



THE HANDBOOK FOR INTEGRATED WATER RESOURCES MANAGEMENT IN TRANSBOUNDARY BASINS OF RIVERS, LAKES AND AQUIFERS

March 2012



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FOREWORD

More than half of the world's population depends daily upon water resources shared by more than one country, both surface water of transboundary rivers and lakes or groundwater contained in aquifers extending over several countries. As the needs for this precious resource continue to increase, the imperative for cooperation between countries for better managing this resource has never been greater. How we agree to share the beneficial uses of transboundary water resources in ways that meet economic, social, and environmental demands in terms of growing uncertainty and financial instability might be one of the greatest challenges of all.

Population growth, expanding urbanization, the development of industry, agriculture, tourism as well as changes in climate and lifestyle, including in food and eating habits, place increasing constraints on water resources and ecosystems. New means are required to better manage this resource at every possible scale; especially in the highly complex situation of transboundary waters.

The integrated approach to water resources management (IWRM) that many countries have introduced into their national policies must also be the backbone of transboundary basin management. The catchment area of a river, lake and aquifer is indeed the space where hydrological, social, economic and environmental interdependences appear and where integrated development and management of water resources and territories have the potential to yield the greatest success.

Building a global community across transboundary waters that enhances connections between all stakeholders is an important undertaking that justifies increased investment and attention, to ensure 'water for all'. Achieving the equitable, reasonable and sustainable use of the world's shared water resources, and moving us all towards increased water security are aims that must be pursued fully.

To support this process, the International Network of Basin Organizations (INBO), the Global Water Partnership (GWP), UNECE, UNESCO, GEF, EVREN and AFD have worked together to produce this Handbook. This collective work provides relevant and practical information that can assist with the improved integrated management of the world's shared transboundary water resources.

This Handbook addresses a large number of stakeholders involved in integrated management of transboundary water resources, from national governments to regional organizations, managers and users in the field. They all are invited to work together to face the many current and future challenges.

The Handbook offers guidance for the integrated management of transboundary water resources in all of its diversity – for developing and developed countries, in temperate, wet or dry areas.

This new work supplements the Handbook for Integrated Water Resources Management in Basins, published in March 2009 during the Fifth World Water Forum in Istanbul.

We welcome your comments and contributions to this Handbook, which we consider to be a platform for engagement across borders, in the peaceful management of our shared transboundary waters in ways that enhance cooperation and assist in making the world a better place for us all.

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ACRONYMS

AFD	French Development Agency
AfDB	African Development Bank
AMCOW	African Ministers' Council on Water
ANBO	African Network of Basin Organizations
APWF	Asia Pacific Water Forum
AWF	African Water Facility
AWIS	African Water Information and Documentation System
BRGM	Office for geological Research and Mining /Bureau de recherche géologique et minière
CEENBO	Central and Eastern European Network of Basin Organizations
CEMAC	Economic and Monetary Community of Central Africa
CEN-SAD	Community of Sahel-Saharan States
CICOS	International Commission of the Congo-Ubangi-Sangha Basin
CILSS	Interstate Committee for Drought Control in the Sahel
CIPMS	International Commission for the Protection of the Mosel and Saar
CWRC	Changjiang (Yangtze) Water Resources Commission
EC	European Commission
ECOWAS	Economic Community of West African States
EECCA	Eastern Europe, Caucasus, Central Asia
EMWIS	Euro-Mediterranean Information System on know-how in the Water Sector
EU	European Union
EUROPE-INBO	European group of basin organizations for WFD implementation
FFEM	French Global Environment Fund
GEF	Global Environment Facility
GIS	Geographic Information System
GIZ	German Technical Cooperation
GWP	Global Water Partnership
GWP TEC	Global Water Partnership Technical Committee
HELP	Hydrology for the Environment, Life and Policy
IAS	Iullemeden Aquifer System
ICPO	International Commission for the Protection of the Oder
CPDR	International Commission for the Protection of the Danube River
ICWC	Interstate Commission for Water Cooperation
IFAS	International Fund for Saving the Aral Sea
IGAD	Intergovernmental Authority on Development
IHP	International Hydrological Programme
IJC	International Joint Commission
INBO	International Network of Basin Organizations
IOWater	International Office for Water
IRBIS	Irtych River Basin Information System
IUCN	International Union for Conservation of Nature
IWAC	International Water Assessment Centre
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
LANBO/RELOB/RELOC	Latin American Network of Basin Organizations
LCBC	Lake Chad Basin Commission
MDG	Millennium Development Goals
MENBO/REMOB/REMOB	Mediterranean Network of Basin Organizations

MERCOSUR	South America Common Market
MRC	Mekong River Commission
NBA	Niger Basin Authority
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NHS	National Hydrological Service
NWSAS	North Western Sahara Aquifer System
OCDE	Organization for Economic Cooperation and Development
ODA	Official Development Assistance
OKACOM	Okavango River Basin Commission
OMVG	Organization for the Development of the Gambia River
OMVS	Organization for the Development of the Senegal River
ORASECOM	Orange-Senqu River Commission
OSCE	Organization for Security and Cooperation in Europe
OSS	Sahara and Sahel Observatory
OTCA	Amazon Cooperation Treaty
PECO	Central and Eastern European Countries
PIANC	the World Association for Waterborne Transport Infrastructure
PIDA	Infrastructure Development Programme in Africa
SADC	Southern African Development Community
SAP	Strategic Action Plan
SDAGE	Master Plan for Water Development and Management
SDAP	Sustainable Development Action Plan
SDC	Swiss Agency for Development and Cooperation
SEA	Strategic Environmental Assessment
SEIS	Shared Environmental Information System
SIDA	Swedish International Development Cooperation Agency
TDA	Transboundary Diagnostic Analysis
UEMOA	West African Monetary and Economic Union / Union économique et monétaire des Etats de l'Afrique de l'ouest
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
USAID	United States Agency for International Development
VBA	Volta Basin Authority
WACDEP	Water, Climate and Development Programme in Africa
WFD	Water Framework Directive
WHYCOS	World Hydrological Cycle Observing System
WIS	Water Information System
WISE	Water Information System for Europe
WMO	World Meteorological Organization
WRCU	Water Resources Coordination Unit of ECOWAS
WWF	World Wildlife Fund

1 Introduction

1.1. Context

In 2008, the Global Water Partnership (GWP) and the International Network of Basin Organizations (INBO) developed a Handbook for Integrated Water Resources Management in Basins. This document, released at the Fifth World Water Forum in Istanbul in March 2009 was a great success worldwide and continues its contribution. The present Handbook builds on that previous work and focuses on Integrated Water Resources Management (IWRM) in the particular context of transboundary water resources, as an important and increasingly complex area that deserves more attention.

This Handbook collects examples of practice across the globe, organised by topic and theme in a work that summarises the key issues of transboundary water resources management. The work is the result of a contribution of many authors from different backgrounds and representing different approaches to the complex topic considered here. This diversity reflects the range of expertise required to tackle the many difficult challenges arising where the over-arching objective is the integrated management of shared waters that cross national sovereign borders.

Why is this an important issue? For those who manage transboundary waters and work in this field the justification for this work is clear: most of the world's population and ecosystems depend upon water resources that cross national boundaries, making this a global issue. Emerging crises (financial, climate change, regional instability) affect water resources management and this situation is more complex within the context of internationally shared waters. Integrating water management across a range of political, social, economic, legal, environmental diversities requires considerable human, financial and temporal resources. It is a long-term exercise that changes over time and is resource intensive.

1.2 How to use this Handbook

This Handbook is aimed at practitioners who are involved in the management and development of transboundary water resources, including the wide range of stakeholders who are interested in the effective and equitable management of transboundary water resources. The Handbook:

- offers an overview of the key concepts, fundamental issues and approaches used in state practice relevant to Integrated Water Resources Management (IWRM) in a transboundary water resources management context. It deals in successive sections with the concepts of cooperation, governance, information systems, participation, planning and financing;
- includes a section on transboundary aquifers, with reference to the guide “Towards joint management of transboundary aquifer systems” (AFD, 2010);
- considers the specific challenges related to inland waterways, major water infrastructure, ecosystems and climate change;
- highlights the importance of capacity development as a foundation for transboundary cooperation;
- provides examples of transboundary IWRM implementation from around the world and offers practical guidance from state practice in this regard.

1.3 Key concepts and definitions

This part introduces and summarises key concepts and definitions relevant to the Handbook's focus on IWRM in the transboundary context.

1.3.1. Integrated Water Resources Management

Central to this work is the notion of integrated water resources management (IWRM). IWRM has been defined by the Global Water Partnership (GWP) as “a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”.

IWRM is based on the principles defined and adopted by the international community since the Rio and Dublin Summits in 1992. These principles summarise as follows:

- 1) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;
- 2) Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;
- 3) Women play a central part in the provision, management and safeguarding of water;
- 4) Water has an economic value in all its competing uses and should be recognized as an economic good.

In its work, GWP refers to the following pillars that support sound IWRM implementation:

- Management instruments
 - Water resources assessment;
 - Information exchange;
 - Socio-economic and regulatory instruments;
 - Plans for IWRM;
- Enabling environment
 - Policies;
 - Legal framework;
 - Financing and incentive structures;
- Institutional roles
 - Central – local ;
 - River basin;
 - Public-private;
 - Capacity building.

Other definitions reflect similar approaches; for example, USAID defines IWRM as “a participatory planning and implementation process, based on sound science that brings stakeholders together to determine how to meet society's long-term needs for water and coastal resources while maintaining essential ecological services and economic benefits. IWRM helps to protect the world's environment, foster economic growth and sustainable agricultural development, promote democratic participation in governance, and improve human health” (see www.usaid.gov/our_work/environment/water/what_is_iwrm.html).

Another definition focuses more on an ecosystems approach, which aims to balance the needs of human communities and ecosystems and promotes harmonious relations at all scales within this context; the basic concepts are as follows:

- all elements of an ecosystem (physical, chemical and biological) are interdependent;
- ecosystems are of a dynamic and complex nature, which must be addressed with a flexible and adaptable approach;
- scientific, social and economic concerns need to be integrated.

1.3.2. Transboundary waters

Transboundary fresh waters cover 45% of the world's land mass, connecting two or more countries in water resources above (surface) and below (groundwater) the earth's surface. This type of resource management faces many challenges and must consider special features of the challenge. In this regard, international water resources management differs from IWRM at the national level in the following ways:

- state sovereignty influences the dynamics of transboundary IWRM in important dimensions that distinguish it from IWRM within national settings;
- water resources management usually responds to national legal and institutional policy frameworks, established a priori without coordination and coherence between the countries in their relations over shared international waters;
- the interests and objectives for water use are linked to national development and security objectives and may differ across nations;
- the proportion of the country affected by the transboundary basin can in some cases have an impact on its involvement and willingness to establish transboundary collaboration; if a country is affected by a river basin on a small part of its territory, its involvement will not be as strong as if a large portion of its territory is concerned;
- conflicts on water resources allocation and benefit sharing are more complex and more difficult to manage across international borders, where international politics and historical or current conflicts (related or not to water) come into play;
- exchange of information and data on water, which can already be a problem between different services within a same State, is often more difficult between States sharing a basin;
- the relationship between water, people and territory, the problems are the same between two neighbouring countries dependent on a single resource as, at a different scale, between two plots or two neighbouring local communities that share water.

As will be discussed in more detail below, the definition of the transboundary water resources varies on a case by case basis, and is often determined in international agreements. Central to this issue is the question of “what water resources are covered” – a complex matter often requiring considerable scientific information, demonstrated in some of the details provided in this Handbook.

At this stage, what is important to know is that international agreements take different approaches to defining the scope of the transboundary water resources; this is critical, since IWRM takes a holistic approach, covering and integrating all aspects of water resources management. The 1997 UN Watercourses Convention on the Non-navigational Uses of Transboundary Waters (UN Water Convention of 21 May 1997), as a framework instrument defines the following terms:

- (a) “Watercourse” means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus;
- (b) “International watercourse” means a watercourse, parts of which are situated in different States.

A close reading of the Convention reveals that the treaty does not cover confined aquifers, a particular type of transboundary water resource that is now being addressed in on-going work by the UN, under its Draft Articles on the Law of Transboundary Aquifers, which propose detailed definitions of transboundary aquifers.

Box 1. Defining transboundary aquifers

- (a) “aquifer” means a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation;
- (b) “aquifer system” means a series of two or more aquifers that are hydraulically connected;
- (c) “transboundary aquifer” or “transboundary aquifer system” means respectively, an aquifer or aquifer system, parts of which are situated in different States;
- (d) “aquifer State” means a State in whose territory any part of a transboundary aquifer or aquifer system is situated;
- (e) “utilization of transboundary aquifers or aquifer systems” includes extraction of water, heat and minerals, and storage and disposal of any substance;
- (f) “recharged aquifer” means an aquifer that regularly receives a non-negligible amount of contemporary (non-fossil) water recharge;
- (g) “recharge zone” means the zone which supplies water to an aquifer, consisting of the catchment area of rainfall water and the area where such water flows to an aquifer by runoff on the ground and infiltration through soil;
- (h) “discharge zone” means the zone where water originating from an aquifer flows to its outlets, such as a watercourse, a lake, an oasis, a wetland or an ocean.

Article 2, UN International Law Commission Draft articles on the Law of Transboundary Aquifers annexed to Resolution 63/124 (available at http://www.isarm.org/dynamics/modules/SFIL0100/view.php?fil_id=282)

1.3.3. Other terms relevant to transboundary basin management

Management at the transboundary water resource “basin” level

The International Network of Basin Organizations proposes an approach on the scale of hydrographic units that are river/aquifer basins: catchment areas for surface waters, aquifers for groundwater. During its successive General Assemblies in Morelia, Valencia, Salvador, Zakopane, Quebec, Martinique, Debrecen and Dakar, it especially recommended that the agreements and strategies, programmes, financing arrangements and controls are designed at the basin level and that cooperation agreements are signed by the riparian countries for large shared rivers, lakes or aquifers.

Water Governance

While the precise definition of water governance is debated, it is clear that it is a broad-reaching notion that revolves around how communities at different levels organize themselves to manage waters in formal and informal ways. This approach includes the “manner in which allocative and regulatory policies are exercised in the management of resources (natural, economic, and social) and broadly embraces the formal and informal institutions” (GWP). Water governance in a transboundary context includes actors across a range of scales, from global/international, to regional, national, sub-national and local user. How the inputs from these actors are facilitated and contribute to the integrated management of transboundary water resources are facilitated (or not) depends upon a variety of circumstances, often under the umbrella of political, legal, administrative and regulatory situations, explored in practice below.

Given the often complex settings that transboundary water resources are managed across, the potential for conflicts and competing demands over a diminishing shared resource is very high. Ensuring “good” water governance that promotes cooperative and consultative approaches is a challenge, but must be an aim.

Hydro-diplomacy

Three elements are at the heart of hydro-diplomacy, which align closely with the principal objectives of the UN Charter, include the following:

1. the preventive nature of diplomacy in maintaining peace and security;
2. the need for dialogue in which traditional bilateral diplomacy is complemented by multilateral and multilevel diplomacy;
3. the notion of collective responsibility of the international community.

Water governance in a transboundary water resources context requires the meaningful engagement of a vast array of stakeholders through operational and functional mechanisms (formal and informal) but there is no one formula that works in all situations.

Water Security

Water security, especially as considered within the water/food/energy security nexus, is an important concern relevant to the discussion of transboundary water resources management. “A water secure world is vital for a better future: a future in which there is enough water for social and economic development and for ecosystems. A water secure world integrates a concern for the intrinsic value of water together with its full range of uses for human survival and well-being. A water secure world harnesses water’s productive power and minimises its destructive force. It is a world where every person has enough safe, affordable water to lead a clean, healthy and productive life. It is a world where communities are protected from floods, droughts, landslides, erosion and water-borne diseases. Water security also means addressing environmental protection and the negative effects of poor management, which will become more challenging as climatic variability increases. A water secure world reduces poverty, advances education, and increases living standards.

It is a world where there is an improved quality of life for all, especially for the most vulnerable—usually women and children—who benefit most from good water governance” (GWP Strategy 2009–2013).

This approach builds on the Ministerial Declaration entitled “Water Security in the Twenty-First Century” adopted at the second World Water Forum (Hague 2000), which listed the following seven “main challenges” to achieving water security:

- (1) meeting basic needs;
- (2) food security;
- (3) protecting ecosystems;
- (4) sharing water resources;
- (5) managing risks;
- (6) valuing water; and
- (7) governing water wisely.

This range of issues, occurring at a range of scales highlights some of the real challenges that need to be tackled in the management of the shared water resources that cross national borders.

Water Cooperation

Clearly one of the aims of transboundary water resources management is to facilitate cooperation. This work does not cover the range of studies on cooperation in this area, but adopts a working definition of cooperation as “working together to the same end” (The Concise Oxford Dictionary).

From an international legal perspective, transboundary cooperation is anchored in the law of nations, codified in many respects in the UN Charter. Thus, the peaceful management of shared transboundary water resources is encouraged by the fundamental tenets: to promote regional peace and security, to achieve cooperation and to ensure the fundamental freedoms of all (Art. 1, UN Charter). Further the UN Watercourses Convention includes a duty to cooperate under its Article 8, with this elaborated upon in Article 5 which introduces the obligation to “participate in the use, development and protection of an international watercourse in an equitable and reasonable manner”, and “includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof”.

2 Establishing transboundary cooperation for water resources management

KEY POINTS:

- The willingness of States to cooperate regarding water management can start with specific challenges or common goals, with regional or community dynamics and even a risk of conflict.
- Cooperation can firstly be established on a part of the basin, or even between limited numbers of countries before being expanded. The evolutionary process must build on existing agreements.
- The United Nations Conventions (UNECE, 1992 and International Watercourses, 1997) provide the general framework for transboundary basin management.
- UN Resolution 63/124 “Encourages the States concerned to make appropriate bilateral or regional arrangements for the proper management of their transboundary aquifers (...)”.
- International water law is a system of norms and rules governing relations between and among sovereign States and plays an important role in the peaceful management of transboundary water resources.
- There are many kinds of transboundary cooperation; the various examples mentioned here allow drawing lessons applicable to various contexts.

This part describes a series of mechanisms that provide the framework for the integrated management of shared international water resources, including policies and legal and institutional practices. The intention is to cover broadly the building blocks of cooperation in transboundary basin management

2.1 Interstate Political Will

Several factors can be used to develop the States' political willingness to cooperate on a transboundary river basin. The various driving forces of interstate cooperation on water management are illustrated by the following examples

2.1.1 Specific challenge and common goals

- Studies or projects jointly carried out by several riparian countries in a specific area (e.g. navigation on the Rhine or the Congo, study on the maintenance and protection of wetlands and ecological interest in the Guadiana river basin) can favour basin level transboundary cooperation.

Example 1: An integrated and participatory approach in the Guadiana River Basin

The Guadiana River basin, with a Mediterranean continental climate and high variability in water resources availability over time, covers an area of 67,147 km² in the west and south of the Iberian Peninsula. The Spanish part involves three autonomous regions (Andalusia, Castilla and Extremadura) and has areas of ecological significance feeding wetlands of high environmental value, as well as the Portuguese district.

Under the Albufeira agreement, a number of activities and studies have been jointly carried out by Spain and Portugal. Regarding hydrological planning, the official participatory process began in May 2011 for the Spanish part and in July 2011 for the Portuguese district.

However, the technical information activities have been promoted since 2007 through meetings, public awareness campaigns and an ongoing and coordinated dialogue. Progress and important agreements were made in connection with cross-border aspects: delimitation of shared water bodies, typology, ecological status and related pressures, protected areas, monitoring network, programmes of measures of the river basin management plans and environmental objectives. As part of the Albufeira agreement, several meetings of the WFD Working Group were held from 2007 to 2011 in addition to the seven specific meetings of the Guadiana basin.

In addition to these joint activities, the Spanish-Portuguese Transboundary Cooperation Programme 2007-2013 (co-financed by the EU Cohesion Fund) includes actions related to the environment and recreational boating in the Alqueva reservoir (in Portugal, but near the Spanish border). Some environmental measures can promote economic development of the basin's municipalities and improve the ecological status of the Guadiana through reforestation, ecological restoration, the establishment of ecological corridors or development of recreational trails to promote landscape and tourism values.

*More information on the websites: www.chguadiana.es - www.arhalentejo.pt - www.inag.pt
www.arhalentejo.pt/index.php?option=com_content&view=article&id=186*

- International associations can catalyze the political will of States wishing to cooperate on the same basin, often on a specific issue championed by the association, as shown in the case of Lake Prespa.

Example 2: Trilateral cooperation on the Lake Prespa

Lake Prespa is situated between Albania, Greece and the former Yugoslav Republic of Macedonia. It is an area of extraordinary natural and cultural beauty. On 2 February 2000, the Prime Ministers of Albania, Greece and the former Yugoslav Republic of Macedonia signed the Declaration for Prespa Park Conservation with the following ultimate goals:

- enhancement of living standards for the inhabitants of Prespa, through the preservation of its natural and cultural values and the sustainable use of its resources;
- peace and cooperation between the three countries.

With the support of the Convention on Wetlands of International Importance (Ramsar Convention on Wetlands), especially as Waterfowl Habitat and its MedWet Initiative, the trilateral Prespa Park Coordination Committee (PPCC) was established in 2001. Joint activities have included the preparation of a Strategic Action Plan for the protection and development of the region, and contribution to the development and submission of a GEF Prespa Park project proposal, approved by the GEF secretariat in 2005.

cont'd ■■■

Further joint cooperation continues with the implementation of the project, “Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, the former Yugoslav Republic of Macedonia and Greece”. Within the project many activities have been carried out and different planning documents were developed.

In 2010, the Environment Ministers of the three countries and the EU Environment Commissioner signed an Agreement on the Protection and Sustainable Development of the Prespa Park Area that sets out detailed principles and mechanisms of transboundary cooperation.

- The development of political will to cooperate on transboundary waters needs clear and precise action objectives in the agreement.

Example 3: Great Lakes–St. Lawrence River Water Resources Regional Body

Through the Great Lakes–St. Lawrence River Water Resources Regional Body, the Great Lakes Governors of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, and the Premiers of Ontario and Quebec are taking the lead in protecting the world’s largest source of surface fresh water—the Great Lakes and St. Lawrence River Basin. They created the Regional Body on December 13, 2005, by signing the Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement and endorsed the Great Lakes–St. Lawrence River Basin Water Resources Compact.

The objectives of this Agreement are:

- to act together to protect, conserve and restore the waters of the River Basin;
- to facilitate collaborative approaches to water management across the Basin;
- to promote cooperation among the Parties;
- to create a cooperative arrangement regarding water management;
- to retain State and Provincial authority within the Basin;
- to facilitate the exchange of data, strengthen the scientific information and engage in consultation on the potential effects of withdrawals and losses;
- to prevent significant adverse impacts of withdrawals and losses;
- to promote an adaptive management approach to the conservation and management of Basin Water resources.

In the United States, the Compact became law in 2008, following approval by each of the eight State legislatures and Congress, and signature by the President. Under the Canadian constitution, no federal approval is required to endorse agreements signed by provinces under their jurisdictional powers. The agreement was approved by the Quebec National Assembly on November 30, 2006, and by the Ontario Provincial Parliament on June 4, 2007.

2.1.2 Regional dynamics and community structure

- The European Union (EU) Water Framework Directive (WFD) or Southern African Development Community (SADC) Revised Protocol on Shared Watercourses, as two regional framework examples provide platforms for management of transboundary water resources; each of these examples is explored in more detail throughout the work.

The EU WFD can encourage the riparian States of the same basin to seek dialogue and build a basin policy. The WFD approach is based on the classification and reporting on basins involving the characterization of the initial status, pressures and impacts, integrated management at the national and international basin levels, the definition of measurable objectives and strict deadlines to achieve them, the drafting of river basin management plans and programmes of measures, the use of information systems, reporting and monitoring, the economic approach, participation of the general public, etc.

- The WFD regional framework for the member countries of the European Union (EU) also plays a role in the countries neighbouring the EU, especially when they share water with the Member States. Despite the limitations of the exercise (data availability, financing), the regional framework can, in this case, give a political impetus to cooperate, leading to the implementation of projects that also benefit non-EU countries.

Example 4: Cooperation on the “Danube Roof Report”

Since 2000, the EU WFD has been the basic legal document which governs the management of waters in EU Member States. Because the EU WFD sets for that “in the case of an international river basin district extending beyond the boundaries of the Community, Member States shall endeavor to produce a single river basin management plan”, EU Member States that share the Danube River Basin, with the consent of all other countries which are contracting Parties to the Danube River Protection Convention, have nominated the International Commission for the Protection of the Danube River (ICPDR) as the coordination body for the development of this plan.

The Danube River Protection Convention was signed on 29 June 1994 in Sofia, and entered into force in October 1998. All countries sharing over 2,000 km² of the Danube River basin (8 EU countries, 1 accession country and 5 non-EU countries), as well as the European Commission, are contracting parties to the Danube Convention.

Ukraine, Moldova, Bosnia - Herzegovina and Croatia, which are not EU Member States but are members of ICPDR have agreed to participate in the preparation of the Danube river basin analysis (DRBA).

Although non-EU Member states were not able to ensure all data collection and processing, they significantly benefited from this process in many ways. Firstly, ICPDR and other donors financially supported necessary projects towards DRBA. Also, non-EU members states get familiar with new EU regulations. And finally, this process improved communications among water management specialists from other countries. Another significant benefit was the ability to examine in detail the various implications (above all, financial) of the implementation of EU water directives in Serbia.

- The development of political will can also result from actions taken by regional economic communities, as shown by the example of the UNECE. UNECE initiated the development of assessments of river basins. This initiative requires a strong cooperation of the administrations of the countries concerned. As a result, governments were stimulated to improve their national monitoring systems and better harmonization with monitoring systems of neighborhood countries. In addition to the example of Southern Africa and SADC, there is that of ECOWAS in West Africa.

Example 5: New assessment encourages transboundary cooperation and improvement of the status of shared waters in the pan-European region

The Second Assessment of Transboundary Rivers, Lakes and Groundwaters was launched at the Seventh “Environment for Europe Ministerial Conference” in Astana, Kazakhstan on 21 September 2011. This publication is the most comprehensive overview of the status of transboundary waters in the region of the United Nations Economic Commission for Europe (UNECE). 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, in close cooperation with water and/or environment administrations of some 50 countries and with involvement of more than 250 experts. The preparation process involved data collection using datasheets and organization of five sub-regional workshops for supported exchange and cooperation between the riparian countries.

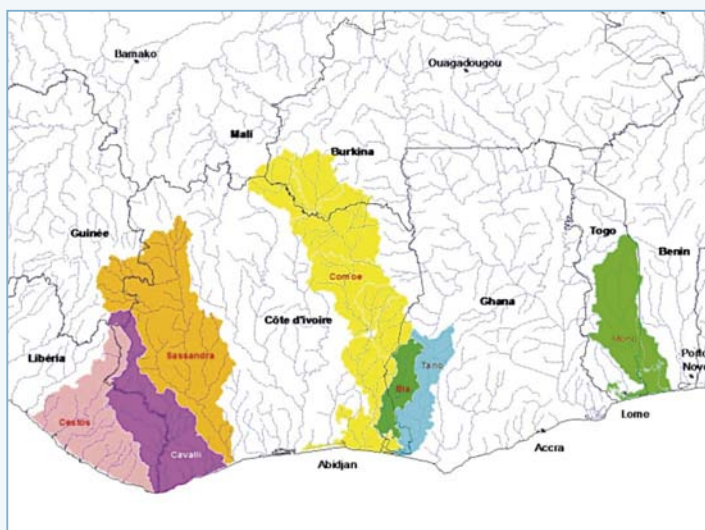
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River basin commissions also played a key role in the process by contributing information. The findings indicate that the status of transboundary waters is improving in many parts of the pan-European region thanks to the efforts to protect waters and the environment. However, transboundary water resources are still under great stress from a variety of causes including: poor management practices, pollution, overexploitation, unsustainable production and consumption patterns, hydro-morphological pressures, inadequate investment in infrastructure and low efficiency in water use. Competition between different water uses, often in different riparian countries, is a challenge. Climate change impacts are expected to further aggravate the problems.

The full report and the executive summary are available in English and in Russian at: www.unece.org/index.php?id=26343&L=0

Example 6: The Water Resources Coordination Unit of ECOWAS space

The fifteen countries of the Economic Community of West African States (ECOWAS) are very dependent on each other in terms of water resources. There are 25 shared river basins in the sub-region, 6 of which being managed by organizations: Gambia, Mono River, Niger, Senegal and Volta Rivers. In 2001, the Heads of State initiated a permanent framework for dialogue on water resources.



The Water Resources Coordination Unit (WRCU), based in Ouagadougou, has led this dialogue since 2004, under the authority of the Commissioner for “Agriculture, Water and Environment” of ECOWAS.

After actively participating at the kick-off of national IWRM plans, WRCU has widely focused on transboundary management by facilitating the birth of the Volta Basin Authority for example and is currently supporting the creation of three new transboundary authorities: i) Bia-Comoé-Tano, (ii) Mono), (iii) Cavaly-Cestos-Sassandra (see map).

In 2008, a Regional Water Resources Policy was adopted with CILSS and UEMOA, thus giving a strong political will to be fulfilled. This will is reinforced by the principle of supranationality, making the ECOWAS directives directly enforceable at the country level. To build its advocacy capacity, the WRCU will host AMCOW West African Secretariat in 2012.

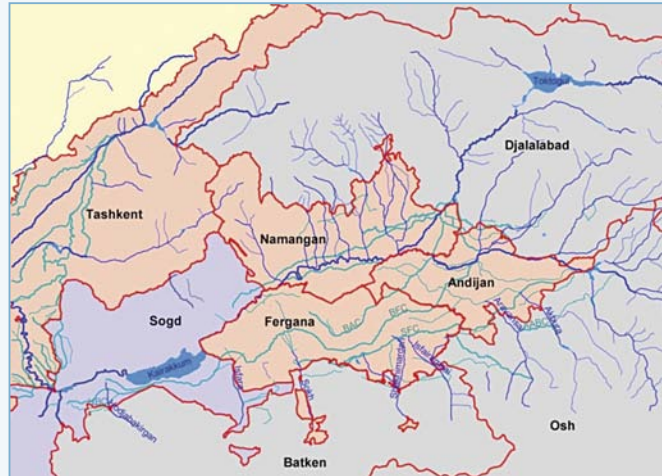
www.wrcu.ecowas.int

2.1.3 Progressive enlargement

- In other situations, a political approach at the local level on a part of a large transboundary basin or sub-basin may be an easier way to start cooperation, before expanding it to the whole basin.

Example 7: Implementation of cross-border cooperation along small transboundary tributaries of the Syr Darya River

Because of the boundary setting within the Ferghana Valley in Central Asia, between Tajikistan, Kyrgyzstan and Uzbekistan, there is a large concentration of Small Transboundary Tributaries (STTs) to the main stem of the Syr Darya. Several factors – e.g., plans for irrigation expansion, a local-level institutional vacuum, population growth – are working to heighten the potential for conflict in these STTs. In such a context, the Integrated Water Resources



Management in Ferghana Valley project, funded by the Swiss Agency for Development and Cooperation (SDC), has established and piloted grassroots transboundary institutions on two small STTs in the Ferghana Valley.

The project has been implemented since 2002 by a partnership of the International Water Management Institute (IWMI) and the Scientific Information Centre of the ICWC. The goal is to improve water management in the Ferghana Valley through IWRM-driven institutional changes. After the successful application of IWRM approaches in main pilot areas, the project expanded in 2007 by reforming the institutional setup of two pilot Small Transboundary Tributary rivers (Shahimardansai et Khojabakirgansai, see map). Overall, the IWRM approach, after adjustment to the local context, aims at:

- facilitating the establishment of a Union of Basin's Water Users,
- rearranging the existing operational water management bodies along the hydrologic boundaries,
- establishing joint governance arrangements with the State through the creation of a System Water Committee.

- Similarly, the political will among States of the same basin, may strengthen gradually, starting first by cooperation limited to a portion of a river strongly affected by a problem to solve, then extending it to the whole basin, taking advantage of parallel initiatives that may develop. The example of cooperation on the Rhine River Basin shows such an approach that tends to establish supranational and cross-border rules based on national legislations.

Example 8: Cooperation on the Rhine River Basin

The Rhine River Basin is a good example to demonstrate that cooperation initially restricted to the main river can be extended to the whole basin: The old and the new Convention on the Protection of the Rhine are limited to the river itself, without its tributaries, with the exception of flood protection and of polluting discharges which adversely affect the River.

Therefore, only the countries on the main stream are Parties to this Convention. Moreover, the upstream boundary of the Rhine is for the purpose of the Convention defined as the outlet of the Lake Untersee (the falls at Schaffhausen) which excludes the more upstream areas from the geographical scope of the Convention.

When the EU WFD came into force in 2000, it was necessary to cooperate in the whole river basin, i.e. including all tributaries, groundwaters and coastal waters. The existing Convention has not been changed. But a parallel more informal structure alongside the Convention's working structure was established, the so-called Coordination Committee to implement the EU WFD.

In this new structure, States that are not Parties to the Convention but which share the Rhine River Basin cooperate, namely Austria, Italy, Liechtenstein and the Walloon Region of Belgium. Switzerland, as a non-EU State, is not bound to the EU WFD, but cooperates within this new structure.

In the meantime, after some years of existence in parallel, the two processes have been structurally merged. Most issues are now discussed together, without focusing on which issue should be treated under which structure. Of course, there are issues that pertain only to the Convention or only to the EU WFD; nevertheless, many issues overlap and synergies are possible. For the implementation of the EU WFD, it has been an absolute advantage to build on an existing international structure and not to have to start from zero.

Example 9: International cooperation on water management in the Czech Republic

The Czech Republic is a typical inland country. Nearly all its rivers and streams flow to the territories of neighbouring countries (Austria, Germany, Poland and Slovakia).

Three important international river basins cover its territory: the Elbe, the Oder and the Danube. The Elbe River Basin is shared with Germany. The Elbe flows into the North Sea. The Oder is shared with Germany and Poland and discharges into the Baltic Sea. The Danube River is shared by 19 countries and flows into the Black Sea. Fourteen countries, including the Czech Republic, are contracting Parties to the Danube River Protection Convention.

It is obvious that international cooperation on water management and protection is extremely important for the Czech Republic.

International cooperation in the Czech Republic is taking place on three levels:

1. Cooperation under UNECE;
2. Cooperation for the protection of international river basins
3. Bilateral cooperation on water management with Austria, Germany, Poland and Slovakia.

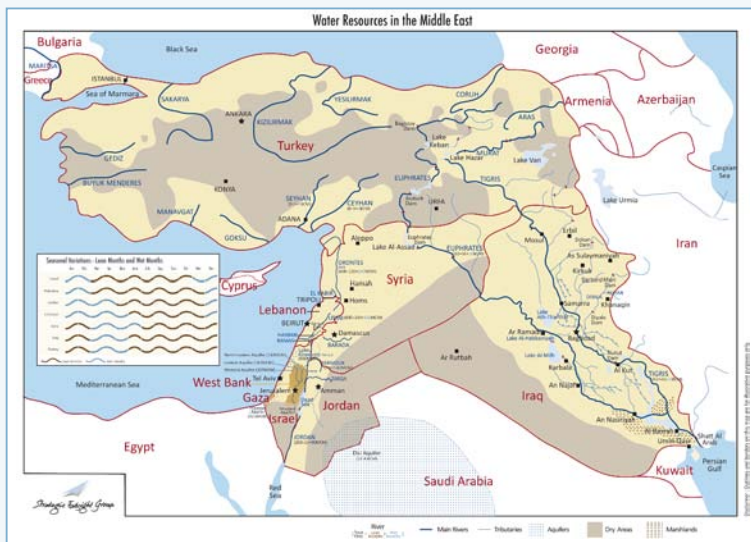
The multilateral and bilateral treaties have similar objectives as the UNECE Water Convention, but the level and detail of cooperation is more concrete. Thus, the Czech Republic implements the Water Convention predominantly through the international legal instruments at a more local level.

- When developing a comprehensive transboundary basin policy, the rules agreed in international agreements that concern those transboundary water resources must be complied in accordance with international law; in the event compliance is difficult or impossible, there are mechanisms for reporting and reviewing compliance. Finally water conflicts may paradoxically be driving forces for increased cooperation between countries.

Example 10: The Blue Peace - Water Security in the Middle East

All the countries in the Middle East already face serious water shortage and additional climate-induced resource scarcity could escalate conflicts and political turmoil. The river flows in Turkey, Syria, Iraq, Lebanon and Jordan have depleted by 50 to 90 per cent from 1960 to 2010.

In response to a demand made by political leaders from the region, Switzerland has co-financed with Sweden a project called “Water security in the Middle-East” to address the critical challenge of water security through the development of collaborative solutions for sustainable regional water management.



The main product of the Water Security in the Middle East project is a book called “The Blue Peace: Rethinking Middle East Water” that was released in February 2011. The report examines present and future water security in 7 countries of the Middle East (Israel, the Palestinian Territories, Jordan, Lebanon, Syria, Iraq and Turkey). The “Blue Peace” puts forward an innovative approach to engage political leaders, the public and the media in harnessing and managing collaborative solutions for sustainable regional water management. It makes a path for the evolution of a regional political and diplomatic community in water and creates new opportunities for resolving protracted water related conflicts.

2.2 International Water Law - Conventions

2.2.1 Introduction: the rule of law as an integrating mechanism

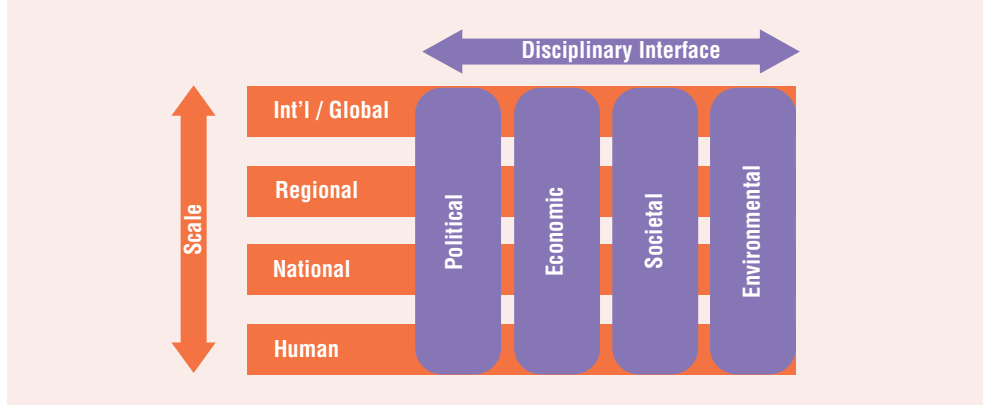
As an important part of IWRM, the rule of law serves to establish the formal rules of the game for management, through legal frameworks, institutions, processes and regulatory arrangements. This is true also within the international domain, where the rules of international law govern international relations. National governments are required to abide by those rules, including customary and treaty law.

In the area of transboundary water resources management, a number of rules of custom apply to all watercourse States and there is an extensive body of treaty law that national governments have agreed. These rules of law provide a formal integrating feature through identifying and implementing processes that facilitate operational cooperation in the management of transboundary water resources.

This part summarises the key rules of international law that apply to transboundary water resources management, including special reference to three important framework treaties in this field. It is important to note that apart from rules of customary law, the rules of treaty law apply only to those parties to the international agreement, and only once that treaty has entered into force and acquires binding forces.

Treaties are formal agreements agreed to and binding upon national governments in their bilateral or multilateral arrangements for managing transboundary water resources. These arrangements generally include transboundary institutions and processes to implement the rules and principles agreed under the treaty. Transboundary water resources management is deeply embedded in political and economic relationships between countries within a basin and within a region, based on the national interests, strength and priorities of countries. Transboundary water management is therefore most effective where there is an organically recognized alignment or compatibility between these national interests and the mutually beneficial imperative for broader cooperation.

Figure 1: Water law within a context



As the only universal instrument in this field the 1997 UN Watercourses Convention provides a useful framework for international relations in the management of shared international watercourses. In addition to this Convention, two regional instruments offer important, but more specific framework instruments in this field: the 1992 Convention on the Protection of Transboundary Watercourses and International Lakes (UNECE Water Convention, 1992) and the SADC Revised Protocol on Shared Watercourses in Southern Africa.

It is appropriate to add to these texts UN Resolution 63/124 adopted in December 2008 for transboundary aquifer management. It “encourages the States concerned to make bilateral or regional provisions adapted for good management of their transboundary aquifers (...)”. There is also the 1999 UNECE Protocol on Water and Health.

The next part reviews each these instruments, apart from the Transboundary Aquifers Resolution, which is reviewed separately in section 5.

2.2.2. UN Watercourses Convention (1997)

The only universal agreement covering the development and management of shared transboundary watercourses is the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (1997). Adopted by the UN General Assembly, this convention resulted from close to 30 years of study on the topic (by the UN International Law Commission) with inputs from all Member states.

The Convention was adopted by the UN General Assembly on 21 May 1997 by vote of 104 States for; 3 States against (Burundi, China, and Turkey), and twenty-six abstaining. It requires thirty-five ratifications to enter into force but in November 2011, only 24 parties had ratified it. At present, the Convention remains open for accession and requires an additional 11 Parties to enter into force.

Box 2: Parties to the 1997 UN Watercourses Convention

Participant	Signature	Ratification
Burkina Faso		22 Mar 2011
Côte d'Ivoire	25 Sep 1998	
Finland	31 Oct 1997	23 Jan 1998
France		24 Feb 2011
Germany	13 Aug 1998	15 Jan 2007
Greece		2 Dec 2010
Guinea-Bissau		19 May 2010
Hungary	20 Jul 1999	26 Jan 2000
Iraq		9 Jul 2001
Jordan	17 Apr 1998	22 Jun 1999
Lebanon		25 May 1999
Libyan Arab Jamahiriya		14 Jun 2005
Luxembourg	14 Oct 1997	
Morocco		13 Apr 2011
Namibia	19 May 2000	29 Aug 2001
Netherlands	9 Mar 2000	9 Jan 2001
Nigeria		27 Sep 2010
Norway	30 Sep 1998	30 Sep 1998
Paraguay	25 Aug 1998	
Portugal	11 Nov 1997	22 Jun 2005
Qatar		28 Feb 2002
South Africa	13 Aug 1997	26 Oct 1998
Spain		24 Sep 2009
Sweden		15 Jun 2000
Syrian Arab Republic	11 Aug 1997	2 Apr 1998
Tunisia	19 May 2000	22 Apr 2009
Uzbekistan		4 Sep 2007
Venezuela (Bolivarian Republic of)	22 Sep 1997	
Yemen	17 May 2000	

Source: UN Treaty series

Regardless of when the Convention enters into force, it already plays (and will continue to play) an influential role in transboundary water resources management since it sets forth a generally accepted codification of the primary rules of customary international law in this field.

At the heart of this Convention, the governing rule of “equitable and reasonable utilization”, supported by a suite of practical procedures – such as the duty to cooperate in the management and development of international watercourses, and a series of steps to follow in the event of planned measures, including the exchange of information and prior notification before development of new or increased uses.

Box 3: UN Convention Treaty provisions (article 8) - Duty to cooperate

1. Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.
2. In determining the manner of such cooperation, watercourse States may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate cooperation on relevant measures and procedures in the light of experience gained through cooperation in existing joint mechanisms and commissions in various regions.

For up to date information see UN treaty website:

http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&lang=en

2.2.3. UNECE Water Convention (1992)

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention) was adopted in Helsinki, Finland, on 17 March 1992. It entered into force on 6 October 1996 and involved 38 Parties in August 2011.

The Convention aims to strengthen measures for the protection and ecologically sound management of transboundary surface waters and groundwaters. It takes a holistic approach to water management, taking into account the relationship between the hydrological cycle, land, flora and fauna, and their impact on socioeconomic conditions. It is based on the understanding that water resources are critical to societies and ecosystems. The core obligations of the Water Convention include an obligation to prevent, control and reduce transboundary impacts, such as significant adverse effects on the environment, and their socioeconomic implications, the obligation to ensure a reasonable and equitable use of transboundary waters and the obligation to cooperate in the use and management of such waters.

More specifically, the Convention includes two categories of obligations:

- the first, more general, applied to all Parties includes: authorization and monitoring of waste water discharges, application of best environmental practices to reduce pollution by nutrients and hazardous substances in agriculture and other sectors, introduction of the environmental impact assessment, monitoring, development of emergency plans, definition of water-quality objectives, and minimizing of the risks of accidental pollution.
- the second category of obligations is addressed to “Riparian Parties”, i.e. those sharing transboundary waters directly; this category is required to cooperate more closely, on the basis of equality and reciprocity, in particular by entering into specific bilateral or multilateral agreements, which promote the creation of joint bodies for transboundary cooperation on water. The Convention encourages the Parties to cooperate on the scale of river basins.

Box 4: The European rivers

Close to 200 international rivers and aquifers are shared by two or more States throughout Europe, ranging from the “most international” river basin, the Danube (covering the territories of 18 States) to some forty watercourses shared only by two countries. Europe’s longest river, the Volga, mostly in Russia, flows primarily in a southerly direction and empties into the Caspian Sea. Other major European transboundary river basins include the Po and Rhone, which flow into the Mediterranean Sea; the Elbe, Loire, Rhine, and Seine, which enter the Atlantic Ocean or the North Sea; and the Oder and Wisa, which flow north to the Baltic Sea. Europe’s biggest freshwater lake is Lake Ladoga in northwest Russia.

Many European nations are heavily reliant on waters coming from outside their national borders: Belgium, Hungary and the Netherlands are each up to 80% reliant on external water resources. For 16 European countries, close to 90% of their territory is located within international basins.

With the changed political situation in the former Soviet Union, a number of rivers in that region have become international, raising a host of complex issues. A recent report explains, “At present 31% of Europe’s population lives in countries already suffering from what we call high water stress, particularly during droughts and periods of low river flow. The trouble is that demand for clean water will probably increase throughout Europe and Central Asia. Areas such as the Mediterranean and Central Asian countries, which are already facing overexploitation of their water resources, may well find this growing demand generating conflicts between the different water users and between countries, too” (UNECE report).

The strength of the UNECE Water Convention is that it is not only a strong legal framework but is also coupled with an institutional framework and an enabling work programme for continuing progress in the exchange of experiences and mutual assistance. The relationship between the Convention and “reality” (countries’ needs) is maintained through the Meeting of the Parties (and established bodies: thematic working groups, etc.) which continue to develop tools and activities to support the Parties and non-Parties. It is also supported by a (small) permanent secretariat.

The Meeting of the Parties to UNECE Water Convention, at its fifth session (November 2010), agreed on the need to establish a mechanism through which problems related to implementation and possible differences on the Convention’s interpretation could be addressed.

The Legal Board discussed a possible mechanism and agreed on the objective, nature and principles of this mechanism, concluding that, if approved by the Meeting of the Parties, the objective would be to facilitate, promote and safeguard the implementation and application of and compliance with the UNECE Water Convention. The mechanism shall be simple, non-confrontational, non-adversarial, transparent, supportive and cooperative in nature, building on the collaborative spirit of the Convention.

In 2003, the Water Convention was amended to allow accession by countries outside the UNECE region, thus inviting the rest of the world to use the Convention’s legal framework and to benefit from its experiences. The entry into force of the amendments will be of great importance for the countries bordering the UNECE region, but also for many others. Since 2009, some non-UNECE countries have participated in activities and workshops organized under the Convention.

2.2.4 SADC Revised Protocol on Shared Watercourses (2000)

In 2000 the Southern African Development Community (SADC) adopted the Revised Protocol on Shared Watercourses, which serves as a framework agreement for the management of transboundary basins within the region.

In existence since 1980, SADC, through its Member States (Angola, Botswana, DR Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Seychelles, Swaziland, Tanzania, Zambia, and Zimbabwe) aims to enhance socio-economic development, regional integration and improvement of the quality of life of all people in the region. Building on these objectives, the SADC Watercourses Protocol has a declared goal of “developing close cooperation for judicious and coordinated utilisation of the resources of the shared watercourse systems in the SADC region” and is predicted on the “the need for coordinated and environmentally sound development of the resources of shared watercourse systems in the SADC region in order to support sustainable socio-economic development”.

The Protocol covers a broad legal scope, including definitions gleaned from the UN Watercourses Convention. For example, reference is made to “drainage basin” (a geographical area determined by the watershed limits of a system of waters including underground waters flowing into a common terminus), with reference to the work of the International Law Association’s under their Helsinki Rules.

The Protocol provides a coherent package of substantive and procedural rules, supported by the establishment of “appropriate institutions necessary for the effective implementation of the provisions of [the] protocol.” Disputes are to be resolved by the SADC Tribunal. This Protocol has entered into force and provides a comprehensive framework for the management of the many transboundary water resources (some 70%) shared across the region.

Example 11: The role of cooperation across SADC

A recent report (August 2011) examined the role of cooperation in transboundary water resources management across SADC with GIZ support. The study considered the conflict-security-development-water nexus, and used these as a basis for discussing the benefits of transboundary water cooperation both in terms of conflict prevention and in terms of outlining the ‘costs of doing nothing’.

The key findings resulted in four key messages:

1. The challenge is to foster sustainable transboundary water cooperation. The study allowed laying the foundation for converging views on conflict and instability versus regional stability and opportunities;
2. International cooperation is not only “good” for the sound stewardship of transboundary water resources, but also an important conflict-prevention tool;
3. The SADC multi-level water cooperation is not only significant at international level, but also in preventing spill-over effects locally across borders;
4. The effectiveness quotient and benefits associated with investment in the SADC Transboundary Water Management Programme are presumed to be very high, the programme costs being minimal compared to the potentially high costs of “hostilities” as a result of no cooperation at all.

More information on the website: www.sadc.int/water

2.2.5. UNECE Protocol on Water and Health (1999)

The UNECE Protocol on Water and Health, adopted in London on 17 June 1999 (entry into force on 4 August 2005) was adopted as a Protocol to the UNECE Water Convention. The Protocol includes 24 state Parties (as at August 2011). It aims to protect human health and well-being by better water management, including the protection of water ecosystems and by preventing, controlling and reducing water-related diseases. It is the first international agreement of its kind adopted specifically to attain an adequate supply of safe drinking water and adequate sanitation for everyone, and effectively protect water used as a source of drinking water. The countries of the UNECE region, whether or not Party to the Water Convention, can join the Protocol.

The Protocol develops an integrated approach to transboundary water management and more specifically, the obligation to establish water-quality criteria and objectives. The main obligations of the Parties to the Protocol are to define and achieve targets for the quality of drinking water, bathing water and waste water, to establish and maintain national and / or local monitoring and warning systems to prevent and respond to water-related diseases and to cooperate and assist each other in the implementation of the Protocol provisions.

In addition, the Protocol introduces a social component into cooperation on water management. Water resources management should link social and economic development to the protection of natural ecosystems. In addition, improving water supply and sanitation is fundamental to breaking the vicious cycle of poverty.

2.3 International Water Law – How it works

The rules of international law are linked directly with national laws, where compliance with international norms is evaluated and tested in line with the fundamental tenets of state sovereignty. Thus, the interface of national and international water law is important, and provides the locus for determining their effectiveness and legitimacy. National water laws relate to the right to use water (including property rights and land use), the regulation of specific domestic issues such as water quality, the provision of water and sanitation services, and set forth the national rules of the game, through a sometimes complex package of legislation and regulations.

The development of international water law is inseparable from the development of international law in general. Such fundamental principles and basic concepts as the sovereign equality of States, non-interference in matters of exclusive national jurisdiction, responsibility for the breach of State's international obligations, and peaceful settlement of international disputes equally apply in the area governed by international water law.

The rules of international law provides that each transboundary watercourse State is entitled to (and obliged to provide to other riparian countries) an equitable and reasonable utilization of the shared fresh water resources. This correlative right and duty is to be determined on a case-by-case basis through a consideration of all relevant factors – including the extent of harm caused – with a conclusion on the legality of the proposed use reached on the basis of the whole. This rule of equitable and reasonable use is an universal rule of customary law, contained in most water-related treaties and followed in state practice.

International law provides the framework for the substantive, procedural and institutional rules and mechanisms that clarify ambiguous water rights and facilitate the allocation and use of transboundary waters in transparent and predictable ways. The following Analytical Framework identifies the 5 key elements at the core of the transboundary watercourse legal regime:

1. **Scope:** the geographical and functional definition of the transboundary water resources covered by the regime or legal instrument;
2. **Substantive rules:** the rules that govern the legal entitlement to use the transboundary water resources;
3. **Procedural rules:** the obligations relating to the planned measures and continued development of the transboundary water resources;
4. **Institutional mechanisms:** the organizations responsible for managing the transboundary water resources;
5. **Dispute settlement:** the range of dispute resolution mechanisms (dispute avoidance, monitoring compliance and dispute settlement procedures) employed in the peaceful management of the transboundary water resources.

Each of these elements should be considered when devising or evaluating a transboundary watercourse regime. In this way the key aspects are covered and a foundation of certainty is established. This framework also provides an easy outline to understand treaties, something that will prove useful to a broad range of stakeholders and managers.

Box 5: Legal Analytical Framework for Transboundary Water Resources Management

Key Elements	Details
1. Scope	<ul style="list-style-type: none"> • Legal reach (what waters?) • Definitions (watercourse; uses) • Parties
2. Substantive Rules	<ul style="list-style-type: none"> • Legal duties & entitlements (equitable and reasonable utilisation; due diligence; protection) • Rules of substance (general or precise)
3. Procedural Rules	<ul style="list-style-type: none"> • Rules of procedure (duty to cooperate as bridge) • Notification / exchange of information
4. Institutional Mechanisms	<ul style="list-style-type: none"> • Joint bodies (RBOs) • Conference of the Parties • Organisations / organs (Ministerial level; other)
5. Dispute Settlement	<ul style="list-style-type: none"> • Dispute avoidance (consultation) • Dispute settlement • Compliance verification (reporting; facilitation)

2.4. Legal agreements as foundations for transboundary water resource management

As noted above, in order to cover the key issues related to transboundary water regimes, the agreed arrangement should cover the scope of the resource, the substantive and procedural rules, the remit and the legal authority, and include provisions related to dispute settlement. From the examples of practices examined below, it is clear that national governments have adopted legal regimes that follow in many ways the UN Watercourses Convention and the other regional instruments referred to above; however, there have been innovations also.

The following case studies show several types of cooperation and collaboration in various regions for transboundary water resources management.

2.4.1 An example of Regional Cooperation: the Astana Water Action initiative linked to the UNECE Water Convention

The 2011 Astana Ministerial Declaration developed the following statements:

- reaffirmation of the important value of the “Environment for Europe” process as a unique pan-European forum for tackling environmental challenges and promoting broad horizontal environmental cooperation among countries in Europe, North America, the Caucasus and Central Asia, and as a pillar of sustainable development in the UNECE region for 20 years;
- invitation to countries to ratify and implement the relevant multilateral environmental agreements, inter alia, the UNECE Water Convention and its Protocol on Water and Health;
- the role of UNECE in assessing the obstacles to ratifying the UNECE environmental agreements and in assisting countries to ratify and implement these agreements.
- encouraging riparian countries to undertake and implement agreements on transboundary waters, to strengthen institutional frameworks and develop strategies including on environment and security issues and to adapt their water management to extreme phenomena and climate change.

The Astana Water Action was initiated by the Chair of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes Bureau, assisted by the UNECE Bureau, Water Convention secretariat and a drafting group composed of representatives of several countries and international organizations.

Some actions are of a general nature and important for a coherent implementation of any water action, such as:

- to make water and water management integral parts of development strategies at local, national or regional levels;
- to improve communication and cooperation on water between different institutions, ministries and sectors and integrate sectoral policies;
- to involve stakeholders (e.g., water users and NGOs) in water development plans, programmes and management in basins, including in river, wetland and lake restoration;
- to develop curricula for water and sanitation professionals at all levels, as well as cross-sectoral curricula;
- to invest in the human capital, i.e., in improving operational/staff capacities of water administration and management institutions;
- to budget sufficient financial resources to finance water management (measures and staff).

2.4.2 Cooperation through a long-standing transboundary basin organization: the Mekong River Basin

In 1995, the four lower riparian States on the Mekong (Thailand, Cambodia, Vietnam, and Laos) concluded the Mekong River Basin Agreement, which sets forth substantive and procedural rules, together with detailed institutional mechanisms in their agreement “to cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin.” Central to this mission is the Mekong River Commission (MRC) comprised of three permanent bodies:

- the Council (consisting of one Ministerial representative from each riparian State) is empowered to make policy decisions on behalf of the respective governments. The Council also has the task “to entertain, address and resolve issues, differences and disputes”;
- the Joint Committee, comprised of one member from each riparian State at no less than Head of Department level – is asked to “address and make every effort to resolve issues and differences that may arise between regular sessions of the Council” and “when necessary to refer the matter to the Council”;
- the Secretariat is charged with the day-to-day operations, including support for the Council and Joint Committee, and providing technical services.

The structure of the agreement contains innovative “agreements to agree”, i.e. a commitment to establish rules for water utilization and inter-basin diversions. As a result, the parties have agreed to a series of protocols on procedures for data and information exchange and sharing; procedures for water use monitoring and procedures for notification, prior consultation and agreement.

2.4.3 A new basin organization in West Africa: the Volta Basin Authority

The Volta is a transboundary river system that, for many years, has remained one of the major river basins in Africa without legal and institutional arrangements between the riparian countries. To establish measures for the sustainable management of transboundary water resources, the Ministers responsible for water resources in the riparian countries (Benin, Burkina Faso, Ivory Coast, Ghana, Mali and Togo) have set up the Volta Basin Authority (VBA) on 16 July 2006 in Lome. The Convention was signed by the Heads of State of the riparian countries during their first general assembly held in Ouagadougou on 19 January 2007 under the auspices of the Government of Burkina Faso; the Convention entered into force after ratification on 14 August 2009.

Under Section III, Article 6 of the Convention on the statute of the Volta River and the creation of the Volta Basin Authority, the mandates of the Authority are to:

- promote tools for continuous dialogue among stakeholders on the development of the Basin;
- promote the implementation of integrated water resources management and fair sharing of benefits arising from their different uses;
- allow carrying out works and projects proposed by the involved States that may have a significant impact on the water resources of the basin;
- carry out joint projects and works;
- contribute to poverty reduction, sustainable development of the involved States and to better socio-economic integration in the sub-region.

As the VBA is still “young”, its convention being in force only since 2000 (although activities started in 2006), several of its mandates are not yet fulfilled. Regarding hydraulic structures and the sharing of benefits, VBA does not fully play its role of regional integration but is preparing the Master Plan for water development and management of the Volta River Basin.

2.4.4 The Columbia River Treaty (Canada - USA): downstream benefits of cooperation in a bilateral setting

Shared by Canada and the USA, the Columbia River rises in Columbia Lake in south-eastern British Columbia, Canada, and runs for some 2,000 kilometres before discharging into the Pacific Ocean at Cape Disappointment north of Portland, Oregon (USA). With a drainage area of some 260,000 square miles in two Canadian provinces (Alberta, British Columbia) and seven USA States (Washington, Oregon, Idaho, Montana, Wyoming, Utah and Nevada), and an average runoff of 180 million cubic meters per year, it is one of the most powerful sources of hydropower in the world.

Canada and the USA, under the 1961 Columbia River Treaty, created an integrated regime of utilization of their transboundary river through balancing the equities, and through recognition and payment for “downstream benefits”. Canada agreed to construct three major dams and reservoirs on its territory and to provide the USA with the resulting downstream benefits in the form of electricity and flood control. In return, the USA undertook to compensate Canada by paying for flood-control measures and by providing 50 per cent of the additional hydropower resulting from the project.

Despite considerable disagreement, the Columbia River has been managed peacefully under the 1961 Canada USA Treaty, in conjunction with the 1909 Boundary Waters Treaty. The innovation in sharing downstream benefits on a 50/50 basis is linked to payments for flood control (recognizing Canada’s storage provision).

The Treaty arrangements are quite operational, establishing a Permanent Engineering Board that manages the hydropower sharing under the agreement. There is a provision for data and information sharing, exchange and harmonization and regular reporting. The Board is also responsible for assisting with reconciling differences concerning technical or operational matters. The Treaty is currently under review (2014/2024 Columbia River Treaty Review) and this transparent process includes stakeholder participation.

2.4.5 Cooperation through dispute settlement: the Indus

In 1960 with the assistance of the World Bank, India and Pakistan concluded the Indus Waters Treaty under which the six major tributaries of the Indus were divided equally between India (the three “Eastern Rivers” - the Sutlej, the Ravi and the Beas) and Pakistan (the three “Western Rivers” - the Indus, the Jhelum and the Chenab). Notwithstanding the almost permanent hostility between the two countries, the treaty has borne the test of time over more than 50 years. The central institutional mechanism established under the Treaty (Art. VIII), the Permanent Indus Commission plays a significant role in the resolution of disputes under the Treaty. It is charged with serving “as the regular channel of communication on all matters relating to the implementation of the Treaty”. The Commission is required to “study and report” to both Governments “on any problems relating to the development of the waters of the Rivers which may be jointly referred to the Commission by the two Governments”.

Regarding disputes, the Commission is obliged to “make every effort to settle promptly, in accordance with the provisions of Article IX (1), any question arising there under.”

The Commission, headed by a Commissioner in each country, who “will be the representative of his Government for all matters arising out of the Treaty and act as regular channel of communication on all matters”, and is required to undertake a list of duties aimed at facilitating cooperation in the implementation of the Treaty.

Despite efforts under the Treaty, in 2005 a dispute related to the Baglihar hydropower plant (being constructed by India on the Chenab River) arose and was brought before a Neutral Expert (in accordance with the Treaty), with a decision rendered in February 2007, which was accepted by the Parties. Recently, however, another dispute has arisen regarding the Indus-Kishenganga waters (Pakistan versus India), which is set to be heard by the Permanent Court Arbitration, as agreed by the parties.

In spite of these two disputes, the Indus Waters Treaty continues to provide an operational framework for cooperation, with its dispute settlement provisions offering recourse for resolving differences under the treaty. This is an important lesson learned: cooperation can occur in the event of conflict-of-uses or disputes, even if it is always preferable to anticipate and prevent them.

2.4.6 Cooperation across the Mediterranean

Across the Mediterranean, nation States are faced by a myriad of challenges, compounded by climate change, declining water quality, water scarcity, financial insecurity and recent regional instability. The region has demonstrated its leadership in transboundary water cooperation, despite considerable diversity across the region.

Example 12: Cooperation in the Drin Basin

The Drin River watershed has its origin in the Lake Ohrid – Lake Prespa ecosystem in Albania, Macedonia, and Greece. The total catchment area of the Drin is 15,540 km². The Prespa-Ohrid-Shkoder lakes region of the Balkan Peninsula has been widely acknowledged as an ecological area of global significance, and the Drin River links the lakes to form a single ecosystem. However, the Drin River Basin encounters water quality and quantity problems (over extraction) - for irrigation and hydroelectricity. These problems have been exacerbated by the use of the river bed for gravel mining.

In view of the deteriorating situation, the Drin Basin Dialogue was initiated, which is a coordinated and structured consultation process among the riparian States, extended to Kosovo and key stakeholders. The Drin Dialogue aims to develop a Shared Vision for the sustainable management of the Basin and enhancing of transboundary cooperation. The initiative has been started in compliance with the UNECE Water Convention.

Activities implemented and to be developed in support of the Drin Dialogue are part of the work of the Mediterranean Component of the EU Water Initiative and of the GEF Strategic Partnership on the Large Mediterranean Marine Ecosystems. On 18 April 2011, Ministers of the riparian States issued a Declaration expressing their support for the continuation and enhancement of the Drin Dialogue with the assistance of GWP Mediterranean and the UN Economic Commission for Europe.

More information:

www.gwp.org/en/gwp-in-action/Mediterranean/News-and-Activities-GWP-Mediterranean/Ministers-Declare-Support-for-Drin-Basin-Dialogue

2.4.7 Cooperation in Scotland based on a non-governmental approach

An interesting example of cooperation can be found in Scotland, where the First Minister of the Scottish Government has initiated a unique undertaking - Scotland as a “Hydro-Nation” (for more details, see www.scotland.gov.uk/Publications/2010/12/14111932/9). Scotland is well endowed with water resources, which help to sustain the health and welfare of the nation. One river shared by Scotland and England is the River Tweed, which is a HELP (Hydrology for the Environment, Life and Policy) basin under the UNESCO International Hydrological Programme (IHP) programme, demonstrating how water law, policy and science integrate in the management of this shared resource. The Tweed Basin is recognized as the longest-running example in the UK of a non-governmental, stakeholder-led approach to integrated catchment management.

The Tweed Basin is recognized as the longest-running example in the UK of a non-governmental, stakeholder-led approach to integrated catchment management. The HELP approach on the Tweed allowed integrating water law, policy and science. Legislative responsibility for management of the Tweed Basin falls to a number of central and local statutory bodies, separately north and south of the national boundary. The UK as Member State of the European Community is responsible for delivery of the EU Water Framework Directive (WFD). Tweed Forum and the Tweed Catchment Management Plan Initiative were well-established long before the WFD or River Basin Management Plans were first introduced. Tweed Forum began life 20 years ago, as an informal liaison group responding to a specific concern relating to damaging physical works being undertaken in the river channel.

In 1999, on the back of a major grant to take forward the Tweed Rivers Heritage Project, Tweed Forum began the production of its first catchment management plan. Most recently, Tweed Forum has played a similar role in the delivery of the new flood risk management plans for the borders, again bringing together the stakeholders concerned to define, with catchment-wide holistic thinking, the necessary measures.

In 2010 Tweed Forum launched the Tweed Wetland Strategy, another partnership programme, looking to maintain wetlands useful for wildlife and people. Because of its success and method, Tweed Forum is a good example of improving governance for sustainability. It also highlights the importance of basing actions on sound scientific evidence, throughout the range of biophysical and social sciences. In this, it recognizes and highlights the other key themes of the HELP Programme.

2.4.8 Cooperation in Central Asia

Central Asia has many examples of transboundary cooperation, and includes a series of international agreements.

A recent meeting of the Organization for Security and Cooperation in Europe (OSCE) recognized successful cooperation on the transboundary management of the Chu-Talas by a bilateral Commission. The OSCE, which promotes best practices on transboundary water management, noted “The work of the Chu-Talas Commission is a break-through in water management in Central Asia and in relations between the countries in this field. It demonstrates a new approach to addressing issues related to shared responsibility and management of transboundary water resources”.

The Commission's activities contribute to better cooperation between Kazakhstan and Kyrgyzstan, and can be used as a model for transboundary integrated water resources management in Central Asia. The OSCE Centre has assisted the dialogue under this project as part of promoting regional cooperation to ensure rational and coordinated use of water resources in Central Asia (www.osce.org/astana/78071).

Example 13: Cooperation on the Chu-Talas River in Central Asia

The Chu-Talas Commission is the only bilateral transboundary water Commission in Central Asia. It contains relevant tools for costs compensation within the Agreement. It has been termed as a best practice by the Organization for Security and Cooperation in Europe in this water critical region.

Cooperation on the Chu and Talas rivers shared by Kazakhstan and Kyrgyzstan is a good example of bilateral cooperation in Central Asia. The Commission Agreement, signed in 2000 by both countries, relates to the use by the States of the water facilities on the two rivers. Article 1 of the agreement declares that "the use of water resources and operation of water management facilities of intergovernmental status shall be aimed at the achievement of mutual benefits on a fair and equitable basis". Article 3 says that the Party that possesses water management facilities of intergovernmental status has a right to compensation from the Party that uses these facilities.

The countries have set up a Commission to implement cooperation on the rivers. The main objectives are the following:

- coordinate and study the activities of the Parties related to the Agreement;
- develop and implement joint activities to meet public and business water demands;
- provide a comprehensive assessment and forecast of the status of water bodies, regulate water resource use to ensure mutual, equitable and reasonable benefit sharing;
- agree on the standard indicators of water consumption, water abstraction, water assessment and monitoring;
- agree on the documents regulating the procedures for organizing operation of the interstate facilities;
- agree on the operational regimes of water reservoirs and adjust the regimes and limits according to the actual water quantity and water users' needs;
- jointly establish a disaster response procedure;
- organize an exchange of hydrological forecasts and data related to water management in the Chu and Talas basins;
- agree upon and coordinate the programmes of monitoring water bodies, the water and hydrotechnical facility assessment and establish a water inventory;
- organize joint scientific research and development in the area of interstate water facility operation.

2.4.9 Cooperation through integrated transboundary projects

In addition to legal frameworks aimed at facilitating cooperation across transboundary water resources, another important approach is through the sectoral integration across disciplines, law, policy and research.

One example is UNESCO IHP (International Hydrological Programme) HELP (Hydrology for the Environment, Life and Policy), which is a cross-cutting programme aimed at integrated catchment management through combining water law, policy and science in responding to stakeholder-driven needs.

Box 6: IWRM in practice - Hydrology for the Environment, Life and Policy (HELP)

Established in 1999, HELP is a cross-cutting programme: it interacts with all core themes of the programme by establishing a global network of basins to improve the links between hydrology and the needs of society:

- Water and climate;
- Water and food;
- Water quality and human health;
- Water and the environment.

HELP aims to deliver social, economic and environmental benefits to scientists and stakeholders through research towards the sustainable and appropriate use of water by:

- hydrological science in support of improved integrated river basin management,
- improving the complex relationships between hydrological processes,
- water resources management,
- ecology,
- socio-economics and policy-making.

*UNESCO HELP Basins Map is available on the website:
www.smhi.se/polopoly_fs/1.9834%21/HELP%20info.pdf*

Another example comes under the European Union framework programme, which has funded research that integrates disciplinary expertise. One recent example, under the STRIVER project (Strategy and methodology for improved IWRM - An integrated interdisciplinary assessment in four Asian-European river basins) has developed methodologies for integrated management approaches that have included transboundary water resources (see website <http://kvina.niva.no/striver/>). The project has emphasized stakeholder involvement, provided new approaches on water governance and contributed also to enabling and supporting local capacity development.

Example 14: Water Law, Policy and Research in the Sesan sub-basin (Mekong) – STRIVER project

The STRIVER project, funded by the European Commission within the Sixth Framework Programme, focused on 4 basins including two Asian and two European. A case-study approach was used to ensure strong real-world foundations for the project. It started in 2006 and was completed three years later and included some 13 partners from 9 countries.

The Sesan River, one of the four river basins concerned, is among the largest tributaries of the Mekong River and has a drainage area of 17,000 km².

The rainy season in this part of the world lasts from August throughout November, with peak flows normally in September-October. After the completion of the Yali Hydropower dam in Vietnam in 2000, a change in the flow regime occurred down-stream from the dam.

The task of the Dundee Centre's project group was to identify the main stakeholders and institutions involved in the governance of the Sesan, and to attempt to get these parties to discuss their common future around the river. A meeting with representatives from Vietnam, Cambodia and the Mekong River Commission was organized, in which visions for a common future were discussed through the use of future scenarios, facilitated by the Centre's researchers.

Source: www.dundee.ac.uk/water/projects/striver



3 Governance of transboundary River Basin Organizations

KEY POINTS:

- Agreements between countries should foster the establishment of transboundary basin organizations to assist in achieving the given objectives.
- The existing transboundary basin organizations provide valuable information depending on the context, both on the type of institution and on the mandate and operation.
- In some cases, it may be preferable to develop a transboundary basin organization gradually.
- The choice of the tasks of the basin organization must result from a detailed analysis of the tasks already fulfilled nationally. The implementation of management tools is a particularly crucial feature.
- A body performing the executive tasks within the organization is often advisable.

3.1. Types of organizations

3.1.1 Typology elements of transboundary basin organizations

A transboundary River Basin Organization can be defined as a permanent institutional arrangement dedicated to all or part of the management of shared waters between at least two countries. This covers a wide range of organizational types performing various functions (see box on the possible functions in the section 3.2). The legal framework and the statute of these institutions are often determined by the basin's context and history as well as by the mandate given to the body established by the Member States.

We can roughly distinguish three levels of general mandates for transboundary basin organizations, in ascending order of importance:

1. a mere informational mandate, focusing on the exchange of data and tasks mainly technical and execution;
2. a consultative mandate, where the body is an institution complementary to the States, but has no decisional power;
3. a decisional mandate, implying indeed a partial loss of the States' sovereignty to the benefit of the organization in the field of shared waters.

Usually, the creation of a permanent body follows an agreement between the riparian countries of the basin, an agreement that, in most cases, is limited to part of the territory of the countries concerned, since the basin limits do not correspond to the borders of each country.

Globally, when water is shared by several countries, it is advisable that the cooperation agreement provides for the creation of a transboundary basin body, based on an inventory and prioritization of the problems in the basin. In addition, it is important to define cooperation issues using a basin-wide approach and to ensure the participation of all the riparian countries, whatever their importance, in the organization.

No structure can be regarded as a universal model because they are each established for specific waters and geopolitical context, and special socio-economic features. Nevertheless, some principles that improve the efficiency of the body and cooperation may be retained. This especially includes:

- A wide responsibility of the joint body to allow for IWRM implementation;
- A clearly defined mandate and institutional organization to allow for the adoption of decisions and their implementation;
- A gradually consolidated legal framework;
- Efficient mechanisms for cooperation between the national authorities and the transboundary basin body;
- Mechanisms for reporting;
- The availability of funds to support joint programmes and structures;
- Mechanisms to promote public and stakeholders participation in the activities of the joint body.

The basin body has a size which can vary and is appropriate to its mandate and basin dimension: e.g. the secretariat of the Mosel - Saar Rivers Basin Commission is made up of two people while the Secretariat of the Mekong River Commission comprises 120 officers.

3.1.2 Evolution of transboundary basin organizations

In many cases, these institutions correspond to bilateral or multilateral bodies that do not include all riparian countries. For example, CICOS gathers 4 countries out of the 10 countries involved in the Congo River Basin and the Mekong River Commission consists of four countries out of the six involved in the basin.

The signing of bilateral agreements should be seen as a step but not as a substitute for cooperation on the whole transboundary basin.

In some cases, the agreement initially plans the establishment of a basin body. In other cases, the treaty or international agreement does not provide for the immediate creation of such a body, it is only time and experience, and even the evolution of the mandate, that show the need to establish a transboundary basin organization.

Example 15: Progressive establishment of the bodies of the Okavango River Basin

Guided by the spirit of managing the Okavango River Basin as a single entity, the three States of Angola, Botswana and Namibia signed an Agreement in 1994 on the establishment of the Okavango River Basin Commission (OKACOM). The Agreement commits the Member States to promote coordinated and sustainable water resources development.

Pragmatism led the Member States to a gradual establishment of OKACOM bodies through the following steps.

- in 2004, the Commission had recognized the need to establish a Secretariat to implement its decisions.
- in 2005, a Memorandum of Understanding was signed for the establishment of the Commission Secretariat (OKASEK) and development of procedural guidelines.
- in 2006, the Organizational Structure was defined for the Permanent Okavango River Basin Commission.

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- in 2007, an agreement was signed by the three governments on the structure of the Commission and on the location of the secretariat in Botswana for the period 2007 to 2010.
- in April 2007, the agreement on the OKACOM permanent organizational structure was reviewed to bring it in line with the Revised SADC Protocol on Shared Watercourses. More recently, the protocol on the sharing of hydrological data was signed in 2010.

The Commission is made up of three representatives from each country. The Secretariat is an internal organ, mandated to assist OKACOM in implementing its decisions. It assumes a role in information sharing and communication.

The Basin Forum, a transboundary committee comprised of 10 local representatives from each State, was established to share experiences and generate an overall view of the socio-economic and hydro-environmental landscape of the basin in order to help formulate action plans based on the local context.

For more information see the website: www.okacom.org

In the case of a mere governmental representation in a “commission” (or “Joint Commission”), there is often no Transboundary Basin Organization (no executive body) and activities are limited to meetings of officials of the countries. This is the first step to consolidate the political willingness to cooperate, learn to work together, build trust among members and promote the exchange of information and data. But this system should, if possible, evolve into a permanent basin body, to enable the establishment of a permanent secretariat which would enhance coordinated management and support implementation of the agreement.

Box 7: Plenipotentiaries and joint commissions

The organizational structure is the most obvious characteristic distinguishing plenipotentiaries and joint commissions. The plenipotentiaries have a relatively simple organizational structure, whereas joint commissions usually have a more developed structure.

Joint commissions most commonly include a decision-making body (or bodies) and working or subsidiary bodies. The organizational structure of joint commissions may include such elements as, inter alia, a Conference of the Parties (plenary of the commission), delegations of Parties, a body comprised of heads of delegations, a chairperson of the commission, a secretariat, working groups, expert groups, an auditing commission, a consultative group of donors, an information centre, a training centre, national offices and observers. Despite the diversity of organizational structures among joint commissions, it is important for these commissions to have, in addition to the decision-making bodies, executive and working bodies, so as to ensure continuity and consistency of activities as well as implementation of decisions.

There is much expertise worldwide regarding the institutional aspects of the establishment of joint commissions, in particular concerning rules of procedure, principles and procedures for decision-making, arrangements for the secretariat, and regulation of legal personality. Joint commissions have developed mechanisms to ensure public participation.

Over time, changing practices of cooperation between the riparian countries of a basin, change in the mandate, level of activities and management tasks and experience may lead to a change of statute of the body. The Mosel and Saar commissions, for instance, have first worked without any secretariat.

Example 16: Mosel - Saar; A gradual birth

Following the Convention on the canal on the Mosel in October 1956, the governments of three countries, Germany, France and Luxembourg, signed, on 20 December 1961 in Paris, the Convention on the Establishment of an International Commission for the Protection of the Mosel against Pollution. Regarding the Saar, the largest tributary of the Mosel, the Convention on the establishment of a similar commission was simultaneously signed by Germany and France in 1956. The two protocols entered into force on 1st July 1962.

The major issue being pollution, two groups were established in 1963 for each commission, respectively responsible for monitoring water quality and proposing technical measures to clean up the rivers. In 1964, the commissions set up an international network for monitoring the quality of the watercourses.

To further strengthen their cooperation, the Contracting States signed, on 22 March 1990 in Brussels, an additional protocol on the establishment of a joint secretariat. Since 1991, this secretariat, which is based in Trier, has assisted the Commissions in carrying out their missions, following up and coordinating work. It has now two full-time employees and two part-time. This example shows that the establishment of a body for managing a transboundary basin can operate properly and successfully in a progressive manner, without requiring from the start the establishment of a heavy institutional arrangement.

Many organizations can improve their activities with mechanisms for institutional and organizational capacity building such as:

- having a better representativeness of national authorities in the joint basin organization, thus improving coordination with the national level;
- attracting commitments for financial and operating resources (availability of staffs, facilities, tools, etc.) from the governments of neighbouring countries, to facilitate the operating of bodies and the implementation of joint programmes;
- establishing execution and operating bodies (at least a permanent secretariat);
- introducing mechanisms for participation and access to the information;
- developing reporting requirements.

In addition, technological innovation and action in collaboration with the private sector can contribute to effective cooperation.

3.1.3 Types of existing organizations

Thus according to the needs, local conditions and history, various approaches have been adopted to organize the useful functions in terms of water management in transboundary basins. Although any option cannot be considered as universal, it is interesting to learn from the types of organizations that exist and operate successfully, when thinking about establishing or reorganizing a transboundary basin organization. These options may be grouped into the following categories:

- “administrative” International Commissions, with or without a permanent secretariat, in which mainly participate representatives of the ministries concerned to coordinate their various projects on the same river or aquifer; to exchange information or data, formalized or not, in particular on emergency situations, to define common rules (e.g. navigation), and whenever necessary to allocate the available resources (or benefits derived there from) between the Countries and the categories of uses, especially in periods of crisis or when regulation structures do exist. International commissions often have a limited role in the formulation of recommendations to Member States on water management;
- arbitration “Authorities” to which the interested “parties” refer for decision-making on the conflicts which arise; this is the case of the International Joint Commission (IJC) between the USA and Canada, or the International Boundary and Water Commission (IBWC) between the USA and Mexico, for example;
- basin Organizations or “Basin Authorities” favouring or even in charge of contracting large structuring or combined developments; this is the case for navigation, flood control, water diversions, the building of reservoirs especially for irrigation, hydropower production, etc.

These organizations, sometime created as public or private “companies”, have usually the concession of community installations and are in charge of their construction and long-term management, generally by providing services, electricity, raw water or by levying specific taxes on waterways transport in particular. Because of their roles, these organizations require both a political decision-making body and a technical execution body;

- “agencies” that are responsible for collecting data to ensure medium-term planning and levying taxes on water withdrawals and discharges to finance or support the necessary investments to achieve the given objectives;
- “Basin Committees or Councils”, or specific working groups which gather, at the side of the administrations, representatives of local authorities, economic sectors, water users, the civil society, etc. They can be advisers or decision-makers, in particular as regards planning, the establishment of taxes even, the allocation of available resources;
- structures or initiatives developed to carry out “projects or programmes” which are usually created temporarily by a partner for the time needed for implementing a specific programme of activities with special funding;

In all cases, the institutional arrangements established should eventually lead to the creation of a joint basin management body. The semantics chosen to name the institution (also differentiated according to the languages used), is much less important than its actual mandate.

Box 8: Trends and practices in agreements and institutions

According to UNECE Convention on the Protection and Use of Transboundary Rivers and International Lakes, there are three major types of institutional arrangements for inter-State agreements on transboundary waters:

- without designation of an institution to implement the agreement;
- the appointment of plenipotentiaries (governmental representatives);
- the establishment of a joint commission responsible for the implementation of the agreement.

Joint commissions clearly prevail in international practice, while plenipotentiaries are mostly present in agreements in Central and Eastern Europe and EECCA.

However, in the agreements concluded since the early 1990s by or with participation of EECCA countries, the institution of plenipotentiaries no longer prevails. Depending on their scope of application, watercourse agreements and joint bodies can be divided into those covering an entire transboundary river basin, part of a basin, only boundary waters, or cooperation within a particular project, programme or use of a transboundary watercourse.

Despite the requirement of the Water Convention to define waters in watercourse agreements, many agreements do not specify the waters to which they apply. Efforts aimed at reaching new agreements and establishing new joint bodies between or with participation of the EECCA countries can start by promoting joint activities of national authorities of riparian States on technical issues or in specific areas of cooperation, as well as from joint activities of NGOs and other stakeholders.

International organizations can offer valuable expertise and become neutral facilitators of the dialogue between the riparian States.

More information on the website: www.unece.org/index.php?id=11628&L=0

3.2. Types of functions of transboundary basin organizations

The functions of transboundary basin organizations are varied and may be multiple. There are three broad categories of functions:

- coordination and advice function to help the Member States in applying the terms of their agreement;
- executive function, i.e. all the direct activities of the organization, in accordance with its mandate (data management, information system, planning and programming, etc.);
- control function on implementation of the agreement (implementation follow-up).

The choice of functions of the transboundary basin organization should result from a detailed analysis of the functions performed by each riparian country (institutional analysis) to guide the political decision in the agreement between the countries governments (or its review).

When selecting the functions, it is necessary to support the implementation of the tools needed for coordination among the riparian countries. It especially implies:

- water monitoring, observation and information systems (see section 4);
- warning systems for floods, droughts and pollution, and prevention and intervention mechanisms to face disasters caused by water and protect lives and properties;
- methods and means for dialogue and mobilization of the populations concerned (see section 6);
- practice of long-term planning and priority investment planning (see section 7);

- appropriate financing mechanisms (see section 8);
- suitable measures for preventing the introduction and spreading of invasive aquatic species that cause huge environmental and economic damage and of which we find constantly new specimens;

Box 9: The categories of functions of the transboundary basin organizations

The 1997 UN Water Convention defines 10 categories of functions that the transboundary basin organizations should fulfil. They are respectively:

1. Collecting, compiling and evaluating data to identify pollution sources that generate a cross-border impact;
2. Developing joint monitoring programmes on the quality and quantity of the resource;
3. Developing inventories and exchange of information on pollution sources that generate a cross-border impact ;
4. Establishing emission limits for waste water and evaluating the effectiveness of control programmes;
5. Jointly defining quality criteria and objectives and the proposed measures to maintain and, if necessary, improve water quality;
6. Developing joint action plans to reduce polluting loads from accidental pollution and diffuse pollution;
7. Establishing alert procedures;
8. Providing a forum for information exchange on existing and planned uses of the resource and related facilities, which generate a cross-border impact;
9. Promoting cooperation and information exchange on best available technologies and fostering cooperation in scientific research programmes;
10. Participating in the environmental impact assessment of transboundary waters, in accordance with the relevant international rules.

Most of these functions apply to both surface and groundwater resource, but it is especially necessary to conclude agreements on transboundary aquifers (see section 5):

- due to their vulnerability, of fossil groundwater in particular, and to the time needed for restoring degraded situations, from a quantitative and qualitative viewpoint on the one hand;
- and, on the other hand, because of the time lost in the field of transboundary groundwater compared to surface water.

Where transboundary river basin organizations exist and operate properly, it is advisable to seek an extension of the mandate of these organizations to transboundary groundwater, even if the area concerned by the aquifer system is never in actual correspondence with the surface water basin limits. This approach has the advantage of using existing resources and skills and of avoiding the overlapping of organizations. It is also important that the transboundary basin organization ensures or facilitates cooperation with the bodies in charge of coastal and marine waters in the basin.

Sometimes, the first agreement that allows the establishment of a transboundary basin organization only covers one or a few areas for intervention: waterways navigation and trade can be the starting point for example. Subsequently, competence increases and can include, according to political will, other areas such as fishing, irrigation, water regulation, hydropower production, flood control, etc. Such matters as the protection and use of groundwater, measures for water quality, ecosystem protection, preservation of landscapes, diversity of heritage, exchange of technology and public participation may also appear later.

It is also necessary to promote the exchange of practical experience and the comparison of approaches and methods by the managers and technicians involved, including supporting the work of specialized cooperation networks in this field.

Example 17: Roles of joint transboundary bodies in EECCA

With time, the competence of joint bodies in Eastern Europe, Caucasus and Central Asia (EECCA) has significantly expanded to include new areas and an increasing environmental mandate. The functions and tasks became comprehensive and diverse to enable joint bodies and riparian States to implement the basin approach and the IWRM principles.

These functions include:

- (a) the coordination and advisory function;
- (b) the executive function;
- (c) control of implementation and dispute settlement function.

The functions of joint bodies are further detailed in the tasks they are entrusted with in the relevant agreements. The UNECE Water Convention lists the minimum tasks that joint bodies established under the Convention shall be entrusted with. In practice, the mandates of many individual joint bodies also include many additional tasks.

3.3 Operation of transboundary basin organizations

Basin management should be distinguished from management of the basin organization.

Box 10: Management of organizations and basins

Management of the transboundary basin organization

- Structure: type of organization, statutes, institutional arrangements, existence of a secretariat,
- Role in the institutional landscape of water resources, particularly in relation to national institutions,
- Governance, organizational chart, bodies ...
- Financial management of the organization, accounting, financing system for operation, investment ...
- Human resources management, staff abilities, training ...
- Service management

Transboundary basin management

- Basin of river, lake and / or aquifer
- Management of water resources : allocation between uses, sharing of benefits between countries, knowledge of the resource, conservation of ecosystems, links to urban management, forestry, agriculture ...
- Rules for resource management
- Time schedule, management plan
- Programme of measures and action plan

In order to be fully operational, i.e. to effectively implement the international basin agreement, it is preferable to establish an executive body (such as an executive secretariat, a high commission, a general secretariat, etc.) at the heart of the joint body, with its functions agreed.

There is no prototype of organizational chart for such a unit, but experience shows that the structure should include various components (executive management, department,...) dealing with technical and financial issues, human resources, communication, data management supported by adequate staffing, sustainable funding, and equipment.

Examples of some of the key decisions that need to be taken at the early stages of establishing a transboundary basin organization include:

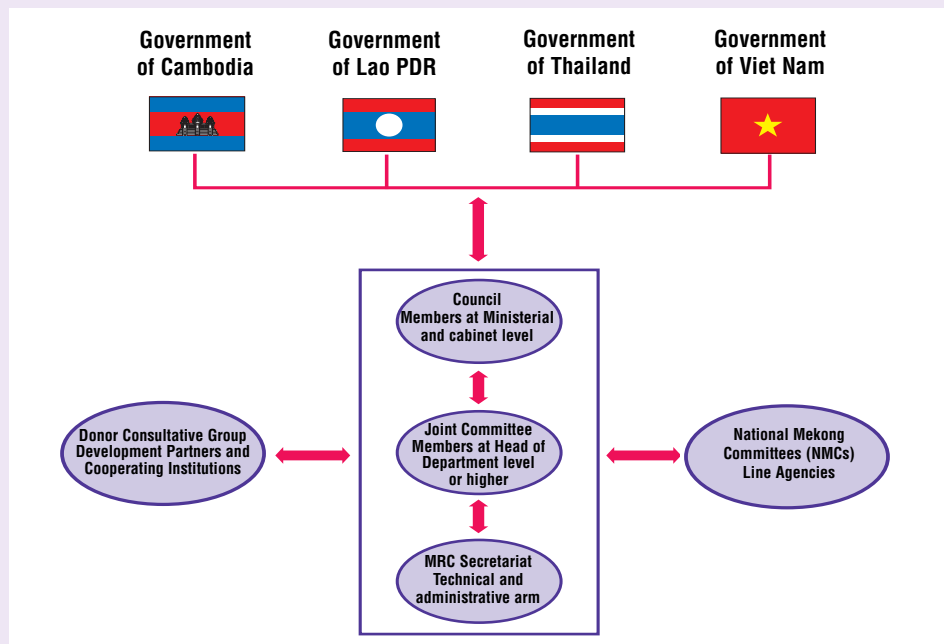
- the official language(s) issue;
- the rules of procedure and internal rules of the transboundary basin organization and of its bodies (e.g. aspects relating to the convening of meetings, the Presidency, the appointments of political and technical staff, rules of decision-making - consensus or vote with qualified majority, unanimity, quorum rules, number of votes of countries according to their importance in the basin or otherwise unrelated to this data)

Example 18: Operation of the Mekong River Commission

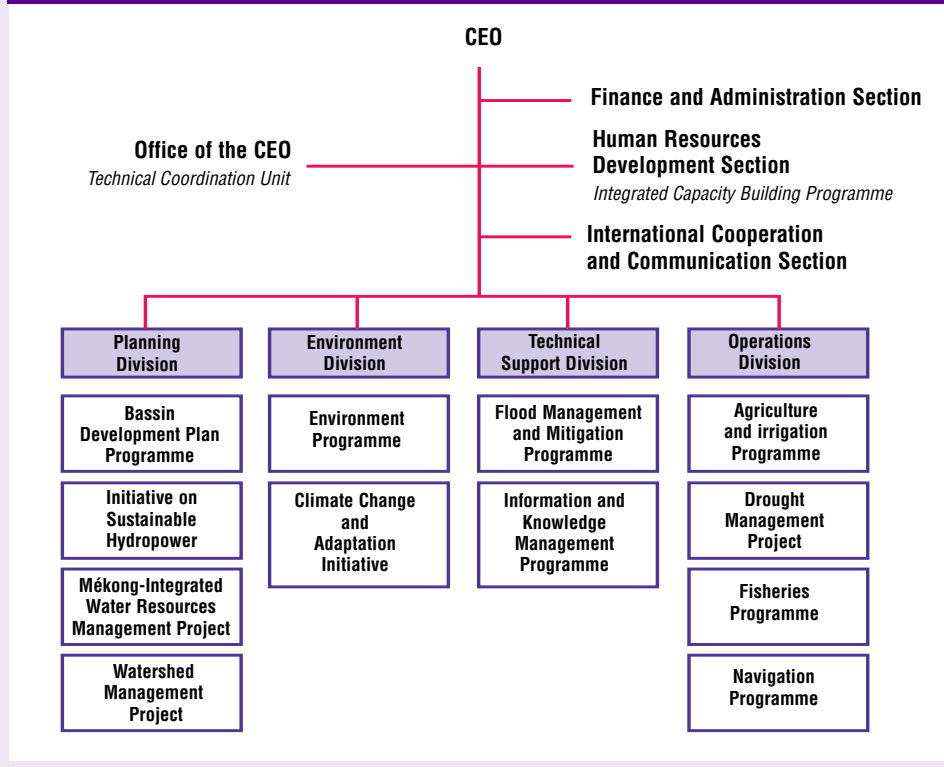
Every year, environment and water Ministers of Cambodia, Lao PDR, Thailand and Vietnam meet to discuss emerging issues related to the Lower Mekong Basin. As Council Members of the Mekong River Commission (MRC), they review the situation and come to mutual conclusions on the management and development of water and related resources within the framework of the 1995 Agreement.

The MRC Joint Committee, which comprises senior officials of the four countries and supported by national line agencies including the Ministry for Foreign Affairs, takes the Council's decisions and policies forward for putting them into action. The Secretariat facilitates regional meetings of the Member Countries and provides technical advice on planning, coordination and cooperation. It also works closely with the four countries' coordinating bodies, the National Mekong Committees and other state agencies or institutions. The People's Republic of China and the Union of Myanmar are only engaged as MRC Dialogue Partners.

Figure 2: Structures of the Mekong River Commission



Mekong River Commission Secretariat Operational Structure



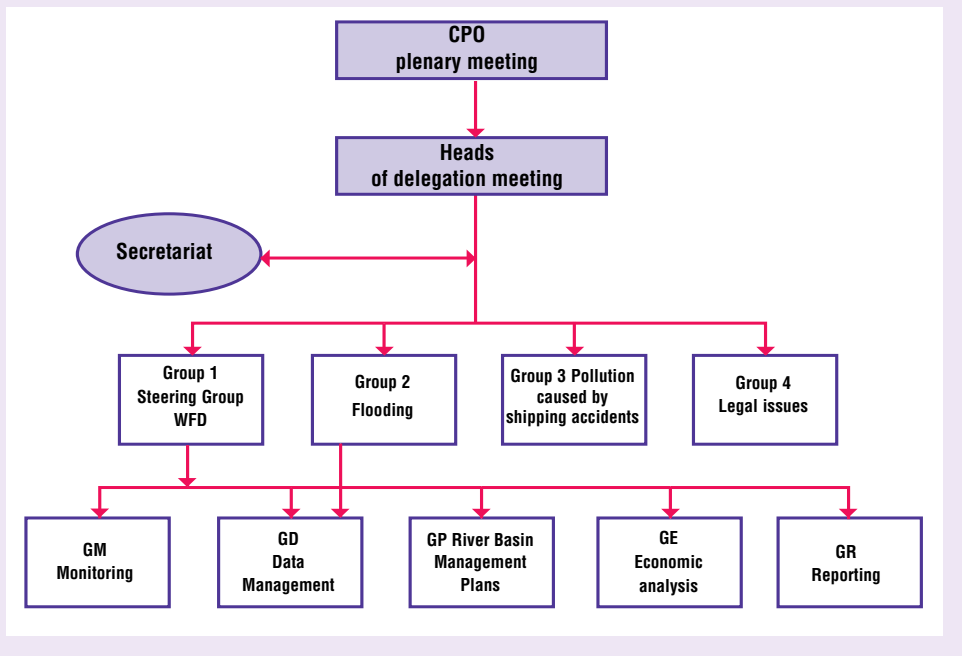
Example 19: The Oder Basin Commission

The Oder is shared between Germany, Poland and the Czech Republic. The organization of the ICPO (International Commission for the Protection of the Oder) Secretariat perfectly reflects the mandate and objectives that the three riparian countries assigned to the organization, namely:

- pollution prevention;
- prevention and reduction of flood risk;
- achievement of good ecological status of ecosystems, in accordance with the European Water Framework Directive (WFD);
- coordination of the WFD implementation.

The functioning of the secretariat in working groups allows easy adaptation and progressive evolution as needed. Indeed, whereas the Convention on the Baltic Sea dates back to 1990, the Convention establishing the ICPO was signed in 1996, with the first thematic working groups (pollution, management plan, legal aspects). Following the disastrous floods of 1997, a fourth working group on floods was established. But it took until 2000 for the permanent secretariat to be officially established.

Figure 3: Organization of the Oder Commission





4 Information Systems and transboundary monitoring

KEY POINTS:

- Information systems of transboundary basins, which can be implemented by the basin organization, are key factors to IWRM development.
- The successful implementation of such systems requires first an analysis of the needs and ability to manage data. A stepwise approach can often be helpful.
- The flood warning systems are among the important areas to be addressed across the entire basin.
- Performance indicators for river basin management can be applied to improve water management in the transboundary basin.

The first two parts of this section detail the aspects relating to data management, processing and transmission at the transboundary level. The acquisition of data is addressed at the national level: unless exception, the data are collected by the countries, which send them to the transboundary basin organization. The aspects relating to modelling, using the data of the information system, are dealt with in section 7.2 (Transboundary planning tools).

4.1 Stakes related to information systems

Management of water resources in transboundary basins needs to organize the production and sharing of information to meet the expectations of stakeholders for the various planning, monitoring, assessment, prevention and alert activities. Transboundary basin managers should be able to obtain reliable, updated and relevant information, when they need it and in a form that suits them.

However, the exchange of information and data on a transboundary basin is often difficult both for structural reasons (when there is no agreement or protocol between the countries to do so) and for technical reasons (linked to difficulties related to information collection, harmonization of data formats, definitions, methods of analysis, the frequency of data collection, the density of monitoring networks and data processing).

Data and information are indeed often dispersed, heterogeneous and incomplete, and are rarely comparable or suitable for making objective decisions. A large number of public, semi-public or private organizations produce and manage data, but often lack the means or guidance to exchange, gather, standardize, summarize and enhance the data they themselves and others have.

Beyond these difficulties there is also a more general problem of reluctance of national authorities to provide neighbouring countries with information as it is considered strategic all the more so when located in an area with scarce resource. This is, for example, the situation encountered in the Mediterranean. In addition, the economic value of water through hydropower, agricultural irrigation, navigation, may increase this reluctance.

4.2 Methodology for implementation of information systems

Information systems are key instruments for the development of integrated management of transboundary basins: they are tools designed to facilitate the production and sharing of the information expected by stakeholders. Given the stakes, their development requires working firstly on institutional, organizational and governance issues and secondly on technical issues related to the construction of the information system.

At the organizational level (see section 2), it is necessary to have prior confirmation of the political will to work together to produce shared information, to agree on the governance framework and organize the system development in close cooperation with stakeholders for continuously looking for “win/win” solutions. At the governance level (see section 3), the transboundary basin organization, when there is one, is usually in charge of developing the information system. It can also manage the system, play a role as facilitator in the working groups established for the production and sharing of summarized information.

From a technical viewpoint, the information system must be constructed by seeking above all to facilitate the production and availability of information, useful for decision making. It will rely, wherever possible, on a clear identification of information needs while enhancing the national information systems and the information that the data producer partners have.

Box 11: Strategies and guidelines for monitoring and assessment in transboundary waters

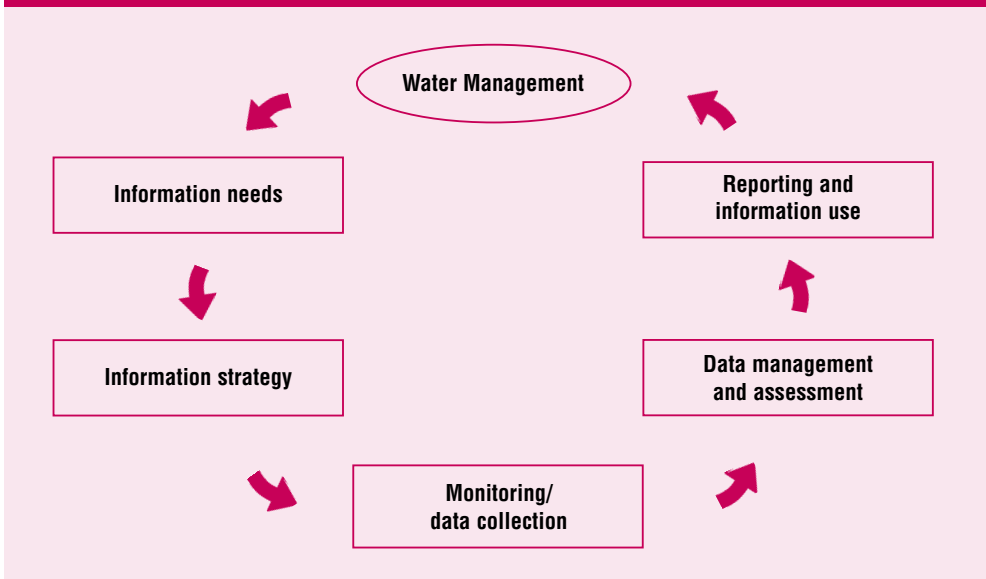
Establishment of joint monitoring and assessment programmes on transboundary waters is a core requirement under the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Accurate assessments based on well-organized monitoring programmes are essential for preparing proper policy actions, also at transboundary level where the need for a common basis for decision-making requires, among others, harmonized and comparable methods. The Strategies for Monitoring and Assessment of Transboundary Rivers, Lakes and Groundwaters represent an overarching tool to this end, synthesizing the experience gained under the UNECE Water Convention.

As the basis for building up a useful monitoring and assessment of river basins (or transboundary aquifers) various uses and functions and related water management issues should be well known, documented and prioritized to identify the most important information needs. Monitoring should enable assessments of the current status of water quantity and quality, and their variability in space and time. Monitoring should support decision-making and operational water management, also in critical situations.

Monitoring and assessment of watercourses follow a sequence of activities, which is shown in the figure below. The outputs produced by each of the elements are used in the consecutive elements of the cycle. With iteration of the cycle, the information needs for water management issued from assessment get fine-tuned or – if policies and/or targets have changed – redefined.

More information on the website: www.unece.org/index.php?id=11683

Figure 4: Monitoring and assessment cycle (UNECE 2006)



4.2.1. Analysis of needs and diagnostic of data management

Analysis of information needs

The analysis of water management issues is the basis for specifying the information needs. These needs are related to:

- water resources status, in quantity and quality;
- uses (e.g. drinking water, irrigation, hydropower, recreational activities, etc.) and related developments, and their impacts on the quality of water resources, and functions of ecosystems (maintenance of aquatic life);
- issues (e.g. flooding, sedimentation, salinization, pollution, drought, etc.);
- measures taken to address the issues or improve the use or functioning of the watercourse.

Prior activities are thus the identification of the functions and uses of the river basin, status assessments, definition of criteria and targets, and evaluation of the water legislation to identify provisions that are important for monitoring and evaluation. Surveys can then be initiated to analyze the information needs of the various partners so that everyone can benefit from the system.

The analysis of information needs can also be an opportunity to analyze the needs of the partners in terms of:

- software and hardware for data processing;
- service provision or Web online external service to host / process data and disseminate information;
- training to develop the technical abilities of human resources for data management, processing and enhancement.

Analysis of data management abilities

→ Identification of the stakeholders

Given the diversity of the topics to be dealt with (surface water, groundwater, quantity and quality aspects, users, uses, infrastructure, socio-economic and environmental data, geographic information, etc.) the number of organizations that produce data at regional, national and local levels can be high. Therefore it is recommended to start with an inventory of producer organizations and analyze their geographical area of intervention, the topics on which they operate and their various collection processes.

→ Inventory of existing data sources (metadata catalogues)

Searching for data on water and understanding how they can be helpful often result in lost time and expenses, which may be major obstacles to effective use of existing data. Thus, an inventory of data sets and existing information is essential for:

- identifying existing data and information, and whether they are accessible or not;
- determining the rules of production and access to data; and
- checking that the quality of available data meets the user needs.

An inventory should be a collaborative activity. When inventories involve online metadata catalogues, the partners can directly integrate the data they manage. They can also assign to each users' group specific rights of access to metadata and data sets. Users can:

- find and identify data through simple multi-language interfaces by using keywords and / or through geographic interfaces; and
- download data, or access to interactive maps, according to the access rights given by the data providers.

Box 12: Online catalogues of data sources for cross-border management

Online catalogues of data sources help the partners to cooperate, respect data confidentiality and help users to find the existing data. The catalogue of data sources on water in EECCA countries is a good example.



Example 20: Capacity building in data administration in Eastern Europe, Caucasus and Central Asia

In the countries of Eastern Europe, Caucasus and Central Asia the stakes related to transboundary water management are critical because the countries often rely heavily on transboundary water resources for drinking water production, hydropower, irrigation, and for other purposes. The implementation of effective policies to manage water resources while respecting the natural balance requires above all that the decision makers involved at regional, national, and local levels have at their disposal information validated with the partners.

The FFEM (French Global Environment Facility), with the help of the French Ministry of Ecology and Sustainable Development and the International Office for Water, support a project on management capacity building and use of data at the level of Transboundary Basins in the countries of Eastern Europe, Caucasus and Central Asia. Administered by IWAC (International Water Assessment Centre), this project began its activities in December 2010 for an initial period of two years:

1. In the Dniester River basin shared between Ukraine and Moldova in cooperation with national authorities.
2. In the Aral Sea Basin (Amu Darya and Syr Darya River Basins) shared by the five Central Asian countries (Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan) and Afghanistan, through IFAS Executive Committee, an international organization, to develop integrated water resources management in the Aral Sea Basin.

After a phase of objectives' validation, the diagnostic phase enabled to:

- develop a database of data producers, managers and users which can be consulted online,
- organize workshops gathering the main data producers,
- develop an online survey that allows partners, data producers, managers and users to present their needs.

4.2.2. Strategy for the development of information systems

As monitoring and assessment have multiple purposes, a step-by-step approach is recommended to make the best use of available resources and knowledge. This entails identifying and agreeing on priorities for monitoring and assessment, and progressively proceeding from general appraisal to more specific and precise assessments.

In a transboundary context a step-wise approach might mean starting from informal cooperation at an operational level which can evolve into more formal agreements, from modest objectives gradually to more ambitious ones to cover the whole basin or aquifer. Step-wise approaches also help in developing cost-effectiveness of monitoring, together with careful consideration of information needs and combining monitoring and modelling.

For transboundary waters, information is usually gathered from the national monitoring systems (which are established and operated according to national laws and regulation, and international agreements) rather than from monitoring systems specifically established and operated by joint bodies. However, the transboundary basin organization can play this role in some cases if it is well equipped and has got a clear mandate from the national governments.

To ensure cooperation among various entities for monitoring and assessment, it is important to make suitable institutional arrangements the functioning of which at national and local levels is a prerequisite for international cooperation. The agreeing upon the implementation of these activities may take place, e.g. in a specific working group established by the riparian countries under a joint body.

The riparian countries may give each other access to relevant information on the status of shared waters for free, according to jointly agreed arrangements. Information should also be provided to the public.

Box 13: Second Assessment of Transboundary Rivers, Lakes and Groundwaters

In 2003, the Parties to the UNECE Water Convention decided to regularly carry out regional assessments, and the First Assessment of Transboundary Rivers, Lakes and Groundwaters was published in 2007. The Second Assessment, published in 2011, which is broader in scope than the first one has been carried out in close cooperation with water or environment administrations of some 50 countries.

The findings of the Second Assessment highlight the challenges related to data harmonization in different parts of the pan-European region. It demonstrates, for example, that information on water quality classification being based on national assessment systems renders comparison between river basins difficult. An important consideration in changing monitoring systems over time is the question how to maintain comparability with historical data. New challenges are emerging in harmonizing approaches for example to monitoring changes in the hydromorphology of rivers.

In most transboundary basins in South-Eastern Europe, information exchange is still very weak and information produced in riparian countries is not harmonized. In the Caucasus, there are problems in quality assurance in sampling, processing and analysis and data comparability. Exchange of information is not effective (as in Central Asia) and related cooperation outside international projects is at a low level. In general, the Assessment demonstrates that where joint bodies (such as river basin commissions) are established, there is better developed data exchange.

For more information, please refer to the website: www.unece.org/env/water/publications/pub/second_assessment.html

Developing infrastructure for information management

The basin information system should be structured to generate the expected information from data produced by different data providers. Developing such a system may require, as a first step, strengthening national information systems consistently with the expectations at transboundary level.

At the regional level, it then means acquiring or strengthening the platform (servers, software) of the information system of the transboundary basin to manage data effectively. To facilitate collaboration between partners, this platform should be, whenever possible, constructed while using the existing infrastructure of each partner. The platform of the information system should then strengthen their capacity to produce, manage and provide information.

The platform should be able to handle all kinds of information: geographic, alphanumeric text and multimedia. Its main components usually are:

- a database and a geographic information system (GIS): they are basic tools for data management and translation into maps, diagrams, indicators and tables of performance;

- tools for managing online catalogues of data sources;
- a Web portal for information sharing and dissemination;
- decision-making supporting and modelling tools (see section 7).

Apart from the platform itself, the basin information system may also include:

- the development of data frames of reference and procedures enabling technical interoperability between partners;
- the definition of models and data dictionaries for the water sector or on specific topics;
- the production of common frames of reference;
- the development and networking of Web services for the identification of data and information, their consultation and sharing according to the rights granted to different users;
- the development of toolboxes, guides and tools (software, applications).

Developing human resources

A basin information system requires trained personnel to operate it. When necessary training may focus on data management methods and tools and be very practical. A training programme may include:

- overall training on the administration of environmental data (e.g. production of data, concepts of management charts, indicators, data quality);
- technical training on software or techniques that are not specific to the water and environment sectors, such as managing databases, geographic information systems, exchange formats, web services; and
- training on methods and tools specific to water data administration at national and regional levels.

4.3 Some types of transboundary information systems

4.3.1. The World Hydrological Cycle Observing System (WHYCOS)

The WHYCOS System is a WMO programme aimed at improving basic observation activities, strengthening international cooperation and promoting free exchange of data in the field of hydrology. The programme is implemented through various components (HYCOSs), especially in transboundary basins.

WHYCOS promotes a bottom-up approach, starting from the needs at the country, basin or region levels up to the global scale. WHYCOS and its components primarily focus on strengthening technical and institutional capacities of National Hydrological Services (NHSs) and improving their cooperation in the management of shared water resources. WHYCOS supports the NHS's to better fulfil their responsibilities, by improving the availability, accuracy, and dissemination of water resources data and information through the development and implementation of appropriate national and regional water resources information systems thereby facilitating their use for sustainable socio-economic development.

WHYCOS was initiated as a flagship programme of Hydrology and Water Resources Programme of WMO in 1993. Over the years, WHYCOS has made a significant contribution to water resources assessment on global, regional, and national scales, supported the assessment of the impacts of climate variability and change on water resources and assisted in identifying appropriate mitigation and adaptation measures under the changing climate.

WHYCOS has contributed to the strengthening of the capabilities of NHSs in hydrological and hydrometeorological data collection and management and in the development and dissemination of information products, particularly in developing countries. WHYCOS has also contributed to the strengthening of cooperation in water resources assessment and management among riparian countries.

The HYCOS projects undertaken under the umbrella of WHYCOS are guided by the WHYCOS Guidelines, while the WHYCOS International Advisory Group (WIAG) provides general technical oversight. The main objectives of WHYCOS remain:

1. Strengthening technical, human and institutional capacities of NHSs of Member States in hydrological data collection and management and in the development and dissemination of information products;
2. Promoting regional and international cooperation in the sharing of hydrological data and the management of shared water resources;
3. Facilitating adaptation to the impacts of climate variability and change.

HYCOS projects are implemented in large basins around the world (Niger, Volta, Mekong), and on a region scale (Southern Africa, Hindu Kush in the Himalaya, the Caribbean). New projects are beginning on the Congo and Senegal basins (www.whycos.org).

4.3.2. Environment observatories in transboundary river basins

The purpose of such observatories is to monitor and measure changes in the environment to support decision-making and develop a shared vision on the scale of transboundary river basins.

The implementation stages of these systems are described below.

1. Technical aspects:

- a. analysis is made of the needs for information and data related to development issues in the basin,
- b. follow-up indicators are defined and the existing monitoring systems are evaluated,
- c. the impacts of existing development are identified and baseline indicators are established,
- d. the environment observatory is established - studies and works for optimal operation of existing monitoring systems, networking of the various monitoring systems

2. Institutional aspects:

- a. consultation with and dialogue between the tool recipients - basin authority, managers of national and sub-basin agencies, governments, NGOs, civil society, private sector and research, users in the basin,
- b. establishment of the environment observatory,
- c. setting up of a network of partners involved and motivated by mutual interest to feed data to the observatory.

3. Capacity building / training:

- a. on Information System for the Environment and GIS,
- b. methodological support to improve the existing monitoring systems.

4. Communication:

- a. in both directions, from the network partners to the observatory and vice versa,
- b. also for a wide dissemination of the collected information.

5. Financing: thinking on the financing of the observatory's operation which is a condition for sustainability of the tool.**Example 21: Development of environment observatories at OMVS, NBA and VBA**

Support to OMVS for the establishment of an environment observatory in the Senegal River Valley started in 2000 with support from the French Global Environment Facility (FFEM). The project, now completed, has resulted in the development of a computerized tool labelled SOE-OMVS DATABASE, allowing each thematic network to manage the stakeholders, the handled information, the information flows between the stakeholders and information processing resulting in actions.

The Niger Basin Observatory has been operational in the NBA since 2006. It has received, as well as the Volta Basin Authority (VBA), financial support from the FFEM for the establishment of an observatory of water resources and associated environments. The project started in 2008.

www.ffem.fr

4.3.3 Regional systems for sharing information

Information systems are often set up in regional political contexts, including a component for the management of water resources and the environment, e.g.:

- WISE : Water Information System for Europe (water.europa.eu).
- SEIS: Shared Environmental Information System, a collaborative initiative of the European Commission and European Environment Agency (EEA) to establish together with the Member States an EU integrated and shared environmental information system (<http://ec.europa.eu/environment/seis/what.htm>).
- EMWIS: Euro-Mediterranean Information System on know-how in the Water Sector. An initiative of the Euro-Mediterranean Partnership, it provides a strategic tool for sharing information and know-how in the field of water between and within countries of the Euro-Mediterranean Partnership (www.emwis.org).
- AWIS: African Water Information and Documentation System; a network of African organizations that wish to communicate about their practices and share their information (www.sadieu.org).

4.3.4. Information and monitoring system in transboundary aquifer basins

Globally, groundwater monitoring data are rarely publicly available. Only a few countries (such as the USA, France and the Netherlands) have made groundwater data accessible via an online information system.

Within the European Union, the Water Framework Directive is being implemented and obliges the Member States to report on the status of water resources. There is a separate 'daughter directive' on groundwater, providing guidance for assessment of 'groundwater bodies' (which are also administrative, managerial units). The directive establishes a set of groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater.

Information about water monitoring by international organizations and storage of groundwater data by regional organizations is also rather limited. Recently, the SADC (Southern African Development Community) secretariat launched an online information system (<http://196.33.85.22/bin-release/index.html>) containing a hydrogeological map, with common monitoring data yet to come. OSS (The Sahara and Sahel Observatory) developed an online information system on the North Western Sahara Aquifer System with a map visualization and browsing tool.

Example 22: Coordination of information systems - The case of the NWSAS

The NWSAS (North-Western Sahara Aquifer System) is a resource that is almost entirely non-renewable. Since the early 1980s, groundwater abstraction has exceeded the natural recharge of the system. To avoid further aggravation of this phenomenon, the three concerned countries (Algeria, Libya and Tunisia) have decided to collaborate for ensuring the joint management of the aquifer system, and for coordinating their research, data sharing, updating of models, definition of common indicators, and action plans for areas at risk. The NWSAS project, launched in 1999 and finished in 2009, has among other points contributed to:

- the construction of a regional hydrogeological model for managing the aquifer, as well as three local sub-models (Jifara, Biskra, Western Basin);
- the creation of a database connected to a GIS and to models, as well as specific databases for the three sub-models;
- the construction of a geographic server;
- the design of a potentiometric network that was validated and identified in the field before being integrated in the national networks of each country.



*The North Western Sahara Aquifer System (OSS 2008)
Geographic distribution of the 'Terminal' Complex' (hatching) and 'Intercalary Continental' (blue) aquifer systems.*

In 2002, the three countries approved a common declaration and adopted a first outline of a technical structure for temporary collaboration as well as its attributions. This first declaration was followed in 2006 by a second that planned the establishment of a permanent structure called "Permanent collaboration mechanism for the SASS". This structure was put in place in 2008 with a revolving coordination and the main assignment of providing a framework for exchange and cooperation between the three countries through:

- the production of indicators concerning the resource and water demand;
- the drawing up of water-resource management scenarios for development in the basin;
- the strengthening and updating of common databases through the exchange of data and information;
- the development and management of common observation networks of the aquifer system.

For the implementation of its assignments, the collaborative mechanism specifically aims at outlining the common studies and research, defining the procedures for data exchange, updating and running the models, identifying risk areas and formulating appropriate proposals, ensuring training, information and awareness-raising actions, etc. This collaborative mechanism represents a fairly advanced cooperation process, and the SASS project is generally perceived as a success.

*Source: Towards a joint management of transboundary aquifer systems, AFD, A Savoir N°3 2010
www.isarm.org/publications/391*

Under the coordination of OAS (Organization of American States) and the ISARM programme, a comprehensive atlas of internationally shared groundwaters is developed (www.oas.org/dsd/waterresources/projects/ISARMAmericas_eng.asp). Again, joint monitoring as well as processing and dissemination of information on groundwater change are yet to be established.

Most current transboundary groundwater monitoring is taking place under the framework of international projects. The European Union is funding a number of international water resources projects in Eastern and South-Eastern Europe, promoting the WFD principles in the neighbouring countries. GEF has set up and co-funded a number of large international groundwater projects, such as the Guarani (South America), the Lullemeden system with OSS, Nubian aquifer system, Limpopo (Africa) and Diktas (Europe).

Monitoring data collected for the purpose of groundwater assessment in these projects are in some cases stored in common databases, usually simple spreadsheets or GIS files. Sometimes, developing an information system is also a part of the projects, but usually accessible only to project members. Even if these systems contain some transboundary groundwater observations, these are usually limited in time, lasting for the duration of the project execution.

Groundwater monitoring networks are designed according to the purpose of the monitoring and hydrogeological conditions. The IGRAC portal (www.un-igrac.org) contains extensive information on groundwater monitoring, including a database on various guidelines and protocols. Already in 2000, UNECE Task Force on Monitoring & Assessment produced "Guidelines on Monitoring and Assessment of Transboundary Groundwaters" (www.unece.org/env/water/publications/pub74.html).

4.4 Flood warning systems

Floods have a hard-to-control devastating effect on people and properties all over the world. The approach to flooding is part of a broad control that includes:

- forecasting of hydrometeorological phenomena that could cause floods, coupled with early warning systems;
- protection against floods (dikes, diversions, retarding reservoir dams, dynamic braking, storage areas catchment area management);
- prevention that involves the mapping of hazard-prone areas, according to different levels of hazards (decadal, centennial floods, and even beyond) and an estimate of vulnerability.

This part is only dealing with forecasting, which is typically an important issue to be jointly addressed by the upstream and downstream sections of a transboundary river basin and by all the riparian countries. For aspects related to flood control, reference is made in Sections 7 (Climate change and water related risks) and 9 (Transboundary hydraulic infrastructures).

If the identification of risk on floodplain maps, the application of specific rules on construction in these areas and protective measures are to be promoted at the national level, it is also important to have a system that allows anticipating and warning people of a weather episode that could lead to flooding. Knowledge of rainfall, river flow rates, and even of the morphology of the river bed, soil cover, topography can now allow forecasting accurately enough the arrival of a flood and its intensity by using models of different nature.

Of course, the river basin is the most appropriate scale to establish and operate a flood warning system. The specificity of transboundary basins is the complexity of the system to establish directly related to the sovereignty of the States vis-à-vis their population, the responsiveness of each State (information chain and then chain of command in emergency and crisis situation) by way of communication and information means and the existing transnational information system (see preceding section).

Example 23: Meriç River flood information system

The Meriç River, also known as Maritsa (Bulgaria) and Evros (Greece), is the second largest transboundary basin in South-Eastern Europe. It originates in Bulgaria and flows through Turkey, where it forms the boundary with Greece.

The lower Meriç suffers from flooding in the territory of all three countries. In recent years, both the frequency and magnitude of floods have increased. Floods originate in the mountainous regions of the Meriç and its tributaries, on Bulgarian territory.

Turkey is dependent on Bulgaria for accurate and timely information regarding flooding danger, as time is lacking (too short time for forecasting) for a warning in Turkey. Improvement in measures for flood prevention and reduction of flood impacts can be achieved only through cooperation and the use of common information sources. Until 2003, there was no communication between neighbouring countries about floods. Subsequently, Turkey and Bulgaria started cooperating on data and information transfer and flood forecasting and early warning.

Turkey and Bulgaria developed three joint projects through the EU Cross-Border Cooperation Programme: one for exchange of information and real-time data and two for flood forecasting and warning.

Additionally, four telemetric hydrometric stations have been established in the Bulgarian part of the Meriç catchment area. The stations and information system have allowed some progress, especially during the 2005 and 2006 floods, but these precautions are not enough. Flood forecasting systems are currently still set up nationally, whereas a joint flood forecasting and early warning system in the Meriç basin is needed.

More information on the website:

www.unece.org/fileadmin/DAM/env/water/mop5/Transboundary_Flood_Risk_Managment.pdf



The flood warning system relies on an effective service which is forecasting floods on the transboundary basin scale and which will closely operate with the Member States and specialized national agencies (meteorological and hydrological services). The central warning service could be installed in the transboundary basin organization, if its mandate includes flood control.

Fed with meteorological and hydrological data, the service is able to calculate the evolution of run-off in the basin and consequently of water levels in streams and rivers, which, compared with predefined warning levels, provide information on the occurrence of the risk or not, and determine the onset of the alert. The signals related to flood forecasting should be addressed to governments that are responsible for protecting people and properties and for implementing adequate and graded procedures.

The transboundary flood warning service provides different kinds of information depending on the type of flooding and degree of flood risk. The information, which may vary depending on the basins and regions, focuses on run-off and flow forecasts (hydrograph and water levels reached). Warning should be accompanied by information on the seriousness of the expected flooding, on the location, particularly in relation to sensitive areas where the risk of damage to people and property is high (especially in urban areas).

Each phenomenon dealt with should also be evaluated in order to learn lessons and change the procedures as appropriate. This is particularly important with regard to extreme phenomena, which occur only after a long period (about a century), but the frequency may be increased due to climate change (see Section 7).

4.5 Performance Indicators

Good water governance requires both accountability and transparency in the management of public resources. Performance indicators are an important tool to improve water governance. The possibilities of this tool include support to water management and governance, providing an analytical tool to support decision making, as well as a communication tool with great potential.

Two groups of indicators designed for transboundary basin organizations are to be considered:

- governance indicators, which assess the organization of the institution as compared to the main pillars of IWRM (political, institutional and organizational aspects, legal framework, funding mechanisms, participatory aspects, planning, information system and communication, capacity building);
- technical indicators that evaluate programme results and characterize the evolution of the “field situation”. They thus allow assessing the obtained skills in knowledge, water resources development and management, uses and users of the basin.

The set of indicators always depends on the context and should be interpreted according to the institutional structures specific to the basin (agreements, financing, functions, goals), hydrological conditions, progress in economic development and the organization’s human resources. The indicators are a step in the process of collecting information to facilitate planning, development and management of water resources. They use variables that are condensed into manageable sets of information, and reflected by indexes.

Thus, indicators can be used as guidance for water policy and provide advice on the effectiveness of IWRM implementation at the basin level. This allows managers, staff and partners of basin organizations to see what was done, how it was done and know what field it is necessary to improve.

4.5.1 Governance indicators

Governance indicators cover many topics, given hereafter:

Indicators of the political process

This implies assessing the quality of the commitment of the riparian States and their involvement in the bodies of the basin organization. In a first step, “political commitment” is obtained through gradual national political willingness to prioritize water resources.

In a second step, the States make commitments regarding the governance and operation of the transboundary basin organization. The outcome of this political process is reflected in the implementation of a mechanism for fair sharing of the benefits obtained from the use of resources.

Indicators of the financing mechanism

The mechanisms and sources of funding are essential to the existence and sustainability of the basin organization. The evaluation of these variables allows measuring the organization's ability to secure sustainable, coherent and coordinated funding for itself and for achieving its objectives.

The indicators will reflect the continued funding of the organization, the consistency of funding with the objectives, the efficiency between operating costs of the basin organization and the financial resources mobilized to implement the action plan, the application of the user-pays and polluter-pays principles, the coordination with donors.

Indicators of stakeholders' representativeness and participation

These indicators refer to the representativeness of the various member countries and to the specific mechanisms established to ensure stakeholders' participation in decision-making. This includes finding the degree of balance in political (in bodies) and technical (in the executive branch) representativeness between the member countries of the basin organization. The participation of water users is checked through the mechanisms that enable them to participate in decision making in basin organizations, by integrating gender and indigenous people issues.

Indicators of the legal framework

For supporting effective transboundary cooperation, the States should set up a legal framework allowing the establishment of an enabling environment for water management at the national and regional level (as relevant). The texts determine the remit, functions and the degree of autonomy of the basin organization. It is also necessary to measure the harmonization and mutual consistency of all national laws with regional agreements that apply to the transboundary water resource. The influence of the legal framework is assessed by identifying, on the one hand, legislation regarding the basin organization, i.e. the legal framework related to the mandate, structure, financial mechanisms, and regarding regional water management (i.e. under international agreements), and, on the other, the consistency between national laws and the legal framework related to the basin organization (such as a Transboundary Water Charter for example).

It is important to appreciate also the overall framework within which transboundary water resources are governed, since the legality of action will be assessed against these rules.

Indicators of planning

The quality of water resources planning is influenced by variables such as the existence and implementation of a long-term strategy, clear objectives, goals of mutual benefits and development priorities.

Having a planning document is not an end in itself. It is also necessary to assess the implementation of key steps to obtain a clear vision of goals achievement (see technical indicators). Finally, an indicator relative to the decision-making process for major water-related infrastructures can raise the question of consistency, durability, transparency and benefit sharing.

Indicators of functional coordination

Coordinating activities is a challenging stage in the implementation of the Action Plan. Indeed, the operationalization of the plan requires that the basin organization build a capacity to coordinate the activities of different stakeholders. Thus, the development of interfaces between the countries and the regional level is needed to facilitate coordination.

The use of appropriate coordination tools (based on dialogue) will also be important to avoid fragmentation and lack of understanding among these different bodies. In addition, the existence and operating method of a reporting system is to be evaluated, as it is essential to improve internal communication on the obtained results.

Indicators of the information and communication system

The aim is to assess the information structure and management through the information system, the degree of information sharing between countries and with the transboundary basin organization, the type and quality of shared information. Protocols for information management are a source that reveals the type of information involved, its presentation, the terms of exchange, in the basin organization. Information and communication, critical for decision making in water resources planning and coordination of activities, are measured by using the procedures of internal and external communication established in the basin organization.

4.5.2 Technical indicators

Technical indicators can refer to the main risks encountered in the basin.

The risk of over-exploitation of water resources

The indicators will address the quantitative aspects of water management at basin level, using as a basis the need for securing the water supply to users. Usually, many indicators can be selected: e.g. the dam-regulated volumes compared to inflows, the share of irrigated agricultural land, the physical efficiency of supply networks, the number of points monitoring flow rate and groundwater, the importance of conflicts on water quantity, etc.

The risk of water resources degradation

This involves assessing the qualitative aspects of water management, using the elements that monitor water quality in the basin, the significance of degraded water discharges, the number of conflicts of uses related to the deterioration of water quality, etc.

The risk of deterioration of the populations' living conditions

These indicators address the socio-economic aspects related to water in the transboundary basin, such as the coverage rate of the urban / rural population having access to some type of sanitation, the share of collected and treated waste water, the proportion of population supplied with drinking water in a sustainable way. The risks associated with water are also analyzed, e.g. by identifying the number of areas at high risk of flooding, their characteristics, etc.

The risk of damage to environments other than water

This means taking into account environmental factors other than water resources, which have an impact on the quality and quantity of water resources. For example, the number of nodal points establishing a minimum flow for aquatic ecosystems and the surface area of wetlands provide information on the degree of conservation of species in the aquatic environment.

Depending on the context of the transboundary basin, other indicators can be added to measure priority aspects specific to the basin such as land degradation, deforestation rates, the importance of invasive species, or even water devoted to navigation, recreational activities, etc.

Box 14: Implementation of a sustainable approach to the development of performance indicators in Africa

The project "Development of IWRM performance indicators for the management of transboundary river basins in Africa (KPI project - Key Performance Indicators)" allowed developing pragmatically appropriate indicators as close as possible to local realities.

The International Network of Basin Organizations, the African Network of Basin Organizations, some African basin organizations and European partners have developed since 2007 performance indicators to measure progress in policies for integrated water resources management, through a project supported by the EU-ACP Water Facility and French Cooperation.

These performance indicators have been progressively defined, tested, refined in the transboundary basins of the Senegal, Niger, Congo, Gambia and Volta rivers as well as in the Lake Victoria and Lake Chad basins. These tests have validated the feasibility of these indicators and demonstrated their usefulness through intense appropriation work.

The performance indicators thus obtained assess both the quality of the governance developed in basin organizations and the results observed in the field. As tools for evaluating progress in IWRM implementation, they are also a potential tool for communicating with local partners, water users and donors.

5 Integrated management of transboundary aquifers

KEY POINTS:

- Knowledge of transboundary aquifer systems, thanks to the scientific and technical tools, is a first step for concerted transboundary groundwater management.
- Establishing contacts, first technical then diplomatic, between concerned countries, is a second step.
- Existing organizations for surface transboundary water management can extend their activities to related aquifer systems.
- The UN GA 63/124 Resolution on the law of transboundary aquifers is the only related international instrument, and can serve as guidelines for States.
- The UNECE Water Convention applies to groundwater; the UN 1997 Watercourses Convention covers groundwater connected to surface water. Many transboundary agreements apply to transboundary groundwater and must be considered on a case by case basis.

5.1 Joint management of surface and ground waters

For all this section, reference is made to the methodological guide “Towards joint management of transboundary aquifer systems” (collective work, 2010, AFD), which is complementary to this Handbook.

On the basis of the findings of this guide, the first step is to improve knowledge of transboundary aquifer systems involving several neighbouring countries. This step is essential not only from a scientific viewpoint (e.g. for properly marking the boundaries of the aquifer and thus the limits for applying the management principles specific to the aquifer) but also in political terms because it allows identifying clearly the interdependences between countries on a given aquifer. The results of this stage are also the basis for developing awareness and capacity on the issue.

The second step is to establish relations between the countries on shared groundwater management. This step is facilitated when there is a transboundary basin organization working properly. The approach must be first technical then address the issue in a more political and diplomatic way, promoting exchanges of views, by measuring the status of knowledge, by sharing concerns and developing confidence on shared groundwater management.

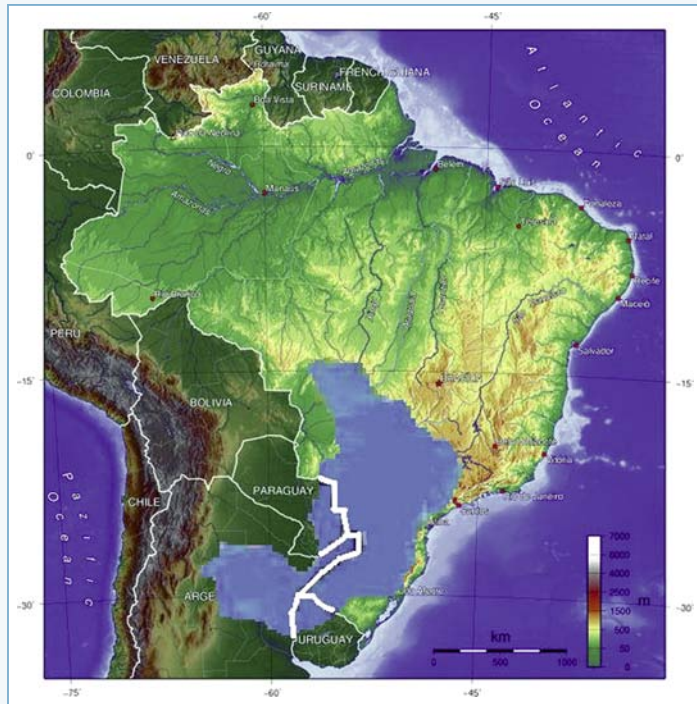
The considerations developed in the various sections of this guide are valid for both surface water and groundwater. However, some points specific to aquifers are developed in this section. One of the major issues is the need to “become more aware of the priceless natural heritage that is groundwater, sensitive areas that are still very unevenly known” (AFD, 2010).

Ideally, groundwater management should be connected with surface water management within a given territory. However, for joint management of surface and ground waters, the complexity of transboundary waters has to be added to that of basins limits not matching and the river or lake basins not overlapping the aquifers in many cases.

Wherever possible, it is advisable that the mandate of the existing transboundary basin organization for surface waters be extended to deal with groundwater and aquifer management, taking care to work with other basin organizations nearby that also work on the same aquifer. In some cases, when there is no effective transboundary basin organization for surface water, the establishment of a transboundary basin organization specific to groundwater is possible.

Example 24: Management of the Guarani transboundary aquifer system

The Guarani Aquifer System is shared by four countries: Argentina, Brazil, Paraguay and Uruguay. The economic and social significance of this aquifer has led the countries to pay particular attention to the problems of pollution and over-exploitation of the resource, in a context of increasing water demand in the region. The history of collaboration between the four States through the Intergovernmental Coordinating Committee of La Plata Basin or within MERCOSUR facilitated collaboration on the transboundary aquifer.



In order to prevent any conflict, the four riparian countries of the Guarani have developed actions focused on:

- development of knowledge about the aquifer system,
- joint development and implementation of a management framework for the aquifer,
- public participation through appropriate institutional information mechanisms,
- implementation of measures against pollution,
- follow-up and evaluation of activities.

Based on a participatory approach and knowledge development, the project enabled countries to develop a 2003 - 2009 strategic action plan. The agreement signed in 2010 plans that this Regional Committee for the Guarani Aquifer System will be established within the Intergovernmental Coordinating Committee of La Plata, under the umbrella of the La Plata Basin Treaty of 1969.

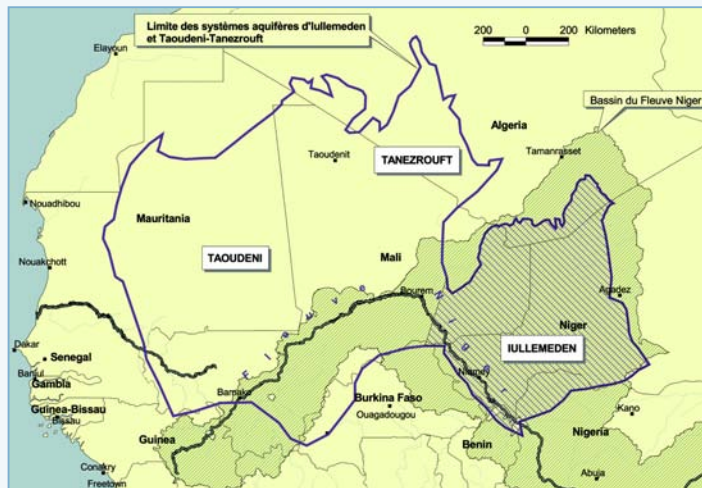
In other cases and when there is a body dealing with groundwater in a given area (e.g. the Sahara and the Sahel Observatory - OSS), it must work closely with the basin organizations concerned (Niger, Chad, Volta, Senegal for OSS).

Example 25: The Sahara and Sahel Observatory

The Sahara and Sahel Observatory (OSS) is an autonomous international organization located in Tunis (Tunisia), which gathers 22 African countries, five Northern countries, 4 sub-regional organizations representing West Africa, East Africa and North Africa, regional organizations, organizations of the UN system and the civil society. Since 1992, OSS has advocated a regional approach to the management of water resources shared by its member countries under its Shared Water Resources Programme.

Among OSS activities, the implementation of the project, “Integrated and Coordinated Water Resources Management of the Iullemeden, Taoudeni/Tanezrouft Aquifer Systems and Niger River”, is supported by France and the African Water Facility. This project will allow extending the findings of the

Iullemeden Aquifer System project shared by Mali, Niger and Nigeria, to the whole system formed by groundwater (the Iullemeden Taoudeni / Tanezrouft aquifers) and surface water (Niger River in cooperation with the NBA) in the sub-region. The project covers seven countries: Algeria, Benin, Burkina Faso, Mali, Mauritania, Niger and Nigeria.



5.2 UN Resolution on Transboundary Aquifer Management

By adopting Resolution A/RES/63/124 on the law of transboundary aquifers on 11 December 2008 and including in its annex the draft articles prepared by the UN International Law Commission with the scientific contribution of UNESCO-IHP (International Hydrological Program), the UN General Assembly offered to States a non-binding framework for developing cooperation on their transboundary aquifers. The draft articles adopted by the International Law Commission, proposes an overall framework for the management of transboundary aquifer systems.

The various principles provided in that instrument include:

- equitable and reasonable use;
- obligation not to cause significant harm;
- general obligation to cooperate with the riparian States of the aquifer;
- regular exchange of data and information;
- development of bilateral and regional agreements and arrangements to facilitate joint management;

- implementation of appropriate measures to protect and preserve ecosystems related to shared aquifers;
- identification by the States of the recharge and discharge areas of aquifers for the part located on their territory;
- need for pollution prevention, reduction and control;
- importance of monitoring transboundary aquifers or aquifer systems;
- implementation of joint management plans by the riparian countries;
- assessment of effects of planned activities on aquifer or aquifer system.

The resolution encourages States to refer to these principles for the proper management of their transboundary aquifers. In 2011, the UN General Assembly adopted resolution 66/104 which “Further encourages the States concerned to make appropriate bilateral or regional arrangements for the proper management of their transboundary aquifers, taking into account the provisions of the draft articles annexed to its resolution 63/124”. The resolution highlights the role of UNESCO-IHP by encouraging the programme “to offer further scientific and technical assistance to the States concerned”. The topic will be discussed again at the UN General Assembly in 2013 “to continue to examine, *inter alia*, the question of the final form that might be given to the draft articles”.

5.3 Application of the UNECE Water Convention to groundwaters

The UNECE Water Convention applies to any groundwaters “which mark, cross or are located on boundaries between two or more States”. The distinguishing features of groundwaters, in particular, the difficulty of their identification, their vulnerability in case of pollution, which cannot easily be mitigated or reduced, in connection with their non-renewable or less renewable character with respect to surface waters, call for special regulatory attention for the proper and effective application of the legal regime of the Convention in this area.

Currently, there are few agreements in the UNECE region addressing solely transboundary groundwaters, the most well known example being the “Convention on the Protection, Utilization, Recharge and Monitoring of the French-Swiss Genevese Aquifer”. Also, only a few agreements concerning surface waters (e.g., the Convention on the Protection of the Rhine; the Agreement on Cooperation for the Protection and Sustainable Use of the Waters of the Spanish-Portuguese River Basins; and the Framework Agreement on the Sava River Basin) contain specific provisions on groundwater.

Example 26: The French-Swiss Genevois aquifer

The Genevois aquifer is a transboundary aquifer system, located south of Lake Geneva and south of the Rhone River, with a length of about 19 km and a surface area of around 30 km². Much of the aquifer lies between the Rhone and Arve rivers and is mostly tapped for providing drinking water, supplying about 20% of greater Geneva.

From 1960 onward, increased pumping caused strong lowering of the average aquifer level, about 7 m in 20 years, fostering plans for artificial recharge of the aquifer with Arve water. At that point, the Swiss Canton of Geneva started negotiations with the French Department of Haute Savoie for carrying out studies into this artificial recharge: this was the birth of an original decentralized transboundary cooperation project. The negotiations led to the signing, on 9 June 1978, of an agreement between the Canton de Geneva and the Prefect of Haute Savoie, called Agreement concerning the protection, utilization, and recharge of the French-Swiss aquifer of the Genevois.

cont'd ■■■

This first Agreement, of a duration of 30 years, created a Commission for Exploitation of the Genevois aquifer, composed of three Swiss members and three French members.

The task of this Commission is to propose a yearly programme for aquifer utilization. It gives its technical opinion on the construction of new equipment or its modification, and it verifies the construction costs and operating expenses of the recharge

installations. All abstraction installations are equipped with instruments for making volumetric and aquifer-level measurements. The Agreement stipulates that the Canton of Geneva looks after the construction and exploitation of the artificial recharge station, of which it remains the single owner. The Agreement further stipulates that the French communes cannot abstract more than 5 million m³/year, 2 million of which are exempt from payment. Each party must give an estimate to the Commission of its abstraction from the aquifer. The Agreement also stipulates calculation of the French share of the artificial-recharge costs for each year. Finally, quality control and a warning network in case of accidental pollution are planned for.

On 18 December 2007, the first Agreement was replaced by a new one, again for a duration of 30 years, which includes almost the same terms as the first one. The signatories now were, for Switzerland, the Canton of Geneva and, for France, the Associations of Local Authorities of the Annemasse and Geneva regions, and the Municipality of Viry; the second Agreement was thus directly signed between territorial authorities.

*Source: Towards a joint management of transboundary aquifer systems, AFD, A Savoir N°3 2010
www.isarm.org/publications/391*



Source: Map, Canton of Geneva, Service de géologie, sols and déchets, 2009

The Water Convention incorporates a number of provisions that apply to groundwaters, most prominently the obligation to define and implement appropriate measures and best environmental practice to reduce inputs of nutrients and hazardous substances from non-point sources of pollution: from agriculture or forestry, urban areas, industries. Additional specific measures usually include the establishment of protection zones around water intakes or in the entire recharge area, with varying degrees of protection, and the clean-up of polluted parts of groundwater aquifers used as sources of drinking water. A typical example of the latter is the rehabilitation of an aquifer (or parts thereof) polluted by leakages from industrial installations, such as petrochemical and chemical enterprises or tailings management facilities.

Other specific measures may also focus on water quantity to prevent or counteract (e.g. by artificial recharge) the overuse of groundwater resources, which may have adverse transboundary effect. This refers both to groundwater abstractions and recharge schemes.

In the latter case, it is important to consult the Espoo Convention, as “groundwater abstraction activities or artificial groundwater recharge schemes where the annual volume of water to be abstracted or recharged exceeds 10 million cubic metres” require an Environmental Impact Assessment and other procedures, in particular a notification and consultations with neighbouring countries, in cases where the proposed activities are likely to cause a significant adverse transboundary impact.

Groundwater management is also addressed in the Water Convention’s Protocol on Water and Health. The Protocol reconfirms the principle that: “Water resources should, as far as possible, be managed in an integrated manner on the basis of river basins, with the aims of linking social and economic development to the protection of natural ecosystems and water resources management to regulatory measures concerning other environmental sectors. Such an integrated approach should apply to the whole river basin, including groundwaters”.

The Protocol sets out the obligations for its Parties in the areas of water supply and sanitation that require respective action for the management and protection of groundwaters. In particular, “the Parties shall pursue the aims of (...) access to drinking water for everyone” and the Parties shall set targets and target dates regarding the “application of recognized good practice to the management of water supply and sanitation, including the protection of waters used as sources for drinking water” and regarding the “quality of waters which are used as sources for drinking water”. This is relevant to transboundary groundwaters, as they represent an important source of drinking water. Moreover, the Protocol includes an obligation to “develop water-management plans at transboundary, national and/or local levels, preferably on the basis of river basins or aquifers”.

Box 15: Transboundary groundwaters and UNECE Water Convention - Key messages

- The UNECE Water Convention and its obligations fully apply to transboundary groundwater. The specificity and particular vulnerability of groundwaters should be taken into account when developing measures on their management and protection;
- The obligations under the Protocol on Water and Health are of particular relevance for the management and protection of groundwaters which represent an important source of drinking water;
- The Water Convention requires Riparian Parties to cooperate on transboundary groundwater management on the basis of agreements and through joint bodies. The Convention allows both for groundwater-specific agreements, including aquifer-specific agreements, as well as for agreements which cover all transboundary waters and include specific provisions on groundwaters;
- Groundwater abstraction activities and artificial groundwater recharge schemes of a specified large volume are included in the Espoo Convention. Such activities that are likely to cause a significant adverse transboundary impact require a notification by a Party of origin and further consultations.

The above considerations on the applicability of the Water Convention to surface and ground waters alike do not exclude the appropriateness of, or even the need for, further normative guidance addressing the highly specific issues concerning the implementation of the Convention with respect to groundwaters.

6 Stakeholders' participation at transboundary level

KEY POINTS:

- It is necessary to ensure the representativeness of water stakeholders, the civil society and of the users, whether they are organized (NGOs, associations) or not.
- It may be useful to start from the organization of stakeholders at the national level and from the latter's relationship to the local level, to enable effective participation on transboundary and regional scales.
- The transboundary basin organizations can play a significant role in the participation of stakeholders.
- Sufficient resources should be allocated to the participation of the civil society;
- Technical assistance may be provided to stakeholders, to those not organized in particular.
- Public consultations on major structuring projects, including in countries experiencing their impacts downstream should be organized.

6.1 Identification and representativeness of stakeholders

It is first necessary to define what is meant by water stakeholders and the civil society. We can distinguish the public sector on the one hand from non-governmental stakeholders on the other, namely the civil society (associations, NGOs, water users, local authorities), labour organizations and the private sector.

Stakeholders in a transboundary basin belong to different countries but share a resource, a land and a cultural, common heritage. This sharing can be expressed through similar activities (agriculture, fishing ...) or by the same sensitivity to risk and phenomena, whether natural or not: drought and water scarcity, floods, impacts of dams, pollution, invasive species, etc.

For the sake of transparency, accountability and appropriation, all stakeholders should be involved in various transboundary IWRM activities through a consultation process. Planning activities are thus of particular significance because of their strategic nature. The different categories of stakeholders should also be involved in the phases of IWRM policy evaluation.

Example 27: Stakeholders' participation in Moldova and Ukraine

The Plenipotentiaries of Moldova and Ukraine facilitate the implementation of the bilateral Agreement on Joint Use and Protection of Transboundary Waters of 1994. In 2007, they adopted a Regulation aimed at ensuring public participation in the activities of this joint body. This became the first example of formalized rules for dissemination of information and public participation in the activities of joint bodies in the Eastern Europe, Caucasus and Central Asia region.

The Regulation on Stakeholder Participation in the Activities of the Plenipotentiaries provides for the development of a Register of Stakeholders. Stakeholders are defined as any public authority, non-governmental organization and their associations, as well as legal persons with an interest in transboundary water management.

The Register is composed of a Moldovan part and a Ukrainian part. Each Plenipotentiary is responsible for maintaining his respective part of the Register, accessible on the Internet. Thirty days before their ordinary meeting, the Plenipotentiaries inform stakeholders about all decisions made since the last meeting and about work plans. Twenty days before their meeting or event, the Plenipotentiaries inform stakeholders about date, agenda and documents of the upcoming meeting.

The Regulation provides for rights of stakeholders to suggest issues to be discussed by the Plenipotentiaries and to submit written or oral comments concerning draft documents together with suggestions and amendments to the draft texts. Draft documents and invitations to submit comments to them are to be published on the Internet. Comments made by stakeholders are to be taken into account when making the final decision. In December 2007, the Plenipotentiaries also agreed to maintain a joint website for the Dniester River basin - (www.dniester.org).

The identification of stakeholders and interested parties is a prerequisite. We distinguish organized groups of stakeholders (e.g. farmers or irrigators' associations) from the water users who are not organized, who are the greatest number and often the final beneficiaries of the various development programmes. Some stakeholders are organized at the local level, sometimes at the national level but rarely across borders.

Example 28: Stakeholders' participation in the Niger River Basin

The starting point for thought on the participation of the civil society in the Shared Vision process for sustainable development of the Niger basin was the invitation sent by the Niger Basin Authority (NBA) to regional organizations and associations for them to participate in a workshop gathering the nine basin countries in January 2005.

A study for the identification and characterization of the water users of the Niger basin was then coordinated by "Eau Vive" and the International Secretariat for Water. Its findings were presented at the First Regional Forum for users of the basin resources, in February 2006 in Fada-Ngourma in Burkina Faso.

For the first time, this step brought together the civil society organizations of the Niger basin to discuss matters of general interest with the States and partners. Several resolutions of the NBA Council of Ministers eventually led to a regional coordination of the Niger Basin users, based on countries' national coordination. Regional coordination, which is represented in some NBA official bodies, especially works on the impacts of large dam projects in the basin.

Example 29: Participatory approach to the development of the SDAGE in the Senegal River Basin

The formulation of the Master Plan for Water Development and Management (SDAGE) of the Organization for the Development of the Senegal River (OMVS) was conducted in a participatory manner. The characterization validated in 2009, a true knowledge base shared by all stakeholders, is firstly based on a rich bibliography of studies, and secondly on meetings organized in each country with the water stakeholders.

The participatory approach implemented by the OMVS helped involving people (often illiterate) in developing the SDAGE, a complex and technical document. An extension guide ("image box") has been developed especially to facilitate the appropriation and development of the SDAGE. Radio programmes were also used and strong support was provided by local facilitators trained by the project team.

One of the main difficulties in relation to the scale of a transboundary basin, which can be large, is obtaining a true representativeness of the stakeholders. One solution is to identify representatives by theme (agriculture, fishery, drinking water supply and sanitation, environment, dams, etc.), while making sure that each country is represented. The representatives' legitimacy should also be gained and accepted. A democratic process can be established so that the groups of stakeholders choose their representatives. Cultural aspects should not be overlooked in this kind of approach and can provide enabling conditions for participation.

Example 30: The "First Great Lakes-St Lawrence River Basin Symphony - its waters, its diversity, its people and its future"

A waterway and inland sea, the Gulf of St. Lawrence, the river of the same name and the Great Lakes remain the gateway to the heart of the North American continent. This territory, which extends from the western tip of Lake Superior to the Gulf of St. Lawrence, involves 6 Canadian provinces and eight US states.

Coordinated by the International Secretariat for Water (ISW), the project enhances the many local, regional and transboundary initiatives on water management in a densely populated watershed. It attempts to define the desired living conditions for year 2035 through a participatory process open to everyone. It is also an opportunity for citizens to express themselves on the water topic through images, music, dancing, painting, sculpture, poetry, etc. The first symphony will be performed in Quebec City in June 2012.

6.2 Participation at transboundary level

Another difficulty is the need to move up and down from the local level, through the national level to the international basin level. These processes are facilitated when the participation of the civil society is already secured in each national IWRM process. The information feedback from local communities is then made by each country, with consolidation at the basin level. Some local processes can be encouraged locally at the borders, should they be replicated more widely later.

Transboundary basin organizations can play an important role in exchange mechanisms within the civil society at different levels, which may require some changes in their organizational culture. In addition, collaboration between national basin organizations and their coordination are also crucial to ensure dialogue. This means in the long run, giving "seats" to representatives of the people in the institutional meetings of the basin organization, in addition to specific meetings, to obtain active participation (involvement in decision making) and not mere information or consultation even.

Example 31: Encouraging cooperation across Mexico – Guatemala borders

Community members from the Buena Vista micro-watershed committee in Chiapas, Mexico, were able to learn about the processes of community management from the Esquiche micro-watershed council from San Marcos in Guatemala. The Buena Vista committee was formed in July 2011, after different communities saw the need to have a local governance structure to promote the conservation of natural resources with a micro-watershed approach.

Among the first actions of the Buena Vista committee, priority was given to an exchange of community experiences with the Esquiche micro-watershed council, Guatemala. They learned about the successful model of community planning and resource management that the IUCN Tacana project had developed. This model also includes the management of water resources based on the ecosystem approach.

The exchange included various visits to project sites, such as sheep housing, composting and tree nursery projects, as well as soil conservation work. The Buena Vista committee delegation learned about the experiences of the Natural Resources and Environment Coordinating Body of San Marcos, on its organizing process and main achievements.

This first Guatemala-Mexico exchange was made possible thanks to the work carried out by IUCN through the Tacana project. It was also part of the activities of the “Good Water Governance for adaptation to climate change” project, supported by the German Ministry of the Environment (BMU), and the “Building River’s Dialogues and Governance” project, sponsored by the Swiss Agency for Development and Cooperation.

Both projects are implemented jointly by members and partners of IUCN, the Global Water Partnership (GWP) and the IUCN Environmental Law Centre.

Box 16: Aarhus Convention

The Aarhus Convention was adopted on 25 June 1998 in Aarhus, Denmark, at the Fourth “Environment for Europe” Ministerial Conference. The Convention entered into force on 30 October 2001 and as of August 2011 has 44 Parties, including the European Union. In Central Asia, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan are Parties.

The Aarhus Convention sets out the key elements of public participation and its provisions have become widely recognized as a benchmark for what is sometimes described as environmental democracy. They include access to environmental information, early and ongoing involvement of the public in decision-making, transparent and user-friendly processes, an obligation on authorities to take account of public input, a supportive infrastructure and effective means of enforcement and appeal.

The Convention’s Protocol on Pollutant Release and Transfer Registers primarily establishes obligations on public authorities towards the public. Pollutant release and transfer registers have proven to be a highly effective and relatively low cost means of gathering environmental information from the private sector and putting it into the public domain, thereby exerting a downward pressure on levels of pollution.

The Protocol introduces a new dimension that implies reporting obligations for the private sector and may be seen as a tool promoting corporate accountability. Such overarching nature of the provisions of the Convention and of the Protocol make them relevant for implementation of other experiences in relation to access to information, public participation in decision-making and access to justice in environmental matters.

Example 32: Spanish-Portuguese cooperation on water

Spain and Portugal share five main rivers and two-thirds of their borders are established by them or their tributaries. Historical cooperation has existed between both countries and formal agreements between the two riparian States started with the Treaty of Limits in 1864. A new phase of cooperation occurred with the signing in 1998 of the more comprehensive Convention on Cooperation for the Protection and Sustainable Use of the Waters of the Portuguese-Spanish River Basins (Albufeira Agreement), which broadened the scope of collaboration from mainly an economic focus on allocating the benefits of hydropower generation to a wider framework for achieving a sustainable use and management of shared water resources.

The essential characteristics include: an ecosystem approach, promotion of the river basin as a management unit, assessment of land uses, encouragement for public participation and transparency. Moreover, the participative formulas cover: the inclusion of participative approaches and information exchange through technical working groups, organization of specific workshops, and social participative forums, among other.

During the hydrological planning process, some public and active participation meetings that involved the civil society, NGO's and interested groups related to water management were organized, and are continuing to take place. More recently, after two bi-national participative meetings (Zamora, 2006 on drought management and Lisbon, 2008 on hydrological planning and climate change) coordination between both sides was encouraged for the elaboration of the Interim Overview of the Significant Water Management Issues.

The financial resources allocated to the civil society should be sufficient and may pass through basin organizations, which may provide technical assistance and facilitation, particularly to users who are not organized, so that stakeholders take ownership of the issues through workshops or specific media. The technical and financial partners can play a catalyst role. Continuity in support to the involvement of stakeholders is also required.

6.3 Public consultations

People affected by the impacts of large transboundary hydraulic infrastructures (dams, water diversions: see Section 9) should be associated to the project, from identification to operation. Guarantees are offered to compensate the affected population, which are more complex when these impacts extend beyond a border.

Consultations are conducted, for example when populations located in the bottom valley of the dams are displaced or relocated. These consultations should be conducted with the downstream people who suffer from the (positive and negative) impacts of the installations, even when these populations are located in other countries.

In addition, stakeholders involved in public consultation strategies support and enrich in many cases the establishment of protected areas providing local knowledge on the value of the areas and their indigenous species (e.g. shared aquifers or natural areas).



7 Strategy and planning in transboundary basins

KEY POINTS:

- A long-term cross-border strategy is established and validated by all the countries of the basin, starting from priorities and consensual objectives.
- A cross-border legal framework and mechanisms for sharing benefits between countries are key planning elements.
- Strategic planning of transboundary IWRM is linked to various other regional and sectoral planning processes.
- Special attention should be paid to the planning of large hydraulic infrastructures, which most often have transboundary impacts.
- For each action, the national or international contracting authority should be clearly identified and the financing package developed.
- The civil society should be involved in the development of strategies and planning on a transboundary scale.

Planning actions in a transboundary basin may take various forms and names. It should include a component:

- In the long term (20-30 years) - strategic action plan, master plan for development and management, management plan, etc.;
- In the short term (3-5 years) - action plan or detailed programme of measures, with an investment programme, structural (including environmental objectives such as maintaining ecological functions) and non-structural measures (including those related to governance).

The strategic plan is consensually developed by the transboundary basin organization, showing the sharing of costs and benefits between the countries of the basin. The action plan must be formally approved by the States to give it enforcement strength. An enabling international institutional environment is a prerequisite to strategic planning and a transboundary legal framework is a necessary supplement (see Section 2).

Representatives of non-governmental stakeholders of the various countries are involved in the development of strategic planning in particular through geographic and thematic working groups, consultation processes, and through their representatives in the bodies of the transboundary basin organization (see Section 6).

7.1 Transboundary diagnostic analysis

The first step in planning is to make an assessment and identify problems but also strengths, e.g. through prior environmental assessment involving the various countries concerned. An assessment matrix crossing the different themes per country can be used.

The assessment and problem identification should focus not only on water resources in quantity and quality and on the natural environment but also on all socio-economic activities and areas that have a direct or indirect, immediate or future impact on water resources such as land uses, demographic data, etc.

In a transboundary diagnostic analysis it is important to take into account the background (previously existing collaborative agreements or projects), the priority of water uses identified by the countries sharing the basin, the existence of protected areas linked to shared waters, possible effects from climate change and extreme phenomena (see section 7.6) and existing research projects that address the identified common problems.

For the projects developed within the Global Environment Facility (GEF) International Waters Portfolio, the main technical role of a Transboundary Diagnostic Analysis (TDA) is to identify, quantify, and set priorities for water related problems that are transboundary in nature. In particular, the TDA aims to:

- identify & prioritize the transboundary problems;
- gather and interpret science-based information on the impacts on water and environment and socio-economic consequences of each problem;
- analyze the immediate, underlying, and root causes for each problem, and in particular identify specific practices, sources, locations, and human activity sectors from which degradation of the water resource and environment arises or threatens to arise;
- complete an analysis of institutions, laws, policies and planned investments.

A TDA is a scientific and technical fact-finding analysis used to scale the relative importance of sources, causes and impacts of transboundary water problems. It should be an objective assessment and not a negotiated document. The analysis is carried out in a cross sectoral manner, focusing on transboundary problems without ignoring national concerns and priorities. In order to make the analysis more effective and sustainable it should include a detailed “governance analysis” which considers the local institutional, legal and policy environment. Further, the TDA should be preceded by a full consultation with all stakeholders, who are involved throughout the subsequent process. The TDA approach is not only a proven way of achieving progress, it also acts as a diagnostic tool for measuring the effectiveness of the Strategic Action Plan implementation.

Box 17: Transboundary Diagnostic Analysis/Strategic Action Plan (TDA/SAP)

The GEF International Waters Programme has supported 183 projects. The GEF is the largest funding mechanism for multicountry collaboration on water and oceans with 149 GEF recipient countries and 23 non-recipient countries working together to manage their transboundary water resources. Countries participating in GEF International Waters projects have negotiated 13 regional cooperation frameworks, treaties, or protocols while receiving GEF funding.

Regional cooperation applying the TDA/SAP approach has been achieved in:

- 22 Transboundary river basins
- 8 Transboundary lake basins
- 5 Transboundary groundwater systems
- 19 Large Marine Ecosystems

For more information: www.thegef.org

The diagnostic analysis provides the factual basis for the formulation of an action plan. In addition to this, it should be part of a process of engagement of stakeholders through the initial steps and the subsequent development of alternative solutions during the formulation of the action plan. Stakeholder identification and consultation and studies of institutional capacity, governance, and investment are all essential components of the process.

The transboundary diagnostic analysis should include a forecasting approach, for example to the elements that generate pressures on water resources: population growth (native and immigration), which induces additional consumption of domestic water, increasing waste water discharges, urbanization, risks related to climate change, as well as management of the water demand and of the corresponding volumes of water: modernization of irrigation systems, water reuse, etc.

Assessing the situation and identifying problems with a forward-looking vision allow, in a second step, defining and prioritizing the objectives, for example by homogeneous development areas - each zone may correspond to several countries, thus crossing the administrative boundaries. The different national priorities should be reflected throughout the basin. From this point, the development of a consensus between countries is important, under the aegis of the transboundary basin organization.

A “shared vision” as a sentence that summarizes the goals and objectives common to the countries of the basin could be defined. This consensual formula must meet the expectations of the people, the final beneficiaries of the process.

7.2 Transboundary planning tools

The different kinds of planning tools use the data from the basin countries that feed the transboundary information system (see Section 4). In addition to monitoring and among the strategic planning tools we can distinguish the decision-making supporting tools based on monitoring and modelling, the economic tools, the environmental tools and geographic information systems. We remind that such tools cannot replace expertise by basin managers.

Water information systems, monitoring networks and the assessment of gathered joint data provide valuable information on the shared water status and help in the decision-taking process in a short-medium term. In the planning stage, it is paramount to identify the relevant control networks, choose the appropriate stations or control points and ensure the quality of the provided data by the countries sharing a basin. To go beyond that models can help water managers anticipate different situations.

Decision-making supporting tools are based on the use of models that allow simulating the hydrological (rain, flow rate, aquifer level), hydraulic (flow propagation, regulating structures) functioning and the allocation of water resources according to uses and geographic areas. This application is particularly useful when it comes to sharing between the basin countries. Some tools also allow modelling water quality or sediment transport.

Quantitative models, often coupled with geographic information systems, can be used to simulate different scenarios, for example according to the hydro-meteorological data: dry or wet years, history records of rainfall and flow rates. Changing these records as well as those of temperature by downscaling global climate models can also allow assessing some impacts of climate change. The scenarios may also involve different development options, particularly with regard to new major cross-border structuring works and their combination within the basin. The scenarios studied are to be developed and validated by consensus by the basin countries.

Example 33: Tool for allocating water resources in the Niger Basin

The Niger Basin Authority (NBA) has developed and uses a tool for simulating scenarios for development and allocation of water resources. This tool was used in 2007 for selecting the basin development scenarios with the building of three new dams and increase in the areas to be irrigated. This tool was developed by local consultants in the NBA with the effective participation of the NBA permanent experts in charge of its handling, to ensure their appropriation and sustainability of its use.

The simulation model is tailored to the specific problems of this large basin of 1.5 million km², including:

- water withdrawals in the river downstream of the dams and demand points far from storage areas;
- high inter and intra-annual hydrological variability;
- vast wetland of global concern (inland delta of the Niger River);
- incorporation of a requirement for equity between countries regarding water withdrawals for irrigation according to the ISO-satisfaction principle, which states that the regulated resource should meet the increased demand in a given country only when it is able to meet a proportional increase in the other countries.

The tool was developed during the Niger Basin shared vision process with the support of French cooperation. The process resulted in the Action Plan for Sustainable Development for 2025, the Investment Programme and in the Water Charter, which were adopted by all nine Member States of the NBA in April 2008. The plan includes a master plan for water resources which analyzes through the model the compatibility and complementarity of the planned hydraulic structuring installations.

Such models allow simulating the development plans and programmes at different time spans (short, medium and long). The same tools can be used later for tactical management (management charts) on the basin scale or in a single country, or for environmental and social impact assessments of the various projects.

Using this kind of tool facilitates the economic optimization of investments and benefit sharing among countries. An economic module can be coupled to the hydraulic tool, to assess the economic performance of different scenarios tested.

The Geographic Information Systems can integrate, combine and analyze data, both physical and socio-economic. They allow visualizing the different geopolitical components of the basin, especially between the different countries that compose it. They are also a powerful communication tool, including for water users and non-technical people. Satellite imagery is particularly useful in the case of transboundary basins, which are often large ones.

7.3 Transboundary master plan

Once the assessment is completed, it is necessary to define the actions to be implemented. These actions can be of different types and of a more or less transboundary nature. In addition to the institutional or capacity building projects we may quote the activities that are most likely to promote integration between different countries of the same basin: hydropower generation, irrigation, navigation, low water replenishment, ecosystem preservation, control of extreme natural phenomena (floods, drought) and of pollution.

Among the various development scenarios studied, a consensus scenario is chosen by the countries and will result in actions.

Example 34: 2010-15 Mekong River Basin Development Strategy

The preparation and adoption in 2011 of the Basin Development Strategy by the Lower Mekong Basin Countries is an important milestone in the history of cooperation under the framework of the Mekong River Commission (MRC). Developments in the Lancang-Upper Mekong Basin in China and in the Lower Basin are changing the Mekong's flow regime. The private sector is now actively seeking investment opportunities to meet growing demand for goods and services, which the river can provide if effective regulatory systems are in place.

The Strategy defines a dynamic basin development planning process that will be reviewed and updated every five years. It defines the following Strategic Priorities for Basin Development:

- opportunities and risks of current developments addressed;
- irrigated agriculture expanded and intensified;
- environmental and social sustainability of hydropower development greatly enhanced;
- essential knowledge acquired;
- options for sharing benefits and risks identified;
- climate Change Adaptation Strategy implemented;
- basin planning integrated into national systems.

The Strategy also includes:

- basin objectives and management strategies defined for water-related sectors;
- national-level basic water resources management processes strengthened;
- basin-level water resources and related management processes strengthened;
- rigorous basin-wide environmental and social objectives and baseline indicators defined; and
- capacity building programme implemented, linked to MRC's overall initiatives and complementary to national capacity building activities.

The action plan for a transboundary basin will first include actions of a transboundary nature, benefiting at least two countries. Actions at the national level will be included provided that they participate in the consistency of the master plan. Actions at the local level and involving only one country should preferably be included in the national IWRM action plan. At the same time, specific mechanisms are planned to identify actions likely to harm the downstream countries.

For the projects developed within the Global Environment Facility (GEF) International Waters Portfolio, the Strategic Action Plan (SAP) is a negotiated policy document that should be endorsed at the highest political level of all relevant sectors. It establishes clear priorities for action (for example, policy, legal, institutional reforms, or investments) to resolve the priority problems identified in the Transboundary Diagnostic Analysis.

A key element of the SAP is a well-defined baseline. This enables a clear distinction between actions with purely national benefits and those addressing transboundary concerns with global benefits. Another key element involves the development of institutional mechanisms at the regional and national levels for implementing the SAP and monitoring and evaluation procedures to measure effectiveness of the outcomes of the process.

A SAP should identify policy, legal and institutional reforms and investments needed to address the priority transboundary waters problems. The preparation of a SAP is a cooperative process among the participating countries. It outlines the actions needed to resolve the priority problems and must be agreed before technical assistance, capacity-building, or investment projects can be developed. The SAP sets out specific actions for each country that can be adopted nationally but harmonized with the other concerned countries.

Sharing the benefits and costs of actions is established by consensus between the different countries of the basin and based on the results of the various economic simulations and through a consultation and negotiation process.

Example 35: Lake Victoria Basin Strategic Action Plan: from Community to Ministry levels

Lake Victoria, the largest of all African lakes, has successfully applied the TDA/SAP approach in the process of establishing a regional environmental and economic sustainable management framework. Phase I of the Lake Victoria Environmental Management project, which was implemented jointly by the riparian countries of Kenya, Tanzania, and Uganda, has taken huge strides in improving regional water management. This phase focused on understanding the lake and building regional capacity, while testing feasibility of a number of community-based actions and institutional modalities at both local community and regional levels.

The Lake Victoria Fisheries Organization was established through a convention signed in 1994 by the States, showing that the community benefits can spur Ministry action. The Lake Victoria Basin Commission was established in 2003 by the Protocol for Sustainable Development of Lake Victoria Basin enacted under the 1999 Treaty for the Establishment of the East African Community.

In phase II of the project, Rwanda and Burundi, the two countries that are part of the upper catchment that drains into the lake through the Kagera River, signed the Treaty and the Protocol. By including these two countries, a more holistic solution can be formulated through efforts to target the concerns that the lake basin has been experiencing over the last three decades, with the lake ecosystem being under increasing pressure from nutrient pollution and the occurrence of massive algal blooms.

One of the essential cornerstones for sustainability is the establishment of a Fish Levy Trust. All fisheries have to pay a minimal fee to the Levy, which, in turn, finances activities that sustain regional and local community's implementation of measures aimed at ensuring that Lake Victoria is properly managed at all levels, from community to Ministry.

In addition to the shared performance of the various facilities (hydropower generation, irrigation, fisheries, navigation, drinking water supply, recreational activities, etc.), the benefits and impacts related to ecosystems (e.g. self-cleaning by wetlands, fish production and sanitary flows) are to be studied.

The strategic action plan for a transboundary basin should be consistent with the other international programmes in the region concerned - agriculture, energy, transport, information / communication, as well as existing sectoral plans or under development (adaptation to climate change, control of floods and droughts, etc.).

7.4 Planning of investments

As strategic planning is a long-term one, priority actions are detailed in a short term action plan (a few years). Its budget is estimated in a realistic manner and given in the form of an investment plan (consisting of financially viable projects) and activities (training, education, development of information systems), distributed as fairly as possible among the basin countries. The implementation process is iterative, as the plan is to be reviewed every few years for the implementation of the next plan, incorporating new data and taking into account new results and future developments.

The basin organization develops the strategy and funding arrangements which may be different (self-financing, external financing in the form of loans or grants, public-private partnerships – see section 8) depending on the type of action. The arrangement for cost sharing between countries is linked to the sharing of benefits generated by actions.

When planned, the major hydraulic infrastructures (dams, diversions, water transfers) are an important part of the investment budget and are also often scheduled over several short-term planning periods.

When such an infrastructure is of a transboundary nature, the decision to implement it can be a particularly sensitive aspect of the cooperation between the countries. Obtaining a consensus over this installation is a significant asset for international cooperation and political and economic integration in the region. The environmental and social impacts of this infrastructure should be assessed according to the international standards in force, following the recommendations of the World Commission on Dams.

Example 36: From Shared Vision to a basin-wide investment programme in the Niger River Basin

The GEF-supported project “Reversing Land and Water Degradation trends in the Niger River Basin” was aimed at the reduction and prevention of further transboundary ecosystem degradation related to water resources; prevention of land degradation; protection of biological resources; and building capacity for sound decision-making at the basin and national levels.

A comprehensive Transboundary Diagnostic Analysis (TDA) and a Strategic Action Plan (SAP) were completed following a participatory process that included multidisciplinary teams at the national and regional levels. Following the conclusions of the TDA, the SAP as a policy document was developed that complemented the Niger Basin Sustainable Development Action Plan.

7.5 Implementation and follow-up

The formulation of the priority action plan is the responsibility of the transboundary basin organization that coordinates its implementation and sets up a follow-up and evaluation system.

We distinguish structural (new developments, work, rehabilitation, maintenance), technical (design, follow-up, capacity building) from institutional actions (procedures, regulations, governance).

Non-structural and environmental measures, such as the recovery of river beds and conservation of wetlands to minimize flood impacts, the introduction of native species, capacity building activities, or awareness campaigns might be easier to apply, as compared to hydraulic works and infrastructures and bring more sustainable benefits. However, these measures will also require consensus processes among the interested parties and the countries sharing the basin to ensure continuity and effectiveness of actions.

For each action, responsibilities are identified for the contracting authority, the prime contractor, the manager and the beneficiaries. Depending on the type of action, the contracting authority may be international, national or even local according to the principle of subsidiarity. Some actions can be under the responsibility of the transboundary basin organization but be implemented by national organizations, under the supervision of regional administrations.

For the basin organization, moving from the planning to the implementation phase is a crucial step, which may require reorganization with the establishment of new bodies and mechanisms, especially to facilitate its operational links with the States.

Performance indicators are useful both for governance of the basin organization and for results obtained in the basin (see Section 4).

It is necessary to regularly inform the various stakeholders of the basin on actions. The different categories of stakeholders are involved in the implementation of actions that concern them.

7.6 Climate change and water-related risks

Controlling water-related risks (floods, droughts, pollution) is more relevant than ever in a context of climate change that may aggravate the frequency of extreme events. The actions associated with this control (prevention, forecasting and protection) should be part of strategic planning on the scale of the transboundary basin. Once again, stakeholder participation and public consultation are needed.

It is important for countries to exchange information, especially hydro-meteorological data necessary for this control, and on the progress made in sectoral plans: controlling climate change impacts, management plans for droughts and floods. The information can be centralized by the transboundary basin organization, which manages the global warning system and warns the countries when there is a threat (see Section 4).

Flood control is part of the IWRM concept. The slowing down of flooding dynamics in natural overflow channels (floodplains and wetlands) is effective and sustainable, including for the protection of downstream countries. The control of human settlements in flood-prone areas is an essential complement.

Example 37: Water, Climate and Development Programme in Africa

The Water, Climate and Development Programme (WACDEP) led by the African Ministers' Council on Water (AMCOW) and implemented by the GWP is intended to support the implementation of the Sharm el-Sheikh Declaration and commitments made by Heads of State of the African Union on water and climate change. Its goal is to promote water security as a key to sustainable development of countries and regions and contribute to climate change adaptation for economic growth and human security.

A Framework for water security, climate resilience and development is thus developed in 2011-2012 by a consortium led by HR Wallingford to facilitate WACDEP implementation:

- this short and user-friendly policy paper outlines the development of “no regret / few regrets” investment strategies;
- it provides the elements for integrating water security and resilience to climate change into national development plans, macroeconomic frameworks, national budgets and into overall economy;
- it is based on the analytical work of the Technical Background Paper, which gathers the best international practices in terms of strategies for water security and climate resilience, provides advice to deal with uncertainties and relevant investments.

More information: www.gwp.org/WACDEP

Example 38: Morava River joint flood risk management planning and implementation

The Morava River, tributary to the Danube, is shared by Austria, the Czech Republic and Slovakia. The river is dangerous due to both floods, caused by regional rainfall, and flash floods. Damages from the 2006 flooding were estimated to be €35 million, much to agricultural land.

There is no joint river basin commission for the Morava, but bilateral agreements between the three countries concern flood forecasting, reporting and warning. Moreover, the Central European Flood Risk Assessment and Management (CEFRAME) project concerns the Morava, Dyje (main tributary of the Morava), Danube and Leitha rivers. It has produced a review and assessment of the situation, a flood risk analysis and mapping, and proposed harmonization of safety regulations and development of best practices.

From a development perspective, floodplain restoration helps to improve local livelihoods. Reduced flooding risk is a major benefit for downstream countries communities.

In some cases, storage can be increased artificially for downstream protection. Compensation mechanisms for the upstream ‘storage’ countries can then be negotiated with the protected downstream countries. Protective measures involving dikes are not recommended because, in addition to their limited effectiveness and their strong impact on the environment, they only transfer the problem downstream.

In geographic areas experiencing water scarcity, regulating dams can be a major solution to climate change adaptation. They are a reserve of water regulating flows according to seasonal variability and needs (see Section 9).

Example 39: The AMICE project on the Maas river basin

The AMICE project is implemented by 17 partners under the leadership of the “Etablissement Public d’Aménagement de la Meuse et de ses Affluents”. It aims to minimize the economic, social and ecological impacts of climate change on densely populated and built-up floodplains, which are some of the most vulnerable areas in Europe. The project, among others, includes several activities to improve natural water retention by making room for the river, transforming agricultural land into natural space and conserving Natura 2000 floodplains.

Example 1) is located in the upper reaches of the basin in the Walloon Ardennes, where rainfall is high. The upstream areas could offer ample retention capacity when restored to their natural condition. They are necessary to slow down floods and store water in the ground in case of droughts.

Example 2) is located in the most downstream part of the basin, near the town of Steenbergem. The objective is to enable streams to flood the surrounding fields when the water level of the Maas is too high to allow the stream’s water flow out. While floodplains are wide and flat, competition with crops and grasslands is intense, making this a particularly challenging context.



Example 3) highlights the use of Natura 2000 zones to compensate for channelled rivers in urbanized areas. The objective is to solve water quantity problems, taking into account ecological aspects and poor water quality. An important challenge here is collaboration with the farmers who have the use of the lands.

However, it will be necessary to establish the carbon balance of such projects (e.g. in wooded areas) as a filling-up reservoir can emit a significant amount of greenhouse gases.

Drought management plans and their measures, the use of indicator systems to follow up the impacts produced by the decrease of available water or the close monitoring of aquifer levels during weather episodes should also be considered in transboundary cooperation.

In some cases, the establishment of minimum required flows and the possibility of their revision under drought circumstances, as well as the increase of communication and data exchange between countries and flexibility in the application of measures during droughts should be recommended.

8 Financing of transboundary basin organizations

KEY POINTS:

- A transboundary basin organization should have a sustainable financing system suited to its missions.
- There are three types of funding requirements related to the operating of the institution, to achieving the basic tasks and, when appropriate, to the management of infrastructures.
- The various possible systems of internal funding are: contributions of Member States, taxes related to uses, fees for project management and the sale of services.
- The external financing systems can be Public-Private Partnerships and contributions from donors (mainly loans).

For a transboundary basin organization to be effective and long-lasting, it should have a sustainable and appropriate financing system. This system should especially foster budget autonomy in the daily operating of the organization, giving it some independence from the Member States and giving it long-term financial resources on which to rely. Sustainability of the financing system will be established when most of the operating budget will be covered by guaranteed and regular resources.

The basin organization may face the problem of variability in the amount of funding from one year to another, the main cause being irregularity in the payment of the contribution of some Member States, which results in significant arrears in the long term. However, the direct contribution of the countries is minor compared to the challenges of developing a transboundary basin, especially regarding infrastructure.

In addition, the financing system of the transboundary basin organization should be built so that it meets:

- the different missions / functions of the basin organization,
- the financing needs in the basin,
- the desired deadlines (financing need in the short, medium or long term).

For example, a basin organization whose role is the development and management of major structural facilities should have a mechanism for mobilizing necessary funds, the origin of which is multiple: public self-financing from Member States, funding by recipients, financing from the private sector, international loans and grants.

On the contrary, a basin organization whose missions would focus on the establishment and operation of a water information system and on planning will have a financing system based on an operating budget primarily fed by funds coming from the basin itself (Member States), except for example for the establishment of the information system that may require external inputs from donors.

It is usual to consider three types of financing needs:

- financing the operating expenses of the basin organization, i.e. payment of staff salaries, facilities, travel expenses, supplies and financing of actions carried out by the organization (studies, database, workshops, training, etc.);
- financing ongoing missions of the organization, such as monitoring or planning;
- financing hydraulic works and infrastructure, from studies to achievement, including maintenance and operation.

If the basin organization needs to have overall consistency in its funding system, it is clear that in its implementation several financing options can be used, according to the type of needs (operation or investment).

8.1 Various systems for financing transboundary basin organizations

Box 18: The different systems for financing transboundary basin organizations

Financing from the basin itself				External financing		
Contributions from the Member States		Tax system	Payment for project management performed by the basin organization	Sale of services	Public-Private Partnership	Contribution from donors (loans accounting for most of the official development assistance)
Direct contribution to the budget according to an allocation key defining the share of each country	Contribution through community levies	Based on the user/polluter - pays principles	Payment for service rendered in project management by the basin organization	Payment for a service or product provided by the basin organization	Funding of infrastructure by the private sector, as part of a contract	On a project basis (or even a programme)
Not directly related to the use of the resources		Directly related to uses	In connection with work performed by the basin organization	Linked to the activities carried out by the basin organization	Linked to water infrastructure	

Example 40: Sustainable financing of the Niger Basin Authority

The Niger Basin Authority (NBA) is globally funded at 90% by donors, primarily for the implementation of projects whose duration is limited in time. The irregularly paid States annual contributions cover the remaining 10% and are almost entirely devoted to current operation. Ironically, in recent years with the advent of the Shared Vision of the Niger Basin, the member countries have given the NBA a growing number of “basin public service” missions inherently perennial: monitoring and hydrological forecasting, environmental monitoring, water allocation, planning and coordination of large dam projects.

The NBA carried out a study with the support of the French Development Agency, to identify and mobilize self-sustainable financial resources. This initiative, which has already been endorsed by the NBA Heads of State, has proposed various identified mechanisms:

- combining States’ contributions to a Community tax based on that of CICOS (see example hereafter);
- implementation of the user - pays principle set out in the Niger Basin Water Charter, which came into force in 2010: it involves a financial contribution, especially from the producers of hydropower, in exchange for hydrological services that only the NBA is able to provide basin-wide;
- implementation of the polluter - pays principle;
- creation of a Capital Fund, which may require the participation of donors;
- payment of the NBA function as Contracting Authority (often shared with the countries);
- payment for services rendered by a Bank mobilizing funds for financing projects;
- implementation of compensatory measures related to the construction of structural works.

8.2 Contribution from the Member States to the basin organization

The principle is an annual contribution from each Member State to the budget of the basin organization. This system allows Member States to affirm their confidence in the organization and in a solidarity process.

To ensure financial visibility in the medium term, it is imperative that the State contribution system be organized by a regulatory or contractual framework between the States and the basin organization. This framework should determine an allocation key for national contributions.

An allocation key may be based on a principle of equality, each country contributing the same rate (e.g. a basin shared by five countries, each country participating at a 20% rate) or a principle of solidarity, the richest States contributing more than the poorest ones. It can also be based on objective and measurable criteria such as the share of rivers, water withdrawals, population, basin’s surface area and economic activities in each country throughout the basin. Logic suggests that the criteria to be selected should be related to water resources (both in quantity and quality) and a mix of several criteria should be established.

Practice shows that, if these criteria are useful, the high sensitivity of the matter often leads the Member States to agree to an allocation key based primarily on political issues, taking into account the contribution possibilities of the States, their interests or their degree of involvement in the river basin management.

In the case of a new basin organization in which States have already had a contribution practice in the past, the development of the allocation key must also take account of this history. To prepare for such negotiations it is strongly recommended that prior allocation scenarios be based on criteria simulations.

The framework can also determine a minimum annual contribution limit, which reflects the willingness of all countries to participate in joint management of the basin. To reduce the risk of non payment of the annual contribution and avoid arrears, it is advisable that the agreement on the allocation key specifies the possible sanctions that States face in case of default of payment of their quota.

8.3 Access to regional community funds

Many regions in the world have one (or several) institution – or economic community - for regional integration (ECOWAS and UEMOA in West Africa, SADC in Southern Africa, MERCOSUR in South America, etc.) established by ratification of a treaty or an agreement on regional cooperation. These institutions are usually levying community taxes such as the UEMOA Community Solidarity Levy, ECOWAS community levy. These levies usually derive from imports of goods.

These regional institutions can provide the framework for financing basin organizations by allocating a portion of their levies for supporting the basin organization.

However, it is up to each basin organization to prove to the regional integration institution the relevance of its objectives, of its activities, its achievements, to convince it to adopt the principle and implementation methods of a specific levy.

This solution seems attractive because of:

- easy recovery;
- good acceptability of the levy by national taxpayers compared to taxes or charges;
- possibility of establishing the mechanism in the short or medium term.

However, this type of solutions has some constraints:

- should the mechanism be linked to the already existing community levies or identify another financing base more in line with the services provided by the basin organization?
- the Member States of the basin organization should reach, with the regional partners concerned, an agreement on the principle, the parameters and implementation methods. The political complexity is especially due to the fact that some Member States of the basin organization may not be part of the regional institution. Conversely, a Member State of the regional economic community may not belong to the basin organization.

This mechanism strongly depends on the political will of the States.

The community tax or levy system based on an economic criterion also raises the problem of economic risk for the basin organization in case of reduced economic activity in the area concerned.

Example 41: CICOS's Community Integration Tax

The International Commission of the Congo-Ubangi-Sangha Basin (CICOS) is a specialized institution of the Economic and Monetary Community of Central Africa (CEMAC). The Heads of State and Government of the CEMAC adopted an autonomous financing mechanism, the Community Integration Tax (CIT), which is applied at a 1% rate of the customs value of goods imported from third countries for consumption in all countries of the community. The revenue from this tax is transferred by the collectors of customs to an account opened in the branches of the Bank of Central African States.

Cameroon, the Central African Republic and Congo, who are members of CEMAC, contribute to the CICOS budget through the CIT, which now accounts for 70% of its financing. The allocation key for the Member States contributions to the budget is 10% for the Republic of Cameroon, 30% for the Central African Republic, 30% for the Republic of Congo and 30% for the Democratic Republic of Congo. The Democratic Republic of Congo, which is not a member of CEMAC, contributes directly.

8.4 Tax of the “user-polluter / pays” kind

The principle of the tax is that withdrawals (in situ or ex situ) for water use and that water pollution are causing damage to the resource in quantity and quality. The tax can be understood as a payment to compensate and repair this damage.

This financing system, unlike earlier ones, is closely linked to water and more specifically to one or more services provided to the users: irrigation, drinking water consumption, sanitation, navigation, hydropower production, etc. Such a system can be applied to some or to all water uses in the basin.

For the irrigation sector, the principle is to apply a tax rate to irrigated lands or according to the withdrawn volumes if a reliable metering system has been installed in the farms. For drinking water supply, the tax rate is applied to the volumes of raw water abstracted in the basin for drinking water. For the hydropower sector, the tax rate can be set per unit of hydropower produced. In the case of the navigation tax, a tax rate may apply to the number of people or tons transported.

Pollution can also lead to the payment of a tax (“polluter / pays” tax). Properly applied, it is a tool that can be a deterrent to limit pollution in the rivers concerned. This implies that the Member States have a performing system of water police and knowledge of the bodies that could cause pollution, whether industry, mining, petroleum, households, handicraft or agriculture.

The choice of a financing system based on taxes can be established separately in each Member State or directly at the basin organization level. In the first case, there are often variations in the implementing rules between countries.

The basin organization has thus a role to play in harmonization between Member States, particularly in defining tax bases and levy methods.

When establishing a tax system, it is important to ensure that it takes account of the following elements:

- solvency of the taxpayers and role of the basin organization to identify the largest users (the solvency problem of small users being addressed at the country level);
- the type of contribution, as the basin organization cannot levy an income tax but a mere tax, understood as the price to pay for the right to use any goods or for a specific service.

The financing system with the levying of taxes for water withdrawal and pollution has the advantage of being directly related to water and of generating regular financing of the basin organization. It is also well suited to the operating budget of the organization.

8.5 Payment for project management performed by the transboundary basin organization

The basin organization, depending on its skills and abilities, may participate in the various phases of a project cycle:

- preparation studies,
- mobilization of funds,
- construction and implementation of field activities,
- operation and maintenance of installations,
- implementation monitoring and evaluation and impact assessment of actions.

In this case, the basin organization may receive compensation as a percentage of the amount of investment, related to the performed duties.

Several recommendations are to be made at this level:

- it is important to carefully identify the actions for which the basin organization is relevant to perform project management. This relevance is also linked to the abilities and technical and economic expertise of the basin organization;
- the project management aspects should be carefully considered when establishing (or reforming) the basin organization and defining its roles and mandates;
- beyond the nature of actions, it will be useful to consider the scope of these actions, their local, national or regional nature, the basin organization being obviously better positioned for actions of regional scope.

It is possible to distinguish three types of actions and associated project management

- actions that require the involvement of national agencies, including in public procurement in the States. In addition to the payment of the agencies, a fee may be paid to the basin organization, based on a percentage of the contract;
- actions in which the basin organization is responsible for procurement procedure without any involvement of national institutions;

- for actions related to heavy investments (dams, development of irrigation, hydropower plants, etc.), a percentage of the investment amount can then be applied, including for national project management. Establishing infrastructure management or exploitation companies under the responsibility of the basin organization (case of the SOGEM and SOGED for OMVS) may accompany such kind of action.

Example 42: Shared dams in the Senegal River Basin

With the drought that has developed since 1972/1973, the leaders of three riparian States of the Senegal River decided in 1972 to join efforts within the Organization for the Development of the Senegal River (OMVS). In addition to the agreements on OMVS establishment and on the legal status of the Senegal River, a Convention on the legal status of common infrastructures was signed on 21 December 1978 by the Heads of State and Government of Mali, Mauritania and Senegal, who decided in 1974 that installations of common interest on the Senegal River would jointly belong to the Member States of the OMVS. The Convention on the financing arrangements for common infrastructures was signed on 12 May 1982 in Bamako.

The Diama (anti-salt dam) and Manantali Dams (hydropower and regulating dam) were respectively built in 1988 and 1990. They are works of the so-called “first generation”. Operation and maintenance are carried out by the Diama Dam Management and Exploitation Company (SOGED) and the Manantali Energy Management Company (SOGEM), the OMVS’s Council of Ministers being the highest supervising body. The payment of the incurred debt to donors is distributed between the OMVS Member States in proportion to the benefits provided by the programme, especially regarding energy production but also navigation and irrigation.

OMVS efforts are continuing today, including the following achievements:

- increasing hydropower generation to create an enabling environment for lower production costs with the completion of the Félou and Gouina installations on the river (ongoing, second generation);
- controlling, regulating, securing and diversifying water resources to meet the enormous needs. Efforts will focus on the implementation of baseline studies and work for the Gourbassi dam (third generation).

8.6 Payment for services provided

The basin organization may be paid a fee for services rendered or for the provision of some specific services, such as:

- assistance to developers of projects in the basin;
- the sale of raw data (which implies an effective information system);
- providing advice to public or private bodies, or associations;
- studies, hydraulic modelling, information (mapping, analysis using databases).

However, these services usually generate small revenue compared to the needs for operating a basin organization with a permanent secretariat.



9 Transboundary challenges

KEY POINTS:

- Waterways navigation, hydropower generation, irrigated agriculture and flood control are often major challenges in transboundary basins.
- It may be interesting to develop large hydraulic infrastructure projects shared between the basin countries.
- The multiple services provided by aquatic ecosystems have an economic, social and cultural value that needs to be shared between the countries of the same basin.
- The “green infrastructures” such as wetlands are complementary to traditional infrastructure and are part of the “Water-Energy-Food Security” nexus.

Aspects relating to floods are addressed in sections 4.4 (Flood warning systems) and 7.6 (Climate change and water-related risks).

9.1 Inland navigation

Inland waterways transport has contributed to the development of mature economies over many centuries and created many bridges between nations. It provides a safe, environmentally sustainable form of transport which is a key element of sustainable economic development. Such transport of goods and people can stimulate the development of regional economies and connect land-locked countries to the sea.

Various international navigation commissions or authorities exist on the major river systems throughout the world. Ancient treaties often formed the basis for larger forms of collaboration around other water uses (Rhine, Niger, Congo, etc.).

Of all modes of transport, inland navigation has the least effect on climate change and the lowest environmental impact. It is developed on an intermodal basis with existing and proposed rail and road services, including transboundary ones. Navigation is inherently energy efficient, and requires the least amount of fuel per tonne of cargo carried. As road freight is transferred to inland waterways and coastal routes, traffic congestion can be reduced even in the most urbanized areas.

River navigation has in the past provided links between countries during war and peace, and has provided them the means to overcome major political and cultural differences, whether in their commercial use or even nowadays in their recreational use.

The use of information technology and electronic communications can create improvements in the marking of channels, the availability of information relating to water levels and tides and the closer cooperation of all stakeholders and countries, to provide a much higher capacity system whilst reducing any possible environmental impact.

Example 43: Inland navigation in the Congo Basin

The middle reach of the Congo River and its tributaries the Ubangi and Sangha falls into the category of international waterways. The General Act of Berlin Conference of 1885 and the Saint-Germain-en-Laye Convention of 1918 already proclaimed the freedom of merchant shipping on all waterways for all signatory States, the equal treatment of riparian nations and freedom of transit. With road and railways networks, waterways in the Congo Basin are thus the multimodal platform serving Central Africa (see map).



The Heads of State of Cameroon, Central African Republic, Congo and Congo Democratic Republic signed on 6 November 1999 the Agreement establishing a unique river regulation and creating the International Commission of the Congo-Ubangi-Sangha Basin (CICOS). The primary objective (now expanded to IWRM) of CICOS is to promote regional integration through sustainable and equitable use of the waterways that are the Congo River and its major tributaries, for navigation purposes. Currently, the system of inland waterways of the Congo-Ubangi-Sangha Basin is characterized by multiple uses and a significant drop in traffic for several decades, a lack of maintenance, ageing infrastructure and equipment, weak regulation and administrative red tape. The assessment made by CICOS in 2007 revealed an ageing and inadequate crew and the presence of more and more untrained crew. To overcome this situation, a Regional Training Centre in inland navigation managed by CICOS has provided courses in Kinshasa since 2009.

The greater knowledge and the increasing transfer of professional expertise, in the field of design, management and operation means that it is now possible to use and develop waterways in a far less environmentally intrusive manner than is the case for other forms of transport. In the navigation sector PIANC (the World Association for Waterborne Transport Infrastructure) is the global organization providing guidance for sustainable waterborne transport infrastructure for ports and waterways.

Example 44: The Seine-Northern Europe Canal

The Seine-Scheldt connection is a comprehensive system of transportation that connects the Seine Basin to 20,000 km of the wide-gauged European waterways network and supports the development of waterways transport on a network of inland ports, reinforced by the creation of four multimodal platforms of the Seine-Northern Europe canal. This network of inland ports will highly increase freight transport and enhance the attractiveness and competitiveness of sea ports.

In order to coordinate the implementation of this connection, the Walloon (Public Service of Wallonia), Flemish (Waterwegen Zeekanaal NV) and French (Waterways of France) managers of waterways have created the Seine-Scheldt EEIG. It opened a dialogue with the European users to better understand their expectations in terms of services and create the conditions for success of this new connection.

This project connects Northern Europe and the Seine River, allowing easier connections between industrial and agricultural areas, large areas of consumption and the coastline.

9.2 Transboundary hydraulic infrastructures

The concept of “sharing” between States of the same basin is not directly related to water, but rather to the benefits associated with it. The large transboundary hydraulic infrastructures are from that point of view a major issue, especially regarding irrigated agriculture and energy.

Large hydraulic infrastructure means:

- large dams, i.e. with a bottom-up height over 15 meters or a normal reservoir volume over 3 million cubic meters;
- large infrastructure along the river (as opposed to storage and regulating structures), especially for hydropower;
- diversions, whether they are water transfers (intra or inter-basins) or water supply to large-scale irrigated lands for example.

Large regulating dams often have multiple functions: e.g. hydropower generation, irrigation (gravity water intake or cultivation around the reservoir), flood control, low water replenishment and various related functions (navigation, ecosystem conservation, etc.). Located in transboundary basins, they provide benefits to several countries of the same basin, and beyond even, in the case of hydropower plants connected to a regional power interconnection network.

Such structures, through water withdrawals and modification of the flow regime, often generate impacts in the downstream countries. When a large infrastructure is in the most downstream country of a transboundary basin, it can also lead to dispute between countries as future new projects in upstream countries may hinder the filling up of the reservoir (notion of prior rights). In addition to transboundary basin organizations, regional economic commissions can play an important role in fostering agreement between countries regarding these large projects.

Example 45: Dialogue on large dams in West Africa

There is, in Africa and West Africa in particular, a need to develop large hydraulic infrastructure projects that enable the development of irrigation, access to energy and improvement of the overall standard of living of the populations. Such projects often involve several countries and contribute to regional integration if they are carried out with dialogue through the transboundary basin organizations, according to internationally recognized environmental and social standards.

The Water Resources Coordination Unit (WRCU) of the Economic Community of West African States (ECOWAS) has developed dialogue on major infrastructure projects in the water sector since 2008. A Panel of experts thus produced recommendations for best practices for the development of sustainable hydraulic infrastructures in West Africa. A list of projects of major priority hydraulic works having a significant impact on regional integration was produced. The selection was made using a multi-criteria analysis tool designed by the International Office for Water (IOWater).

Meanwhile, a regional dialogue on major water infrastructure projects in West Africa is developed in partnership with the International Union for Conservation of Nature (IUCN). It allows opening discussions with the civil society stakeholders, especially representatives of local communities and resource users, often forgotten in dialogue and decision-making.

Large infrastructures in transboundary basins often cause disputes between countries of the same basin. But they may also be major factors of integration, when designed and managed by consensus, especially within a transboundary basin organization, and respecting ecosystems and populations.

Several statutes of these transboundary structures can be distinguished:

- common infrastructure, whose ownership and profits are shared among the Basin States. This is the “ideal” situation, which requires a basin organization with a strong mandate to act as the contracting authority;
- infrastructure of common interest, for which a specific agreement is signed by countries but remains the property of a single one;
- infrastructure operated by a single country. This potentially generates conflicts, particularly in the case of structures located upstream.

Example 46: Programme for Infrastructure Development in Africa

The Programme for Infrastructure Development in Africa (PIDA) is a joint initiative of the Commission of the African Union, NEPAD Secretariat and the African Development Bank. Its purpose is to promote regional integration in Africa through the development of infrastructures at regional and continental levels. A PIDA Priority Action Plan was drafted up to 2020.

PIDA covers four sectors: transboundary waters, energy, transport, and information and communication technology. The African Water Facility is financing the “transboundary water” component.

Prioritization of major hydraulic infrastructure projects is made at the level of large transboundary surface water and groundwater catchments areas. Various economic, environmental, social, technical and institutional criteria were used for this prioritization.

The Regional Economic Commissions and Transboundary Basin Organizations will play an important role in the implementation of the projects to be selected. This implementation will be accompanied by a progressive institutional capacity building of the basin organizations according to proven models.

Transboundary water infrastructure can be planned and operated jointly. For example, the Chu-Talas Water Management Commission set up by Kazakhstan and Kyrgyzstan with assistance from UNECE and OSCE is based on two crucial principles:

1. the countries have agreed to follow inter-country water allocation schemes and schedules applied in the Soviet era; and
2. the downstream country, i.e. Kazakhstan, must reimburse the upstream country (i.e. Kyrgyzstan), for a part of its maintenance and operation costs of water infrastructure proportional to the volume of the water delivered by that infrastructure.

For each large water infrastructure project, an environmental and social impact assessment must be made according to international standards. Regarding transboundary structures, this study should preferably be conducted by the basin organization and not only by the country hosting the structure. The report of the World Commission on Dams provides valuable information on decisions relating to such structures.

When several structures are planned in a basin, undertaking a Strategic Environmental Assessment can advantageously complement the Basin Action Plan and provide input to decision-making basin countries.

Example 47: Strategic Environmental Assessment of proposed dams on the Mekong

Twelve hydropower schemes are being studied by private sector developers for the mainstream of the Mekong River. The 1995 Mekong Agreement requires that such projects are discussed extensively among all four countries prior to any decision being made.

Mekong River Commission (MRC) has undertaken in 2010 the Strategic Environmental Assessment (SEA) of the proposed mainstream dams to provide a broader understanding of the opportunities and risks of such development.

The assessment concluded that the mainstream projects would bring significant additional power and investment/revenue benefits to the region. They would also bring many serious risks and uncertainties to issues of strategic economic, social and environmental concern to the Mekong countries and communities and for the sustainable development of the Basin.

The assessment recommends:

1. Decisions on mainstream dams should be deferred for a period of ten years with reviews every three years to ensure that essential deferment-period activities are being conducted effectively;
2. The deferment period would prioritize feasibility studies for innovative systems for tapping the power of the mainstream in ways which do not require dams across the full breadth of the river channel. This would involve governments in partnership with the MRC, multi-lateral development banks and developers;
3. The deferment period would also include an assessment of tributary projects that are considered feasible and ecologically sustainable according to current international good practice, including retrofitting of existing projects and innovative schemes;
4. The deferment period needs to commence with a systematic distribution of the SEA report within each Lower Mekong Basin country in national languages, and consultation with line agencies, private sector and the NGO community;
5. The Mekong mainstream should never be used as a test case for proving and improving dam hydropower technologies.

For large infrastructure, safety standards must obviously be strictly complied with. Simulations of wave propagation in case of dam break must be carried out over a distance long enough downstream, even when they involve several countries.

Example 48: Dam Safety in Central Asia

Central Asia has more than 100 major dams and many other water control facilities, mostly on rivers shared by different countries. Ageing dams and lack of funding for their maintenance represent a very real threat to the lives, health, property and environment of the sub-region. In 2010, the failure of the Kyzyl-Agash Dam in Kazakhstan caused the flooding of the nearby village, killing 43 and leaving some 300 people injured.

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Moreover, the safe exploitation of the ageing hydraulic infrastructure in Central Asia, in particular the hundreds of dams and reservoirs built 40 to 50 years ago, is crucial for the future of these countries. The UNECE project “Capacity-building for cooperation on dam safety in Central Asia” is funded by Finland and the Russian Federation. A component of the UNECE Water Convention work programme, it was implemented in cooperation with the International Fund for Saving the Aral Sea.

The progress achieved during the project includes:

- enactment of national legislation or its further enhancement in Kazakhstan, Tajikistan and Uzbekistan;
- a draft agreement on the safety of hydraulic installations in Central Asia;
- inter-State cooperation to increase the safety of individual dams such as a safety assessment on the Kirov dam by a joint Kazakh-Kyrgyz working group;
- improved cooperation at the national level between agencies with responsibilities for dam safety;
- a model of technical regulation on the safety of hydraulic installations;
- increased capacity to deal with, and awareness about, dam safety issues owing to a number of UNECE-organized training activities.

9.3 Ecosystems, climate change and green infrastructure

The services provided by aquatic ecosystems (rivers, lakes, streams, wetlands, aquifers, estuaries and marine deltas) are many and varied:

- goods produced or provided (water supply, agriculture, animal husbandry, fisheries, wildlife, fiber and wood, genetic and biochemical resources);
- regulation (lateral flow expansion, floods slowdown and control, protection against flooding, sediment retention and transport, groundwater recharge and drainage, low water replenishment, waterways transport, maintaining biodiversity, self-purification, CO₂ storage, pollination, habitats);
- cultural and religious services (landscape, heritage, values, history, recreational activities, ecotourism).

In the case of transboundary basins, these benefits are felt beyond the borders, particularly with regard to flood control, low water replenishment by groundwater, self-purification by wetlands. The economic, social and cultural values of aquatic ecosystems should thus be shared between the countries of the same basin.

Ecosystems also play an important role in climate adaptation. For instance they can contribute to flood regulation by attenuating the variability of hydrological events, including in downstream countries. Forests can retain water, thus slowing down run-off, and wetlands have a buffering effect against floods and droughts. Healthy ecosystems increase resilience. Conservation and restoration of ecosystems should therefore be an integral part of adaptation strategies, especially in transboundary basins.

Example 49: Integrated approach for transboundary aspects in Dutch freshwaters and North Sea

Due to the geographical position below sea level, as well as downstream, Dutch water systems are vulnerable and Dutch water managers are facing real challenges. Key solutions are effective communication and joint efforts made by the various water authorities, the countries, freshwater and marine water managers and by the various Marine Conventions, International River Commissions (such as the Rhine) and the European Directives (Water Framework and Marine Strategy Framework). Also important is to follow a common River Basin wide approach in identifying sources, fate, transport and concentrations of the various parameters such as hazardous substances, nutrients and eutrophication effects.

The Dutch West-Rhine river project, with participation from the start of all Dutch water authorities in the West-Rhine region, illustrates how the various main transport routes and their various scales can be viewed in an integrated way. This results in a clear insight in parameters, various levels of scale and transport routes across the borders. With this information the gap between actual and desired status can be assessed and the effectiveness of a joint package of measures can be identified.

The UNECE programme of pilot projects on adaptation to climate change in transboundary basins aims to support countries in cooperation on adaptation to climate change in transboundary basins, in assessing jointly climate change impacts and developing basin-wide adaptation strategies. Several of the pilot projects, some of which are implemented by other organizations, also consider ecosystems in their adaptation efforts.

Example 50: Dauria going dry

Dauria wetlands are crucial for local biodiversity. The Dauria International Protected Area was created by Mongolia, China and the Russian Federation in 1994 to protect and study the ecosystems of the region. Increasingly altered by human activities, the Argun River basin with Dalai Lake and the still relatively pristine Uldz River basin with Torey lakes are a great comparative example for a study on transboundary water management options and climate adaptation in Amur River headwaters.

The joint project led by Daursky Biosphere and WWF Russia is aiming to harmonize transboundary river protection and management in Dauria. In 2010, the project achieved the following actions:

- 1) Analysis of climate change influence on hydrology in Argun, Onon and Ulz Rivers;
- 2) Data collection on habitat and biota conditions on key watercourses and water bodies during the dry phase of the climate cycle;
- 3) Analysis of datasets on multi-year observations of wetland plant communities' succession, abundance and breeding success of water birds, etc.;
- 4) Development of an information base necessary for determining parameters of environmental flows in transboundary watercourses. Collection of most relevant case studies and methodologies from dryland rivers of the world;
- 5) Development of a monitoring system and 3 field monitoring transects established with more than 100 standard observation plots;
- 6) Establishment of an International Bird Observatory.

To continue providing services within the “Water-Energy-Food Security” nexus, nature itself depends on functioning ecological processes and species assemblages and on the flow and cycle of water beyond national boundaries. Pressures on freshwater resources are intensifying because of population growth, industrialization, migration to cities and rising prosperity.

Future growth in water demand will tighten the squeeze, especially between countries sharing a same basin. The failure to place economic value on water, the relative political weakness of Ministries of environment and water compared to Ministries that finance larger infrastructure development, the non-accordance between countries within a same basin and a misperception that water allocated to the environment is water unavailable for humans all contribute to degradation of aquatic ecosystems and their vital services.

Example 51: Development strategy for Lake Chad

Lake Chad is the second largest wetland in Africa. Some three million people from four riparian countries - Chad, Cameroon, Niger and Nigeria - are living along the lake from resources and services provided by the lake. The drought of the 1970 and 80's and, more recently, from 2008 to 2010, the opening of regional roads that favoured commercial expansion, resulted in a dual dynamic migration of farmers to the south (as in all the Sahel) and the flow of migrants from near and far West. Population densities on the edge of the Lake, 60 inhabitants/km², are unusual in the Sahel.

The lake is also encountering strong seasonal and inter-annual variations. During the last century, these changes were very pronounced. A very low level was recorded at the beginning of the century; it peaked in the 1960's, before strongly lowering again due to the Sahel drought of the 1970's. There has been a new upward trend in the past ten years.

In order to better manage resources, to avoid conflicts of uses and contribute to the development of the basin, the six lake basin States established in 1964 the Lake Chad Basin Commission (LCBC), based in N'Djamena. Experts' opinions differ on the actions and developments to make to preserve the lake, including the proposed water diversion from a tributary of the Congo River to increase inputs to Lake Chad.

The French Global Environment Facility, the GEF, the European Commission and the African Water Facility help the LCBC to contribute to the preservation of Lake Chad and of its socio-economic and environmental role for the riparian countries, through the drafting of operational proposals in accordance with the conservation of ecosystems and joint management of water resources.

Critical services from nature equate to most functions of infrastructure. Upland forests, aquifers, lakes and wetlands provide water storage, wetlands filter water, rivers provide conveyance and transportation, floodplains and wetlands lower flood peaks in downstream countries and cities, while mangroves, coral reefs and barrier islands protect coasts against storms and inundation.

With the term infrastructure defined as “the stock of facilities, services and installations needed for the functioning of a society”, nature is part of infrastructure portfolio of every country and every economy. Nature is then “green infrastructure” or “natural infrastructure” based on its capacity to complement or augment the services provided by traditional engineered infrastructure, including transboundary ones.

Natural infrastructure does not replace the need for built infrastructure or “grey infrastructure”. The multiple ecosystem services provided by natural infrastructure multiply the benefits received. In this sense, well-functioning natural infrastructure is necessary for built infrastructure to perform its functions better, to ensure projected benefits shared by countries and to increase returns on investment.

Box 19: Examples of green and grey infrastructure providing same benefits

“Green” infrastructure	Grey infrastructure	Benefit
Forests and wetlands	Water filtration facility	Clean drinking water
Forests (on slopes upstream of hydroelectric facility)	Periodic sediment dredging	Reliable power and flood control, including in downstream countries
Mangroves	Sea walls	Shoreline protection from storms
Coral reefs	Breakwaters and groins	Reduced beach erosion
Natural floodplains	Dikes, dams and canals	Flood protection downstream
Wetlands	Tertiary water treatment facility	Clean effluent from municipal or industrial processes

Natural infrastructure can be integrated into the financing and investment for grey infrastructure. This would result in mixed portfolios of engineered and natural infrastructure in river basins in which each complements the other, with results in terms of cost-effectiveness, risk and sustainable development that are closer to optimal.

Integrating values for natural infrastructure into cost-benefit analysis for infrastructure opens the possibility of optimizing infrastructure development between countries for a transboundary river basin. It is then possible to identify mixed portfolios of engineered and natural infrastructure that would best meet multiple development objectives such as hydropower generation, agricultural water supply, fisheries productivity, biodiversity conservation and climate resilience. Natural infrastructure can then be positioned effectively as a building block for the future green economy.

Example 52: Saving the Aral Sea

Understanding of realities of the current environmental and socio-economic situation in the post-soviet area made the Heads of the Central Asian States come to a decision to create an interstate body for water resources management - Interstate Commission for Water Cooperation (ICWC) in 1992. In January 1993, a meeting of the Heads of the five Central Asian States was held in Tashkent, which resulted in a decision to establish the International Fund for Saving the Aral Sea (IFAS).

The Executive Board of Directors of the Fund was established in Almaty, and the decision was made to create a permanently acting Executive Committee in Tashkent. In 1997, the Heads of States adopted a new IFAS management plan.

Activities of the Fund in the Aral Sea basin help to maintain dialogue and understanding in the region, as well as to solve many ecological and socio-economic issues. During the years of operation, IFAS and its organizations have become a platform for a negotiation process between the States and the elaboration of bilateral and multilateral documents. A number of conventions and agreements were adopted for collaboration in the area of water allocation, joint management, development and protection of water resources in the region.

In December 2008, IFAS was given a status of observer at the UN General Assembly. The main goal of IFAS activities has been the promotion of further improvement of the ecological and socio-economic situation in the region to create normal conditions for the people living in the Aral Sea basin. IFAS organizations received a new impulse in their activities after the Summit of the Heads of IFAS founder-States held on 28 April 2009 in Almaty.

10 Capacity Building and Development

KEY POINTS:

- A growing matrix of uncertainties in this already complex field of transboundary basin management requires evolving capacity enhancement and development activities at a national and regional level.
- There should be a focus on educating and training a new generation of 'local water leaders' having the skills needed to tackle the challenges in this field.
- We need new and deep thinking on multidisciplinary expertise, which should include scholarly research in addition to technical training and skills enhancement.

Managing transboundary waters requires a portfolio of skills that cut across disciplines (political, economic, social and environmental) and covers a range of scales (from user level to global). In such a context the need for an ongoing and targeted capacity enhancement and development is readily evident.

This aligns with one of the key findings of a recent study, which concluded, "Effective transboundary cooperation depends upon national capacity to give effect to the obligations of international law and the agreements between riparian countries. Processes to facilitate cooperation between riparian countries must therefore involve targeted national institutional capacity building initiatives to 'level the playing field' and ensure national alignment with the prerequisites for effective transboundary cooperation." (International Architecture for Transboundary Water Resources Management 2010, Report 2010).

The importance of sufficient national capacity in addressing issues related to transboundary water resources development and management at a regional level cannot be underestimated. The 2003 World Bank Development Report confirms this approach: "to work, these agreements must reconcile interests within and between countries". This requires mobilizing concern and demands for action among the many who would gain some benefit from the agreement, but who are less vocal than the few who perceive their main interests to be at risk.

It thus requires creative ways of framing problems and solutions to increase the perceived congruence of interests within and across countries. And it often depends on strengthening the capabilities of people and organizations in the developing world to assess options, to negotiate provisions, and to finance and undertake actions".

In this context, national institutions need to have the in-house ability to identify and to address these issues, with strong linkages to local institutions and coherent management structures, including laws and regulations to cope with these challenges (at a range of scales, from local to regional). Unless national stakeholders have ownership of the regional and global agendas related to transboundary water resources management, nothing will change on the ground.

Example 53: Capacity building for transboundary water management in Africa

The project “Strengthening institutions for transboundary water management in Africa” is funded by the European Union and has been implemented since 2011 by the Global Water Partnership (GWP). Its specific objectives are to:

- strengthen the African Network of Basin Organizations (ANBO) as a pillar of the development of river basin organizations, as part of the African Union and the African Ministers’ Council on Water (AMCOW);
- improve transboundary water governance in Africa through ANBO platform.

The following activities are planned:

1. Institutional development of ANBO. Establishment of an information and experience sharing system;
2. Support to cooperation and regional integration for sustainable transboundary water management in collaboration with the regional economic commissions;
3. Development of IWRM action plans for basin organizations in connection with regional and national priorities;
4. Participation of ANBO in the infrastructure development programme in Africa;
5. Sustainable financing of ANBO and basin organizations.

A recent report from the SADC region (Southern Africa) highlights the following lessons learned in building national capacity in the context of transboundary water management: “Over the years, quite a few riparian countries outside the SADC region have meticulously been building institutions to enhance the efficiency and effectiveness of the management of transboundary waters. Some of the lessons that have been learned are as follows:

- trust, as reflected in data sharing and joint planning, is a hallmark of any sustainable water-sharing arrangement: building trust is a fundamental issue, which must be interwoven into any cooperative effort;
- once international institutions are in place, they are tremendously resilient over time, even between otherwise hostile riparian nations, and even as conflicts are waged over other issues;
- the creation of institutions to share the benefits of water in a basin, rather than focus on allocating the limited water resources, is proving useful in some cases (for example, in the Nile Basin and the Mekong Basin) and offers hope for the future.”
(Conflict Prevention and Peace Dividends through Cooperation on Transboundary Water Management in SADC - Achieving Peace Dividends through the Prevention of Water Conflicts (2011).

According to UNDP, “capacity building commonly refers to a process that supports only the initial stages of building or creating capacities and is based on an assumption that there are no existing capacities to start from”. Managing transboundary waters requires a portfolio of skills that cut across disciplines (political, economic, social and environmental) and covers a range of scales (from user level to global).

Example 54: Regional networks of basin organizations

In the same geographic region, member organizations of the International Network of Basin Organizations that wish so, can create “Regional Networks” among them, especially to mutually strengthen their capabilities. The following map describes the regional networks created to date.



For example, organizations in charge of “River Basin Districts” have established the EUROPE-INBO group for the implementation of the Water Framework Directive (WFD), for exchanging their practical experiences, identifying operational problems and making concrete proposals for the implementation of the WFD.

In such a context the need for an ongoing and targeted capacity enhancement and development is readily evident. The many who would gain some benefit from the agreement, but who are less vocal than the few who perceive their main interests to be at risk, should be the target. It thus requires creative ways of framing problems.

Example 55: IHP-HELP Centre for Water Law Policy and Science

The IHP-HELP Centre for Water Law Policy and Science, which was created in 2006 under the auspices of UNESCO, is located within the Postgraduate School of Management and Policy at the University of Dundee, UK. It is the first UNESCO “category II” centre to be established in the UK. The Centre works with stakeholders both within Scotland and throughout the world.

The Centre is a world leader in its field and works to find new ways of effectively integrating law, policy and science to address water challenges of the 21st century. It undertakes a wide breadth of research and consultancy, recognizing that if water law is to effectively implement integrated water resource management and help the international community reach international development targets, three essential elements must be considered: water rights, frameworks for water allocation, and institutional mechanisms. It is especially known for the Master of Laws in Water and International Water Law Symposiums conducted each year to an international audience.

www.dundee.ac.uk/water/

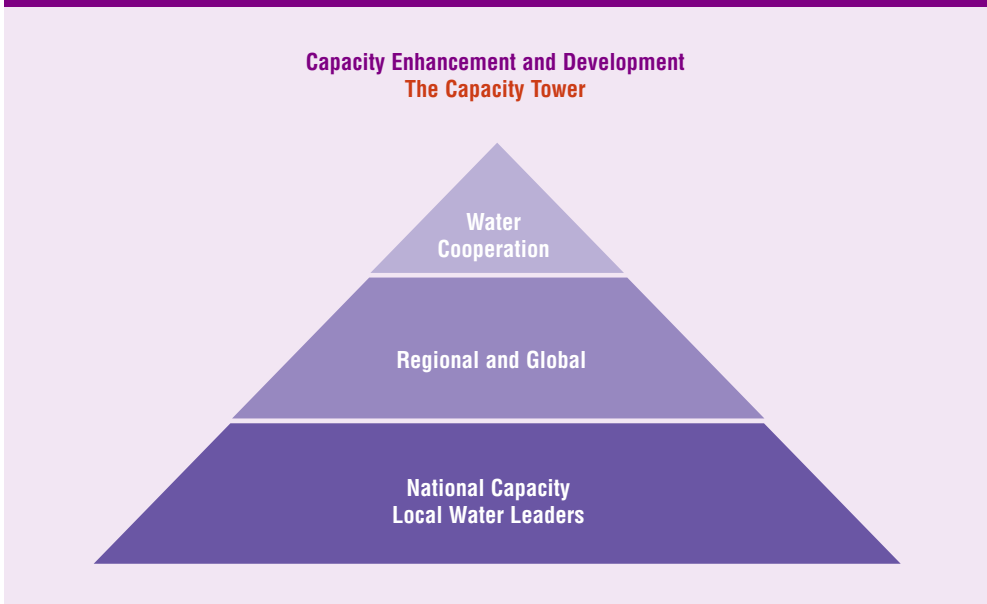
Example 56: Cap-Net

Cap-Net is an international network for capacity building in IWRM. It is made up of a partnership of autonomous international, regional and national institutions and networks committed to capacity building in the water sector. Cap-Net helps countries to build the human and institutional capacity in water management to reach the Millennium Development Goals.

www.cap-net.org

In seeking to establish regional cooperation in transboundary water resources management, a knowledge sharing and capacity enhancement programme must be a targeted and ongoing process. One leading example of this occurs across the Mediterranean, where transboundary waters are covered by a diverse portfolio of legal instruments, which the Global Water Partnership (GWP) works with, drawing together a range of stakeholders under a variety of processes.

Figure 5: Capacity tower



Example 57: Distance training - The INBO Academy

“INBO-Academy” (International Network of Basin Organizations) and CIREF (Iberian Centre for River Restoration), in coordination with ECRR (European Centre for River Restoration), join their forces to propose to basin managers a distance training programme on river restoration in Spanish. The general training programme is made up of short courses in which all aspects related to river restoration are targeted, with the objective of offering the students the possibility of obtaining the necessary knowledge to develop a good quality work in their jobs related to river restoration to achieve good ecological status of their river ecosystems and water bodies and to control floods.

All courses end up with a wrap up session and round table with all lecturers to discuss on most interesting matters, and answer to participants' questions. To attend the courses, students only need a computer connected to the Internet and a microphone. The software used in the courses is easy to use and will be explained in the first session of each course.

Distance training is an excellent way to make learning easier at low cost, since time and money usually spent in travel and accommodation are saved, without any effect on the course quality.

www.cirefluvial.com/formacion.php

Example 58: Regional Knowledge - Sharing and Capacity Enhancement across the Mediterranean

The Mediterranean is among the most arid regions in the world, with limited renewable water resources that are unequally distributed in space and time. The countries in the southern Mediterranean receive a mere 10% of the total annual average rainfall, while more than 180 million people in the region are considered water poor and an additional 60 million face water stress. Rapid demographic growth and urbanization trends, coupled with high socio-economic development, place additional pressures on scarce resources and fragile ecosystems.

Since its establishment, GWP Mediterranean has been instrumental in developing the Vision for Water in the region and the 2000 Framework Programme for Action for Water. It facilitates a multi-stakeholder regional water partnership that brings together major Mediterranean networks of different water disciplines and over 80 other organizations, institutions and companies. In addition, GWP Mediterranean actively participates in several region-wide initiatives, including the recent elaboration of the new Strategy for Water in the Mediterranean within the framework of the Union for the Mediterranean.

www.gwp.org/en/gwp-in-action/Mediterranean



11 Awareness and communication

KEY POINTS:

- Good research is not enough: we need to discuss programme priorities with stakeholders and decision makers and communicate them quickly the outcomes, according to a formulation that allows understanding and quick use in the field.
- A Knowledge Exchange Strategy is essential for success in making relevant stakeholders aware of the issues and current state of play.
- Awareness of transboundary water resources management issues must occur across a range of scales – from local users, to national, regional, international and global communities; the message and means of communicating it must be tailored to the particular community.

Despite the considerable amount of research and studies on water resources management, the effective dissemination and uptake of knowledge requires an effective Knowledge Exchange Strategy. In this regard it is essential to have an awareness and communication strategy as part of the transboundary water resource management strategy. The EU has identified the lack of effective dissemination and uptake of the significant amount of research that it has paid for under the EU framework programme.

The GWP offers a range of tools in this field, from its extensive collection of publications, including the TAC and TEC (Technical Committees) publications and the Toolbox. The GWP TEC has introduced the concept of the “Knowledge Chain” as a mechanism for connecting up the knowledge across the GWP network – an useful approach, especially in the field of transboundary water resources management, where sharing knowledge across regions is invaluable and should be actively encouraged.

Example 59: Asia-Africa Sharing of knowledge of Transboundary Water Resources Management

GWP knowledge and expertise were shared with an IUCN-Asia delegation that visited the Nile Basin Initiative Secretariat in Entebbe, Uganda, on 12 September 2011. GWP Eastern Africa presented its work on IWRM processes.

The South Asia Water Initiative and the Abu Dhabi Dialogues were presented after a speech on “Water Security: Global, regional and local challenges”. A perspective was given on transboundary issues with a history on shared waters between India and Pakistan.

“The potential for inter-regional partnerships is a hidden resource yet to be fully realized across the GWP network to support learning between river basins especially facing climate change and demographic trends in particular”.

www.gwp.org/en/gwp-in-action/Eastern-Africa/News-and-Activities-GWP-Eastern-Africa/Asia-Africa-Inter-regional-Sharing

The GWP ToolBox (www.gwptoolbox.org/) is a free and open database with a library of case studies and references that can be used by anyone who is interested in implementing better approaches for the management of water or learning more about improving water management at a local, national, regional or global level. It comprises the following elements:

Box 20: Example of Knowledge Exchange in Action: GWP Toolbox

A. The Enabling Environment

A1 Policies

A2 Legal Framework

A3 Financing and Incentive Structures

B. Institutional Roles

B1 Creating an Organizational Framework - Forms and functions

B2 Building Institutional Capacity

C Management Instruments

C1 Water resources Management

C2 Plans for IWRM

C3 Efficiency in Water Use

C4 Social Change Instruments

C5 Conflict Resolution

C6 Regulatory Instrument

C7 Economic Instruments

C8 Information Exchange

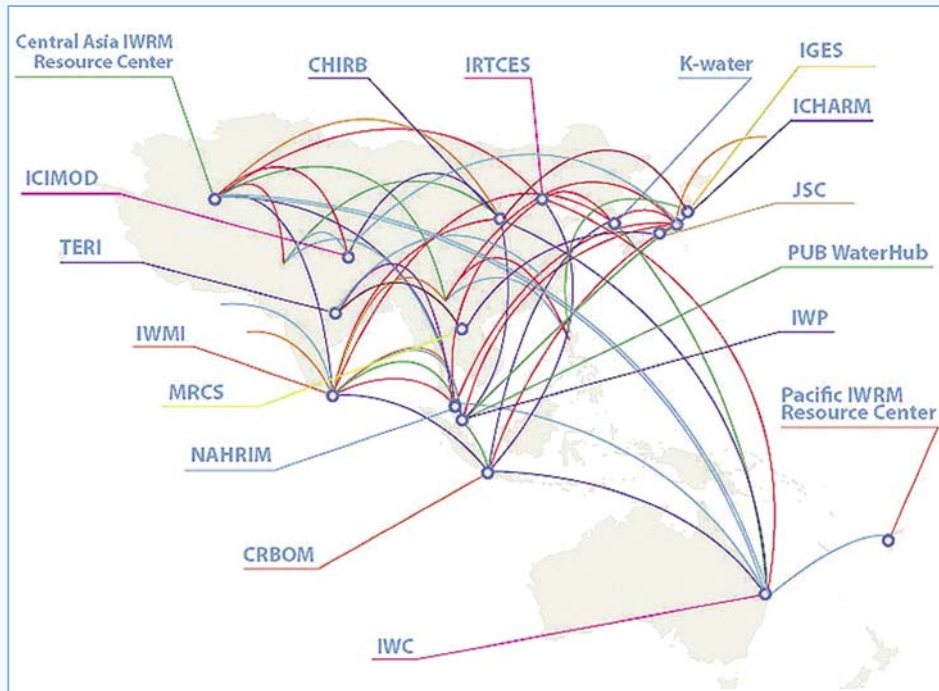
C9 Assessment Instruments

Another regional example of Knowledge-Sharing includes the Asian Development Bank-led initiative called Knowledge Hubs, which stretches across the Asia-Pacific region and is aimed at establishing and linking up regional water knowledge hubs.

Exemple 60: Knowledge Hubs as platforms for Knowledge Sharing and Capacity Enhancement

Knowledge Hub is the Asia-Pacific Water Forum's (APWF) network of regional water knowledge hubs. Knowledge Hub was launched on 26 June 2008 during the Singapore International Water Week. Each hub is a centre of excellence committed to improving water security in the Asia-Pacific region by promoting knowledge sharing and championing feasible solutions for its priority water topic. Together, the hubs collaborate to generate and share knowledge and develop capacity in more than a dozen water knowledge domains.

The Collaborative Knowledge Hubs in the Network



www.apwf-knowledgehubs.net



12 Conclusion

Integrated Water Resources Management of rivers, lakes and aquifers should be organized at the basin level, with cooperation between riparian countries. Tangible results are achieved when there is strong political will to cooperate between States and when trust and solidarity have been established. We can thus note the significant progress made since the 1990s, but others remain to be accomplished, especially with regard to shared aquifers.

Clear legal frameworks at the national and international levels should align and provide the “rules of the game” that support the sustainable application of IWRM principles. The basins, whenever possible, will be under the stewardship of functional transboundary basin organizations, with different types and names. Providing enhanced and on-going support for the creation and strengthening of transboundary water bodies (commissions, authorities, meeting of the parties and so forth) facilitates dialogue, information exchange and joint implementation of actions required for integrated management, within a context of advancing cooperation and avoiding conflict.

The transboundary water community (including all stakeholders) could agree on a shared vision for the development and management of the transboundary water resources, across a range of scales that link up and provide the basis for a medium and long-term development and management plan. Appropriate financial mechanisms should be developed, based upon some of the key principles set forth in this Handbook. In addition to planning, Basin Information Systems can assist with the implementation monitoring of legal frameworks and policies between countries.



WEBSITES, REFERENCES, FURTHER READING

Websites

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www.omvssoe.org/raob.htm

Albufeira Convention, Permanent Technical secretariat www.cadc-albufeira.org

CapNet, an international network for capacity building in IWRM www.cap-net.org

Central and Eastern Europe Network of Basin Organizations ceenbo.mobius.ro

Dundee UNESCO IHP-HELP Centre
www.dundee.ac.uk/water

Global Water Partnership www.gwp.org

GWP ToolBox www.gwptoolbox.org

International Network of Basin Organizations
www.inbonews.org

International Office for Water
www.oieau.fr/anglais/index.htm

Internationally Shared Aquifer Resources Management www.isarm.org

Latin American Network of Basin Organizations
www.ana.gov.br/relob/?lang=es and
www.rebob.org.br

Mediterranean Network of Basin Organizations
www.remoc.org

Network of Asian River Basin Organizations
www.narbo.jp

Portal of Knowledge for Water and Environmental Issues in Central Asia www.cawater-info.net

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UNESCO/water www.unesco.org/water

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Further reading

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- Asian Development Bank; November 2010 ; Policy Paper: Governance – Sound Development Management
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- INBO; 30 Sept.-4 Oct. 2000; 4th General Assembly of the International Network of Basin Organizations. Krakow - Poland
- INBO; 1-4 December 1998; 3rd General Assembly of the International Network of Basin Organizations. San Salvador de Bahia - Brazil
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Integrated Water Resources Management (IWRM) should be organized on the relevant scale of the basins of rivers, lakes and aquifers, especially when they are transboundary. But significant progress should be made to move from theory to practice and take concrete action for transboundary cooperation on water wherever necessary, regarding surface waters and groundwater as well.

To facilitate this process, the International Network of Basin Organizations (INBO), the Global Water Partnership (GWP), the United Nations Economic Commission for Europe (UNECE), the UNESCO Dundee Centre, the Global Environment Facility (GEF) and the Centre for Natural Resources Assessment

(EVREN) have joined forces to write this handbook. This document aims to provide practical advice to improve governance of freshwater resources in the context of shared water resources between countries, based on practical examples of achievements already developed in various basins.

This handbook is primarily addressed to managers of transboundary basins, water professionals and representatives of public authorities, but also to non-governmental stakeholders who are involved in actions on a transboundary basin scale. It has received financial support from the French Development Agency.

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