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Second report on the law of the non-navigational uses of international watercourses, by Mr. Robert Rosenstock, Special Rapporteur

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THE LAW OF THE NON-NAVIGATIONAL USES OF INTERNATIONAL WATERCOURSES

[Agenda item 5]

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Second report on the law of the non-navigational uses of international watercourses, by Mr. Robert Rosenstock, Special Rapporteur

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CONTENTS

Introduction

1. The Special Rapporteur, in this his second report on the law of the non-navigational uses of international watercourses proposes to focus on three themes:

(*a*) His affirmative conclusions on the wisdom and utility of including unrelated confined groundwaters;

(*b*) Recommendations for the articles not dealt with in his first report[1] (i.e. arts. 11-32);

(*c*) Provisions concerning dispute settlement.

[1] *Yearbook... 1993*, vol. II (Part One), p.179, document A/CN.4/451.

CHAPTER I

Groundwaters

2. The Special Rapporteur, in his first report,[2] raised the possibility of including "unrelated" confined groundwaters in the draft articles on the non-navigational uses of international watercourses. Following an exchange of views at its forty-fifth session held in 1993, the International Law Commission considered that more information was needed. It therefore requested the Special Rapporteur to undertake a study on the question of unrelated "confined groundwaters" in order to determine the feasibility of incorporating them into the topic.[3] The Special Rapporteur has carried out the study called for by the Commission. The study is contained in the annex to the present report.

3. The study carried out by the Special Rapporteur has demonstrated the wisdom of including unrelated confined groundwaters in the draft articles. The recent trend in the management of water resources has been to adopt an integrated approach. Inclusion of "unrelated" confined groundwaters is the bare minimum in the overall scheme of the management of all water resources in an integrated manner.[4]

4. The Special Rapporteur is convinced that the principles and norms applicable, in a framework convention or model rules, to watercourses and related groundwaters are equally applicable to unrelated confined groundwaters. It is moreover the Special Rapporteur's view that the changes required in the draft, which emerged from first reading[5] to achieve this wider scope, are relatively few and uncomplicated.

5. It would therefore seem unwise to retain the existing scope, which excludes unrelated confined groundwaters, and embark on a separate subsequent effort to draft a similar instrument concerning unrelated confined groundwaters. In the nature of things, this would involve delaying the conclusion of work on the subject until well into the next quinquennium of members of the ILC.

6. The changes required to include unrelated groundwaters are not complicated. One approach would commence with dropping the requirement of a "common terminus".

7. The Special Rapporteur continues to hold the view that the term "flowing into a common terminus" should be deleted from article 2 of the draft. Such a deletion would not, in the opinion of the Special Rapporteur, lead to an unmanageable expansion of the scope of the draft articles as a whole. In support of the deletion of the words "flowing into a common terminus", the Water Resources Committee of the ILA observed that those words seem to reflect a concern that a national watercourse that is artificially connected to an international watercourse system might be held to have become part of that system. In its view, which is shared by the Special Rapporteur, "this concern, however, would be better met by an express statement excluding such an interpretation of "watercourse".[6] The argument for the inclusion of the notion of "flowing into a common terminus" is an artificial one. This point is demonstrated, for example, by the flow of the waters of the Danube river. At certain times of the year, waters of that river flow into Lake Constance and the

[2] Ibid., para. 11.

[3] *Yearbook... 1993*, vol. II (Part Two), paras. 371 and 441.

[4] ILA, "The International Law Commission's draft articles on the Law of the non-navigational uses of international watercourses: Comments by the Water Resources Committee of the International Law Association" (copy of the report on file with the Special Rapporteur). As noted by the Water Resources Committee of the ILA, "The notion that the waters of a watercourse must always flow into a common terminus cannot be justified in the light of today's knowledge of the behaviour of water, in particular of the nature of aquifers and their relationship to surface waters".

[5] For the articles adopted provisionally on first reading, see *Yearbook... 1991*, vol. II (Part Two), pp. 66-70.

[6] See note 4 above.

Rhine river. Yet no one considers the Rhine and the Danube part of a single system.[7]

8. Should the Commission be willing to delete the "common terminus" requirement, the Special Rapporteur would be amenable to expanding the definition of watercourses and eschewing any addition of references to "aquifer" or "transboundary aquifer".

9. If the deletion of the requirement of a "common terminus" is not widely agreed upon, there are several relatively simple methods of including unrelated confined groundwaters.

10. The changes required to include unrelated confined groundwaters could be achieved by defining "watercourse" to include "unrelated confined groundwaters" or by adding a reference to "groundwaters" to the various articles as necessary. The Special Rapporteur believes that it is slightly preferable to follow the latter approach rather than use a strained definition of watercourse.

11. The Special Rapporteur has redrafted the articles on the assumption that unrelated confined groundwaters are to be included and that the deletion of the term "flowing into a common terminus" was either rejected or, if accepted, not considered a sufficiently clear indication of the inclusion of unrelated confined groundwaters (see redrafted text in chapter IV below).

[7] *Streitsache des Landes Württemberg und des Landes Preussen gegen das Land Baden, betreffend die Donauversinkung, Staatsgerichtshof*, Germany, 18 June 1927, *Entscheidungen des Reichsgerichts in Zivilsachen*, Berlin, vol. 116, appendix, pp. 18 et seq. The record of the case is found in the *Annual Digest of Public International Law Cases, 1927 and 1928* (A. McNair and H. Lauterpacht, eds., London, Longmans, 1931), p. 128. The case is analysed in Lederle, "Die Donauversinkung", *Annalen des Deutschen Reichs, 1917* (Munich, 1917), p. 693. See also the analysis of this case in J.A. Barberis, *Le statut des eaux souterrains en droit international*, (FAO, Etude législative 40, 1987), pp. 40 and 41. See also the examination of the case in the seventh report of the previous Special Rapporteur, Mr. Stephen C. McCaffrey (*Yearbook . . . 1991*, vol. II (Part One), pp. 45 et seq., document A/CN.4/436, especially pp. 56-57, paras. 39-43).

CHAPTER II

Other recommended changes in articles 11 to 32[8]

Obligations of the notified State (art.16)

12. The Special Rapporteur considers that it is appropriate to provide some sanction against a State which, having been notified, nevertheless fails to respond to the notification within the prescribed time. As article 16 is currently worded, there is no incentive for a notified State to reply to the notification. There is, moreover, too little protection for a notifying State which incurs expenses as a result of the failure of the notified State to respond in a timely manner. Perhaps most seriously, there is no incentive for the notified State to seek solutions to problems of conflicting uses consistent with equitable and optimal utilization. The notifying State, however, is unable to proceed with its planned measures for six months while waiting for a reply to its notification. If no reply is forthcoming, that State has lost time in implementing its planned measures and is also deprived of the opportunity to modify its planned measures in order to avoid possible infringement of the rights of other watercourse States.[9]

13. In order to correct these problems, the Special Rapporteur has introduced a new paragraph 2 in article 16 (see chapter IV below).

[8] The only articles which the Special Rapporteur suggests be changed (leaving aside the consequential minor amendments required to include unrelated confined groundwaters) are article 16 and article 21, where it is suggested that "or energy" be added in para. 3, after the word "substances".

[9] For a more detailed comment on this point, see C. B. Bourne, "The International Law Commission's draft articles on the law of international watercourses: principles and planned measures", *Colorado Journal of International Environmental Law and Policy* (Boulder, 1992), vol. 3, No. 1, pp. 68-69. See also the comments by the Water Law Resources Committee of the International Law Association (footnote 4 above); and paragraphs 18 and 19 of the comments and observations of the Government of the Netherlands (*Yearbook . . . 1993*, vol. II (Part One), p. 161, document A/CN.4/447/Add.1-3).

CHAPTER III

Dispute settlement

14. The Commission has declined, owing to lack of time or otherwise, to accept the sophisticated and complex provisions of previous Special Rapporteurs on dispute settlement. It is, moreover, a framework convention with which we are dealing.

15. The Special Rapporteur remains convinced that, at a minimum, a tailored, bare-bones provision on the settlement of disputes is an indispensable component of any convention the Commission would put forward on the current topic.

16. While the Special Rapporteur would be more than willing to return *in toto*, should the members so desire, to the scheme contained in Mr. McCaffrey's sixth report (1990),[10] he urges, as an alternative and at a minimum, consideration of the addition in the main body of the draft of the simplified article reproduced below (see chap. IV below).

[10] *Yearbook . . . 1990*, vol. II (Part One), p. 41, document (A/CN.4/427 and Add.1.

CHAPTER IV

Text of the draft articles incorporating the changes proposed by the Special Rapporteur

17. The text of the draft articles, incorporating the changes proposed by the Special Rapporteur (*in italics*), is as follows:

PART I

INTRODUCTION

Article 1

18. In paragraph 1, the words "and transboundary aquifers" should be added after "international watercourses" and "and aquifers" after "those watercourses", so that the article would read:

"*Article 1. Scope of the present articles*

1. The present articles apply to uses of international watercourses *and transboundary aquifers* and of their waters for purposes other than navigation and to measures of conservation *and management* related to the uses of those watercourses *and aquifers* and their waters.

2. The use of international watercourses for navigation is not within the scope of the present articles except in so far as other uses affect navigation or are affected by navigation."

Article 2

19. In subparagraph (*a*), the definition of an "international watercourse" should include the words "transboundary aquifers"; in subparagraph (*b*) the words "flowing into a common terminus" should be deleted; a new subparagraph (*b*) *bis* should add a definition of the term "confined groundwaters" and other terms related to it; and subparagraph (*c*) should add the words "transboundary aquifer". Article 2 would then read as follows:

"*Article 2. Use of terms*

For the purposes of the present articles:

(*a*) "International watercourse" means a watercourse or aquifer, parts of which are situated in different States;

(*b*) "Watercourse" means a system of surface and underground waters constituting by virtue of their physical relationship a unitary whole [and flowing into a common terminus];[11]

(*b*) bis. "Confined groundwaters" means waters in aquifers;

"Transboundary confined groundwaters" means waters in transboundary aquifers;

"Aquifer" means a subsurface, water-bearing geologic formation from which significant quantities of water may be extracted; and the waters therein contained;

"Transboundary aquifer" means an aquifer intersected by an international boundary;[12]

(*c*) "Watercourse State" means a State in whose territory part of an international watercourse or a transboundary aquifer is situated."

Article 3

20. The words "or aquifer" and "or transboundary aquifer" should be added in paragraphs 1, 2 and 3. Article 3 would thus read:

"*Article 3. Watercourse or aquifer agreements*

1. Watercourse States may enter into one or more agreements, hereinafter referred to as 'watercourse or aquifer agreements', which apply and adjust the provisions of the present articles to the characteristics and uses of a particular international watercourse or transboundary aquifer or part thereof.

2. Where a watercourse or aquifer agreement is concluded between two or more watercourse States, it shall define the waters to which it applies. Such an agreement may be entered into with respect to an entire international watercourse or transboundary aquifer or with respect to any part thereof or a particular project, programme or use, provided that the agreement does not adversely affect, to a significant* extent, the use by one or more other watercourse States of the waters of the watercourse or aquifer.

3. Where a watercourse State considers that adjustment or application of the provisions of the present articles is required because of the characteristics and uses of a particular international watercourse *or transboundary aquifer*, watercourse States shall consult with a view to negotiating in good faith for the purpose of concluding a watercourse *or aquifer* agreement or agreements.

[11] The inclusion or exclusion of this phrase is not critical with regard to the draft articles covering confined groundwaters. The Special Rapporteur suggests its deletion since it is a hydrologically unsound oversimplification which serves no useful purpose.

[12] For the source of these definitions, see Robert D. Hayton and Albert E. Utton, "Transboundary groundwaters: The Bellagio draft treaty", *Natural Resources Journal* (Albuquerque, N.M), vol. 29, No. 3, 1989, p. 663.

* In accordance with the decision of the Drafting Committee at the forty-fifth session (1993) of the International Law Commission, the term "significant" will replace the term "appreciable" throughout. It was agreed by the Drafting Committee that the commentary would reflect the fact that the term was changed from "appreciable" to "significant" to avoid the ambiguity of the term "appreciable" (which may mean either "capable of being measured" or "significant") and not as a means of seeking to raise the threshold. See *Yearbook . . . 1993*, vol. I, 2322nd meeting, para. 4; and ibid., vol. II (Part Two), paras. 374-389.

Article 4

21. The words "or aquifer" and "or transboundary aquifer" should be added throughout the text, so that the article would read:

"*Article 4. Parties to watercourse or aquifer agreements*

1. Every watercourse State is entitled to participate in the negotiation of and to become a party to any watercourse *or aquifer* agreement that applies to the entire international watercourse or *transboundary aquifer*, as well as to participate in any relevant consultations.

2. A watercourse State whose use of an international watercourse *or transboundary aquifer* may be affected to a significant* extent by the implementation of a proposed watercourse or aquifer agreement that applies only to a part of the watercourse *or aquifer* or to a particular project, programme or use is entitled to participate in consultations on, and in the negotiation of, such an agreement, to the extent that its use is thereby affected, and to become a party thereto."

* See the note to article 3.

PART II

GENERAL PRINCIPLES

Article 5

22. The words "or transboundary aquifer" and "or aquifer" should be added, so that article 5 would read:

"*Article 5. Equitable and reasonable utilization and participation*

1. Watercourse States shall in their respective territories utilize an international watercourse *or transboundary aquifer* in an equitable and reasonable manner. In particular, an international watercourse *or transboundary aquifer* shall be used and developed by watercourse States with a view to attaining optimal utilization thereof and benefits therefrom consistent with adequate protection of the watercourse *or aquifer*.

2. Watercourse States shall participate in the use, management, development and protection of an international watercourse *or transboundary aquifer* in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse *or aquifer* and the duty to cooperate in the protection and development thereof, as provided in the present articles."

Article 6

23. The words "or transboundary aquifer" and "or aquifer" should be added, so that article 6 would read:

"*Article 6. Factors relevant to equitable and reasonable utilization*

1. Utilization of an international watercourse *or transboundary aquifer* in an equitable and reasonable manner within the meaning of article 5 requires taking into account all relevant factors and circumstances, including:

(*a*) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;

(*b*) The social and economic needs of the watercourse States concerned;

(*c*) The effects of the use or uses of the watercourse *or aquifer* in one watercourse State on other watercourse States;

(*d*) Existing and potential uses of the watercourse *or aquifer*;

(*e*) Conservation, protection, development and economy of use of the water resources of the watercourse *or aquifer* and the costs of measures taken to that effect;

(*f*) The availability of alternatives, of corresponding value, to a particular planned or existing use.

2. In the application of article 5 or paragraph 1 of this article, watercourse States concerned shall, when the need arises, enter into consultations in a spirit of cooperation."

Article 7

24. In the amended version of the article proposed by the Special Rapporteur in his first report,[13] the words "or transboundary aquifer" and "or aquifer" should be added, so that article 7 would read:

"*Article 7. Obligation not to cause appreciable harm*

Watercourse States shall exercise due diligence to utilize an international watercourse *or transboundary aquifer* in such a way as not to cause significant* harm to other watercourse States, absent their agreement, except as may be allowable under an equitable and reasonable use of the watercourse *or aquifer*. A use which causes significant* harm in the form of pollution shall be presumed to be an inequitable and unreasonable use unless there is: (*a*) a clear showing of special circumstances indicating a compelling need for ad hoc adjustment; and (*b*) the absence of any imminent threat to human health and safety."

* See the note to article 3.

[13] (A/CN.4/451) (footnote 1 above), para. 27.

Article 8

25. The words "or transboundary aquifer" should be added at the end of the text, so that article 8 would read:

"*Article 8. General obligation to cooperate*

Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity and mutual benefit in order to attain optimal utilization and adequate protection of an international watercourse *or transboundary aquifer*."

Article 9

26. The words "or aquifer" should be added to paragraph 1, so that article 9 would read:

"*Article 9. Regular exchange of data and information*

1. Pursuant to article 8, watercourse States shall on a regular basis exchange readily available data and information on the condition of the watercourse *or aquifer*, in particular that of a hydrological, meteorological, hydrogeological and ecological nature, as well as related forecasts.

2. If a watercourse State is requested by another watercourse State to provide data or information that is not readily available, it shall employ its best efforts to comply with the request but may condition its compliance upon payment by the requesting State of the reasonable costs of collecting and, where appropriate, processing such data or information.

3. Watercourse States shall employ their best efforts to collect and, where appropriate, to process data and information in a manner which facilitates its utilization by the other watercourse States to which it is communicated."

Article 10

27. The words "or transboundary aquifer" should be added, so that article 10 would read:

"*Article 10. Relationship between different categories of uses*

1. In the absence of agreement or custom to the contrary, no use of an international watercourse *or transboundary aquifer* enjoys inherent priority over other uses.

2. In the event of a conflict between uses of an international watercourse *or transboundary aquifer*, it shall be resolved with reference to the principles and factors set out in articles 5 to 7, with special regard being given to the requirements of vital human needs."

PART III

PLANNED MEASURES

Article 11

28. The words "or transboundary aquifer" should be added at the end of the text, so that article 11 would read:

"*Article 11. Information concerning planned measures*

Watercourse States shall exchange information and consult each other on the possible effects of planned measures on the condition of an international watercourse *or transboundary aquifer*."

Articles 12 to 15

29. No change is proposed for articles 12 to 15, which read as follows:

Article 12. Notification concerning planned measures with possible adverse effects

Before a watercourse State implements or permits the implementation of planned measures which may have an appreciable adverse effect upon other watercourse States, it shall provide those States with timely notification thereof. Such notification shall be accompanied by available technical data and information in order to enable the notified States to evaluate the possible effects of the planned measures.

Article 13. Period for reply to notification

Unless otherwise agreed, a watercourse State providing a notification under article 12 shall allow the notified States a period of six months within which to study and evaluate the possible effects of the planned measures and to communicate their findings to it.

Article 14. Obligations of the notifying State during the period for reply

During the period referred to in article 13, the notifying State shall cooperate with the notified States by providing them, on request, with any additional data and information that is available and necessary for an accurate evaluation, and shall not implement or permit the implementation of the planned measures without the consent of the notified States.

Article 15. Reply to notification

1. The notified States shall communicate their findings to the notifying State as early as possible.

2. If a notified State finds that implementation of the planned measures would be inconsistent with the provisions of articles 5 or 7, it shall communicate this finding to the notifying State within the period referred to in article 13, together with a documented explanation setting forth the reasons for the finding.

Article 16

30. A paragraph 2 should be added, so that article 16 would read as follows:

"*Article 16. Absence of reply to notification*

1. If, within the period referred to in article 13, the notifying State receives no communication under paragraph 2 of article 15, it may, subject to its obligations under articles 5 and 7, proceed with the implementation of the planned measures, in accordance with the notification and any other data and information provided to the notified States.

2. Any rights of a notified State which has failed to reply may be offset by any costs incurred by the notifying State for action undertaken after the expiration of the time for reply. Reparations shall not lie for damage suffered between the date by which the notified State was required to reply and sufficient time after the receipt of the complaint from the notified State for the notifying State to terminate the conduct which is causing harm."

Articles 17 to 19

31. No change is proposed for articles 17 to 19, which read as follows:

Article 17. Consultations and negotiations concerning planned measures

1. If a communication is made under paragraph 2 of article 15, the notifying State and the State making the communication shall enter into consultations and negotiations with a view to arriving at an equitable resolution of the situation.

2. The consultations and negotiations shall be conducted on the basis that each State must in good faith pay reasonable regard to the rights and legitimate interests of the other State.

3. During the course of the consultations and negotiations, the notifying State shall, if so requested by the notified State at the time it makes the communication, refrain from implementing or permitting the implementation of the planned measures for a period not exceeding six months.

Article 18. Procedures in the absence of notification

1. If a watercourse State has serious reason to believe that another watercourse State is planning measures that may have a significant* adverse effect upon it, the former State may request the latter to apply the provisions of article 12. The request shall be accompanied by a documented explanation setting forth the reasons for such belief.

2. In the event that the State planning the measures nevertheless finds that it is not under an obligation to provide a notification under article 12, it shall so inform the other State, providing a documented explanation setting forth the reasons for such finding. If this finding does not satisfy the other State, the two States shall, at the request of that other State, promptly enter into consultations and negotiations in the manner indicated in paragraphs 1 and 2 of article 17.

3. During the course of the consultations and negotiations, the State planning the measures shall, if so requested by the other State at the time it requests the initiation of consultations and negotiations, refrain from implementing or permitting the implementation of those measures for a period not exceeding six months.

* See the note to article 3.

Article 19. Urgent implementation of planned measures

1. In the event that the implementation of planned measures is of the utmost urgency in order to protect public health, public safety or other equally important interests, the State planning the measures may, subject to articles 5 and 7, immediately proceed to implementation, notwithstanding the provisions of article 14 and paragraph 3 of article 17.

2. In such cases, a formal declaration of the urgency of the measures shall be communicated to the other watercourse States referred to in article 12 together with the relevant data and information.

3. The State planning the measures shall, at the request of any of the States referred to in paragraph 2, promptly enter into consultations and negotiations with it in the manner indicated in paragraphs 1 and 2 of article 17.

PART IV

PROTECTION AND PRESERVATION

Article 20

32. The words "or transboundary aquifers" should be added at the end of the text, so that article 20 would read:

"*Article 20. Protection and preservation of ecosystems*

Watercourse States shall, individually or jointly, protect and preserve the ecosystems of international watercourses *or transboundary aquifers*."

Article 21

33. Paragraph 1 of article 21, which deals with the definition of pollution, should be moved to article 2 (Use of terms), adding "or transboundary aquifer" after "international watercourse" in paragraphs 1, 2 and 3. In paragraph 3, add "or energy" after "list of substances". On the understanding that paragraph 1 is to be moved to article 2, article 21 would read:

"*Article 21. Prevention, reduction and control of pollution*

1. For the purpose of this article, 'pollution of an international watercourse *or transboundary aquifer*' means any detrimental alteration in the composition of quality of the waters of an international watercourse *or transboundary aquifer* which results directly or indirectly from human conduct.

2. Watercourse States shall, individually or jointly, prevent, reduce and control pollution of an international watercourse *or transboundary aquifer* that may cause significant harm to other watercourse States or to their environment, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse. Watercourse States shall take steps to harmonize their policies in this connection.

3. Watercourse States shall, at the request of any of them, consult with a view to establishing lists of substances *or energy*, the introduction of which into the waters of an international watercourse *or transboundary aquifer* is to be prohibited, limited, investigated or monitored."

Article 22

34. The words "or transboundary aquifer" should be added after "an international watercourse" and "or aquifer" after "the watercourse", so that article 22 would read:

"*Article 22. Introduction of alien or new species*

Watercourse States shall take all measures necessary to prevent the introduction of species, alien or new, into an international watercourse *or transboundary aquifer* which may have effects detrimental to the ecosystem of the watercourse or aquifer resulting in significant* harm to other watercourse States."

* See the note to article 3.

Article 23

35. No change is proposed for article 23, which reads as follows:

Article 23. Protection and preservation of the marine environment

Watercourse States shall, individually or jointly, take all measures with respect to an international watercourse that are necessary to protect and preserve the marine environment, including estuaries, taking into account generally accepted international rules and standards.

PART V

HARMFUL CONDITIONS AND EMERGENCY SITUATIONS

Articles 24 and 25

36. No change is proposed for articles 24 and 25, which read as follows:

Article 24. Prevention and mitigation of harmful conditions

Watercourse States shall, individually or jointly, take all appropriate measures to prevent or mitigate conditions that may be harmful to other watercourse States, whether resulting from natural causes or human conduct, such as flood or ice conditions, waterborne diseases, siltation, erosion, salt-water intrusion, drought or desertification.

Article 25. Emergency situations

1. For the purposes of this article, 'emergency' means a situation that causes, or poses an imminent threat of causing, serious harm to watercourse States or other States and that results suddenly from natural causes, such as floods, the breaking up of ice, landslides or earthquakes, or from human conduct, as for example in the case of industrial accidents.

2. A watercourse State shall, without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations of any emergency originating within its territory.

3. A watercourse State within whose territory an emergency originates shall, in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency.

4. When necessary, watercourse States shall jointly develop contingency plans for responding to emergencies, in cooperation, where appropriate, with other potentially affected States and competent international organizations.

PART VI

MISCELLANEOUS PROVISIONS

Article 26

37. In paragraphs 1 and 2 (*a*), the words "or transboundary aquifer" should be added after "international watercourses". In paragraph 2 (*b*), the words "or aquifer" should be added after "watercourse". Article 26 would thus read:

"*Article 26. Management*

1. Watercourse States shall, at the request of any of them, enter into consultations concerning the management of an international watercourse *or transboundary aquifer*, which may include the establishment of a joint management mechanism.

2. For the purposes of this article, "management" refers, in particular, to:

(*a*) Planning the sustainable development of an international watercourse *or transboundary aquifer* and providing for the implementation of any plans adopted; and

(*b*) Otherwise promoting rational and optimal utilization, protection and control of the watercourse *or aquifer*."

Article 27

38. In paragraphs 1 and 3, the words "or transboundary aquifer" should be added at the end. Article 27 would thus read:

"*Article 27. Regulation*

1. Watercourse States shall cooperate where appropriate to respond to needs or opportunities for regulation of the flow of the waters of an international watercourse *or transboundary aquifer.*

2. Unless they have otherwise agreed, watercourse States shall participate on an equitable basis in the construction and maintenance or defrayal of the

costs of such regulation works as they may have agreed to undertake.

3. For the purposes of this article, 'regulation' means the use of hydraulic works or any other continuing measure to alter, vary or otherwise control the flow of the waters of an international watercourse *or transboundary aquifer.*"

Article 28

39. In paragraphs 1 and 2 (*a*), the words "or transboundary aquifer" should be added after "watercourse". Article 28 would thus read:

"*Article 28. Installations*

1. Watercourse States shall, within their respective territories, employ their best efforts to maintain and protect installations, facilities and other works related to an international watercourse *or transboundary aquifer.*

2. Watercourse States shall, at the request of any of them which has serious reason to believe that it may suffer significant* adverse effects, enter into consultations with regard to:

(*a*) The safe operation or maintenance of installations, facilities or other works related to an international watercourse *or transboundary aquifer*; or

(*b*) The protection of installations, facilities or other works from wilful or negligent acts or the forces of nature."

* See the note to article 3.

Articles 29 to 32

40. While the Special Rapporteur is not necessarily advocating deletion of article 29, he notes that several States have so suggested in statements and written comments and that the article does not lay down any rule which does not, by the terms of the article, exist already as a binding obligation. No change is proposed for the article. No change is proposed, either, for articles 30 to 32. Articles 29 to 32 would read as follows:

"*Article 29. International watercourses and installations in time of armed conflict*

International watercourses and related installations, facilities and other works shall enjoy the protection accorded by the principles and rules of international law applicable in international and internal armed conflict and shall not be used in violation of those principles and rules."

Article 30. Indirect procedures

In cases where there are serious obstacles to direct contacts between watercourse States, the States concerned shall fulfil their obligations of cooperation provided for in the present articles, including exchange of data and information, notification, communication, consultations and negotiations, through any indirect procedure accepted by them.

Article 31. Data and information vital to national defence or security

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

Article 32. Non-discrimination

Watercourse States shall not discriminate on the basis of nationality or residence in granting access to judicial and other procedures, in accordance with their legal systems, to any natural or juridical person who has suffered significant* harm as a result of an activity related to an international watercourse or is exposed to a threat thereof."

* See the note to article 3.

Article 33

41. The Special Rapporteur proposes the following provision on dispute settlement.

"*Article 33. Settlement of disputes*

1. Watercourse States shall settle their watercourse disputes by peaceful means.

2. In the absence of an applicable agreement between the States concerned for the settlement of such disputes, the disputes are to be settled in accordance with the following:

(*a*) If a dispute arises concerning a question of fact or concerning the interpretation or application of the present articles, the States concerned shall expeditiously enter into consultations and negotiations with a view to arriving at an equitable resolution of the dispute;

(*b*) If the States concerned have not arrived at a settlement of the dispute through consultations and negotiations within six months, they shall have recourse to impartial fact-finding or conciliation;

(*c*) If after twelve months from the initial request for fact-finding or conciliation or, if there has been agreement to establish a fact-finding or conciliation commission, six months after receipt of a report from the fact-finding or conciliation commission, whichever is later, the parties have been unable to settle the dispute, any of the parties may submit the dispute to binding arbitration by any permanent or ad hoc tribunal that has been accepted by all the parties to the dispute.

Annex

THE LAW OF THE NON-NAVIGATIONAL USES OF INTERNATIONAL WATERCOURSES

"UNRELATED" CONFINED GROUNDWATERS

A. Transboundary groundwaters

1. Transboundary groundwaters are found in virtually every continent of the world. For example, there are extensive aquifers found in north-eastern Africa, north-central Africa and in north-western Africa.[1]

2. The North-Eastern Aquifer underlies the Libyan Arab Jamahiriya, Egypt, Chad and the Sudan; that on the Arabian peninsula is shared by Saudi Arabia, Bahrain, and perhaps Qatar and the United Arab Emirates; the aquifer in the northern Sahara basin is shared by Algeria, Tunisia and the Libyan Arab Jamahiriya; the Chad aquifer is shared by Chad, Niger, the Sudan, the Central African Republic, Nigeria and Cameroon; the aquifer on the Taoudeni basin is shared by Chad, Egypt, the Libyan Arab Jamahiriya and the Sudan; and the Maestrichian aquifer or basin is shared by Senegal, the Gambia, Guinea-Bissau and Mauritania.[2] A recent study of the Nubian Sandstone Aquifer showed that the aquifer underlies vast areas of Chad, Egypt, the Libyan Arab Jamahiriya and the Sudan, and is subdivided into hydraulically interconnected sub-basins. Other examples could be cited in North America, Asia and Europe. It has been pointed out that, "apart from remote islands, virtually all countries share a groundwater system with one or more other countries".[3]

3. A number of transboundary groundwaters are not related to surface water, and do not flow into a common terminus, especially in arid regions.[4] These unrelated confined groundwaters are completely enclosed and the only outlets for water are through capillary action and evaporation, and they may for all practical purposes be independent of any identifiable inland surface water system. They may periodically recharge from water filtering through floods along dry gulches and into dry pans in the desert.[5] These confined groundwaters are said to have occurred through clogging of the overlying terrain, or the geologic movement of the earth may have resulted in the original surface recharge zones being cut off from the aquifer formation. Additionally, climatic changes a long time ago may have caused rivers and lakes which once fed the aquifers to disappear. The recharge of these aquifers takes place in many cases from precipitation or melting of ice or snow, in cases where these are present. Thus, from all points of view, such aquifers are "independent" reservoirs and do not interact significantly with existing surface water.[6]

B. Human dependence on groundwater

4. Groundwater is the largest source of fresh water available in storage on earth. It is estimated that, in comparison with freshwater lakes which hold 120,000 cubic kilometres of water, the amount of groundwater to a depth of 800 metres into the crust of the earth is about 4 million cubic kilometres. A further 14 million cubic kilometres of water is said to occur at depths of between 1 and 3 kilometres.[7]

5. Throughout the world, the majority of people are dependent on groundwater reserves for their supplies. For example, in the States members of the European Union, groundwater accounts overall for 70 per cent of the drinking water, with a much higher percentage in Germany and in the Benelux countries, and 93 per cent in Italy.[8] Half of all drinking water in the United States comes from groundwater,[9] and 97 per cent of that is used by the rural population. According to the OECD, groundwater in Europe provides 75 per cent of all drinking-water supplies. In some countries, groundwater is virtually the only source of drinking water. In Denmark, for example, groundwater accounts for 98 per cent of drinking water. Groundwater is often the only source of water in arid and semi-arid regions. In such regions, groundwater is of vital importance to any socio-economic development. With an ever increasing human population, coupled with the

[1] ILA, *Report of the Sixty-second Conference*, Seoul, 1986, London, 1987, pp. 231 et seq. (hereinafter referred to as the Seoul report), particularly p. 238.

[2] D. A. Caponera and D. Alhéritière, "Principles for International Groundwater Law", *Natural Resources Journal* (Albuquerque, N.M.), vol. 18, No. 3, 1978, pp. 589 et seq., particularly p. 590.

[3] Ibid., citing *Ground Water in Africa* (United Nations Sales No. E.71.II.A.16); and *Ground Water in the Western Hemisphere*, Natural Resources Water Series No. 4 (United Nations publication, Sales No. E.76.II.A.5).

[4] ILA, Seoul report, p. 256.

[5] Ibid., citing Margat, "Groundwater reservoirs, physical basis for their use", in *Groundwater Seminar Granada*, report of the FAO/UNDP seminar organized by the Government of Spain on the role of groundwater in the optimal utilization of hydraulic resources; Granada, 1971, FAO Irrigation and Drainage Paper No. 18 (Rome, 1973).

[6] Ibid.

[7] *Groundwater Storage and Artificial Recharge*, Natural Resources/Water Series No. 2 (United Nations publication, Sales No. E.74.II.A.11), p. 1.

[8] L.A. Teclaff and E. Teclaff, "Transboundary Ground Water Pollution: Survey and Trends in Treaty Law", *Natural Resources Journal* (Albuquerque, N.M.), vol. 19, No. 3, 1979, p. 629 .

[9] Ibid., citing the Environmental Protection Agency (EPA), *Federal Register*, vol. 43, p. 58948 (1978).

depletion or contamination of surface water, the value of groundwater has taken centre stage in many parts of the world. In Africa, where surface water is scanty away from big rivers, most of the water for consumption is drawn from underground wells. In recent times there has been a sharp increase in the use of groundwater as a result of Africa's rapid entry into the modern industrial economy.

6. In both North and South America, groundwater is extensively utilized. In Mexico in particular, "where desert and arid and semi-arid conditions prevail over two thirds of the territory, groundwater is a priceless resource". About 12 billion cubic metres of water per annum is extracted from wells for various uses.[10] Similarly, in the Eastern Mediterranean and Western Asia, there has been a correspondingly rapid increase in the demand for water. For the most part, groundwater is the only source of water supply in most of the region. This rapid demand is the result of industrial development and urbanization, especially following the discovery of large reserves of oil, and the need to increase agricultural production. In some countries of the region, "groundwater exploration and development have reached spectacular levels".[11] In general, groundwater has become a more reliable and controllable source of water than surface water for irrigation.[12] Throughout the world "the general picture is one of more recent resort to groundwater".[13]

C. Pollution of groundwater

7. Present-day concerns for all water resources, and for groundwater in particular, are over their increased pollution. This concern has been encapsulated in a recent Charter on groundwater management, adopted by the ECE:

> Groundwater—as a natural resource with both ecological and economic value—is of vital importance for sustaining life, health and the integrity of ecosystems. This resource is, however, increasingly threatened by overuse and insidious long-term effects of pollution. Pollution comes from both point sources and diffuse sources. Potential risks or actual impacts could permanently impair underground water resources, with far-reaching and unpredictable implications for present and future generations. Action is urgently needed.[14]

8. Pollution of transboundary aquifers could be catastrophic to countries sharing their waters.[15] The pollution of groundwater, and particularly confined groundwater, could be even more serious than that of surface water since, owing to the groundwater's slow movement, the pollutants tend to be stored in the aquifer.[16] According to experts, it could take up to 100 years of constant recharging with clean water before a polluted aquifer is again capable of discharging potable water, if in fact the contaminant could be degraded.[17] On the other hand, it could take an indefinite period of time to get rid of a pollutant which is not readily degradable or absorbable underground, "since the average residence time of groundwater is of the order of 200 years".[18]

9. The sources of pollution for groundwater, related or unrelated, and surface water as well, for that matter, include agricultural fertilizers, animal wastes and pesticides, septic tanks, underground storage tanks, waste sites, underground injection wells, surface impoundments, materials storage and transport, urban runoff, chemical and other processing plants and mining and saline intrusion.[19] Contamination may also occur when groundwater is depleted, thus allowing the intrusion of salt water into the aquifer.

D. State practice concerning transboundary groundwater

10. In the past, there has been little concern by States over the proper utilization of groundwater and its protection from pollution owing to lack of a better understanding of the hydraulic cycle and also because, unlike surface water, groundwater is out of sight, and its pollution is not readily apparent until at a very late stage.[20] State practice concerning transboundary groundwater in particular is scanty. Only a few treaties dealing with shared water resources include groundwater. Examples of such treaties are: the 1925 agreement between Egypt and Italy concerning the Ramla well,[21] the 1927 Convention and Protocol between the Soviet Union and Turkey regarding the use of frontier waters[22] and the 1947 Treaty of Peace between the Allies and Italy which set out the guarantees between Italy and Yugoslavia on springs in the Commune of Gorizia.[23] Some treaties deal with the question of protection of groundwater against pollution. These include the 1955 agreement between Yugoslavia and Hungary,[24]

[10] *Ground Water in the Western Hemisphere*, see footnote 3 above, p. 2.

[11] *Ground Water in the Eastern Mediterranean and Western Asia*, Natural Resources/Water Series No. 9 (United Nations publication, Sales No. E.82.II.A.8), p. 4.

[12] E. Fano and M. Brewster, "Issues in ground water economics", in United Nations, Department of Technical Cooperation for Development, *Ground Water Economics*; report of a United Nations international symposium and workshop convened in cooperation with the Government of Spain, Barcelona, Spain, 19-23 October 1987, document TCD/SEM.88/2, p. 35.

[13] R.D. Hayton, "The ground water legal regime as instrument of policy objectives and management requirements", *Natural Resources Journal* (Albuquerque, N.M.), vol. 22, No. 1, 1982, p. 119.

[14] ECE, *Charter on groundwater management* (United Nations publication, Sales No. 89.II.E.21), "Foreword".

[15] See A. E. Utton, "The development of international ground water law", *Natural Resources Journal* (Albuquerque, N.M.), vol. 22, No. 1 (1982), p. 109.

[16] Ibid., p. 108. See also Teclaff and Teclaff, loc. cit., p. 632.

[17] M.C. Haase, "Interrelationship of ground and surface water: an enigma to Western water law", *Southwestern University Law Review* (Los Angeles, Calif.), vol. 10, 1978, pp. 2069 et seq., particularly 2079 (1978), cited in Teclaff and Teclaff, loc. cit., p. 632.

[18] Environmental Protection Agency estimate (see footnote 9 above); also cited in Teclaff and Teclaff, loc. cit., p. 632.

[19] OECD, *Water Resource Management—Integrated policies* (Paris, October 1989), p. 222.

[20] See Teclaff and Teclaff, loc. cit., p. 636.

[21] Agreement between Egypt and Italy fixing the frontier between Cyrenaica and Egypt (Cairo, 6 December 1925) (United Nations, *Legislative Texts* . . . (ST/LEG/SER.B/12)), p. 99, Treaty No. 6.

[22] Ibid., p. 384, Treaty No. 106.

[23] United Nations, *Treaty Series*, vol. 49, pp. 3 et seq., particularly p. 13.

[24] Agreement concerning water-economy questions, together with the Statute of the Yugoslav-Hungarian Water Economy Commission (Belgrade, 8 August 1955) (United Nations, *Legislative Texts*, Treaty No. 228, p. 830).

the 1956 agreement between Yugoslavia and Albania,[25] the 1958 agreement between Yugoslavia and Bulgaria,[26] the 1958 agreement between Poland and Czechoslovakia,[27] the 1964 agreement between Poland and the USSR,[28] the 1971 agreement between Finland and Sweden concerning frontier rivers,[29] the 1972 Convention between Switzerland and Italy concerning the protection of frontier water against pollution[30] and the 1973 agreement between the United States and Mexico concerning the problems of salinity of the Colorado River.[31]

11. All the treaties on this subject refer to "groundwater" and apply equally to both unrelated confined groundwater as well as to those watercourses which flow into a common terminus. The Yugoslav agreements, for example, apply to "all water economy questions". The expression "water system" is defined to mean "all watercourses (surface or underground, natural or artificial)".

12. The 1964 agreement between Poland and the USSR defines "frontier waters" to include "groundwaters intersected by the State frontier" (art. 2, para. 3). By that agreement, the parties undertook to cooperate in economic, scientific and technical activities relating to the use of water resources in frontier waters, including, in particular, "the protection of surface and groundwaters against depletion and pollution" (art. 3, para. 7). The treaty between Finland and Sweden applies, *inter alia*, to "measures taken in any waters which may affect groundwater conditions" (chap. 3, art. 1).

13. The 1973 agreement between the United States and Mexico limits the pumping of groundwater in each territory within 5 miles (8 kilometres) of the Arizona-Sonora boundary near San Luis to 160,000 acre-feet (197,558 cubic metres), pending the conclusion of a more comprehensive agreement on groundwater. The two countries are required to consult with each other "prior to the undertaking of any new development of either the surface or the groundwater resources, or undertaking substantial modifications of present developments, in its own territory in the border area that might adversely affect the other country". By taking these measures, Mexico, which is the lower riparian State, was to receive a consistent volume of water, as well as qualitatively clean water for its use in agriculture, industry and for human consumption.[32]

14. As for the Convention between Italy and Switzerland, a Pollution Control Joint Commission was established to undertake all necessary investigations on the origin, nature and magnitude of pollution of surface and groundwater which might contribute to the pollution of Lake Maggiore, Lake Lugano and other waters.[33]

E. Integrated water resource management

15. State practice on the management of groundwater resources has been found to be lacking. The tendency in the past has been for States to treat groundwater as separate from surface water. This approach has resulted mainly from a lack of proper understanding of the interconnection between groundwater and surface water and the hydrologic cycle in particular. This segregation of groundwater from surface water:

> has been common among hydrologists as well as the general public, and is reflected in legislation, in the division of responsibility among government agencies, in development and regulation . . . Any water pumped from wells under equilibrium conditions is necessarily diverted into the aquifer from somewhere else, perhaps from other aquifers, perhaps from streams or lakes, perhaps from wetlands—ideally, but not necessarily, from places where it was of no use to anyone. There are enough examples of stream flow depletion by groundwater development, and of groundwater pollution from wastes released into surface waters, to attest to the close though variable relation between surface water and groundwater.[34]

16. More recently, however, there has been a concerted effort "to optimize the utilization of available water resources in the face of increasing demand".[35] There is now a search for a better understanding of the hydrologic cycle. Contamination of water has also "provided additional emphasis on the resolution of water management problems in which rational development, use and conservation of groundwater have become major factors".[36] It has been recommended that the most viable way in which to attain proper utilization and management of water is to adopt an integrated management of all the water resources, including, in particular, groundwater.

17. A series of recommendations and resolutions on the proper utilization and management of water resources has been adopted, starting with the United Nations Water Conference, at which it was recommended that:

> measures be taken to utilize groundwater aquifers in the form of collective and integrated systems, where possible and useful, taking into account the regulation and use of surface-water resources. This will provide an opportunity to exploit the groundwater aquifers to their

[25] Agreement concerning water-economy questions, together with the Statute of the Yugoslav-Albanian Water Economy Commission and with the Protocol concerning fishing in frontier lakes and rivers (Belgrade, 5 December 1956) (ibid., p. 441, Treaty No. 128).

[26] Agreement (with annex) concerning water economy questions (Sofia, 4 April 1958) (United Nations, *Treaty Series*, vol. 367, p. 89).

[27] Agreement concerning the use of water resources in frontier waters (with annex) (Prague, 21 March 1958) (ibid., vol. 538, p. 89).

[28] Agreement concerning the use of water resources in frontier waters (Warsaw, 17 July 1964) (ibid, vol. 552, p. 175).

[29] Signed at Stockholm on 16 September 1971 (ibid., vol. 825, p. 191).

[30] Signed at Rome on 20 April 1972 (ibid., vol. 957, p. 277).

[31] Exchange of notes between the United States of America and Mexico constituting an agreement confirming minute No. 242 of the International Boundary and Water Commission, United States and Mexico, relating to Colorado River salinity, Mexico and Tlatelolco, 30 August 1973 (United Nations, *Treaty Series*, vol. 915, p. 203; *United States Treaties and Other International Agreements*, vol. 24 (2), 1973 (Washington, D.C., United States Government Printing Office, 1974), p. 1968).

[32] J. Barona Lobaoto, "Legal considerations, interpretations and projections of Minute 242", *Natural Resources Journal* (Albuquerque, N.M.) vol. 15, 1975, p. 37.

[33] Article 2 of the Convention (see footnote 30 above).

[34] H. E. Thomas and L. B. Leopold, "Groundwater in North America", *Science* (Washington, D.C.), vol. 143, No. 3610, 1964, pp. 1001 et seq., particularly p. 1003.

[35] Hayton, "Institutional alternatives for Mexico-U.S. ground water management", *International Groundwater Law* (New York, Oceana Publications, Inc., 1981), p. 135.

[36] Ibid.

physical limits, to protect spring and groundwater from over-draught and salinity, as well as to ensure proper sharing of the resources.[37]

18. A call for the adoption of the integrated development and management of shared water resources for their optimum utilization, conservation and protection was also made at the 1982 Dakar interregional meeting, proposing that:

1. Whenever shared international aquifers or basins are present, technical cooperation for integrated development is required.

2. To arrive at correct modelling and proper management of shared aquifers, their potential must be assessed, the source of water and its possible replenishment defined and also the water flow within the aquifer. These and many other factors essential to the evaluation and proper management of the aquifer can be properly dealt with only by investigations across the national boundaries of the countries.

3. An integrated approach to groundwater is desirable: integration not only with other water resources, such as rivers and rainfall, but also with other inputs required for successful use of water, in particular, soil survey and land classification.[38]

19. With regard to groundwater development in an integrated manner, the meeting recommended that governments should, *inter alia*:

actively plan for groundwater studies and development, for its integrated use with surface water and other agricultural inputs, and for the economic and social evaluation of groundwater development schemes

[...]

and that:

groundwater development should be seen as an integral component of overall water resources development; hence groundwater development should be considered in relation to surface water development, with effective utilization of direct precipitation; and it should be considered alone only with regard to the more arid areas.[39]

20. The project findings and recommendations concerning the Nubian Sandstone aquifer also recommended that "the development of groundwater of the Nubian Sandstone aquifer in each area should be part of its integrated development plan".[40]

21. With respect to groundwater pollution control, the 1977 United Nations Water Conference recommended that States should, *inter alia*:

(*a*) Conduct surveys of present levels of pollution in surface water and groundwater resources, and establish monitoring networks for the detection of pollution;

[...]

(*f*) Conduct research on and measures of the pollution of surface and groundwater by agricultural fertilizers and biocides with a view to lessening their adverse environmental impact;

[...

(*m*) Promote the use of infiltration techniques when the nature of the applicants and the terrain make it possible to do so without endangering surface and groundwater resources;

[...]

(*o*) Apply appropriate land-use planning as a tool for preventing water pollution, especially in the case of groundwater.

[...].[41]

22. The Charter on groundwater management adopted by the ECE has also made a number of recommendations on how groundwater should be treated. In the area of groundwater policy, governments are requested to:

formulate and adopt a long-term policy to protect groundwater by preventing pollution and overuse. This policy should be comprehensive and implemented at all appropriate levels. It should be consistent with other water-management policies and be duly taken into account in other sectoral policies.[42]

23. As for the strategies to be adopted on the use and protection of groundwater, the Charter recommends that:

1. As groundwater should be recognized as a natural resource with economic and ecological value, groundwater strategies should aim at the sustainable use of groundwater and preservation of its quality. These strategies should be flexible so as to respond to changing conditions and various regional and local situations.

2. Groundwater pollution is interrelated with the pollution of other environmental media (surface water, soils, atmosphere). Groundwater protection planning should be incorporated into general environmental protection planning.

3. Protection measures aimed at prevention of groundwater pollution and overuse should be the basic tools for groundwater management. Such protection measures include, *inter alia*, monitoring of groundwaters, development of aquifer vulnerability maps, regulations for industry and waste disposal sites paying due account to groundwater protection considerations, geo-economic assessment of the impact of industrial and agricultural activities on groundwater, and zoning of groundwater protection areas.[43]

24. Another practical measure recommended by the Charter on groundwater management is that in issuing permits for regulating the discharge, disposal and possible storage of waste, officials should specifically take into account the vulnerability of the aquifer concerned and the provisions necessary for its protection. Those provisions should, in particular, apply to production, handling, trading, transporting, storage and use of potentially hazardous substances, especially those which are toxic, persistent and bio-accumulative.[44] As for nuclear plants and the handling and processing of radioactive substances, it was recommended that specific regulations should be adopted which should include appropriate provisions for the protection of underground waters from contamination.

25. In order to regulate and distribute the water resources in an efficient and efficacious manner, the United Nations Water Conference recommended that:

studies should explore the potential of groundwater basins, the use of aquifers as storage and distribution systems and the conjunctive use of surface and subsurface resources to maximize efficacy and efficiency.[45]

[37] *Report of the United Nations Water Conference, Mar del Plata, 14-25 March 1977* (United Nations publication, Sales No. E.77.II.A.12), Part One, chap. 1, p. 11, para. 10.

[38] *Experience in the Development and Management of International River and Lake Basins*, Proceedings of the United Nations Interregional Meeting of International River Organizations, Dakar, 5-14 May 1981, Natural Resources/Water Series No. 10 (United Nations publication, Sales No. E.82.II.A.17), p. 334.

[39] Ibid., p. 307.

[40] United Nations Department of Technical Cooperation for Development, *Transnational Project on the Major Regional Aquifer in North-East Africa, Egypt and the Sudan, Project Findings and Recommendations* (DP/UN/RAB-82-013/1), 1988.

[41] *Report of the United Nations Water Conference* (see footnote 37 above), para. 39.

[42] *Charter on groundwater management* (see note 14 above), p.1.

[43] Ibid.

[44] Ibid., p. 7.

[45] *Report of the United Nations Water Conference* (see footnote 37 above), para. 10 (*b*).

26. In connection with drought loss management, it was recommended that countries should:

Study the potential role of integration of surface and underground phases of water basins utilizing the stocks of water stored in groundwater formations in order to maintain a minimum supply under drought conditions.[46]

27. States were also recommended to promote research concerning, *inter alia*, artificial recharge of aquifers and contamination of underground waters.[47]

28. The United Nations Conference on Desertification stressed the need for "wise and efficient management of shared water resources for national use", and for "developing and strengthening regional activities concerning the assessment of surface and groundwater resources".[48]

29. The Charter on groundwater management also places great emphasis on the management of transboundary groundwater resources. It recommends that:

concerted endeavours to strengthen international cooperation for harmonious development, equitable use and joint conservation of groundwater resources located beneath national boundaries should be intensified. To this end, existing or new bilateral or multilateral agreements or other legally binding arrangements should be supplemented, if necessary, or concluded in order to place on a firmer basis cooperative efforts among countries for the protection of those groundwater resources which can be affected by neighbouring countries through exploitation or pollution. In order to implement such cooperation, joint commissions or other intergovernmental bodies should be established. The work of other international organizations, particularly on data harmonization, should be taken into account.[49]

30. The International Conference on Water and the Environment emphasized the need to have reliable information on the condition and trend of a country's water resources—surface water, water in the unsaturated zone and groundwater, its quantity and quality. This information, it was stated, would be required for a number of purposes, such as: assessing the resource and its potential for supplying current and foreseeable demand; protecting people and property against water-related hazards; planning, designing and operating water projects.[50]

31. With regard to protection of groundwater from contamination, the Conference pointed out that:

the extent and severity of contamination of unsaturated zones and aquifers has long been underestimated due to the relative inaccessibility of aquifers and the lack of reliable information on aquifer systems. A strategy for the protection of groundwater must be aimed at protecting aquifers from becoming contaminated and preventive efforts should be directed first at land-use activities and point and non-point sources that pose a high risk of causing pollution. Care must be exercised to avoid groundwater development that leads to the degradation of groundwater quality or the depletion of groundwater supplies. By the year 2000 assessments of known aquifers and their vulnerability to contamination should have commenced in all countries, while potential sources of groundwater pollution should be identified and plans for their control developed. These activities should be matched to the capacities, available resources and needs of countries and undertaken with the help of external support agencies, as appropriate.[51]

32. The United Nations Conference on Environment and Development also considered the question of fresh water. It recognized the widespread scarcity, gradual destruction and aggravated pollution of freshwater resources in many world regions, along with the progressive encroachment of incompatible activities. These factors, according to the Conference, demanded integrated water resources planning and management, and such integration must cover all types of interrelated freshwater bodies, including both surface water and groundwater.[52] The Conference also encouraged conjunctive use of surface and groundwaters, including monitoring and carrying out of water-balance studies.[53]

Movement of groundwater

33. Concerning the movement of water, experts have pointed out that the water that eventually forms underground lakes and streams follows a certain pattern:

. . . a certain amount of water lying in pools or lakes or flowing in rivers will seep into the earth and percolate slowly down until it reaches the water table, the natural level of free groundwater. This water, prevented from percolating still lower by a watertight geological layer, will now tend to flow horizontally through the subsoil until it reaches land at a lower altitude, where it may reappear as a spring or artesian well, or flow from below the surface into a lake or even into the sea. Where groundwater appears above the surface, new streams are formed and the water resumes its journey overland to the sea.[54]

34. Certain groundwater is in constant motion, moving from the higher levels to lower elevations of the Earth. As observed by experts:

Water does not usually remain stationary in the aquifers but flows from the changing areas either to areas of natural discharge, such as springs, swamps, ponds and lakes, or to wells . . . Water has been known to move 300 miles (480 km) or more in these underground strata, although the usual distances range from 5 to 100 miles (8 to 160 km).[55]

35. In the light of the above facts, a previous Special Rapporteur was thus led to sum up the question of groundwater, and in particular its contribution to watercourses, as follows:

Despite problems in collecting data regarding groundwater under varying hydrologic and geologic conditions, there can be no doubt that groundwater is an integral and vital part of the unbroken cycle of movement through which the supply of fresh water is continually replenished. If, in some manner, the movement of groundwater were to come to a halt, the quantity of water in watercourses would be reduced dras-

[46] Ibid., para. 68 (*n*).

[47] Ibid., para. 82 (g).

[48] *Report of the United Nations Conference on Desertification, Nairobi, 29 August to 9 September 1977* (A/CONF.74/36), para. 33.

[49] *Charter on groundwater management* (see footnote 14 above), p. 29.

[50] *Report of the International Conference on Water and the Environment: Development issues for the 21st century, Dublin, 26-31 January 1992* (A/CONF.151/PC/112, annex II), para. 3.9.

[51] Ibid, para. 4.12.

[52] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (A/CONF.151/26/Rev.1 (vol. I and vol. I/Corr.1, vol. II, vol. III and vol. III/Corr.1)) (United Nations publication, Sales No. E.93.I.8 and corrigendum), vol. I, *Resolutions adopted by the Conference*, resolution 1, annex II (Action 21), para. 18.3 (*b*). See also paragraph 18.12 (*k*).

[53] Ibid., para. 18.76 (*c*) (iii).

[54] M. Overman, *Water: Solutions to a Problem of Supply and Demand* (Doubleday, Garden City, N.Y., 1969), p. 33-34. See also *Yearbook . . . 1979*, vol. II (Part One), document A/CN.4/320, p. 147, para. 12.

[55] J. H. Hirshleifer, J. C. DeHaven and J. W. Milliman, *Water Supply* (University of Chicago Press, Chicago, Ill., 1960), p. 10. See also *Yearbook . . . 1979*, vol. II (Part One), document A/CN.4/320, p. 148, para. 19.

tically. Many perennial surface streams would become intermittent, or even dry up altogether. Accordingly, the contribution of groundwater to watercourses must be taken into account in framing principles to govern the uses made of watercourses. At an elementary level, the amount of groundwater moving into an international watercourse has to be included in calculating the total volume of flow of the watercourse. At the level of water resources management, it is necessary, in forming principles regarding the use of water, to give consideration to the effects of a contribution of groundwater to a watercourse. It is necessary to consider as well the effects of the existence of available reserves of groundwater, and of the contribution of water flowing in watercourses to the quantity of groundwater.[56]

Conclusion

36. The foregoing review has demonstrated the vital importance of groundwater, whether confined or not, as a source of fresh water for both human consumption and for industrial and agricultural use. It has also shown the concerns expressed in various forums and the important steps that are required to be taken to prevent its depletion, pollution and contamination. Moreover, it has been repeatedly stated that the only viable way for achieving optimum utilization and conservation of water is through integration of both surface water and groundwater resources.

37. It is to be observed that in the treatment of this subject the tendency has been not to distinguish between transboundary confined groundwaters and related groundwaters, i.e. those that contribute water to a system flowing into a common terminus.

38. The Special Rapporteur is of the view that it is important for the draft on the law of the non-navigational uses of international watercourses to include provisions on "unrelated" confined groundwaters, in order to encourage their management in a rational manner and prevent their depletion and pollution. As the commentary to article 1 of the Rules on International Groundwaters adopted by the International Law Association at its sixty-second Conference states:

> There is . . . a need to treat in these rules those cases where a shared aquifer is an independent water resource body, not contributing water to a "common terminus" via a river system, or receiving significant amounts of water from any extant surface water body. A shared aquifer, isolated from perennial streams or lakes, can readily be conceptualized as a kind of international "drainage basin", underground; the hydrogeologist is inclined to employ "groundwater basin", "groundwater reservoir" and "aquifer" interchangeably.[57]

39. While the international trend calls for the management of all freshwater resources including groundwater in an integrated manner, the Special Rapporteur hopes that the Commission would be willing at least to include transboundary groundwaters in the scope of the topic. If "unrelated" confined groundwaters are excluded from the scope of the present draft articles, it would leave a lacuna or a vacuum in the management of transboundary water resources. Moreover, such an omission would ignore international trends and developments in this field.

[56] First report on the law of the non-navigational uses of international watercourses by Mr. Stephen M. Schwebel, Special Rapporteur, *Yearbook . . . 1979*, vol. II (Part One), document A/CN.4/320, p. 149, para. 21.

[57] ILA, *Report of the Sixty-second Conference* (see footnote 1 above), p. 256.