



## International water law for transboundary aquifers – a global perspective

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### **Abstract**

*Today two global conventions, the Convention on the law of the non-navigational uses of international watercourses (1997) and the Convention on the protection and use of transboundary watercourses and international lakes are part of the available international legal framework for managing transboundary water resources. In addition to these two instruments, a specific text exists for transboundary aquifers: the Draft articles on the law of transboundary aquifers, annexed to two UN General Assembly resolutions on the topic. These three instruments apply to transboundary aquifers in different ways with differences in their scope, and numerous similarities in their principles. This paper will present the rules of international water law, as they apply to transboundary aquifers following from these instruments, with a specific focus on the draft articles.*

**Keywords:** International law, transboundary aquifers, UN Watercourses Convention, UNECE Water Convention, Draft articles.

**Paper type:** Research paper

### **1. Introduction**

The international community gave little attention to transboundary aquifers until the end of the 20<sup>th</sup> century. The first global instrument of international water law is the Convention on the law of non-navigational uses of international watercourses (UNWC) (adopted on 21 May 1997 by the UN General Assembly, and in force 17 August 2014), which focuses on surface waters, and covers groundwater in a limited way, keeping out of its scope an important number of transboundary aquifers. Thirty-six States are parties to this Convention.

To fulfill the gap, the UN International Law Commission (ILC), in charge of the codification and progressive development of international law<sup>1</sup>, embarked in 2002 in a subject related to “Shared natural resources”, which included a sub-topic on “confined transboundary

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<sup>1</sup> The ILC had prepared the draft articles which became the UNWC.

groundwaters”<sup>2</sup>. It prepared a full set of draft articles on the law of transboundary aquifers (DA), which were adopted in 2008, and then deferred to the UN General Assembly (GA), as per its statute. The DA apply to all transboundary aquifers. They are the subject of four UN GA resolutions (63/124 (2008), 66/104 (2011), 68/118 (2013) and 71/150 (2016)), and annexed to two of them (63/124 (2008) and 68/118 (2013)).

A third instrument covering transboundary water resources is the Convention on the protection and use of transboundary watercourses and international lakes adopted in 1992 by the UN Economic Commission for Europe<sup>3</sup> (UNECE Water Convention). The Convention entered in force in 1996, and it counts today 43 Parties. It has a wide coverage as it applies to “any surface or ground waters which mark, cross or are located on boundaries between two or more States” (article 1§1). All shared waters; surface and ground, fall under its scope as long as they cross or are located on a boundary. It was originally a regional convention for the Member States of the UN ECE. However, since 2013, it is open to all UN Member States. Various States outside the UN ECE region have shown interest in becoming party to the Water Convention, such as Irak, Jordan, Tunisia and others. Chad and Senegal have recently ratified it.

Whereas the two Conventions represent a binding instrument for their Parties, the DA being annexed to UN GA resolutions do not have any obligatory force. However the DA represent the only international instrument on transboundary aquifers and can serve as a reference for the States whenever considering entering into cooperation or in an agreement on such an aquifer. In resolutions 63/124 and 68/118, the UN GA “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”. The resolutions of 2013 and 2016 mark an evolution as the UN GA changed its language to *commend* “to the attention of Governments the draft articles...as guidance for bilateral or regional agreements and arrangements for the proper management of transboundary aquifers”, expressing a probable intention to give the status of guidelines to the draft articles. It is interesting to note that the DA served for the preparation of the “Model provisions on transboundary groundwaters” (Model Provisions) (2014) under the UNECE Water Convention, in view of “providing concrete guidance for implementing, with regard to groundwater, the 1992 Convention”. Whereas both the DA and the Model Provisions represent guidelines regarding the development of cooperation on transboundary aquifers, the DA remain a self-standing instrument, whereas the Model Provisions need to be interpreted and implemented according to the precepts of the UNECE Water Convention.

The three instruments include principles that are part of international customary law which

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<sup>2</sup> For a summary of the discussions regarding the inclusion of groundwater in the UNWC, and the decision to add it within a new topic at the ILC, see Yamada (2003).

<sup>3</sup> The UN ECE covers Europe, North America (Canada and the United States), the Caucasus (Armenia, Azerbaijan, Georgia), Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and Western Asia (Israel), 56 States in total.

apply to all States<sup>4</sup>. In this paper, the author will concentrate on the principles applying to transboundary aquifers, deriving from these three instruments, including the Model provisions. Most of these principles are presented in another paper of this special issue, as they were first issued for surface waters. The focus here will be on their specificities regarding transboundary aquifers, and how they respond to the needs and challenges of the management of transboundary aquifers. Another aspect will be the particular principles stated for these aquifers.

## 2. On the scope

The initial sub-topic at the ILC concerned “transboundary confined groundwaters”. However, the draft articles adopted dealt with the law of “transboundary aquifers”. The shift from “confined groundwaters” to “aquifers” has represented an extension of the scope, and led to the introduction of subsequent considerations.

### 2.1. *The consideration of aquifers*

While the topic at the ILC concerned “transboundary confined groundwaters”, the Special Rapporteur decided, in his second report (Yamada 2004) to drop the word “confined” and the word “groundwaters”, and to adopt the term “aquifer”. An aquifer is 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», which means an aquifer represents not only the water, it is the container and the content. Therefore the scope of the DA extends beyond the groundwater itself. Including aquifer in its scope, rather than only groundwater, corresponds to the qualitative and quantitative management requirements of the latter, which does not react the same depending on the nature and the characteristics of the geologic formation (Stephan and De Los Cobos 2015). Subsequently, in article 2§b a watercourse is defined 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”. This definition implies that only groundwaters connected to a surface water system falls within the scope of the UNWC. The aquifer/groundwater itself does not need to cross the borders, what matters is the connection with a surface water system. However, the second part of the definition relates to “a common terminus” between the surface and groundwater systems, creating an additional condition to include groundwaters within the scope of the UNWC. In reality, there is still a lot of uncertainties on transboundary rivers and aquifers and their eventual linkages, therefore it is often difficult to determine whether an aquifer related to a river will fall under the UNWC or not an aquifer and a surface water body (river or lake) even if connected do not necessarily share the same terminus. The aquifer might discharge in a wetland or a lake, while the river flows to the sea; or the river might discharge in a lake, and the aquifer in another river. Therefore, the UNWC leaves out of its scope not only the

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<sup>4</sup> The customary character of the core principles of international water law (the equitable and reasonable use, and the no harm rule) is still debatable. Eckstein and Sindico, (2014) suggest that the obligation not to cause significant harm can be considered as customary for the customary character of these principles regarding transboundary aquifers.

transboundary unconnected aquifers, such as the non-recharging or fossil aquifers, but also all other aquifers not sharing the same terminus with the surface water body. The limited knowledge of some aquifers and of their discharge zone render this condition difficult to verify, adding an uncertainty on the possible application of the UNWC. And finally the UNECE Water Convention gives a wide definition of transboundary waters (“any surface or ground waters which mark, cross or are located on boundaries between two or more States”), ensuring thus the coverage of all groundwaters. While the UNECE Water Convention offers this wide coverage, it does not contrary to the UNWC refer to the water channel, or to the geological formation like the DA. It only concerns the waters. In the Model Provisions, the terminology used is “groundwater”, which is defined as “the water contained in a geological formation”. However the text specifies in its Introduction that “the present Model Provisions also apply to the geological formation containing the water and allowing the flow of groundwater”, without referring to the term “aquifer”, nor introducing the term in its provisions. Therefore, it is not really clear when and how the geological formation itself falls in the scope of the Model Provisions.

It seems that the DA, which were prepared with a specific focus on transboundary aquifers, acknowledge the best the needs of the proper management of groundwater, with the consideration of the aquifer as the management unit. The “quantitative and qualitative groundwater management must necessarily begin with an in-depth study of the entire aquifer system surrounding this water resource” (Stephan and De Los Cobos 2015). The Model Provisions seem also to recognize that in the case of groundwater it is necessary to consider and manage the geological formation, therefore the land use, in addition to the water. The insertion of the aquifer as the subject of the principles leads to the extension of the scope, beyond water itself. Compared to surface waters, the management of groundwater requires further consideration.

## *2.2. Beyond the aquifers*

In article 1 on Scope, the DA follow partly the example of the UNWC by mentioning that they apply to the “utilization of transboundary aquifers or aquifer systems” (article 1§a) and to “measures for the protection, preservation and management of such aquifers or aquifer systems” (article 1§c). However the DA apply in addition to “other activities that have or are likely to have an impact upon such aquifers or aquifer systems”. As mentioned in the commentary under the DA (ILC 2008), “in the case of aquifers, it is absolutely necessary to regulate such activities”. “Such activities are those that are carried out just above or close to an aquifer or aquifer system”, and which “cause or may cause some adverse effects on it”. These activities can be the use of fertilizers or pesticides in agriculture, which would infiltrate through the soil, reach the aquifer and contaminate the water. Or it could be a construction which does not consider the geology and alters the recharge process. The commentary adds that “The impact upon aquifers would include deterioration of water quality, reduction of water quantity and adverse change in the functioning of the aquifers”. The consideration in the

scope of the DA of activities not related to the use of the aquifer itself nor to its management (the protection and preservation are included in the management measures) represents another extension of the scope. In the case of aquifers, as the commentary has acknowledged, the consideration of other activities and of land use is absolutely necessary because of the possible impacts. The Model Provisions have acknowledged this requirement but not in full. Provision 1 states the obligation for the Parties “to take all appropriate measures to prevent, control and reduce any transboundary impact” in the utilization of a transboundary aquifer *and* “while undertaking any activity affecting in any way transboundary groundwaters”. As in the DA, the Model Provisions consider the possible impact on the groundwaters of an activity other than its proper utilization. However there is no mention of any potential impact on the geological formation, which could alter the functioning of the aquifer, and ultimately affect the water use. The UNWC, and the UNECE Water Convention do not include any such provision.

### **3. The principles**

The three instruments (UNWC, UNECE Water Convention and the DA) have codified the two core and customary principles of international water law: the equitable and reasonable utilisation and the no harm rule. The DA has provided a specific interpretation regarding transboundary aquifers.

In addition other considerations were introduced in the DA as specific in the sound management of a transboundary aquifer.

However the DA include also a controversial article on Sovereignty, which could be a consequence of the introduction of the aquifer, instead of groundwater, in the scope.

#### *3.1. Sovereignty*

The DA include a provision on Sovereignty (article 3), which does not have its equivalence neither in the UNWC, nor in the UNECE Water Convention. This inclusion has raised many criticism, as referring to absolute sovereignty (McCaffrey 2010 and 2011), and representing a regress in the development of international water law, though the provision expresses a limited sovereignty, reflecting nothing more than the current status of international law. Article 3 states that each aquifer State “shall exercise its sovereignty in accordance with international law and the present articles”. The current status of international law is about limited sovereignty, the doctrine of absolute sovereignty had been abandoned since a long time. And the DA have codified the principles of equitable and reasonable utilization, the no harm rule, the general obligation to cooperate, all expressing limited sovereignty.

While at first sight this inclusion could appear as a consequence of the selection of “aquifer” for the scope rather than “groundwater”, in fact it comes from the incorporation of the initial topic “confined transboundary groundwater” under the wider subject of “Shared natural resources”, which lead the States to require a reference to the UN GA Resolution 1803 (XVII) on permanent sovereignty over natural resources (1962) (Sohnle 2012, Stephan and Los Cobos 2015). Though the notion of aquifer is closely related to the land (the geological

formation) and its management requiring the consideration of land use, which has close links with the concept of sovereignty, article 3 is related to the UN GA Resolution 1803 (mentioned in the preamble).

The introduction of the concept of aquifer had other consequences on the application of the principles of international water law.

### *3.2. The core principles of international water law*

As mentioned above the three instruments have codified the core and customary principles of international water law. The DA being focused on transboundary aquifers have given them a special interpretation closely related to its topic. The Model Provisions refer also to their application to transboundary aquifers. The following developments will focus on the principles as they are codified in the DA (articles 4 and 5), their application based on the UNWC and the UNECE Water Convention being developed in another paper of this issue.

#### *3.2.1. The equitable and reasonable utilization*

According to the DA, the principle of equitable and reasonable utilization can be divided in three parts:

- The first part refers to the equitable utilization:

Article 4§a provides that aquifer States “shall utilize transboundary aquifers or aquifer systems in a manner that is consistent with the equitable and reasonable accrual of benefits therefrom...”

This paragraph implies an equality of rights on a transboundary aquifer between the riparian States, meaning each one is entitled to an equitable (not necessary equal) allocation of benefits.

- The reasonable utilization:

In article 4§b it is required that Aquifer States “aim at maximizing the long-term benefits derived from the use of water contained therein”. This provision is particularly important in the case of non-recharging aquifers; the objective being to make the best use within the longest period possible.

The reasonable utilization appears also article 4§c, which states that Aquifer States “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».

A first important element for a reasonable utilization is the “comprehensive utilization plan” representing the tool for realizing the maximization of the long term benefits. This paragraph invokes article 14 on Management which includes the obligations for each aquifer State to establish its own plan with regard to the aquifer and to implement it, and to enter into consultations with other aquifer States concerned at the request of any of them. A joint management mechanism is established if appropriate.

The second element in paragraph c is the consideration of the present and future needs, reflecting the concerns of sustainability and intergenerational equity, already mentioned in the Preamble (§7).

- The duty to protect:

The equitable and reasonable principle is about the right to use and the duty to protect the transboundary water body (surface and groundwater). Article 4§d adds that the Aquifer States “shall not utilize a recharging transboundary aquifer or aquifer system at a level that would prevent continuance of its effective functioning”. The paragraph addresses the situation of recharging aquifers. It imposes an obligation of protection, by maintaining their functioning, which is not necessary to limit the level of utilization to the level of recharge (ILC 2008). It represents a control on the utilization level of the aquifer.

This application of the equitable and reasonable utilization principle is reflected in a similar way in the Model Provisions (Provisions 1 and 2).

The principle of equitable and reasonable utilization is not self-sufficient for implementation, it is applied through the identification of relevant factors. As in the UNWC, a following article gives a non-exhaustive list of factors related to a transboundary aquifer such as the natural characteristics of the aquifer, the contribution to the formation and recharge of the aquifer, the dependent ecosystems but also the population relying on the aquifer and the social and economical, present and future, needs of the States.

### 3.2.2. *The no harm rule*

The obligation not to cause significant harm imposes on Aquifer States an obligation of due diligence or of conduct: the harm is not caused intentionally or by neglect. The harm is caused through the use of the transboundary aquifer. However reflecting on the scope of the DA, article 6§2 mentions that the harm could also be caused through “activities other than utilization of a transboundary aquifer ...that have, or are likely to have, an impact on that transboundary aquifer”. In its last paragraph, article 6 covers also the case of the harm caused to a discharge zone State, which is not considered as an aquifer State as per the definitions adopted in the DA. Following the definition of a recharge zone and a discharge zone of article 2 of the DA, “these zones are outside the aquifer although they are hydraulically connected to it” (ILC 2008). Therefore a discharge zone State is not necessary an aquifer State, if the zone is located in the other side of the border of where a transboundary aquifer is located.

### 3.3. *Other relevant management principles for transboundary aquifers*

The DA have introduced a series of principles based on the needs of the sound management of transboundary aquifers. Some of these principles are already included in the UNWC and/or in the UNECE Water Convention. However the DA had given them a special focus for transboundary aquifers.

The management of groundwater/aquifer, whether transboundary or not, faces a major challenge related to its nature. Being under the ground, groundwater and aquifers are invisible, so the knowledge factor becomes more important than for surface waters, to adopt the proper management principles and decisions.

One first principle related to this aspect is the regular exchange of data and information, which represents the first application of the general obligation to cooperate, both in the UNWC and

in the DA. They are also reflected similarly in the UNECE Water Convention. The DA adds an additional requirement on the aquifer States “to collect and generate more complete data and information” “where knowledge about the nature and extent of a transboundary aquifer or aquifer system is inadequate” (article 8§2).

Other requirements concern the protection and preservation of ecosystems. In the DA, the ecosystems concerned are those within or dependent on a transboundary aquifer. The obligation concerns the quality and the quantity of the water. Both the UNWC and the UNECE Water Convention include provisions on ecosystems without further specifications. The Model Provisions target in Provision 2 the groundwater dependent ecosystems with the obligation to preserve them. Under Provision 7, specific reference is made to their needs, in matter of (ground)water.

The recharge and discharge zones of a transboundary aquifer receive a specific protection in the DA in article 11. Aquifer States are under the obligation to prevent and minimize detrimental impacts in these zones (§1). In the second paragraph, article 11 extends its own scope to touch other States than the aquifer States, on whose territory a recharge or discharge zone is located. These States are requested to “cooperate with the aquifer States to protect the aquifer or aquifer system and related ecosystems”. This article has no equivalence in the other instruments, which does not mean that these sensitive zones in an aquifer are not considered. It is only that their protection falls under a more general obligation, such as the obligation to prevent, reduce and control, pollution in the UNWC (article 21), or transboundary impact in the UNECE Water Convention (article 3). The Model Provisions mentions the protection of the recharge zone as a vulnerable zone, under Provision 5 related to the wider obligation “to take appropriate measures to prevent, control and reduce the pollution of transboundary groundwaters”.

Monitoring is an important aspect of groundwater management, because of its invisible character. It represents in the UNECE Water Convention a primordial facet for the management of transboundary waters, either conducted by each Party (article 4) or jointly (articles 9 and 11). The Model Provisions do not include any disposition on monitoring; however in the commentaries numerous references are made to the articles in the Convention, and to the ECE Guidelines on monitoring and assessment published under the Convention. The DA adopt a step by step approach to monitoring (article 13). It is an obligation for aquifer States. The duty has to be undertaken jointly “wherever possible”, and “where appropriate, in collaboration with competent international organizations”. The DA acknowledge here the difficulty to organize and to establish monitoring systems. Developing States might need to receive assistance from international organizations, which explains the reference in article 13§1. The DA recognize also the complication to organize the monitoring jointly. When it is not the case, the aquifer States have the obligation to exchange the monitored data. In the second paragraph of article 13, the DA give details about how the aquifer States should plan the monitoring:



- Use agreed or harmonized standards and methodology
- identify key parameters based on an agreed conceptual model
- Key parameters as per article 8§1, and on the utilization of the transboundary aquifer.

The “prevention, reduction and control of pollution” are strongly codified in the three instruments. As in the article on monitoring, the DA provide that this obligation can be organized individually or jointly. It adds, focusing on the characteristics of aquifers and their vulnerabilities, that this prevention, reduction and control of pollution should also consider infiltrations through the recharge process. Another specificity about aquifers is the uncertainty about their nature, extent and fragilities which oblige the States to adopt a precautionary approach.

The DA are much less detailed on the “Planned activities” than the UNWC. They include only one article on the topic, whereas in the UNWC a whole part is dedicated to “Planned measures”. The UNECE Water Convention does not include a specific provision to such activities, however it provides for such rules in the framework of the role of the joint bodies such as consultations, joint monitoring, assessment and exchange of information (Tanzi 2015). The provision in the DA is simple and expresses the basic rules of prior notification in case of an activity which “may affect a transboundary aquifer or aquifer system » and “have a significant adverse effect upon another State” (article 15). In the Model Provisions, two obligations are combined in Provision 8 for a planned measure: to undertake an environmental impact assessment procedure (as in the UNECE Water Convention), and “to notify the other Party accordingly as early as possible” (following the DA).

And finally the DA, following the example of the UNWC, mention the establishment of “joint mechanisms” in the provision related to the “General obligation to cooperate” (article 7) and the one concerning “Management” (article 14), without more details. The ILC has considered that “The competence of such a body would be for the aquifer States concerned to determine.” (ILC 2008). On the contrary the UNECE Water Convention is more detailed regarding the joint bodies and their tasks (article 9). It provides for their establishment by an inter-state arrangement, and gives a non-exhaustive list on their tasks, such as, to collect, compile and evaluate data in order to identify pollution sources likely to cause transboundary impact; to elaborate joint monitoring programmes concerning water quality and quantity; to draw up inventories and exchange information on the pollution sources, or to elaborate emission limits for waste water and evaluate the effectiveness of control programmes. In view of the details provided in the Water Convention, the Model Provisions remain rather concise as the DA (Provision 9).

#### **4. Conclusion**

The law of transboundary aquifers has known a significant development in the last years.

While there are still very few inter-state agreements (6 in total<sup>5</sup>) on a transboundary aquifer, and some are not really effective, there are much more treaties considering conjunctively surface and groundwater. These agreements reflect the importance of the regular exchange of data, and the monitoring in the case of the cooperation on a transboundary aquifer. They also demonstrate the importance of considering the vulnerability of the transboundary aquifer or parts of it, and protecting it against any pollution or harm. Some joint bodies which were established initially for surface waters are integrating gradually groundwater such as the International Joint Commission between Canada and the USA, or the Orange-Senqu River Commission (Burchi 2018). Therefore transboundary aquifers are not totally ignored, yet there is still much to accomplish for reaching appreciable level of cooperation on these resources. The global opening of the UNECE Water Convention, and its adoption of the Model Provisions, as well as the regular (every three years) inclusion of the topic of the law of transboundary aquifers in the agenda of the 6<sup>th</sup> Committee of the UN GA keeps certainly the wide attention on this wide and vulnerable water resource, and the need of its careful management.

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These are the following:

- The Genevese aquifer (1978/2008)
- The Nubian Sandstone Aquifer System (Chad, Egypt, Libya, Sudan) (1992)
- North Western Sahara Aquifer System (Algeria, Libya, Tunisia) (2008)
- Iullemeden aquifer system (Mali, Niger, Nigeria) (2009) (which was never in force), being replaced by the Protocol on Iullemeden/Taoudeni-Tanezrouft aquifer system (Algérie, Benin, Burkina Faso, Mali, Mauritanie, Niger et Nigeria) (2014) (still under signature by the Parties)
- Guarani Aquifer System (Argentina, Brazil, Paraguay, Uruguay) (2010)
- Al-Saq/Disi (2015) (Jordan, Saudi-Arabia)

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