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the Protection and Use of Transboundary  
Watercourses and International Lakes

#### Working Group on Integrated Water Resources Management

**Seventh meeting\***  
Geneva, 3 and 4 July 2012

#### Working Group on Monitoring and Assessment

**Thirteenth meeting\***  
Geneva, 3 and 4 July 2012

Item 4 (b) of the provisional agenda

**Support for implementation and compliance:  
transboundary groundwaters**

### **Study on the application of the Convention to groundwater: explicatory recognition of the existing United Nations Economic Commission for Europe regulatory language**

**Prepared by the Chair and the Vice-Chair of the Legal Board**

#### *Summary*

At its fifth session, the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) mandated the Legal Board and the Working Group on Integrated Water Resources Management to prepare a preliminary study on the application of the principles of the Convention to transboundary groundwater, to be submitted to the Meeting of the Parties at its sixth session for consideration as to whether further action was needed (ECE/MP.WAT/29/Add.1, programme area 1.2, para. (e)).

The present document provides explanations and analyses the provisions of the

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\* Joint meeting of the two Working Groups.

Convention, documents developed under its framework and other relevant references in relation to groundwater. It emphasizes that the distinguishing features of groundwater, in particular difficulties in identification and characterization and its particular vulnerability in case of pollution, call for specific regulatory and practical measures suitable for groundwaters when applying the principles of the Convention.

The document was discussed by the Legal Board at its eighth meeting (Geneva, 24-25 February 2011) and by the Working Group on Integrated Water Resources Management at its sixth meeting (Geneva, 4-5 May 2011).

At those meetings, the two bodies agreed that the work on transboundary groundwaters in the current programme of work should also aim at developing draft model provisions on transboundary groundwaters, and entrusted a Core Group on Groundwater with that task. The draft model provisions will also be considered by the Working Groups during this joint session.

The present document is submitted to the Working Groups for endorsement and submission to the sixth session of the Meeting of the Parties (Rome, 28-30 November 2012).

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## I. The scope of the Convention with respect to groundwaters

1. The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) does not contain a provision specially devoted to its scope of application, similar to article 1 of the 1997 Convention on the Non-navigational Uses of International Watercourses and article 1 of the 2008 International Law Commission's Draft articles on the Law of Transboundary Aquifers (2008 ILC Draft Articles). As far as its scope *rationae materiae* is concerned, its title, as well as the first paragraph of its preamble, refer to "transboundary watercourses and international lakes", while in the rest of the language of the Convention, reference to cooperation is made in a general fashion to the protection and use of transboundary waters.

2. Indeed, the scope of application of the Convention stems in particular from the definitions contained in article 1 in terms which are wider than what the title of the Convention may suggest. In fact, there is no definition of the terms transboundary watercourses and international lakes, while the more generic term "transboundary waters" is addressed, which comprises also groundwaters of a transboundary character.

3. The question as to which types of groundwaters fall under the above definition is subject to scrutiny, both with regard to the exact meaning of the term "groundwater" (see section A below), as well as with regard to the qualifier "transboundary" (see section B below), which is less obvious than in the case of surface waters.

### A. Meaning of the term groundwater

4. The Water Convention uses the term "groundwater", while in the Guide to Implementing the Convention<sup>1</sup> the term "aquifer" is also used: "As for groundwaters, the Convention includes both confined and unconfined aquifers."<sup>2</sup> In some other legal texts the meaning of the term aquifer is distinguished from the meaning of the term groundwater. For instance, the International Law Association (ILA) 2004 Berlin Rules on Water Resources and the European Union (EU) Water Framework Directive<sup>3</sup> define an aquifer as the underground geological formation which functions as a container for water,<sup>4</sup> while groundwater is conceived as the water contained therein.<sup>5</sup> In the 2008 ILC Draft Articles, the latter term is used to refer to both the water-bearing geological formation, as well as the water contained therein.<sup>6</sup>

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<sup>1</sup> The draft guide contained in the annex to document ECE/MP.WAT/2009/L.2 was adopted by the Meeting of the Parties to the Convention at its fifth session in November 2009.

<sup>2</sup> ECE/MP.WAT/2009/L.2, para. 73

<sup>3</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

<sup>4</sup> See ILA Berlin Rules on Water Resources, article 3, para. 2: "'Aquifer' means a subsurface layer or layers of geological strata of sufficient porosity and permeability to allow either a flow of or the withdrawal of usable quantities of groundwater". Article 2, para. 11, of the EU Water Framework Directive provides that "Aquifer" means a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater".

<sup>5</sup> See ILA Berlin Rules, article 3, para. 11: "'Groundwater' means water beneath the surface of the ground located in a saturated zone and in direct contact with the ground or soil." Article 2, para. 2, of the EU Water Framework Directive provides that "'Groundwater' means all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil".

<sup>6</sup> See article 2, subpara. (a): "'aquifer" means a permeable water-bearing geological formation

5. Given the differing definitions of groundwater in international instruments, the question arises as to the scope of the term groundwater in article 1, paragraph 1, of the Convention. Since this provision qualifies as “transboundary waters” the groundwaters which “mark, cross or are located on boundaries between two or more States”, one might argue that it does not necessarily encompass geological formations or any kind of solid matter. However, one should not lose sight of the fact that the Water Convention, through its article 2, paragraph 6, adopts an integrated approach to water protection, based on the concept of catchment area, encompassing also other elements such as air, land, etc., which interact with transboundary waters.<sup>7</sup> Therefore, the scope of application of the Convention should not be limited to a water body — be it surface water or groundwater — but to extend to “the entire catchment area of a surface water body or a recharge area of the groundwater aquifer”.<sup>8</sup> The latter is considered as “the area receiving the waters from rain or snow melt, which infiltrate through the subsoil (i.e., the unsaturated zone) into the aquifer”.<sup>9</sup>

6. It is therefore beyond doubt that regardless of our understanding of the term groundwater in article 1, paragraph 1, the scope of application of the Water Convention comprises also the geological formation allowing the flow of groundwater (which constitutes the unsaturated zone of infiltration of the groundwater formation), as part of the recharge area of the aquifer.<sup>10</sup> In this context, the two-tier approach adopted by the ILC with respect to the content of the term aquifer (covering both the geological formation and the water therein), fits also the Water Convention, irrespective of whether this two-tier approach is expressed through the term groundwater or aquifer, both of them being used in the Guide to Implementing the Convention.

7. The question also arises as to whether the Water Convention applies to all kinds of transboundary groundwaters, whether related or unrelated. Related groundwaters are those interacting, directly or indirectly, with surface watercourses, while unrelated groundwaters are those not hydraulically connected to surface watercourses. Unrelated groundwaters should not, however, be considered as waters contained only in non-recharging aquifers. In fact, one may think of a groundwater not connected with any surface waters but receiving recharge from other sources (i.e., precipitation),<sup>11</sup> especially in arid or semi-arid zones.

8. The Guide to Implementing the Convention refers to “confined” and “unconfined” groundwaters, a terminology which is also used in the 2008 ILC Draft Articles, with commentaries. According to the latter, confined groundwaters are the waters stored in aquifers which are upper-lain by less permeable layers. Those groundwaters are

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underlain by a less permeable layer and the water contained in the saturated zone of the formation”. See also para. 1 of the ILC commentary to article 2 of the Draft Articles: “the definition of an aquifer in subparagraph (a) offers the precise description of the two elements of which an aquifer consists and activities relating to which must be regulated. One element is the underground geological formation which functions as a container for water. The other element is the water stored therein which is extractable.” *Report of the sixtieth session of the International Law Commission, 2008 (A/63/10)*, pp. 34–35.

<sup>7</sup> See Guide to implementing the Convention, para. 76.

<sup>8</sup> Ibid., para. 74.

<sup>9</sup> Ibid.

<sup>10</sup> See A/63/10, p. 38, para. 8 of the commentary to article 2: “A recharge zone contributes water to an aquifer and includes the zone where the rainfall directly infiltrates the ground, the zone of surface runoff which eventually infiltrates the ground and the *underground unsaturated zone of infiltration*” (emphasis added).

<sup>11</sup> For such a distinction see ILA 2004 Berlin Rules, article 36, para. 1: “The Rules of this Chapter apply to all aquifers, including aquifers that do not contribute water to, or receive water from, surface waters or receive no significant contemporary recharge from any source”.

“pressurized by more than atmospheric pressure”<sup>12</sup>. For the purposes of the present exercise, the terms “unrelated” and “confined” groundwaters should be considered as equivalent. This seems also to be the meaning attributed to the term “confined groundwaters” in the Guide to Implementing the Convention, as in its paragraph 74 it is argued “that transboundary waters should not be limited to a water body ... but should cover ... in case of ... groundwater, whether confined or unconfined, its entire recharge area”,<sup>13</sup> which means that confined groundwaters are conceived as having their own recharge zone, thus assimilating them to unrelated recharging groundwaters.

9. The silence of article 1, paragraph 1, of the Convention with regard to the distinction between related and unrelated groundwaters implies that “the same principles and provisions of the Convention applicable to transboundary surface water apply to both”.<sup>14</sup>

## **B. The scope of transboundary groundwaters**

10. According to the wording of article 1, paragraph 1, of the Water Convention, the latter applies to any groundwaters “which mark, cross or are located on boundaries between two or more States”. Therefore, any groundwaters which are intersected by State boundaries are to be considered as transboundary and thus subject to the provisions of the Water Convention, even if those groundwaters are not connected with the catchment area of any transboundary surface waters.<sup>15</sup> As much as it is of the utmost legal and political importance, the determination of the transboundary character of groundwater may not be an easy matter. Especially with regard to aquifers, their transboundary nature cannot be established, as it is in the case of surface waters, by mere physical observation, and technology such as isotope tracing to define the outer limits of the aquifer may be needed.<sup>16</sup>

11. However, the scope of application of the Convention, given the integrated approach adopted in its article 2, paragraph 6, encompasses also groundwaters located exclusively within the territory of one State, if those groundwaters interact with surface transboundary waters (e.g., located in the discharge zone of those groundwaters).<sup>17</sup> As it is clearly explained in the Guide to Implementing the Convention, “article 2(6) provides that transboundary waters should not be limited to a water body (e.g. a river, a lake, an aquifer), but should cover the catchment area of the said water body”.<sup>18</sup>

12. Conversely, the integrated approach implies also that surface waters located entirely in the territory of one State fall under the scope of application of the Convention, by virtue

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<sup>12</sup> A/63/10, p. 35, para. of the commentary to article 2.

<sup>13</sup> One might of course argue that the term confined groundwaters is broader than the term unrelated groundwaters, in the sense that it covers not only groundwaters which are not connected with surface waters, but also non-recharging at all groundwaters.

<sup>14</sup> “Application of the UNECE Water Convention to groundwater and possible developments” (LB/2010/INF.2), para. 17. The same approach has also been followed by ILC regarding the scope of application of its draft articles: “all the transboundary aquifers and aquifer systems will be governed by the present draft articles, regardless of whether they are hydraulically connected to international watercourses” (A/63/10, p. 32, para. 2 of the commentary to article 1).

<sup>15</sup> Cf. ILA 2004 Berlin Rules, article 42, para. 1 (b): “The Rules applicable to internationally shared waters apply to an aquifer if: ... (b) It is intersected by the boundaries between two or more States even without a connection to surface waters that form an international drainage basin.”

<sup>16</sup> See A/63/10, p. 37, para. 4 of the commentary to article 2.

<sup>17</sup> See also ILA 2004 Berlin Rules, article 42, para. 1 (a): “The Rules applicable to internationally shared waters apply to an aquifer if: ... (a) It is connected to surface waters that are part of an international drainage basin”.

<sup>18</sup> Guide to implementing the Convention, para. 74.

of its article 2, paragraph 6, if they are connected to an aquifer which is intersected by State boundaries.

## **II. Some specific aspects of the application of the Water Convention to groundwaters**

13. The above considerations on the applicability of the Water Convention to surface and groundwaters alike do not exclude the appropriateness of, or even the need for, further normative guidance addressing the highly specific issues concerning the implementation of the Convention with respect to groundwaters. A number of references to groundwater issues in the Guide to Implementing the Convention, as well as a host of various ECE instruments, including documents endorsed by the Meeting of the Parties on the point at issue,<sup>19</sup> may already provide useful guidance in this area. However, a specific comprehensive instrument falling within one or more of the options put forward in the present document — be it of a model or explanatory nature, or both — might prove of crucial added value.

14. Indeed, the distinguishing features of groundwaters, in particular, the difficulty of their identification, their vulnerability in case of pollution, which cannot easily be mitigated or reduced, in connection with their non-renewable or less renewable character with respect to surface waters, appear to call for special regulatory attention for the proper and effective application of the legal regime of the Convention in this area. This chapter is limited to a brief presentation of the regulatory and practical measures suitable for addressing the specificity of groundwaters when applying the provisions of the Convention. It provides a non-exhaustive list of those measures. It should also be taken into account that they do not provide a complete framework for protecting and avoiding transboundary impact related to groundwaters, as they have to be taken in conjunction with other measures and policies, which are common to both surface water and groundwaters.

### **A. The no-harm and the equitable and reasonable utilization principles (article 2, paragraphs 1, 2 (c) and 5 (c))**

15. As illustrated in the Guide to Implementing the Convention,<sup>20</sup> the no-harm and the equitable utilization principles make up the material normative pillar of the Convention. While the obligation of prevention, control and reduction of transboundary impact — “significant adverse effect on the environment” — is prominent in the Water Convention, it is inseparably intertwined with the equitable utilization principle. The assessment of whether a given utilization causes, or not, significant transboundary harm is a priority factor for the assessment of the equitable and reasonable nature of such an utilization. Against this background, one should note that these same principles require specific forms of application with respect to groundwaters. By way of example, the material identification of groundwaters appears as a precondition for complying with the obligations of prevention under consideration in terms which are very different from those concerning surface waters. Much the same “speciality” applies with regard to the major vulnerability of groundwater deriving from the lower capacity of self-depuration with respect to surface waters.

16. Similar considerations also apply to the equitable utilization principle, particularly in connection with the no-harm rule and to the extent that it “incorporates [the principle] of

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<sup>19</sup> E.g., “Application of the UNECE Water Convention to groundwater and possible developments”.

<sup>20</sup> See especially paras. 81, 91, and 136.

sustainable development”.<sup>21</sup> To that end, States are to “take measures on the best scientific evidence available to maintain at, or to restore to, the level of the resources which produces the maximum sustainable yield: it requires measures to keep resources in perpetuity”.<sup>22</sup> While as to water quality, compliance with the principle of sustainability of a given use appears to be more onerous with respect to groundwaters, due to their higher vulnerability, as to water quantity, compliance with the principle of sustainability of a given use may appear to be less onerous since groundwaters are either less renewable than surface waters or, in some cases, not renewable at all, hence making it easier to “maximize the long-term benefits from the use of such waters”<sup>23</sup> while respecting the minimum environmental requirements. The above means preserving renewable groundwater resources and maintaining non-renewable groundwater resources to the maximum extent reasonably possible, through: (see section 1 below) tools for the sustainable use of transboundary groundwaters; and (see section 2 below) taking into account all groundwater-relevant criteria in case of conflict of uses, according to the specificities of groundwater, as exemplified in non-exclusive terms below.

## 1. Tools for the sustainable use of transboundary groundwaters

17. Among the specific elements to be taken into account when planning a policy for the sustainable use of transboundary groundwaters are the recharge of the aquifer (including artificial recharge if any), its outflow to surface waters, which should be preserved so as to protect the related ecosystem, as well as the degree of human abstraction. Groundwater use may not be considered sustainable in cases where groundwater withdrawals exceed or are likely to exceed recharge so as to endanger water quality and quantity or diminish the quality or quantity of interrelated surface water.<sup>24</sup>

18. In order to ensure the sustainable use of the transboundary groundwater, Riparian States should establish, individually or jointly, a comprehensive utilization plan, taking into account all relevant physical factors — e.g., the amount of groundwater in reserve and the rate of its replenishment — as well as present and future needs.<sup>25</sup> For States which are members of the European Union, such a utilization plan could take the form of a specific management plan supplementing the river management plan of the river basin to which the groundwater has been assigned.<sup>26</sup>

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<sup>21</sup> Ibid., para. 102.

<sup>22</sup> A/63/10, p. 42, para. 4 of the commentary to article 4 of the 2008 ILC Draft Articles.

<sup>23</sup> Ibid.

<sup>24</sup> See Bellagio “Model Agreement concerning the Use of Transboundary Groundwaters” (1989), art. VII, para. 5 (a), as well as art. 1, para. 7. See also the EU Water Framework Directive, which defines “available groundwater resource” as “the long-term annual average rate of overall recharge of the body of groundwater less the long-term annual rate of flow required to achieve the ecological quality objectives for associated surface waters specified under article 4, to avoid any significant diminution in the ecological status of such waters and to avoid any significant damage to associated terrestrial ecosystems”, as well as annex V of the Directive, where “good quantitative status” implies, inter alia, that “the level of groundwater in the groundwater body is such that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction”.

<sup>25</sup> See A/63/10, p. 42, para. 4 of the commentary to article 4 of the 2008 ILC Draft Articles.

<sup>26</sup> See EU Water Framework Directive, art. 13, para. 5: “River basin management plans may be supplemented by the production of more detailed programmes and management plans for sub-basin, sector, issue or *water type*, to deal with particular aspects of water management.”

19. Such plans should provide, inter alia, for the recording of water extractions and the quantification of the aggregate of annual abstraction,<sup>27</sup> while the imposition of pumping limitations and criteria for well placement might also be considered.<sup>28</sup>

## **2. Criteria for apportionment of conflicting claims and uses**

20. The utilization plan should also apportion the uses of groundwater. In case of conflict, the balancing of the interests of the States involved should be made on a case-by-case basis, taking into account all relevant factors, as provided in the commentary to article 2, paragraphs 2 (c) and 5 (c), of the Guide to Implementing the Convention.<sup>29</sup> Such factors include, inter alia, the characteristics of the aquifer or aquifer system, the contribution of each Riparian State to the formation and recharge of the groundwater, the availability of alternative water sources and the role of the aquifer in the related ecosystem.<sup>30</sup>

## **B. Principle of cooperation based on an integrated approach for the whole catchment area (article 2, paragraph 6)**

21. As signalled in the Guide to Implementing the Water Convention, the principle of cooperation is the catalyst for the case-specific application of the principles of no-harm and equitable utilization. Accordingly, in line with the above considerations on the specific application to groundwaters of the no-harm and equitable utilization principles, it is all the more evident how appropriate it would be to provide specific regulatory guidance on cooperation in relation to groundwaters.

22. First of all, it should be noted that the principle of cooperation, based on an integrated approach to water protection according to the concept of catchment area as enunciated in article 2, paragraph 6, of the Convention, has to be applied taking into account, in case of related groundwaters, their interaction with surface waters. Accordingly, Riparian States, once they have identified and assigned related groundwaters to the relevant river catchment area or catchment areas, should strive to promote this interaction,<sup>31</sup> and consider and manage surface waters and associated groundwater in an integrated manner.<sup>32</sup>

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<sup>27</sup> See “Agreement on the protection, utilization and recharge of the Franco-Swiss Genevese Aquifer” (1977), articles 2, paragraph 1, and 6 and 9.

<sup>28</sup> See Bellagio Model Agreement, art. 8, para. 2 (c).

<sup>29</sup> Guide to Implementing the Convention, paras. 106–108.

<sup>30</sup> See also article 5 of the 2008 ILC Draft Articles and related commentary (A/63/10, pp. 43–46) for a list of the criteria to be taken into account.

<sup>31</sup> See Convention on the Protection of the Rhine (1999), art. 3, para. 1 (c): “The Contracting Parties shall pursue the following aims through this Convention: ... maintaining, improving and restoring the natural function of the waters; ensuring that flow management takes account of the natural flow of solid matter and promotes interactions between river, ground water and alluvial areas; conserving, protecting and reactivating alluvial areas as natural floodplains”.

<sup>32</sup> “Basin States should consider the integrated management, including conjunctive use with surface waters, of their international groundwater at the request of any of them” (International Law Association, *The Seoul Rules on International Groundwaters*, 1986, art. IV). See also article 11 of the International Framework Agreement on the Sava River Basin: “The Parties agree to cooperate on management of the waters of the Sava River Basin in a sustainable manner, which includes integrated management of surface and groundwater resources ...”.



### C. Additional specific measures to protect groundwaters against pollution (article 3, paragraph 1 (k))

23. Again on the basic obligation of prevention, control and reduction of transboundary impact, special consideration should be given to the fact that the slow renewal process of groundwaters and their long residence time increases the risk that their quality will be modified by the surrounding aquifer material.<sup>33</sup> Once groundwaters have been adversely affected, it may take many years for any remedial process to reverse the concentration of pollutants. It is extremely important that Riparian States take all necessary measures to prevent pollutants from entering the aquifer and adopt long-term strategies to control and reduce any transboundary impact. The higher vulnerability of groundwaters, together with the scientific uncertainty about the nature and extent of certain aquifers,<sup>34</sup> suggest the adoption of a precautionary approach: their effective protection and rehabilitation requires early action and stable planning of protective measures.<sup>35</sup>

24. Pollutants enter the aquifer either through the recharge process, or through their direct discharge into groundwater. While the latter may be prohibited or strictly regulated, the former is often due to diffuse sources of pollution (i.e., agriculture) and requires the adoption and implementation of a whole series of measures and policies so as to prevent the input of pollutants into the groundwater and to reverse any deterioration of their qualitative status. Such measures should be “integrated into general water-protection strategies with due regard to the specific characteristics of the groundwater cycle, diffusion processes, hydrochemical regimes and response to natural and anthropogenic factors”.<sup>36</sup>

25. For the protection of groundwaters against pollution, the Riparian States may, inter alia, require the issuance of permits for the discharge and disposal of waste, taking into consideration the vulnerability of aquifers and the requirement not to overload the self-purification capacity of the soil.<sup>37</sup> Any artificial recharge of groundwaters as well as any large-scale abstraction of groundwater should be subject to a prior authorization regime, including an environmental impact assessment procedure, to ensure that the quality of groundwaters is not compromised.<sup>38</sup> Riparian States should also set coordinated water quality criteria to assess the chemical status of groundwaters (including saline water intrusion) and to identify upward trends in the concentration of pollutants.<sup>39</sup>

<sup>33</sup> See United Nations Economic Commission for Europe, *Guidelines on monitoring and assessment of transboundary groundwaters*, 2000, para. p. 9. Available from <http://www.unece.org/fileadmin/DAM/env/water/publications/documents/guidelinesgroundwater.pdf>.

<sup>34</sup> See article 12 of the 2008 ILC Draft Articles and related commentary (A/63/10, p. 57).

<sup>35</sup> See 2004 Berlin Rules, art. 38. See also EU Water Framework Directive, preamble, para. 28.

<sup>36</sup> “Recommendations to ECE Governments on the protection of soil and aquifers against non-point source pollution”, endorsed by the Senior Advisers to ECE Governments on environmental and water problems at their first session (March 1988). Available from [http://www.unece.org/fileadmin/DAM/env/water/documents/Reco\\_%20Protect.%20of%20Soil%20&%20Aquifers.pdf](http://www.unece.org/fileadmin/DAM/env/water/documents/Reco_%20Protect.%20of%20Soil%20&%20Aquifers.pdf).

<sup>37</sup> See ECE, “Charter on ground-water management” (E/ECE/1197–ECE/ENVWA/12). chap. XI, paras. 1 and 5.

<sup>38</sup> See “Agreement on Cooperation for the Protection and Sustainable Use of the Waters of the Spanish-Portuguese Hydrographic Basins” (1998), annex II, para. 3, as well as EU Water Framework Directive, art. 11, para. 3 (e) and (f).

<sup>39</sup> See EU Water Framework Directive, article 3, para. 3, and article 17, as well as Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration, articles 1 and 3.

26. In some cases, the establishment of protection zones in which land use must be regulated may contribute to minimizing pollution of groundwaters.<sup>40</sup> This policy may materialize by having recourse to a payment for ecosystem services (PES) scheme, i.e., through financial transfers from the beneficiaries of groundwater use to farmers conducting agriculture or other activities in the recharge zone of the aquifer.<sup>41</sup>

27. Such a PES scheme may include incentives to induce land users to adopt certain policies and measures, such as improvements of farm practices to reduce the concentration of nitrates and phosphorus in the groundwater, as well as the water pollution by pesticides, or the reduction of the number of cattle per hectare, or the conversion of the land use to low-use or even to natural vegetation, so as to improve water retention and water quality. It should be stressed that, before establishing such a scheme, the feasibility as well as the impact of changes or restrictions on land use on the quality of groundwaters, as well as other social and economic impacts, should be assessed.

28. The Riparian Parties may adopt programmes and management plans aiming not only at preventing or combating pollution, but also at improving the quality of groundwater through the reversal, to the extent possible, of the concentration of pollutants in groundwater. In this respect, the EU Water Framework Directive, as well as the Directive on the protection of groundwater against pollution and deterioration, set the target of achieving “good groundwater status” within 15 years of the coming into force of the EU Water Framework Directive.<sup>42</sup>

29. In sum, once again, it appears that the due-diligence standards making up the obligation of prevention, control and reduction of transboundary impact in relation to groundwaters are higher and more specific than those applicable to surface waters.

#### **D. Bilateral and multilateral cooperation (article 9)**

30. On the basis of the documentation researched, it appears that in the ECE region there are no agreements solely addressing transboundary groundwaters, with the exception of the 2007 Convention on the Protection, Utilization, Recharge and Monitoring of the Franco-Swiss Genevois Aquifer,<sup>43</sup> between the Haute Savoie and the Swiss Canton of Geneva.

31. Further to that, only a few of the agreements concerning surface waters (such as the Convention on the Protection of the Rhine, the Agreement on cooperation for the protection and sustainable use of the waters of the Spanish-Portuguese Hydrographic Basins and the Framework Agreement on the Sava River Basin), contain specific provisions on groundwater. However, the growing recognition of the importance of groundwater militates in favour of the conclusion of relevant agreements and the establishment of appropriate joint bodies. In case of groundwaters related to transboundary rivers and lakes, the concept of integrated management of both surface and groundwaters implies that, instead of concluding specific agreements for groundwaters, bilateral and multilateral agreements dealing with surface waters should also contain some provisions granting to the relevant joint bodies effective attributions in the field of groundwaters. The joint bodies could then activate those provisions either directly or through appropriate working groups.

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<sup>40</sup> See Bellagio Model Agreement, art. 8, para. 2 (a) (5).

<sup>41</sup> See “Payment for Ecosystem Services in Integrated Water Resources Management” (ECE/MP.WAT/2006/5).

<sup>42</sup> See EU Water Framework Directive, art. 4, para. 1 (b) (ii), as well as annex V.

<sup>43</sup> Available from [http://www.unece.org/env/water/meetings/legal\\_board/2010/annexes\\_groundwater\\_paper/2008Franko-Swiss-Aquifer-English.pdf](http://www.unece.org/env/water/meetings/legal_board/2010/annexes_groundwater_paper/2008Franko-Swiss-Aquifer-English.pdf).

32. Joint bodies should be entrusted with a whole series of duties necessary to implement the provisions of the Water Convention in the field of groundwaters, such as the production of utilization programmes or even joint management plans, the carrying out of joint monitoring and assessment and the control of the volume of water extracted from the aquifer.

## **E. Joint monitoring and assessment (article 11)**

33. Joint monitoring and assessment of groundwaters should be conducted taking into account the *Guidelines on monitoring and assessment of transboundary groundwaters*, endorsed by the second Meeting of the Parties to the Water Convention in 2000, and the “Strategies for monitoring and assessment of transboundary rivers, lakes and groundwaters”<sup>44</sup> adopted in 2006. It should be stressed that some features “influence the way groundwaters are monitored and assessed” and “distinguish them from surface waters”.<sup>45</sup>

34. Thus, specific monitoring of groundwaters should also take into account, apart from the usual parameters for all water bodies — such as the chemical composition of water<sup>46</sup> or the average rate of abstraction — some elements specific to groundwaters, such as aquifer geometry, aquifer vulnerability, recharge rates and interaction with surface waters, the general character of the overlying strata and hydrogeological characteristics such as hydraulic conductivity, porosity and confinement.<sup>47</sup>

## **F. Exchange of information between Riparian Parties (article 13)**

35. In the specific case of groundwaters, the implementation of the obligation of Riparian Parties to exchange information should also encompass information relating to the special characteristics of aquifers. Thus, not only hydrological, but also geological and hydrogeological data should be exchanged.<sup>48</sup> This obligation is of particular importance in case knowledge about the nature and extent of the aquifer is inadequate and there is a need to collect more accurate data on the matter. In addition, the exchange of information relating to pollutants, to the volume of water extracted and the authorizations and licences granted for the use of the groundwaters is of particular importance, so as to effectively monitor and assess the status of the groundwater body.

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<sup>44</sup> ECE/MP.WAT/2006/12.

<sup>45</sup> *Guidelines on monitoring and assessment*, p. 9. The features are presented on pp. 9 and 10.

<sup>46</sup> In this respect, see EU Directive 200/118, article 4, dealing with the procedure for assessing groundwater chemical status.

<sup>47</sup> See Bellagio Model Agreement, art. V, para. 1, as well as EU Water Framework Directive, annex V.

<sup>48</sup> “Geology” describes age, composition and structure of the aquifer matrix. “Hydrogeology” describes the ability of the aquifer to store, transmit and discharge groundwaters” (A/63/10, p. 52).