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PRINCIPLES OF INTERNATIONAL WATER LAW AND THEIR ADEQUACY FOR INTERNATIONAL GROUNDWATER

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Principles of International Water Law and their Adequacy for International Groundwater

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I. Introduction

International waterlaw is a fairly well developed field of international law; not so international groundwater law. The latter has received considerably less attention. Shared aquifers have rarely been the subject of case law or specific agreements and international legal rules have only seldom specifically addressed shared groundwater resources. Therefore, international groundwater law is still in its infancy and fragmented.

The neglect of groundwater is due to a number of reasons: Part of the difficulty of developing legal rules is due to the complex nature of aquifers. Little is known about their characteristics in comparison to surface water. Any attempt to develop rules for aquifers poses interdisciplinary problems as hydrogeologists and lawyers do not necessarily share the same technical vocabulary and lawyers have difficulties in understanding physical and chemical processes that are essentially unseen. Furthermore, States are less inclined to develop rules for aquifers. Groundwater is water in the ground and the ground has traditionally been perceived as to fall within the scope of the exclusive sovereignty of the territorial state. While the "sharedness" of the resource is obvious in the case of a body of surface water, it is "invisible" in the case of an aquifer. While the limitation of sovereignty with regard to shared surface water are undisputed and part of customary international law they are by far less accepted when it comes to groundwater. This, in addition to the many factual uncertainties that exist with respect to shared aquifers, has made states until now far less inclined to bring groundwaters within the scope of international law.

Those few international instruments that comprise at least some types of groundwater such as the Helsinki and Seoul Rules and the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UN WCC) tend to apply the same main principles to groundwater as to surface waters, notably the principle of equitable utilization, the duty not to cause significant harm and the duty to cooperate. The key question that has, however, hardly been tackled in legal literature is whether these principles are adequate or whether they need to be amended and developed.

This question is not only of factual relevance because of the increasing importance of groundwater for domestic, agricultural and industrial use and for the realization of the human right to water that goes hand in hand with increasing risks of depletion and pollution. It is also of legal relevance as the principles of international groundwater law are currently on the programme of work of the United Nations International Law Commission (ILC), the international expert body charged with codifying and developing international law. The work of the ILC might lead to the codification of new principles of international groundwater law within the coming years.

It will be argued that the main norms of international water law – the principle of equitable utilization, the duty not to cause significant harm and the duty to cooperate – are, in principle, applicable to international groundwater, but that the particularities of groundwater still call for the elaboration of different and more specific rules. These must be developed on the basis of an interdisciplinary collaborative effort of hydrogeologists, lawyers and other disciplines.

The paper will first look at in which cases one can speak of international groundwater. It will then give a brief overview over how groundwater has been dealt with in international law, that is in bilateral and regional agreements as well as in the main international

instruments of a global scope. Third, it will present the core principles of international water law. Fourth, the adequacy of these principles for groundwater in general and for so-called fossil aquifers in particular will be discussed. This part will not attempt to comprehensively evaluate the adequateness of the principles, but rather to raise a number of questions and issues for further discussion. The conclusion will wrap-up the findings, and also look at the new undertaking of the ILC and the interface between international and national law.

II. International Groundwater: Model Cases

Before looking at the law, the question has to be asked in which cases international law applies to water resources and groundwater in particular. There are a number of possible constellations in which one has to speak of international groundwater. Six of them shall be looked at here. They present reality in a simplified way that does not necessary correspond fully to the demands of hydrogeologists, but will hopefully serve to illustrate the factual scope of the topic.

The first four cases deal with constellations in which groundwater is hydraulically linked with a body of surface water. These are covered by the international legal instruments such as the UN WCC.

The first two cases are those in which a body of surface water and groundwater are hydraulically linked and both the surface water and the groundwater resource are transboundary. In the first case an aquifer is linked hydraulically with a river, both of which are located along an international border so that the river forms the border between two States. In the second case an aquifer is intersected by an international border and linked hydraulically with a river that is also intersected by the same or another international border.

In the third and forth scenario an aquifer and a surface water body are hydrologically linked, but only one of the two resources is transboundary in character. In the third case an aquifer flows across an international border and is hydraulically linked to a river that flows completely within the territory of one state. Here, the aquifer is the transboundary component that makes the whole of the system international in character. The forth scenario describes the reverse situation. An aquifer is completely within the territory of one state but is hydraulically linked to a river flowing across an international border (in such cases, the aquifer is almost always located in the downstream State).

The last two cases, for which international law is almost non-existent, are cases in which an aquifer transverses an international boundary, but is not linked with a body of surface water. In the fifth case the aquifer is part of the hydrological cycle and still recharged, in the sixth case it is a non-renewable groundwater resource decoupled from contemporary hydrological processes. Examples of the latter include parts of the extensive Nubian Sandstone Aquifer System and the Qa-Disi Aquifer underlying southern Jordan and northern Saudi Arabia.

These examples show that international applies in a number of different constellations and even resources that are apparently national, because they are located within the boundaries of one state, can fall within the scope of international instruments because they are hydraulically connected with another resource that is transboundary.

III. Groundwater in International Law

The next section will look at the question how international law has so far dealt with international groundwater. It will first address briefly bilateral and regional instruments and then instruments of global scope.

1. State Practice: Bilateral and Multilateral Agreements

In state practice groundwater has long been forgotten. Whereas innumerable bi- and multilateral agreements deal with shared surface water resources and a large number of joint bodies and commissions has been established to manage them, only a few agreements deal with surface and groundwater jointly and only in exceptional cases treaties have been concluded with respected to groundwater alone.[2]

Such cases are the 1977 Agreement on the Protection, Utilisation and Recharge of the Franco-Swiss Genevese Aquifer[3] that offers also the rare example of a treaty that establishes a joint commission for the administration of the shared aquifer. For the Nubian Sandstone Aquifer System two concise technical agreements were concluded among Egypt, Libya, Chad and Sudan, one on Monitoring and Exchange of Groundwater Information[4] and one on Monitoring and Data Sharing[5]. Moreover, at the end of last year Algeria, Libya and Tunisia have agreed to institutionalize cooperation in the management and development of the water resources of the North-Western Sahara Aquifer System, better know by its French acronym SASS[6], and established, with support from FAO's legal office, a mechanism for consultation.

In regional agreements groundwater is dealt with, for example, in the 1968 African Convention on the Conservation of Nature and Natural Resources[7], the 1992 ECE Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes[8], and the 2000 Revised SADC Protocol"[9].

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[2] Groundwater connected to surface water has, for example, been included in the scope of a agreements such as the 1964 Lake Chad Convention, the 1990 Agreement between Nigeria and Niger, the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River, 1994 Peace Treaty between Israel and Jordan, or the 1973 agreement between Mexico and the United States known as Minute 242.

[3] Arrangement relatif à la protection, à l'utilisation et à la réalimentation de la nappe souterraine franco-suisse du Genevois, 9 Juin 1977, Le Conseil d'Etat de la République et Canton de Genève – Préfet de Haute-Savoie, Art. 2.2, reprinted in: Teclaff, Ludwik A. and Albert E. Utton (eds.), International Groundwater Law, London, Rome, New York 1981, p. 464.

[4] Agreement for the Monitoring and Exchange of Groundwater Information of the Nubian Sandstone Aquifer System, 5 October 2000, Chad, Egypt, Libya, Sudan, on file with author.

[5] Agreement on Monitoring and Data Sharing, Chad, Egypt, Libya, Sudan, 5 October 2000, on file with author.

[6] Système Aquifère du Sahara Septentrional.

7 Its Art. V para. 2 recognizes the importance of common groundwater resources: Where surface or underground water resources are shared by two or more of the Contracting States, the latter shall act in consultation, and if need arises, set up inter-State Commissions to study and resolve problems arising from the joint use of these resources, and for the joint development and conservation thereof." 16 September 1968, 1001 UNTS 3.

[8] It defines "transboundary waters" as "any surface or ground waters which mark, cross or are located on boundaries between two or more States; 17 March 1992, 31 ILM 1312 (1992).

[9] Revised Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC), 7 August 2000, http://faolex.fao.org/faolex/index.htm (last accessed 18 February 2003)

2. Groundwater in International Legal Instruments of Global Scope

Global instruments that deal with groundwater are the Helsinki and Seoul Rules, the UN WCC and the ILC Resolution on "Confined" Transboundary Groundwater.

a) The ILA Rules

The 1966 Helsinki Rules on the Uses of the Waters of International Rivers[10] were developed by the International Law Association (ILA) a non-governmental body. They are a non-binding, but still core document of international water law. The Helsinki Rules use the drainage basin as a point of reference for their scope and define it as "a geographical area extending over two or more States determined by the watershed limits of the *system of waters, including surface and underground waters, flowing into a common terminus*" (emphasis added), Art. II Helsinki Rules. The original Helsinki Rules were by this definition limited to groundwaters linked to bodies of surface waters. To fill this lacuna the ILA adopted in 1986 the "Seoul Rules on International Groundwaters" consisting of four articles that deal exclusively with groundwater and made the Helsinki Rules applicable to connected and unconnected aquifers, Art. 2.[11] In consequence, the general principles of waterlaw were applied to all groundwaters[12]. They also added provisions on the protection of groundwaters and pollution that show that the ILA was aware of the specific vulnerability of groundwaters to pollution.

Currently the ILA is revising the Helsinki Rules and discusses both the incorporation of all groundwaters in the Revised Rules itself and the inclusion of a specific article (Draft Art. 19) on managing groundwater that shall encourage states to limit the drawdown of aquifers to a reasonable extent, to take special care to prevent contamination of groundwater; and to otherwise take into account the special characteristics of groundwater.[13] As the Draft Revised Rules also incorporate developments in the field of environmental law, such as the precautionary principle, a wider set of rules would be recommended for the use and management of aquifers than that contained in the original Helsinki and Seoul Rules.

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[10] Reprinted in FAO, Sources of International Water Law, Legislative Study No. 65, Rome 1998, p. 290.

[11] Art. 1 states that "the waters of an aquifer that is *intersected* by the boundary between two or more States are international groundwaters and such an aquifer with its waters form an international basin or part thereof. Those States are basin States within the meaning of the Helsinki Rules whether or not the aquifer and its waters form with surface waters part of a hydraulic system flowing into a common terminus."

[12] They also added to the Helsinki Rules as they contain an article on protection of groundwater (Art. 3) that strengthens the general pollution rule in the Helsinki Rules. It states that States shall prevent or abate the pollution of international groundwaters in accordance with international law applicable to existing, new, increased and highly dangerous pollution and that special consideration shall be given to the long-term effects of the pollution of groundwater. The Article on Protection of groundwater also contains a rule on consultation and exchange of data for the purpose of preserving groundwaters from degradation and protection from impairment of the geologic structure of aquifers, including recharge areas and for the purpose of considering joint or parallel quality standards and environmental protection measures.

[13] The Revised International Law Association Rules on Equitable and Sustainable Use in the Management of Waters, 8th draft, March 2003, on file with author.

b) The UN WCC

Also the 1997 UN WCC[14] applies to some types of groundwater. It covers "international watercourses" (Art. 2 I UN WCC). According to the UN WCC a "watercourse" is a "system of surface and groundwater's constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus", (Art. 3 lit a) UNWCC). An "international watercourse" is a watercourse parts of which are situated in different states", (Art. 3 lit. b) UNWCC). For groundwater to be covered by the UN WCC four criteria must hence be fulfilled: it must be part of a *system* of surface and groundwater's (1); this system must by part of a *unitary whole* (2); the system must normally flow into a *common terminus* (3) and parts of the system must be located in *different states* (4).

Therefore, aquifers that do not form part of a system because they are not linked to a body of surface waters do not fall within the scope of the UN WCC. A recharge zone alone is not enough to speak of a *system constituting a unitary whole* in legal terms.

c) ILC Resolution on "confined" groundwater

This limitation of the UN WCC was subject of a debate with the International Law Commission.[15] The ILC had over twenty years developed the draft articles of the UN WCC, but had only began to discuss the question of the inclusion of groundwater within the scope of its draft articles at a very late stage. Its Special Rapporteur Robert Rosenstock had proposed to include all types of groundwater within the scope of the draft UN WCC. The majority of the members of the ILC was, however, of the opinion that the topic of groundwater was included so late in the discussion of the draft articles that they might not do full justice to the particularities and different types of aquifers.

Instead the ILC decided to adopt a resolution dealing with what it called "Confined Transboundary Groundwater".[16]

The title of this resolution is misleading. The ILC did not, in fact, mean to refer to "confined" aquifers in a hydrogeological sense, but simply to those groundwaters not connected to bodies of surface waters. In hydrogeological terms, a confined aquifer is an aquifer overlain and underlain by an impervious or almost impervious formation,[17] in which water is stored under pressure. Confinement is thus a matter of hydraulic state and not a question of being 'connected'.

The ILC clearly mistook the term "confined" for meaning de-coupled from a body of surface water. This becomes clear from the preamble of the resolution the ILC defined "confined groundwater", as "groundwater not related to an international watercourse". The aquifers that it mainly wanted to exclude from the scope of the UN WCC are the fossil

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[14] It is a framework convention deriving weight from twenty years of drafting and research done by the International Law Commission. The UN WCC is annexed to U.N. G.A. Res. 229, U.N. GAOR, 51st session, U.N. Doc. A/Res/51/229, 21 May 1997. It was adopted by a vote of 103 for and 3 against (Burundi, China, Turkey) with 27 abstentions. It is reprinted in 36 ILM 700 (1997).

[15] The ILC was established by the United Nations in 1947 to promote the progressive development of international law and its codification. It is an elected body of 34 international lawyers representing the major legal systems of the world and serving in their individual capacity.

[16] Report of the ILC to the General Assembly on its forty-sixth session, reprinted in: (1994) Y.B.Int'l L. Comm'n, vol. 2, pt. 2, p. 135.

[17] UNESCO, International Glossary of Hydrology, Paris, 1992.

aquifers that are de-coupled from contemporary recharge and that might be confined or unconfined. It is the fact that they are not renewable under present climate regimes that renders them distinctive, not the degree of pressure under which these waters are stored. The water in these aquifers can be hundreds or thousands of years old. It is often of remarkably good quality and constitutes in some of the most arid parts of the world, like the Sahara, the predominant source of water. It is a natural resource of vital importance for sustaining life, health and the integrity of ecosystems.

In its resolution the ILC commends states to be guided by the principles of the draft articles of what later became the UN WCC *where appropriate* (see Article 1). This cautious recommendation as well as the erroneous use of the term "confined" are indicative of the lack of hydrogeological knowledge among the ILC's members that – more than anything else – prevented the development of meaningful rules for groundwater.

d) Intermediary Findings

Groundwater as been dealt with in international law only sparingly – although one can distinguish a tendency to include it more and more. To the extent that it has been addressed the general main principles of international law have been applied.

IV. Principles of International Water Law

The next chapter will develop the normative content of the principle of equitable utilization, the duty to not cause significant harm and the duty to cooperate which are the basis of international water law. They have been embodied in a number of international instruments such as the 1966 Helsinki Rules and most recently, comprehensively and authoritatively in the 1997 UN WCC that still has to enter into force.[18] The UN WCC shall serve as the reference document for the current status of the principles of international water law.

1. The Principle of Equitable Utilization

The first principle is the principle of equitable utilization. It is at the heart of international water law. Whereas in earlier times it was disputed whether unfettered absolute sovereignty (which crystallised in the so-called Harmon doctrine) or riparian rights or prior appropriation were the rule of law[19], the principle of equitable utilization is by now uncontested the core principle of international water law.[20]

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[18] The literature on the UN Watercourse convention is vast. See generally, among others, McCaffrey, Stephen, The Law of International Watercourses, New York, 2001; McCaffrey, Stephen and Mpazi Sinjela, The 1997 United Nations Convention on International Watercourses, 92 The American Journal of International Law 97 (1998); McCaffrey, Stephen, The Contribution of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses, 1 International Journal of Global Environmental Issues 250 (2001); Tanzi, Attila, The UN Convention on International Watercourses as a Framework for the Avoidance and Settlement of Waterlaw Disputes, in: 11 Leiden Journal of International Law 441, 443 (1998).

[19] See generally, amongst others, McCaffrey, *supra* note 18, pp. 76–174; Paisley, Richard, Adversaries into Partners: International Water Law and the Equitable Sharing of Downstream Benefits, 3 Melbourne Journal of

the UN WCC this obligation reads as "Watercourse States shall ... utilize an international watercourse in an *equitable* and *reasonable* manner ... with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of watercourse States concerned, consistent with adequate protection" (Art. 5 UN WCC, emphasis added).

The entitlement to an equitable share is based on the notion of equality of *right* – not of *share* –. Optimal use is not equivalent to maximum use. Rather it implies to attain maximum possible benefits for all watercourse states and to achieve the greatest possible satisfaction of all their needs, while minimising the detriment to, or unmet needs of, each.[21] The equitable sharing of an international watercourse is a complex, ongoing process that can require constant adaptation to changing circumstances and uses.[22]

Art. 6 of the UN WCC gives guidance as to which factors a state has to consider when determining whether an actual or potential use is equitable, by assembling an indicative, non-weighted and non-comprehensive list. Comprised are natural or physical factors (lit. a)), social and economic needs (lit. b)), the population dependent on the watercourse (lit. c)), the effects of the use (lit. d)), existing and potential uses (lit. e)), conservation, protection, development and economy of use of the water resources and the costs of measures taken to that effect (lit. f)) as well as the availability of alternatives to a particular or planned use (lit. g)).[23] In order to ensure that its use is equitable and reasonable a state has to take these and other factors relevant in the specific case into account, not only with regard to its own territory, but also with regard to the whole of the shared watercourse.

2. The Duty not to Cause Significant Harm

The second fundamental principle generally recognised as governing international watercourse law is the obligation to not cause significant harm (*sic utero tuo ut alienum non laedas* – so use your own as not to harm that of another).

Art. 7 UNWCC contains the specific obligation "to take all appropriate measures to prevent the causing of significant harm..."[24] The phrasing "to take all appropriate *measures*"

International Law 280, 282 note 6 (2002); Tanzi, Attila, *supra* note 18, p. 453 note 45, all with further references.

[20] It has been confirmed by the International Court of Justice as reflecting existing law in the Gabcikovo-Nagymaros case where the ICJ stated that "[w]atercourse States shall participate in the use, development and protection of an international watercourse in an *equitable* and *reasonable* manner." (emphasis added); Gabcíkovo-Nagymaros Project (Hungary v. Slovakia), 1997 I.C.J. 7 (September 25).

[21] ILC Report, (1994) Y.B.Int'l L. Comm'n, vol. 2, pt. 2, p. 97, para. 3, U.N. Doc. A/CN.4/SER.A/1963/Add.1 (Part 2).

[22] A use that was equitable and reasonable can become inequitable and unreasonable through hydrological changes and a new use by one state can change the equitable utilization calculus as among all other states.

[23] A similar list can be found in Art. V para. 2 of the ILA's Helsinki Rules.

[24] Examples of the no-harm principle in other international instruments are Art. 3 of the Charter of Economic Rights and Duties of States that reads: "in the exploitation of natural resources shared by two or more countries, each State must cooperate ... in order to achieve optimum use of such resources without causing damage to the legitimate interests of others", GA Res. 3281(XXIX), U.N. GAOR, 29th Sess., Supp. No. 31 (1974), 14 ILM 251 and Principle 21 of the Stockholm Declaration (Declaration of the United Nations Conference on the Human Environment, 16 June 1972, UN Doc. A/Conf.48/14/rev.1) as well as Principle 2 of the Rio Declaration on Environment and Development, UN Doc. A/CONF.151/5/Rev. 1, 31 ILM 874 (1992). The latter, being almost identical to the former, reads: "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own

shows that the obligation is one of conduct, not one of result. "Significant" means that the harm caused must be more than minor or trivial, but that it can be less than substantial or serious.[25] Harm occurs in different forms and types. Proscribed is not so much factual harm, but injury of a legally protected interest.[26]

The obligation not to cause significant harm does not stand on its own, but must be reconciled and brought into line with the principle of equitable utilization.[27]

The relationship between the two principles has been one of the most debated questions of international water law. Whereas some schools of thought argued that the equitable utilization principle took precedence over the no-harm rule, others saw the no-harm rule overriding the right to equitable utilization.[28] The latter opinion cannot be followed as a complete prohibition of causing any harm would result in almost a veto power for new uses since any new use of a river, lake or groundwater resource is likely to cause some negative effect somewhere in the system. Were this to be prohibited states would be disadvantaged that develop their water resources later than others and new developments would be blocked leading to an inherently inequitable situation. Also the term no "*significant* harm" shows that when the two principles must be reconciled some harm can be accommodated.[29]

The no-significant-harm principle therefore operates only in conjunction with the principle of equitable utilization.[30] It is the balancing of interests under the equitable utilization rule that has to solve the problem whether in a specific case a certain type of harm may be caused as a result of an equitable utilization or not. The duty to consult with the

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environmental and development policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction".

[25] McCaffrey, *supra* note 18, p. 329 *et seq.*

[26] *Id.* p. 347, 365.

[27] The problem of reconciling equitable utilization and the causing of harm occurs with respect to the shared use of all natural resources and different attempts have been made to find satisfactory solutions. See, for example, UNEP's Principles of Conduct in the Field of the Environment for the Guidance of States in the Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States, 17 ILM 1097 (1978). Principle 1 reads:

> It is necessary for States to co-operate in the field of the environment concerning the conservation and harmonious utilization of natural resources shared by two or more States. Accordingly, it is necessary that *consistent with* the *principle of equitable utilization* of shared natural resources, States co-operate with a view to *controlling, preventing, reducing or eliminating adverse environmental effects* which may result from the utilization of such resources (emphasis added).

[28] The relationship of the two principles in the UN WCC continues to be debated. Brunnée/Toope, for example, argue that the UN WCC ties the two principles together in a circular relationship without resolving the priority issues and thereby neutralizing them, Brunnée, Jutta and Stephen J. Toope, The Changing Nile Basin Regime: Does Law Matter?, 43 Harvard International Law Journal, 105, 151 (2002).

[29] In the Gabcikovo-Nagymaros case the ICJ relied explicitly on the principle of equitable utilization, but stated with regard to no-harm issues only that "The existence of the general obligations of States to ensure that activities within their jurisdiction and control *respect* the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment. (emphasis added).
The fact that the ICJ gave not more prominence to the no-harm rule despite Hungary relying heavily upon it in its arguments can be seen as a rejection of the thesis that the duty not to cause significant harm takes prominence over other rules.

[30] In the UN WCC convention it is ultimately the principle of equitable utilization that dominates which can also be deduced from Art. 7 para. 2 UNWCC that states that "where significant harm is nevertheless caused to another watercourse State, the States whose use causes such harm shall, ..., take all appropriate measures, having due regard for the provisions of articles 5 and 6," *i.e.*, the principle of equitable utilization,..., "to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation."

affected state to eliminate or mitigate such harm, and to discuss compensation where appropriate (Art. 7 para. 2 UN WCC), alleviates the burden of this compromise for the state subject to harm.

3. Principle of Cooperation

The third principle is the principle of cooperation. It is procedural corollary to the other two principles. Art. 8 para. 1 UN WCC contains the general principle that "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".[31] This general duty is reflected and specified in the procedural duty to regularly exchange data and information (Art. 9), and in the obligations of notification, consultation and negotiation concerning planned measures.

a) The Duty to Exchange Data and Information

Art. 9 para. 1 UN WCC imposes upon states a duty to exchange "on a regular basis ... readily available data and information[32] on the condition of the watercourse, in particular of its hydrological, meteorological, hydrogeological and ecological nature and related to the water quality as well as related forecasts".[33]

Such information from all parties concerned needs to be taken into account if a state wants to determine whether a specific use is reasonable and equitable, since the state has to assess the situation of all relevant parts of the shared watercourse.[34]

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[31] A duty to cooperate can be found in a number of international instruments. See, for example, Art. 4 of the ILA's Rules on Water Pollution in an International Drainage Basin (Montreal Rules), reprinted in FAO, Sources of International Water Law, Legislative Study No. 65, Rome 1998, 314; Art. 3 of the Charter of Economic Rights and Duties of States Charter of Economic Rights and Duties of States, GA Res. 3281(xxix), UN GAOR, 29th Sess., Supp. No. 31 (1974), 14 ILM 251; or Principle 24 of the Stockholm Declaration, Declaration of the United Nations Conference on the Human Environment, 16 June 1972, UN. Doc. A/Conf.48/14/rev.1. A survey of international agreements, decisions of international courts and tribunals, declarations and resolutions adopted by intergovernmental organizations, conferences and meetings, and studies by intergovernmental and nongovernmental organizations relating to the principle of cooperation is contained in Third Report Special Rapp., (1987) Y.B.Int'l L. Comm'n, vol. 2, pt. 1, Doc. A/CN.4/406, paras. 43–58.

32 As the duty is limited to exchanging only "readily" available data, such as already collected data or easily accessible data, it does not overburden states. The regular and continuous exchange is furthermore a means of confidence building.

[33] The need for regular collection and exchange of a broad range of data has been recognized also in a large number of other international agreements. Art. XXIV para. 1 Helsinki Rules states that "with a view to preventing disputes from arising ..., it is recommended that each basin State furnish relevant and reasonably available information to the other basin States concerning the waters of a drainage basin within its territory and its use of, and activities with respect to such waters." A survey of other agreements as well as of declarations and resolutions adopted by intergovernmental organizations, conferences and meetings as well as studies by intergovernmental and international non-governmental organizations can be found in
Spec. Rapp., Fourth Report, (1988) Y.B.Int'l L. Comm'n, vol. 2, pt. 1, pp. 2105 *et seq.*, Doc. A/CN.4/412 and Add. 1 and 2, paras. 15 - 26.

[34] It would, for example, be very difficult for a downstream state to optimise its uses of an international watercourse without information about such matters as rainfall and the quality and flow of water in the upper parts of the basin. This therefore calls for information that cannot be gathered by the assessing states unilaterally, but requires the provision and cooperative sharing of data and information between co-riparians.

b) Information, Notification and Consultation

Other obligations of cooperation concern planned measures. Part III of the UN WCC (Planned Measures) contains, among other duties, an obligation to inform and consult regarding the possible effects of planned measures (Art. 11) and, in case the planned measures could have significant adverse effects, a duty to notify (Art. 12). Whereas the duty to regularly exchange data and information (Art. 9) provides for an ongoing and systematic process, these provisions concern duties only arising in connection with planned measures - to be interpreted broadly as including new projects or programmes of a major or minor nature, as well as changes in existing uses of an international watercourse[35] - to enable co-riparians to realize the nature of the proposed undertaking and the possible effects.

4. Other Norms

Apart from these three main rules the UN WCC contain also rules on protection, preservation and management of an international watercourse (Part IV UN WCC). Watercourse States shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses (Art. 20 UN WCC) and they shall prevent, protect and control pollution.

VI. Adequacy of the Principles of International Water Law for International Groundwater Law?

In this section it shall be discussed whether the principles of international water law outlined above are adequate for international groundwater law. Fossil aquifers shall receive particular attention. Until now this issue has hardly been dealt with in legal literature. Therefore, more questions will be raised than answers given.

1. The Principle of Equitable Utilization

The principle of equitable utilization as such is adequate for sharing groundwater as much as any other transboundary resource. However, groundwater specific criteria to determine what constitutes equitable utilization should be developed. One could, for example, think about a reference to the proportion of the segment of the aquifer lying on each state's territory in order to determine the quantity that equitably can be withdrawn (which is usually done in the case of oil and gas deposits)? Or a reference to quantities of recharge. Or and maybe better one could refer to the level of the groundwater table and the quantities of water that are economically recoverable[36]. For groundwater it is not so much sheer quantity as such that counts, but the quantity that is economically recoverable now and maybe also in the future. This in turn is largely a function of the level of groundwater. Although water might still be in abundance in the ground, it might no longer be economically, physically or technologically abstractable. Therefore, the law needs to take account of the fact that any abstraction on one side of the border can affect the overall watertable. In confined aquifers, also the equitable sharing of pressure is an issue. Furthermore, the law should maybe take

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[35] (1994) Y.B.Int'l L. Comm'n, vol. 2, pt. 1, p. 111, Art. 11, para. 4.

[36] Barberis, International Groundwater Resources Law, FAO Legislative Study, Rome, 1986, p. 51.

specific note of the specific and overarching importance of groundwater for drinking water supply.

2. The Duty not to cause Significant Harm

The duty not to cause significant harm gives rise to more doubts as to its adequacy. Once polluted aquifers and groundwaters can be very difficult to clean up. This sheds doubt on the rule that causing some harm should be legally allowed in order to equitably utilize a resource and that thereby – and within these limits – the principle of equitable utilization overrules the no-harm rule. If a resource cannot be cleaned even allowing some harm means destroying it partly in the sense that it might no longer be usable for some purposes like for drinking. While a "no-harm at all" rule would not be realistic, it appears that more stringent protection and a stricter standard should apply than the no-*significant*-harm principle. Also the precautionary principle or other rules of international environmental law should to be taken into account with regard to the development, exploitation, allocation or conservation of shared aquifers.

Another problem is that the consequences for the underlying waters of a particular use of land, for example, become sometimes only apparent after long periods of time after which a specific causal links are difficult to establish. It will need to be looked at how the law can take this adequately into account and whether this fact would, for example, rule out the application of the polluter pays principle.

3. The Duty to Co-operate

The duty to co-operate is without doubt adequate for gorundwaters, as are the more specific obligations to exchange readily available data and to notify of planned measures. One might however consider specifying the types of data and information that should be exchanged. Also, it should be questioned if the duty to cooperate should not be developed as to also comprise more than the exchange of *readily* available data such as a duty to jointly assemble knowledge about a shared aquifer in cases where little or not sufficiently is know about it.

4. Fossil Aquifers

With respect to fossil aquifers even more factors have to be taken into account. In fossil aquifers there is neither recharge nor flow. Due to the lack of flow it is not so much the actual molecules of water that are transboundary, but rather the pressure in a confined aquifer. It might again be the equitable sharing of this pressure that the law has to address. While depletion can affect all aquifers in case abstraction exceeds recharge, it is inevitable – at least in the long run – when water is abstracted from a non-renewable resource. Therefore, for example, sustainable utilization that is one of the dimensions of equitable utilization according to Art. 5 UN WCC cannot be a criterion. Fossil aquifers cannot be used in a sustainable way; they can only be exhausted over shorter of longer period of time. State practice reflects an understanding that this should be allowed, especially when the use of fossil waters is indispensable for survival in arid regions. However, at least where a shared resource is concerned abstraction must be *coordinated, controlled* and *limited*. The fact that

fossil aquifers can be depleted in the same way as other non-renewable resources has let to suggestions to apply rules governing the use of oil and gas to them. However, the legal regimes of oil and gas do not take sufficient account of the particularities of water versus other resources. While oil and gas are not necessary for human survival and can therefore be depleted, clean freshwater is indispensable and therefore needs protection. Unlike aquifers oil and gas reserves are not vulnerable to pollution from surface sources.

Pollution poses specific problem with respect to fossil aquifers. Due to their de-coupling from the contemporary hydrological cycle the cleaning of polluted aquifers is almost impossible. This sheds even more doubt on the adequacy of the no-significant-harm principle than with respect to aquifers in general, especially in cases where the generally very pure waters of a fossil aquifer are indispensable for the drinking water supply. The lack of flow in fossil aquifers also affects the causality patterns of pollution. In case of pollution with a substance that does not mix well with water, the transboudary consequences of the pollution of some part of the aquifer is only a function of pumping of the aquifer in another part. The pumping action forms an expanding cone of depression and the water within the cone of depression will flow towards the pump well and with it the polluting particles will travel.[37] Therefore, these two causal actions are necessary to cause the transboundary effect. Without abstraction the water will be almost stagnant and pollution that occurs originally only in one state would not become transboundary.

5. Intermediary conclusions

The principle of equitable and reasonable utilization and the duty to cooperate are as adequate for groundwater as for surface. They could become, however, even more useful if they were developed by adding specific criteria and complementary duties that take account of the specificities of groundwater. Only the adequacy of the obligation not to cause significant harm is doubtful because of the vulnerability of aquifers. It provides certainly a minimum standard and is therefore better than no law at all and should be adhered to. One could also argue that the principle is wide enough to accommodate aquifer specific problems, e.g., by interpreting significant in a stricter way when it comes to groundwater. Then the same level of pollution would pass the "significant" threshold earlier in the case of an aquifer than in the case of a body of surface water. While this could be done from a legal point of view, the development of a clearly stricter standard would be preferable to reduce uncertainty as to what the law allows and to highlight the value of groundwater resources.

VII. Conclusion

International groundwater law is not yet sufficiently developed. While the main principles of international water law, namely the principle of equitable and reasonable utilization, the duty not to cause significant harm and the duty to cooperate provide a legal basis for sharing groundwater resources, there is a clear need to develop the law further to do full justice to the specific characteristics of different groundwater resources.

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[37] Picture a curved funnel-shape depression in the groundwater table centered at the pumping well; the largest drop in the groundwater table occurs in the center of the "funnel", i.e. at the pumping well and diminishes with distance from the pump-well.

The topic is now again on the agenda of the ILC as it was perceived that the law of these important natural resources should be developed and codified. Therefore, the ILC decided to include on its programme of work the topic "Shared Natural Resources" comprising oil, gas and "confined" aquifers and appointed Chusei Yamada as Special Rapporteur for the topic.[38] The ILC's dealing with the topic might lead to the codification of a new international law instrument on groundwater. The Special Rapporteur will during the course of his work look at international groundwater use and law in general – and not only at decoupled groundwater - and might include in his report recommendations regarding all types of groundwater. His report on groundwater will be presented to the ILC in May 2004, its final report containing a comprehensive review of oil, gas and groundwater in 2006.

The Special Rapporteur will be supported in his work by a multidisciplinary group of experts working under the framework of the International Shared Aquifer Resources Management (ISARM) initiative. FAO as a member of ISARM contributes both legal and hydrogeological expertise to this group of hydrogeologists, lawyers and others. It is the aim of this support group to bring together knowledge from different disciplines to help the ILC in the development of rules that take adequately into account both the hydrogeological complexities related to groundwater and the wider framework of international law. At this point it is not clear which direction the work of the Special Rapporteur will take. However, any suggestions for the development of the law need to take into careful consideration a number of issues such as the environmental value of the resource as such, its finiteness and vulnerability as well as its indispensability for human survival on the one hand and the socio-economic development needs of states on the other that might require such waters for agriculture and industry or that might make other developments seem necessary that could impact negatively on the resource.

Independent of this initiative to find and define framework rules at the international level, states sharing an international groundwater resource should take the interconnectedness of groundwater with the surface and the transboundary nature of the resources into account in their bi- and multilateral relations. It is not possible and not necessary to wait for the ILC to come up with new rules. National regulation governing well drilling and groundwater pumping, the regulation of wastewater disposal or the use of land are only some areas that are often dealt with exclusively at the national level, although they can have cross-boundary impacts and should fall within the ambit of a bi- or multilateral treaty governing the shared resource. Therefore, States should develop and conclude bi- or multilateral agreements governing the ways and limits of a shared resource.

Overall three components are necessary for the adequate management of a shared resource. First, abstract international rules for general guidance. Second bi- and multilateral agreements regarding a specific shared resource to determine jointly rights, obligations and objectives with regard to the management of the resource. Such an agreement could, for example, determine the overall quantity of water that can be abstracted by each state. Third, implementation of such an agreement at the national level harmonized towards achieving the commonly established objectives. It is at this stage that national legislation concerning water resources management including the regulation of permits and specific quantities of abstraction for single users as well as waste disposal and laws governing land use come into play.

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[38] Report of the ILC to the General Assembly on its fifty-forth session, http://www.un.org/law/ilc/reports/2002/2002report.htm (last accessed 15 February 2003).

Finally, I would like two issues that sound banal, but are important. First, any law needs to be complemented by adequate human, financial and institutional resources for its implementation. Second, the law is no substitute for political will. Where the latter is lacking, the best international or national rules will be without effect.