Albania	AL	Hungary	HU	Portugal	PT
Andorra	AD	Iceland	IS	Republic of Moldova	MD
Armenia	AM	Islamic Republic of Iran	IR	Romania	RO
Austria	AT	Ireland	IE	Russian Federation	RU
Azerbaijan	AZ	Italy	IT	San Marino	SM
Belarus	BY	Kazakhstan	KZ	Serbia	RS
Belgium	BE	Democratic People's Republic of Korea	KP	Slovakia	SK
Bosnia and Hesegovina	BA	Kyrgyzstan	KG	Slovenia	SI
Bulgaria	BG	Latvia	LV	Spain	ES
China	CN	Liechtenstein	LI	Sweden	SE
Croatia	HR	Lithuania	LT	Switzerland	CH
Cyprus	CY	Luxembourg	LU	Tajikistan	TJ
Czech Republic	CZ	Malta	MT	The former Yugoslav Republic of Macedonia	MK
Denmark	DK	Monaco	MC	Turkey	TR
Estonia	EE	Mongolia	MN	Turkmenistan	TM
Finland	FI	Montenegro	ME	Ukraine	UA
France	FR	Netherlands	NL	United Kingdom	GB
Georgia	GE	Norway	NO	Uzbekistan	UZ
Germany	DE				

ACRONYMS

Al	Aluminium	EECCA	Eastern Europe, the Caucasus and Central Asia
As	Arsenic	EIA	Environmental Impact Assessment
a.s.l.	Above sea level	ENVSEC	Environment and Security Initiative
BOD	Biochemical oxygen demand	EU	European Union
BOD ₅	Biochemical oxygen demand for 5 days	FASRB	Framework Agreement on the Sava River Basin
CaCl ₂	Calcium chloride	Fe	Iron
CAREC	Regional Environmental Centre for Central Asia	GDP	Gross Domestic Product
Cd	Cadmium	GEF	Global Environment Facility
CIPAIS	International Commission for the Protection of Italian Swiss Waters	GIS	Geographical Information System
CIPEL	International Commission for the Protection of Lake Geneva	GRDC	Global Runoff Data Centre (in Koblenz, Germany)
Cl ⁻	Chloride	GWh	Gigawatt-hour
Co	Cobalt	GWP-Med	Global Water Partnership Mediterranean
COD	Chemical oxygen demand	HMWB	Heavily Modified Water Body
COD _{Cr}	Chemical oxygen demand, using potassium dichromate (K ₂ Cr ₂ O ₇) as oxidizing agent	ICPDR	International Commission for the Protection of the Danube River
COD _{Mn}	Chemical oxygen demand, using potassium permanganate (KMnO ₄) as oxidizing agent	ICPER	International Commission for the Protection of the Elbe River
Cr	Chromium	ICPMS	International Commissions for the Protection of the Moselle and the Saar
Cu	Copper	ICPO	International Commission for the Protection of the Oder
EC-IFAS	Executive Committee of the International Fund for Saving the Aral Sea	ICPR	International Commission for the Protection of the Rhine
EEA	European Environment Agency	ICWC	Inter-State Commission for Water Coordination

IFAS	International Fund for Saving the Aral Sea	RBD	River Basin District according to the definition of the WFD
Interreg	Community initiative which aims to stimulate interregional cooperation in the EU between 2000-06	RBM	River Basin Management
IPCC	Intergovernmental Panel on Climate Change	RBMP	River Basin Management Plan
IPPC	Integrated Pollution Prevention and Control	SAC	Special Areas of Conservation
IRBD	International River Basin District according to the definition of the WFD	SEE	South-Eastern Europe
ISRBC	International Sava River Basin Commission	SO ₂	Sulfur dioxide
ISWC	Interstate Water Commission	SO ₄ ²⁻	Sulfate
IUCN	International Union for Conservation of Nature	SPA	Special Protected Area
IWRM	Integrated Water Resources Management	TACIS	Technical Assistance to the Commonwealth of Independent States
KMnO ₄	Potassium permanganate	TDS	Total dissolved solids
MAC	Maximum allowable concentration (in case of oxygen: minimum required concentration)	TNMN	TransNational Monitoring Network of the ICPDR
Mb	Molybdenum	TOC	Total organic carbon
Mn	Manganese	UNDP	United Nations Development Programme
N	Nitrogen	UNECE	United Nations Economic Commission for Europe
N _{tot}	Total nitrogen	UNEP	United Nations Environment Programme
NATO	North Atlantic Treaty Organisation	UNESCO	United Nations Educational, Scientific and Cultural Organization
NGO	Non-governmental organization	UNFCCC	United Nations Framework Convention on Climate Change
NH ₄ ⁺	Ammonium	USAID	United States Agency for International Development
Ni	Nickel	USSR	Union of Soviet Socialist Republics
NO ₃ ⁻	Nitrate	UWWTD	Urban Wastewater Treatment Directive, Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment
NO ₂ ⁻	Nitrite	UWWTP	Urban wastewater treatment plant
N/A	Not available	V	Vanadium
Q _{av}	Average water discharge	WFD	Water Framework Directive, i.e. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
Q _{max}	Maximum water discharge	WHO	World Health Organization
Q _{min}	Minimum water discharge	WWF	World Wildlife Fund
P	Phosphorus	Zn	Zinc
PAH	Polycyclic aromatic hydrocarbons	~	Approximately
Pb	Lead		
PCB	Polychlorinated biphenyls		
p.e.	Population equivalent		
PO ₄	Phosphate		
ppm	Parts per million		
P _{tot}	Total phosphorus		

UNITS OF MEASURE

a	Year	kt	Kilotonne	mS	Milli Siemens
g	Gram	l	Litre	MW	Megawatt
h	Hour	m	Metre	s	Second
ha	Hectare	m ²	Square metre	t	Metric tonne
km ²	Square kilometre	m ³	Cubic metre	µg	Microgram
kg	Kilogram	mg	Milligram	°C	Degree Celsius
km	Kilometre	ml	Millilitre		