



United Nations  
Educational, Scientific and  
Cultural Organization



International  
Hydrological Programme  
of UNESCO

# TRANSBOUNDARY AQUIFERS: MANAGING A VITAL RESOURCE

## THE UNILC DRAFT ARTICLES ON THE LAW OF TRANSBOUNDARY AQUIFERS



Edited by Raya Marina Stephan

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# TRANSBOUNDARY AQUIFERS

## Managing a vital resource

The UNILC Draft Articles  
on the Law of Transboundary Aquifers

Edited by Raya Marina Stephan

# PREFACE

The UNESCO International Hydrological Programme (IHP) is the only intergovernmental programme of the UN system devoted entirely to water research, water resources management, education and capacity building. Originally purely scientific, the programme has since become management and policy-orientated, taking into account social, economic, institutional and cultural dimensions. The programme, tailored to the needs of Member States, is implemented in six-year phases and 2008 saw IHP's entrance into its 7th Phase (2008-2013). IHP-VII is set to be action-orientated and policy-relevant to the benefit of governments and civil society as well as the scientific community.

The IHP Programme has been dealing with the many issues related to groundwater resources since 1996. Theme 2 of IHP-VII deals in particular with one of those issues - water governance. The water crisis is primarily one of governance: institutions lack the capacity to overcome conflicting approaches in the use and allocation of water from within one basin or aquifer system – both at national and transboundary level. This lack of integration, sectoral approaches and institutional resistance all contribute to the fragmented management of freshwater sources. Yet water-related systems are interdependent and have to be managed in an integrated manner. Many solutions to water problems lie in better governance, with sharing water as one of the key challenges. In

response to this, the IHP Intergovernmental Council launched the International Shared Aquifer Resources Management (ISARM) project in 2000 to compile a world inventory of transboundary aquifers and to develop wise practices and guidance tools concerning shared groundwater resources management.

From a scientific perspective, it is hoped this brochure will contribute to a better understanding of transboundary aquifers and the importance of their role in water governance and thus the drafting of the Convention on Transboundary Aquifers. The recognition of the contribution of the UNILC draft articles towards the better management of aquifer systems is undeniable and we hope they receive the due attention of both the scientific and policy making communities.

Finally we are highly appreciative of the opportunity given by the UNILC to enable UNESCO-IHP to participate in the preparation of these draft articles. It has allowed for us to call upon our international network of hydrogeologists, brought together to render their scientific expertise suitable for the compilation of this instrumental tool. We would especially like to thank Ambassador Chusei Yamada, whose inspiration and enthusiasm for this project has never waned and on whom we have always been able to rely to facilitate our own understanding of the process involved.

Alice Aureli  
UNESCO-IHP

# Codification of the law of transboundary aquifers by the UN International Law Commission

**T**he UN International Law Commission (ILC) embarked on the codification of the law of transboundary aquifers in 2002 in order to provide legal regime for the proper management of aquifers in view of the critically important freshwater resources. UNESCO-IHP played a central role in providing the valuable assistances and support to the ILC by mobilizing hydrogeologists, aquifer administrators and water lawyers.

In a rather short period of 6 years, the ILC was able to adopt a set of 19 draft articles at its session in 2008. It sent the draft articles together with the commentaries thereto to the 63rd session (2008) of the UN General Assembly.

The UN General Assembly adopted the resolution entitled “The law of transboundary aquifers” which took note of the draft articles, encouraged the States concerned to make appropriate bilateral or regional arrangements for the proper

management of their transboundary aquifers, taking into account the provisions of these draft articles and also decided to examine the question of the final form of these draft articles in its 66th session in 2011. The texts of the draft articles and the UN resolution are reproduced in this brochure.

As the problem of aquifers is indeed an urgent global matter, it would be most desirable if the UN General Assembly would decide to transform the draft articles into a legally binding framework convention. It is my firm belief that such a decision will contribute to promote cooperative relations among the States in solving world water crisis and it is my sincere hope that the readers of this brochure would render their valuable support to this important cause.

Ambassador Chusei YAMADA  
Former Special Rapporteur on the topic  
of Shared Natural Resources of the UN  
International Law Commission

# BACKGROUND

## Importance of groundwater resources and transboundary aquifers

**W**ater is humanity's most important natural resource. The availability of, and access to, fresh water is high on the agenda of planners, politicians and executives.

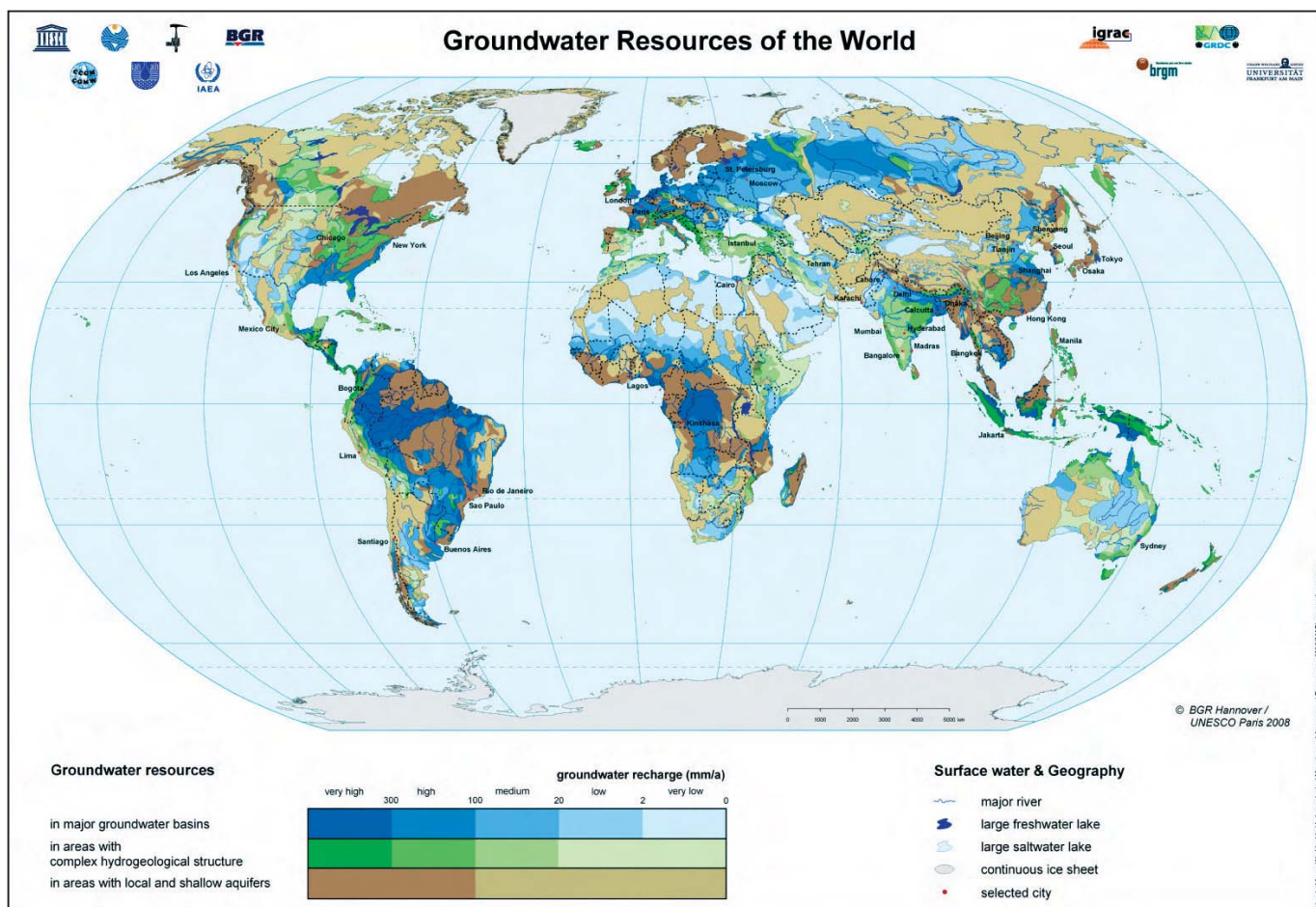
Most of all freshwater is found in aquifers, many of them transboundary. In recent decades groundwater has become a source of wealth and well-being for a society that shows an increasing need for water. Because of this any effort made to protect and wisely use aquifers will contribute greatly towards the improvement of human life and the preservation of groundwater dependent ecosystems. To define the characteristics of the world's groundwater resources, the world map (WHYMAP) was prepared (Fig.1) within the framework of the sixth phase of the UNESCO International Programme (IHP) 2002-2007.

Characteristics of the aquifers are different from those of surface water bodies. An aquifer can be defined as a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation. An aquifer system consists of a series of two or more aquifers

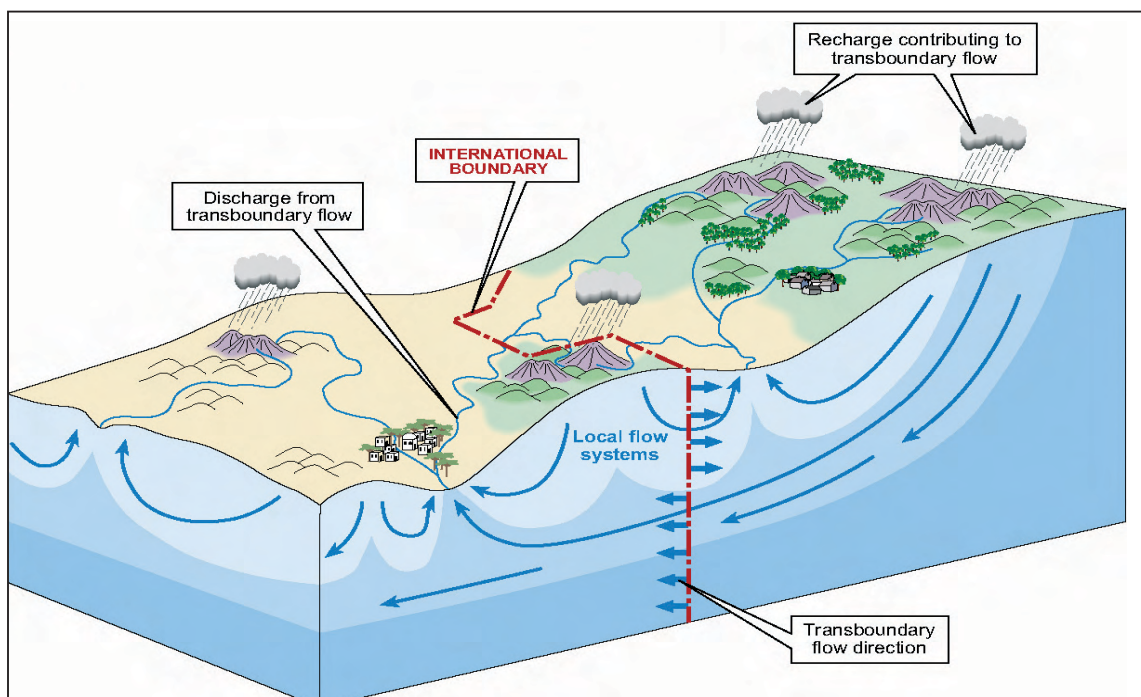
that are hydraulically connected. A transboundary aquifer or transboundary aquifer system is an aquifer or aquifer system, parts of which are situated in different States (Fig 2). An aquifer State is a State in whose territory any part of a transboundary aquifer or aquifer system is situated. As geological formations and aquifers know no political borders, international boundaries are often crossed by groundwater flow.

Currently, rising demands from population growth and food production call for larger and more reliable quantities of water on the one hand. While on the other hand declining resources due to pollution, over-pumping and climate changes are reducing useable water resources per capita.

Groundwater is often the primary source for water supplies. It supports agriculture by providing large quantities of water for irrigation purposes, especially in regions where the climate is dry and crop production without irrigation is simply not feasible. The development of groundwater has provided great socio-economic benefits. Globally, groundwater is estimated to provide about 50% of current drinking water supplies.



**Fig.1** Groundwater Resources of the World (WHYMAP, 2008)



**Fig. 2** Schematic diagram of a Transboundary aquifer system (PURI et al. 2001, modified, UNESCO ISARM Framework Document)



## SHARED AQUIFER RESOURCES MANAGEMENT (ISARM)

At its 14th Session, in June 2000, the Intergovernmental Council of UNESCO's International Hydrological Program (IHP) adopted a resolution to promote studies on transboundary aquifers<sup>1</sup> (considered an important source of freshwater, particularly under arid and semi-arid climatic conditions) and launched the International Shared Aquifer Resources Management Project (ISARM).

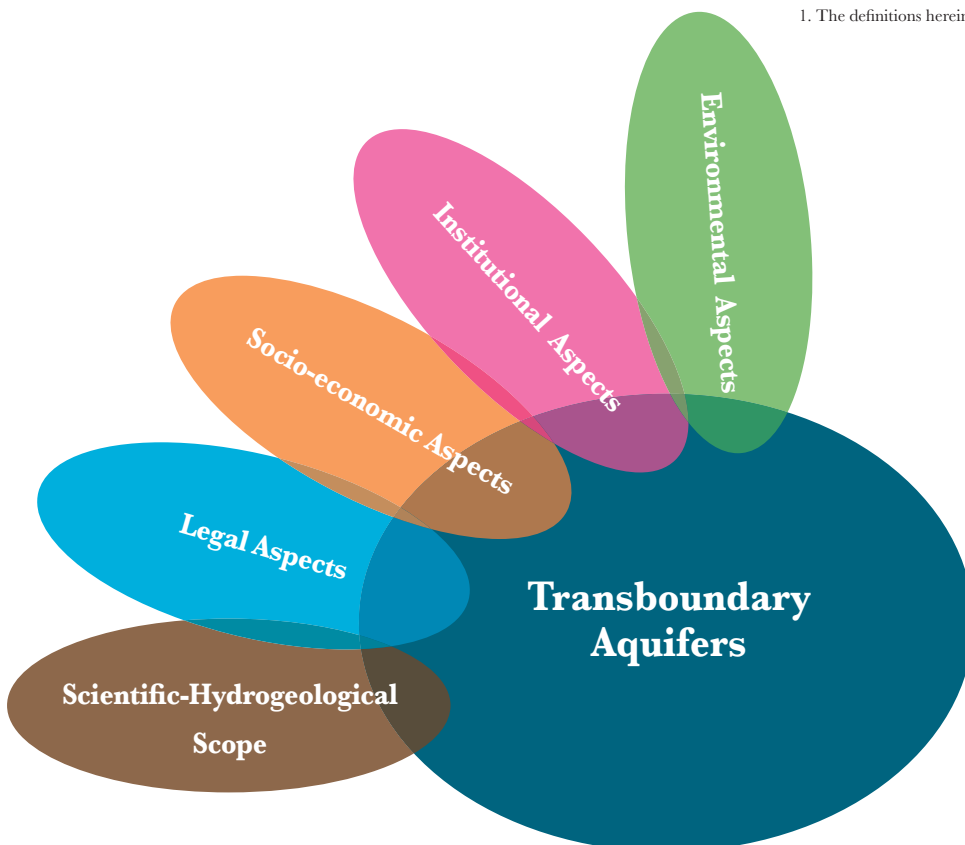
The aim of the project is to improve existing scientific knowledge and to contribute to the multifaceted efforts involved in global cooperation. The ISARM Project has identified five key focus areas for the sound development of transboundary aquifers (Fig 3). These include scientific, hydrogeological, legal, socio-economic, institutional and environmental components.

To carry out this project UNESCO established close cooperation with Member States, several United Nations organizations, international organizations and associations, as well as non-governmental organisations.

Within the framework of the ISARM component on the legal and institutional aspects, UNESCO-IHP established an international experts group to provide scientific and technical advice to the Special Rapporteur of the United Nations International Law Commission (UNILC), in the preparation of the draft articles on the law of transboundary aquifers.

ISARM is also linked to the UNESCO project From Potential Conflict to Cooperation Potential (PCCP), a further initiative that addresses the challenges of water sharing and conflict prevention.

1. The definitions herein mentioned are adopted from draft article 2 (p.17)



**Fig. 3** Focus areas of the ISARM Project, (UNESCO IHP 2001)

## REGIONAL DEVELOPMENTS

### **ISARM of the Americas**

The ISARM of the Americas Project was implemented jointly by UNESCO-IHP and the Organisation of American States (OAS).

Following the UNESCO ISARM approach, the first phase of this project involved the collection of data on both the hydrogeological characteristics of transboundary aquifers located within the continent and their use. As of January 2006 a total of 68 transboundary aquifers had been identified (Fig 4); 29 located in South America, 18 in Central America, 17 in North America and four in the Caribbean. Evaluation of the results shows that some of the largest aquifers in South America are transboundary systems.

The second phase assessed and analyzed the institutional and legal frameworks of transboundary aquifers in the region; the results of which were published in 2008. The third phase focuses on the sustainable socio-economic and environmental aspects of transboundary aquifers for which results should be published in 2009.

The establishment of a regional network of hydrogeologists is one of the most important achievements of the project and it was the close cooperation between country representatives that facilitated the preparation of the first comprehensive continental assessment of transboundary aquifers. In fact the cooperative and participative process undertaken under the ISARM of the Americas Project was critical to its success. The results of the project, providing valuable tools to decision-makers of the region, have substantially contributed to the sustainable management of these resources.

### **ISARM Africa**

As a result of the first phase of ISARM Africa (Fig 5) 38 transboundary aquifers were identified within the continent. Many countries in Africa depend almost entirely on the groundwater resources contained in these large trans-

boundary aquifer systems and these resources often represent the only source of water supply for those countries located in the arid zones of the continent. The inventory shows that one aquifer system can often be shared by three or more countries at a time.

While water scarcity in most African countries implies a serious threat to socio-economic development, at the same time many aquifer systems are under-utilized. The limited financial resources and inadequate appreciation of aquifer systems, in terms of quantity and quality, add to the current limitations of the sustainable management of these resources in Africa.

### **ISARM South Eastern Europe (SEE)**

UNESCO-IHP contributes to the strengthening of cooperation between countries in the sustainable management of transboundary groundwater resources in the SEE (South Eastern Europe) region. The ISARM SEE Project is being coordinated by the UNESCO Chair (INWEB) hosted by the Aristotle University of Thessaloniki in Greece. (Fig.6). Within this particular region, 65 transboundary aquifers have been identified.

### **ISARM Asia**

UNESCO-IHP, in collaboration with the Geological Survey of China, has undertaken the inventory of transboundary aquifers in the region. A first volume containing the preliminary results of the inventory with special emphasis on China has been published. Twelve transboundary aquifer systems have been identified and appear in the map (Fig 7).

### **ISARM Europe**

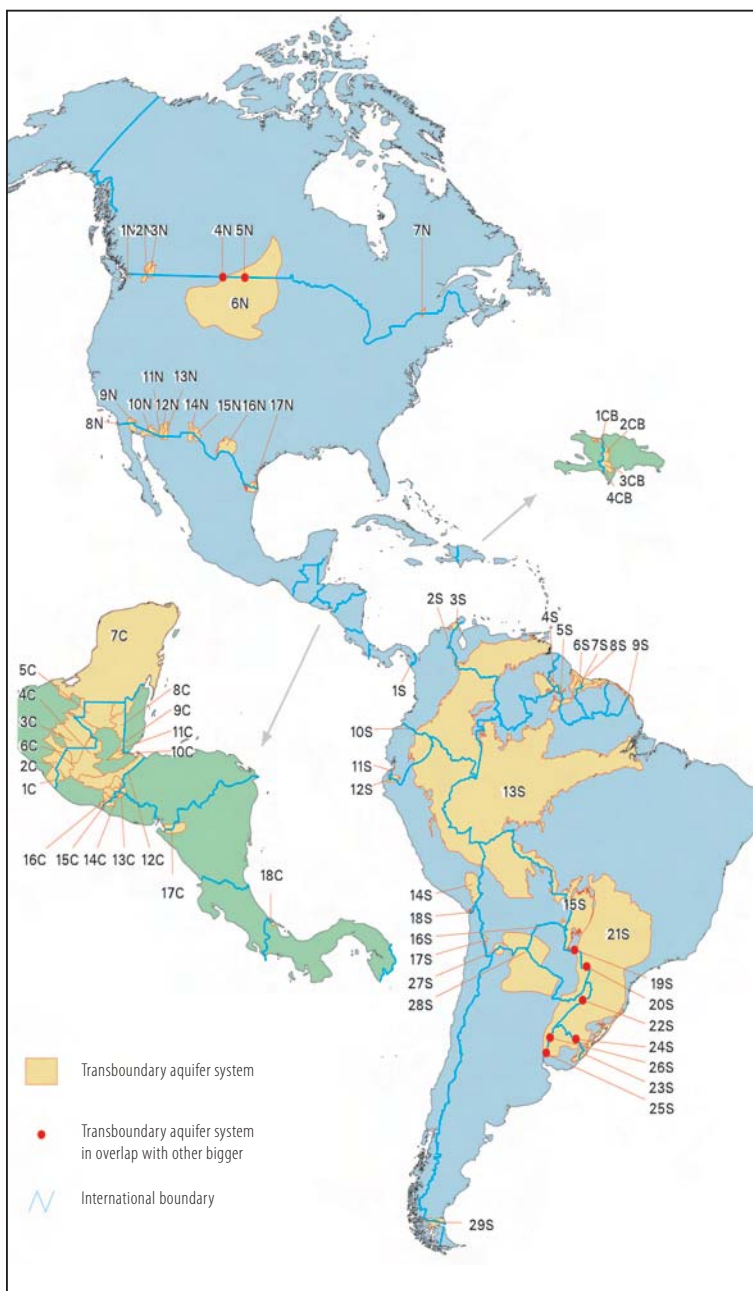
ISARM has established cooperation with the United Nations Economic Commission for Europe (UNECE), whose Groundwater Group deals with aquifers in Europe. UNECE is in charge of follow up to the Convention on the Protection and Use of Transboundary Water-

courses and International Lakes (1992) (Water Convention) under which it has produced not only an important inventory of transboundary waters in Europe (Fig 8), but also guidelines on the monitoring and assessment of transboundary aquifers. Results show that more than 90 transboundary aquifers have been identified.

The UNECE activity aims to inform, guide and stimulate further action by Parties and non-Parties to the Convention, river basin organiza-

tions, international organizations and relevant non-governmental organizations.

The UNECE assessment describes the hydrological process of these water bodies, the transboundary impact, as well as trends, future developments and management measures foreseen for the future. This assessment highlights the achievements of over ten years work under the Water Convention aimed at preventing, controlling and reducing transboundary impacts.



**America del Norte/North America**

No.	Name	No.	Name
1N	Abbstoford-Sumas	10N	Sonoyta-Papagos
2N	Okanagan-Osoyoos	11N	Nogales
3N	Grand Forks	12N	Santa Cruz
4N	Poplar	13N	San Pedro
5N	Estevan	14N	Conejos Medanos-Bolsón de la Mesilla
6N	Cambrian - Ordovician	15N	Bolsón del Hueco-Valle de Juárez
7N	Chateauguay	16N	Edwards-Trinity-El Burro
8N	Tijuana-San Diego	17N	Cuenca Baja del Río Bravo/ Grande
9N	Cuenca Baja del Río Colorado		

**Caribe/Caribbean**

1CB	Masacre	3CB	Los Lagos
2CB	Artibonito	4CB	Pedernales

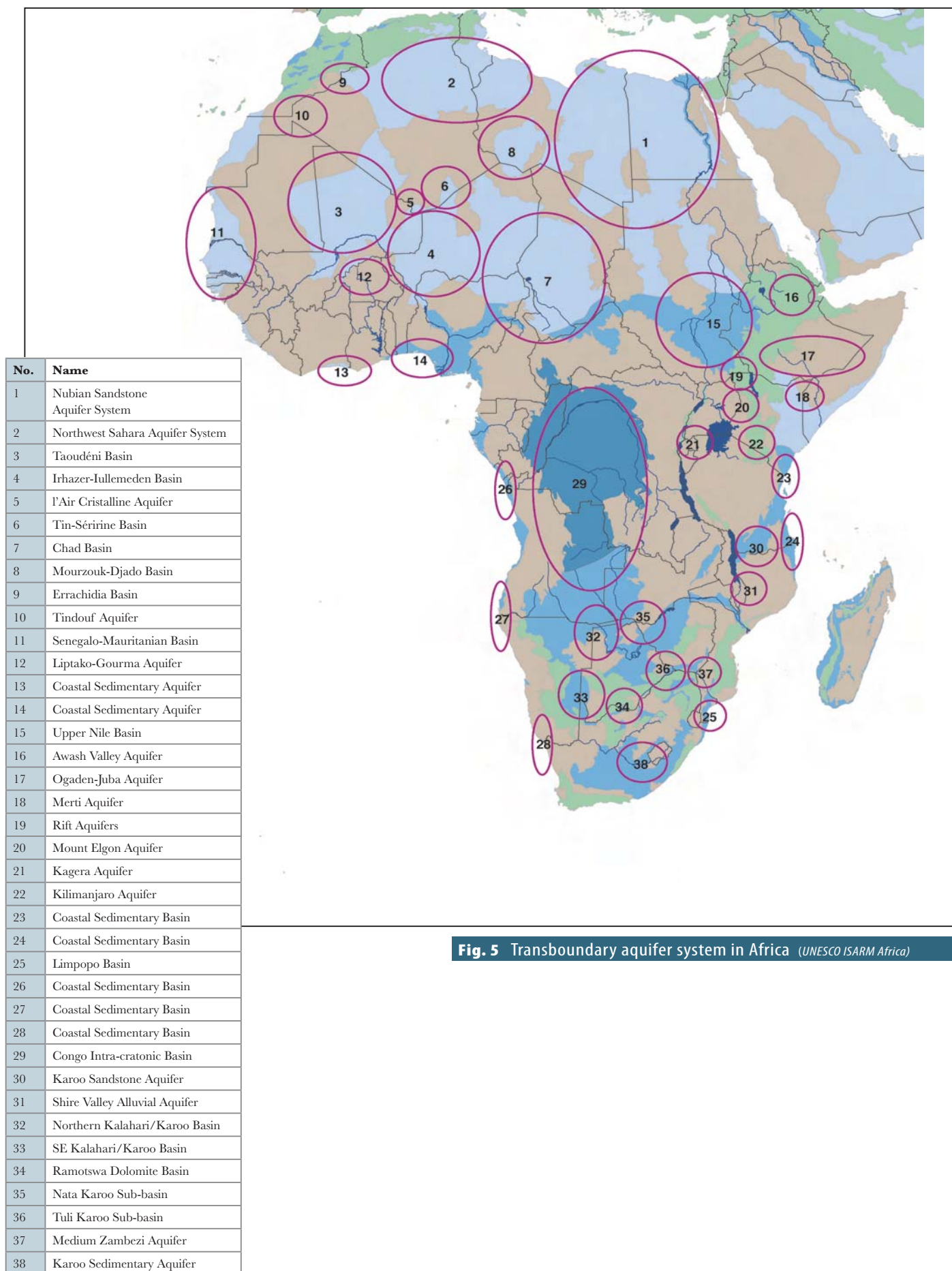
**America Central/Central America**

1C	Soconusco-Suchiate-Coatan	10C	Sarstun
2C	Chicomuselo-Cuilco-Selegua	11C	Temash
3C	Ocosingo-Usamacinta-Pojom-Ixcan	12C	Motagua
4C	Marques de Comillas-Chixoy-Xaclbal	13C	Chiquimula-Copan Ruinas
5C	Boca del Cerro-San Pedro	14C	Esquipulas-Ocotepeque-Citala
6C	La Trinitaria-Nenton	15C	Ostua-Metapan
7C	Península de Yucatan-Candelaria-Hondo	16C	Rio Paz
8C	Mopan-Belice	17C	Estero Real-Río Negro
9C	Pucila-Moho	18C	Sixaola

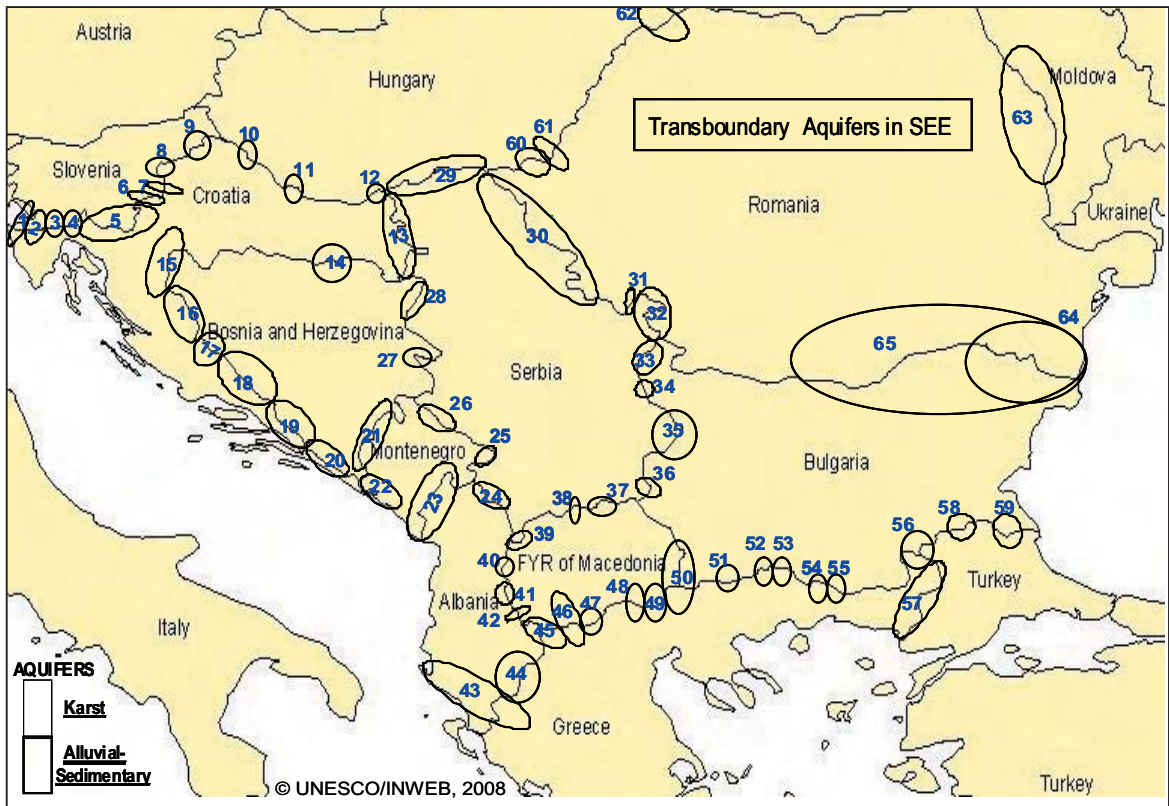
**America del Sur/South America**

1S	El Choco-Darién	16S	Agua Dulce
2S	Tachira-Pamplonita	17S	Ollague-Pastos Grandes
3S	Guajira	18S	Concordia - Escritos-Caplina
4S	Grupo Roraima	19S	Aquidauana-Aquidaban
5S	Boa Vista-Serra do Tucano-North Savanna	20S	Caiua-Bauru-Acaray
6S	Zanderji	21S	Guarani
7S	Coesewijne	22S	Serra Geral
8S	A-sand	23S	Litoraneo-Chuy
9S	Costeiro	24S	Permo-carbonífero
10S	Tulcan-Ipiales	25S	Litoral-cretácico
11S	Zarumilla	26S	Salto-Salto Chico
12S	Puyango-Tumbes-Chira-Catamayo	27S	Puneños
13S	Amazonas	28S	Yrenda-Toba -Tarijeno
14S	Titicaca	29S	El Cóndor-Cañadon del Cóndor
15S	Pantanal		

**Fig. 4** Transboundary aquifer system in the Americas (ISARM Americas)

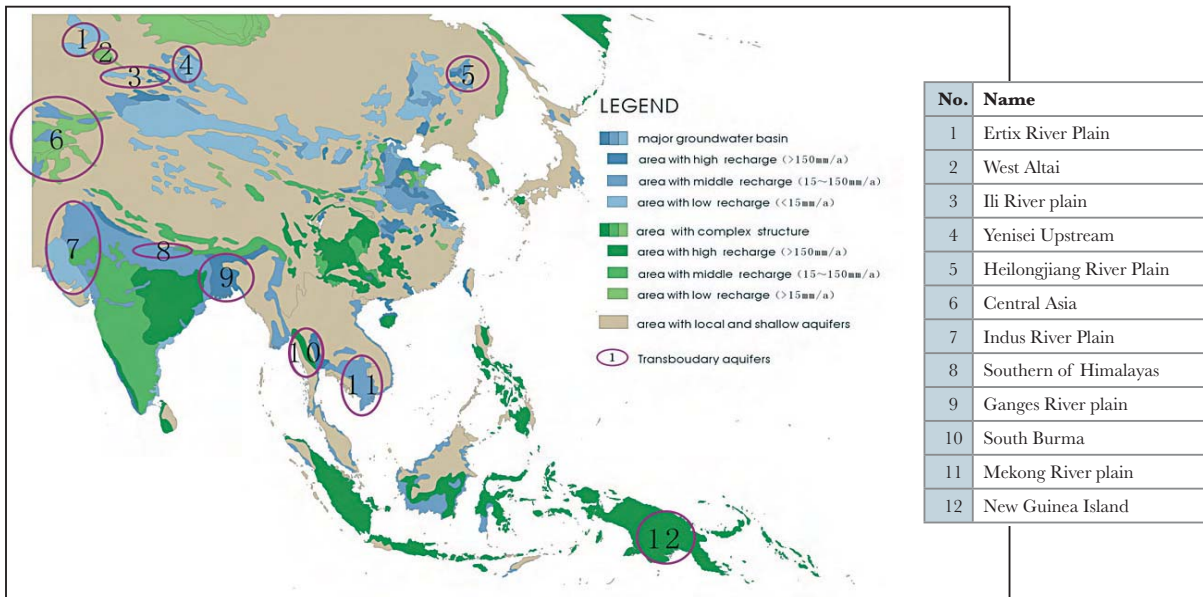


**Fig. 5** Transboundary aquifer system in Africa (UNESCO ISARM Africa)

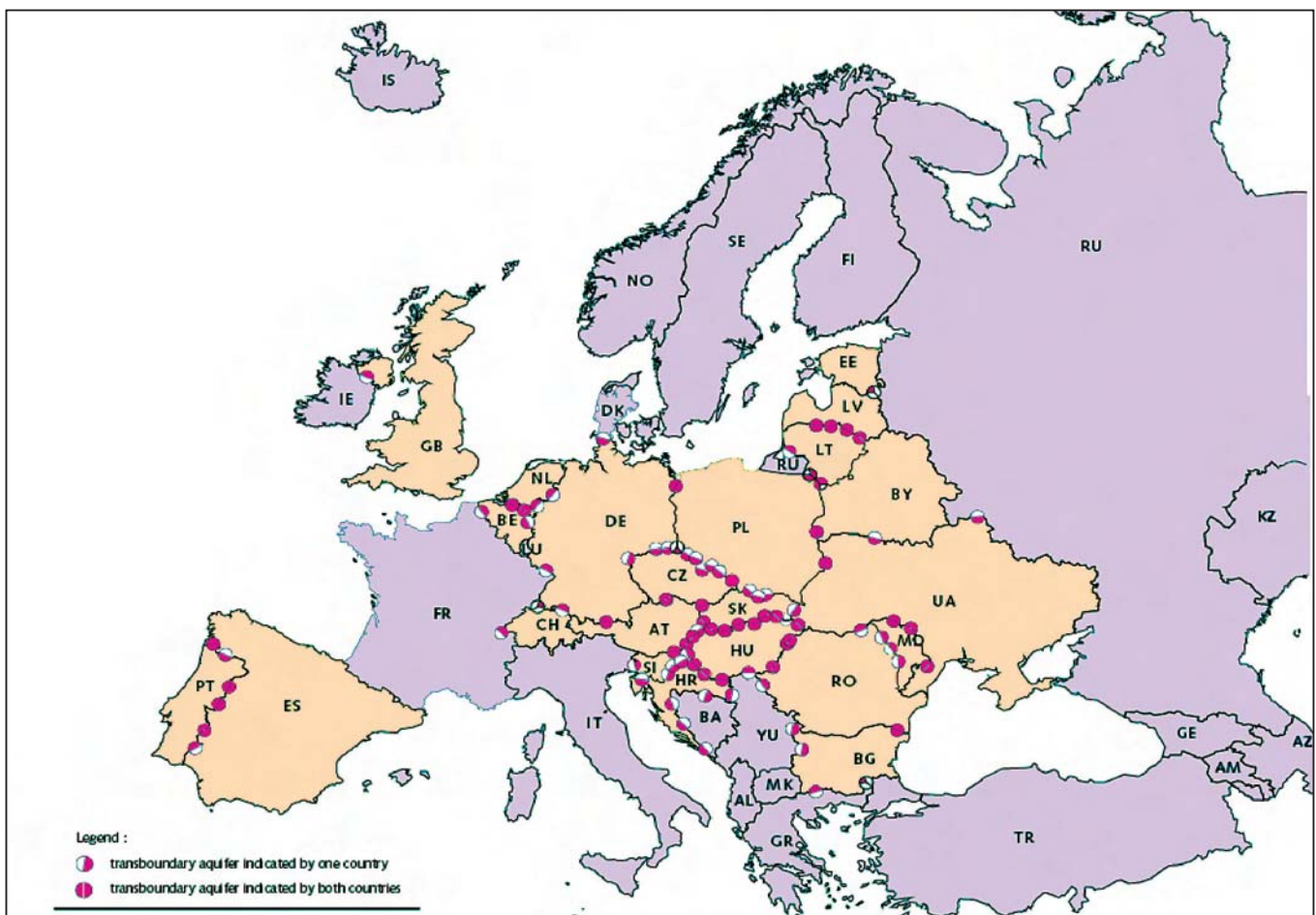


**Fig. 6** Transboundary aquifer systems in South Eastern Europe (SEE) (UNESCO INWEB)

No.	Name	No.	Name
1	Dragonja	33	Timok Alluvium/Bregovo Novo
2	Mirna-Istra	34	Stara Planina/Salasha Montana
3	Opatija	35	Nishava & Tran Karst
4	Rijeka	36	Zemen
5	Kupa	37	FYROM-SW Serbia
6	Zumberak	38	FYROM-Central Serbia
7	Sava	39	Tetovo-Gostivar
8	Sutla	40	Bistra-Stogovo
9	Drava	41	Jablanica
10	Mura	42	Ohrid Lake
11	Drava	43	Vjosa/Pogoni
12	Baranja	44	Mourgana
13	West Serbia	45	Prespes Lakes
14	Sava	46	Galicica
15	Kupa	47	Pelagonija/Florina
16	Una	48	Gevgelija/Axios-Vardar
17	Krka	49	Dojran Lake
18	Cetina	50	Sandansky-Petrich
19	Neretva	51	Gotze/Agistro
20	Dubrovnik	52	Nastan-Trigrad
21	Karst-Montenegro	53	Smolyan
22	Dinaric Karst West Coast	54	Rudozem
23	Dinaric Karst East Coast/Skadar Lake	55	Erma Reka
24	Beli Drim	56	Svilegrad/Orestiada
25	Metohija	57	Evros/Meric
26	Lim	58	Topolovgrad Karst Waterbearing Massif
27	Tara Massif	59	Malko Tarnovo Karst Waterbearing Massif
28	Macva-Semberija	60	Upper Pleistocenesomes Alluvial Fan
29	Backa	61	Lower Pleistocene Mures Alluvial Fan
30	Banat	62	Lower Pleistocene Somes Alluvial Fan
31	Miroc & Golubac	63	Middle Sarmatian Pontian
32	Dacian Basin		



**Fig. 7** Transboundary aquifers in Asia (ISARM / Geological Survey of China)



**Fig. 8** European transboundary aquifers (UNECE)

# CHALLENGES

## Groundwater vulnerability to contamination and over-exploitation

Groundwater contained in aquifers is an important component of the earth's hydrological cycle. In nature groundwater sustains ecosystems, spring discharge, river base-flow, as well as many lakes and wetlands. In many regions, especially where surface waters are scarce, groundwater is often the most accessible, cheapest and most reliable freshwater resource. It is a key resource for urban and rural supply. The utilization of aquifers provides significant social benefit to many regions. In the last half century aquifer utilization has contributed towards the alleviation of poverty, the fight against malnutrition and famine and the improvement of public health conditions. Consequently the intensive utilization of aquifers has become common in many areas of the world, especially in semi-arid and arid areas as well as in small islands and coastal zones.

It is clear that benefits resulting from the withdrawal of groundwater resources from aquifers have been significant, this includes a more reliable water supply and increased food security through the use of irrigation. Nevertheless, aquifers can be vulnerable to different degrees to impacts resulting from human activities. While on the whole aquifer systems, due to their partial isolation from surface impacts, contain water of excellent quality, they can be affected by poor management. Thus they can become contaminated as result of industrial and agricultural activities.

Large and uncontrolled groundwater extraction from aquifers may induce certain negative side effects, such as a reduction in spring discharge and the availability of aquifer storage, deterioration of dependent ecosystems, of water quality and even land surface subsidence. These effects may appear some time after groundwater development has begun, from a matter of months to many years.

The consequences of such intensive aquifer use should be made known and evaluated. However this requires monitoring as well as the execution of inventories and adequate studies. Aquifers may be developed in a sustainable manner if their utilization is adequately planned as part of a national integrated water resource development scheme. Adequate planning and governance are essential prerequisites for the sustainable management of transboundary aquifers. The fact the term transboundary aquifers implies a natural movement of groundwater flow across national boundaries provides a strong enough reason to encourage improved study into the characteristics of aquifers. Also, to carry out adequate assessment and monitoring of the resources available on each side of the border in order to avoid any unintentional impacts to either of the countries concerned. Moreover, close cooperation between riparian countries is an essential factor in the management of transboundary aquifers.

Despite an increased dependency on groundwater resources, transboundary aquifers have received, until recently, little attention in international law. While regulations for transboundary surface waters are quite well developed, this is not the case for transboundary aquifers.

The UN Convention on the Law of Non-Navigational Uses of International Watercourses (1997) (UN Doc. A/RES/51/229) (known as the UN Watercourse Convention) represents the latest authority in international water law. It includes groundwater in its coverage but in a very limited way. In article 2 on the 'Use of terms', the Convention defines a watercourse as "a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus" (article 2 paragraph a). An international watercourse is defined as 'a watercourse, parts of which are situated in different State'" (article 2 paragraph b). Regarding groundwater, the Watercourse Convention appears limited in its scope. It only considers groundwater when it is related to surface water, flowing to a common terminus. For instance, groundwater unrelated to surface water is excluded. This leaves out important transboundary aquifer systems located in different regions of the world, containing large amounts of freshwater resources. On the other hand, groundwater and surface water, even when they are related, do not necessarily "share" a common terminus. In reality, surface water and groundwater do not always flow to a common terminus.

As a result, transboundary aquifers receive limited coverage in international law. Furthermore, the provisions are tailored for a surface water body and do not cover the specific hydrogeological characteristics of aquifers.

State practice over transboundary aquifers is also evolving. Agreements on transboundary

aquifers have appeared in recent years. For example, the riparian countries (Chad, Egypt, Libya and Sudan) of the Nubian Sandstone Aquifer System have established a joint authority among them. The agreement was first signed in July 1992 between Egypt and Libya and Sudan and Chad joined later. Amongst other things, the Authority is responsible for collecting and renewing data, conducting studies, formulating plans and programmes for water resources development and utilization, implementing common groundwater management policies, training technical personnel, rationing the aquifer waters and studying the environmental aspects of water resources development. Similarly, an institutional mechanism was established among the three States of the North Western Sahara Aquifer System. The structure of the mechanism includes a steering committee composed of the respective national water authorities in the three countries concerned, a coordination unit hosted by the Observatoire du Sahara et du Sahel, and an ad hoc scientific committee for evaluation and orientation, of which UNESCO-IHP is a member. The mechanism is in charge of managing the tools developed for the system (a common data base and a model) and the exchange of information, the establishment of monitoring indicators and promoting studies.

In Africa, as in other regions of the world, cooperation on transboundary aquifers is developing, and is now an important component of the Global Environment Facility International Waters (GEF IW) Portfolio. The GEF projects have played a pivotal role in developing a methodology for conducting transboundary diagnostic analysis (TDA). In order to improve existing knowledge of transboundary aquifers systems close cooperation has been established between the UNESCO ISARM and the GEF IW projects.



## THE NEED FOR PROPER REGULATIONS FOR THE MANAGEMENT OF TRANSBOUNDARY AQUIFERS

### TRANSBOUNDARY AQUIFER MANAGEMENT

Within the framework of the UNESCO ISARM programme, water experts have expressed their understanding of the need for legal and institutional tools to manage transboundary aquifers. This appears increasingly more evident and as a result several cooperation projects on transboundary aquifers including a legal and institutional component have been successfully introduced, providing sound recommendations for coordinated actions and planning. This is the case with the GEF project concerning the Iullemeden Aquifer System, where the three countries concerned, Niger, Nigeria and Mali, agreed to create a consultative mechanism (2006).

Another example is the interregional project developed by UN ESCWA (Economic Commission for Western Asia) in cooperation with UNESCO-IHP on “Capacity building for the sustainable utilization, management and protection of internationally shared groundwater in the Mediterranean region” (2006-2008). The project is aimed at strengthening the capacity of water management institutions in the Mediterranean region in order to implement sustainable forms of utilization, management and protection of shared groundwater resources. As the projects have progressed, strong recommendations have been expressed by the participating experts for legal tools to be developed.

## EVOLUTION: UNILC DRAFT ARTICLES

With growing pressure placed on groundwaters in general, and on transboundary aquifers in particular, plus, given their importance for the planet as a whole, there is a need and a demand for a regulatory framework developing cooperation and joint management of this precious resource. New questions are being raised in the international arena concerning the use and protection of transboundary groundwater resources. These questions have been addressed in the draft articles on the law of transboundary aquifers. A UN General Assembly Resolution

(A/RES/63/124) was adopted in December 2008, including the draft articles as an annex and encouraging States sharing an aquifer to consider them when entering an agreement for the proper management of the underground resource.

The Resolution constitutes a step forward in the progress of international water law on transboundary aquifers and represents a reference for States, as well as for water experts and managers. The text of the Resolution is reproduced in the following pages.



## RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the Sixth Committee (A/63/439)]

### **63/124. The law of transboundary aquifers**

*The General Assembly,*

*Having considered* chapter IV of the report of the International Law Commission on the work of its sixtieth session,<sup>1</sup> which contains the draft articles on the law of transboundary aquifers,

*Noting* that the Commission decided to recommend to the General Assembly (a) to take note of the draft articles on the law of transboundary aquifers in a resolution, and to annex the articles to the resolution; (b) to recommend to States concerned to make appropriate bilateral or regional arrangements for the proper management of their transboundary aquifers on the basis of the principles enunciated in the articles; and (c) to also consider, at a later stage, and in view of the importance of the topic, the elaboration of a convention on the basis of the draft articles,<sup>2</sup>

*Emphasizing* the continuing importance of the codification and progressive development of international law, as referred to in Article 13, paragraph 1 (a), of the Charter of the United Nations,

*Noting* that the subject of the law of transboundary aquifers is of major importance in the relations of States,

Taking note of the comments of Governments and the discussion in the Sixth Committee at the sixty-third session of the General Assembly on this topic,

1. *Welcomes* the conclusion of the work of the International Law Commission on the law of transboundary aquifers and its adoption of the draft articles and a detailed commentary on the subject;
2. *Expresses its appreciation* to the Commission for its continuing contribution to the codification and progressive development of international law;
3. *Also expresses its appreciation* to the International Hydrological Programme of the United Nations Educational, Scientific and Cultural Organization and to other relevant organizations for the valuable scientific and technical assistance rendered to the International Law Commission;<sup>3</sup>
4. *Takes note* of the draft articles on the law of transboundary aquifers, presented by the Commission, the text of which is annexed to the present resolution, and commends them to the attention of Governments without prejudice to the question of their future adoption or other appropriate action;
5. *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 these draft articles;
6. *Decides* to include in the provisional agenda of its sixty-sixth session an item entitled "The law of transboundary aquifers" with a view to examining, inter alia, the question of the form that might be given to the draft articles.

<sup>1</sup> Official Records of the General Assembly, Sixty-third Session, Supplement No. 10 (A/63/10).

<sup>2</sup> Ibid., para. 49.

<sup>3</sup> Ibid., para. 51.

# ANNEX

## THE LAW OF TRANSBOUNDARY AQUIFERS

*Conscious* of the importance for humankind of life-supporting groundwater resources in all regions of the world,

*Bearing in mind* Article 13, paragraph 1 (a), of the Charter of the United Nations, which provides that the General Assembly shall initiate studies and make recommendations for the purpose of encouraging the progressive development of international law and its codification,

*Recalling* General Assembly resolution 1803 (XVII) of 14 December 1962 on permanent sovereignty over natural resources,

*Reaffirming* the principles and recommendations adopted by the United Nations Conference on Environment and Development of 1992 in the Rio Declaration on Environment and Development<sup>4</sup> and Agenda 21,<sup>5</sup>

*Taking into account* increasing demands for freshwater and the need to protect groundwater resources,

*Mindful* of the particular problems posed by the vulnerability of aquifers to pollution,

*Convinced* of the need to ensure the development, utilization, conservation, management and protection of groundwater resources in the context of the promotion of the optimal and sustainable development of water resources for present and future generations,

*Affirming* the importance of international cooperation and good-neighbourliness in this field,

*Emphasizing* the need to take into account the special situation of developing countries,

*Recognizing* the necessity to promote international cooperation,

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<sup>4</sup> *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992*, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

<sup>5</sup> *Ibid.*, annex II.

# PART I

## INTRODUCTION

### ARTICLE 1

#### Scope

**The present draft articles apply to:**

- (a) utilization of transboundary aquifers or aquifer systems;
- (b) other activities that have or are likely to have an impact upon such aquifers or aquifer systems; and
- (c) measures for the protection, preservation and management of such aquifers or aquifer systems.

### ARTICLE 2

#### Use of terms

For the purposes of the present draft articles:

- (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 and aquifer systems” includes extraction of water, heat and minerals, and storage and disposal of any substance;
- (f) “recharging aquifer” means an aquifer that receives a non-negligible amount of contemporary water recharge;
- (g) “recharge zone” means the zone which contributes 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.

## Part II

### GENERAL PRINCIPLES

#### ARTICLE 3

##### **Sovereignty of aquifer States**

Each aquifer State has sovereignty over the portion of a transboundary aquifer or aquifer system located within its territory. It shall exercise its sovereignty in accordance with international law and the present draft articles.

#### ARTICLE 4

##### **Equitable and reasonable utilization**

Aquifer States shall utilize transboundary aquifers or aquifer systems according to the principle of equitable and reasonable utilization, as follows:

- (a) they shall utilize transboundary aquifers or aquifer systems in a manner that is consistent with the equitable and reasonable accrual of benefits therefrom to the aquifer States concerned;
- (b) they shall aim at maximizing the long-term benefits derived from the use of water contained therein;
- (c) they shall establish individually or jointly a comprehensive utilization plan, taking into account present and future needs of, and alternative water sources for, the aquifer States; and
- (d) they shall not utilize a recharging transboundary aquifer or aquifer system at a level that would prevent continuance of its effective functioning.

#### ARTICLE 5

##### **Factors relevant to equitable and reasonable utilization**

1. Utilization of a transboundary aquifer or aquifer system in an equitable and reasonable manner within the meaning of draft article 4 requires taking into account all relevant factors, including:

- (a) the population dependent on the aquifer or aquifer system in each aquifer State;
- (b) the social, economic and other needs, present and future, of the aquifer States concerned;
- (c) the natural characteristics of the aquifer or aquifer system;
- (d) the contribution to the formation and recharge of the aquifer or aquifer system;
- (e) the existing and potential utilization of the aquifer or aquifer system;
- (f) the actual and potential effects of the utilization of the aquifer or aquifer system in one aquifer State on other aquifer States concerned;
- (g) the availability of alternatives to a particular existing and planned utilization of the aquifer or aquifer system;
- (h) the development, protection and conservation of the aquifer or aquifer system and the costs of measures to be taken to that effect;
- (i) the role of the aquifer or aquifer system in the related ecosystem.

2. The weight to be given to each factor is to be determined by its importance with regard to a specific transboundary aquifer or aquifer system in comparison with that of other relevant factors. In determining what is equitable and reasonable utilization, all relevant factors are to be considered together and a conclusion reached on the basis of all the factors. However, in weighing different kinds of utilization of a transboundary aquifer or aquifer system, special regard shall be given to vital human needs.

## ARTICLE 6

### **Obligation not to cause significant harm**

1. Aquifer States shall, in utilizing transboundary aquifers or aquifer systems in their territories, take all appropriate measures to prevent the causing of significant harm to other aquifer States or other States in whose territory a discharge zone is located.
  
2. Aquifer States shall, in undertaking activities other than utilization of a transboundary aquifer or aquifer system that have, or are likely to have, an impact upon that transboundary aquifer or aquifer system, take all appropriate measures to prevent the causing of significant harm through that aquifer or aquifer system to other aquifer States or other States in whose territory a discharge zone is located.
  
3. Where significant harm nevertheless is caused to another aquifer State or a State in whose territory a discharge zone is located, the aquifer State whose activities causes such harm shall take, in consultation with the affected State, all appropriate response measures to eliminate or mitigate such harm, having due regard for the provisions of draft articles 4 and 5.

## ARTICLE 7

### **General obligation to cooperate**

1. Aquifer States shall cooperate on the basis of sovereign equality, territorial integrity, sustainable development, mutual benefit and good faith in order to attain equitable and reasonable utilization and appropriate protection of their transboundary aquifers or aquifer systems.
  
2. For the purpose of paragraph 1, aquifer States should establish joint mechanisms of cooperation.

## ARTICLE 8

### **Regular exchange of data and information**

1. Pursuant to draft article 7, aquifer States shall, on a regular basis, exchange readily available data and information on the condition of their transboundary aquifers or aquifer systems, in particular of a geological, hydrogeological, hydrological, meteorological and ecological nature and related to the hydrochemistry of the aquifers or aquifer systems, as well as related forecasts.
  
2. Where knowledge about the nature and extent of a transboundary aquifer or aquifer system is inadequate, aquifer States concerned shall employ their best efforts to collect and generate more complete data and information relating to such aquifer or aquifer system, taking into account current practices and standards. They shall take such action individually or jointly and, where appropriate, together with or through international organizations.
  
3. If an aquifer State is requested by another aquifer State to provide data and information relating to an aquifer or aquifer system that are not readily available, it shall employ its best efforts to comply with the request. The requested State may condition its compliance upon payment by the requesting State of the reasonable costs of collecting and, where appropriate, processing such data or information.
  
4. Aquifer States shall, where appropriate, employ their best efforts to collect and process data and information in a manner that facilitates their utilization by the other aquifer States to which such data and information are communicated.

## ARTICLE 9

### **Bilateral and regional agreements and arrangements**

For the purpose of managing a particular transboundary aquifer or aquifer system, aquifer States are encouraged to enter into bilateral or regional agreements or arrangements among themselves. Such agreements or arrangements may be entered into with respect to an entire aquifer or aquifer system or any part thereof or a particular project, programme or utilization except insofar as an agreement or arrangement adversely affects, to a significant extent, the utilization, by one or more other aquifer States of the water in that aquifer or aquifer system, without their express consent.

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# PART III

## PROTECTION, PRESERVATION AND MANAGEMENT

### ARTICLE 10

#### **Protection and preservation of ecosystems**

Aquifer States shall take all appropriate measures to protect and preserve ecosystems within, or dependent upon, their transboundary aquifers or aquifer systems, including measures to ensure that the quality and quantity of water retained in an aquifer or aquifer system, as well as that released through its discharge zones, are sufficient to protect and preserve such ecosystems.

### ARTICLE 11

#### **Recharge and discharge zones**

1. Aquifer States shall identify the recharge and discharge zones of transboundary aquifers or aquifer systems that exist within their territory. They shall take appropriate measures to prevent and minimize detrimental impacts on the recharge and discharge processes.
2. All States in whose territory a recharge or discharge zone is located, in whole or in part, and which are not aquifer States with regard to that aquifer or aquifer system, shall cooperate with the aquifer States to protect the aquifer or aquifer system and related ecosystems.

### ARTICLE 12

#### **Prevention, reduction and control of pollution**

Aquifer States shall, individually and, where appropriate, jointly, prevent, reduce and control pollution of their transboundary aquifers or aquifer systems, including through the recharge process, that may cause significant harm to other aquifer States. Aquifer States shall take a precautionary approach in view of uncertainty about the nature and extent of a transboundary aquifer or aquifer system and of its vulnerability to pollution.

## ARTICLE 13

### Monitoring

1. Aquifer States shall monitor their transboundary aquifers or aquifer systems. They shall, wherever possible, carry out these monitoring activities jointly with other aquifer States concerned and, where appropriate, in collaboration with competent international organizations. Where monitoring activities cannot be carried out jointly, the aquifer States shall exchange the monitored data among themselves.

2. Aquifer States shall use agreed or harmonized standards and methodology for monitoring their transboundary aquifers or aquifer systems. They should identify key parameters that they will monitor based on an agreed conceptual model of the aquifers or aquifer systems. These parameters should include parameters on the condition of the aquifer or aquifer system as listed in draft article 8, paragraph 1, and also on the utilization of the aquifers or aquifer systems.

## ARTICLE 14

### Management

Aquifer States shall establish and implement plans for the proper management of their transboundary aquifers or aquifer systems. They shall, at the request of any of them, enter into consultations concerning the management of a transboundary aquifer or aquifer system. A joint management mechanism shall be established, wherever appropriate.

## ARTICLE 15

### Planned activities

1. When a State has reasonable grounds for believing that a particular planned activity in its territory may affect a transboundary aquifer or aquifer system and thereby may have a significant adverse effect upon another State, it shall, as far as practicable, assess the possible effects of such activity.

2. Before a State implements or permits the implementation of planned activities which may affect a transboundary aquifer or aquifer system and thereby may have a significant adverse effect upon another State, it shall provide that State with timely notification thereof. Such notification shall be accompanied by available technical data and information, including any environmental impact assessment, in order to enable the notified State to evaluate the possible effects of the planned activities.

3. If the notifying and the notified States disagree on the possible effect of the planned activities, they shall enter into consultations and, if necessary, negotiations with a view to arriving at an equitable resolution of the situation. They may utilize an independent fact-finding body to make an impartial assessment of the effect of the planned activities.



## PART IV

### MISCELLANEOUS PROVISIONS

#### ARTICLE 16

##### **Technical cooperation with developing States**

States shall, directly or through competent international organizations, promote scientific, educational, technical, legal and other cooperation with developing States for the protection and management of transboundary aquifers or aquifer systems, including, *inter alia*:

- (a) Strengthening their capacity-building in scientific, technical and legal fields;
- (b) Facilitating their participation in relevant international programmes;
- (c) Supplying them with necessary equipment and facilities;
- (d) Enhancing their capacity to manufacture such equipment;
- (e) Providing advice on and developing facilities for research, monitoring, educational and other programmes;
- (f) Providing advice on and developing facilities for minimizing the detrimental effects of major activities affecting their transboundary aquifer or aquifer system;
- (g) Providing advice in the preparation of environmental impact assessments;
- (h) Supporting the exchange of technical knowledge and experience among developing States with a view to strengthening cooperation among them in managing the transboundary aquifer or aquifer system.

#### ARTICLE 17

##### **Emergency situations**

1. For the purpose of the present draft article, “emergency” means a situation, resulting suddenly from natural causes or from human conduct, that affects a transboundary aquifer or aquifer system and poses an imminent threat of causing serious harm to aquifer States or other States.

2. The State within whose territory the emergency originates shall:

- (a) without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations of the emergency;
- (b) in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate any harmful effect of the emergency;

3. Where an emergency poses a threat to vital human needs, aquifer States, notwithstanding draft articles 4 and 6, may take measures that are strictly necessary to meet such needs.

4. States shall provide scientific, technical, logistical and other cooperation to other States experiencing an emergency. Cooperation may include coordination of international emergency actions and communications, making available emergency response personnel, emergency response equipment and supplies, scientific and technical expertise and humanitarian assistance.

## **ARTICLE 18**

### **Protection in time of armed conflict**

Transboundary aquifers or aquifer systems and related installations, facilities and other works shall enjoy the protection accorded by the principles and rules of international law applicable in international and non-international armed conflict and shall not be used in violation of those principles and rules.

## **ARTICLE 19**

### **Data and information vital to national defence or security**

Nothing in the present draft articles obliges a State to provide data or information vital to its national defence or security. Nevertheless, that State shall cooperate in good faith with other States with a view to providing as much information as possible under the circumstances.



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