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Fifth report on the law of the non-navigational uses of international watercourses by Mr. Stephen C. McCaffrey, Special Rapporteur

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Introduction

1. In his fourth report on the law of the non-navigational uses of international watercourses,[1] which was before the International Law Commission at its fortieth session, the Special Rapporteur set forth a "schedule for submission of remaining material" concerning the present topic.[2] The schedule indicated that in 1989 he would submit for the consideration of the Commission parts VI (Water-related hazards and dangers) and VII (Relationship between non-navigational and navigational uses) of the proposed outline of the draft articles, as well as material relating to the subtopic "Regulation of international watercourses". The Special Rapporteur noted that he intended to submit the full set of draft articles by 1990, and that adhering to this schedule would allow the Commission to complete the first reading of the draft articles by the end of its current term of office (1991). Accordingly, the present report considers the subtopics of water-related hazards and dangers (part VI of the draft articles), the relationship between non-navigational and navigational uses (part VII of the draft articles) and the regulation of international watercourses (part VIII of the draft articles).

[1] *Yearbook ... 1988*, vol. II (Part One), p. 205, document A/CN.4/412 and Add.1 and 2.

[2] *Ibid.*, p. 208, paras. 8-10.

CHAPTER I

Water-related hazards and dangers

(Part VI of the draft articles)

Introduction

2. In his fourth report, the Special Rapporteur submitted an article entitled "Pollution or environmental emergencies" (article 18 [19]) as part of a set of draft articles on the subtopic of environmental protection, pollution and related matters. Owing to the limited time available during the fortieth session of the Commission for consideration of the fourth report, as well as for organizational reasons, the Special Rapporteur suggested that this particular article not be discussed extensively at that session. He indicated his intention to submit a new, comprehensive article on water-related hazards and dangers at the forty-first session.[3] The idea of broadening the scope of the article received support both in the Commission[4] and in the Sixth Committee at the forty-third session of the General Assembly.[5]

3. On the surface, there might appear to be a basic difference between emergencies and dangerous situations involving pollution and those caused by floods and floating ice: while the former are often the result of human activity, the causes of the latter are frequently natural. Such a difference in factual causes of disasters or dangerous situations could be thought to justify different regulatory régimes. However, while it is sometimes possible to separate water-related dangers, hazards and catastrophes that are man-made from those whose causes are entirely natural, this is not always the case. Phenomena which are often purely natural may in some instances be exacerbated, or even wholly caused, by human intervention. Floods, for example, may be caused or rendered more harmful by such activities as the construction of canals[6] or dams[7] or land-use practices, such as deforestation,[8] which cause unnaturally rapid run-off. Conversely, nature may interact with human activities to produce disastrous consequences, as in the case of flooding caused by earthquake damage to dams.

4. Thus there is a continuum of possibilities, ranging from the wholly natural hazard or disaster at one end to that which is entirely man-made at the other.[9] The legal régimes of prevention, mitigation and reparation should therefore take into account not only the nature of the disaster (e.g., flood versus chemical spill) but also the degree to which human intervention contributes to harmful consequences. It would appear, prima facie, that the obligations of watercourse States would increase with the degree of human involvement. As will be seen below, however, this does not necessarily indicate a complete absence of obligation even where natural forces are entirely responsible for a water-related danger. On the contrary, State practice, chiefly in the form of international agreements, is replete with examples of obligations of co-operation, notification and the like which are triggered by dangers whose causes are entirely natural, such as floods and floating ice (see paras. 20-34 below).

5. It may be concluded from the foregoing discussion that all types of water-related hazards and dangers,

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[3] *Yearbook ... 1988*, vol. II (Part Two), p. 25, para. 130.

[4] See, for example, the statements of Mr. Yankov (*Yearbook ... 1988*, vol. I, p. 156, 2067th meeting, para. 14), Mr. Calero Rodrigues (*ibid.*, p. 157, para. 25) and Mr. Eiriksson (*ibid.*, p. 161, 2068th meeting, para. 22).

[5] See, for example, the statement of the representative of Venezuela (*Official Records of the General Assembly, Forty-third Session, Sixth Committee*, 29th meeting, para. 31).

[6] Canals may collect and concentrate surface run-off, discharging a large quantity of water at a single point (the end of the canal). For an instance of State practice involving such a problem, see the Rose Street canal case discussed below (paras. 55-63).

[7] The sudden release of a large volume of water from a dam may produce harmful effects downstream. The release may be deliberate (e.g., in order to protect the dam itself) or may be caused by rupture of the dam. Finally, the damming of a river may prevent it from being "scoured" downstream of the dam by spring run-offs, resulting in siltation of the river bed and consequent inadequate carrying capacity of the river channel. This, in turn, may cause the river to overflow its banks.

[8] Some observers have attributed the particularly severe floods in Bangladesh in 1987 and 1988 in part to upstream deforestation. See, for example, *The New York Times*, 3 October 1988, pp. A1 and A6; Masum, "Some aspects of impact of floods on Bangladesh economy", and Kahn, "Flood hazard in Bangladesh and its impact on the rural environment", papers presented at the International Seminar on Bangladesh Floods: Regional and Global Environmental Perspectives, organized jointly by the Bangladesh Research Bureau and SCOPE/Bangladesh from 4 to 8 March 1989 (hereinafter referred to as "1989 Bangladesh Flood Seminar"); the papers presented to the seminar appeared in the conference brochure. See generally footnote 11 below and the sources cited therein.

[9] See the following description, in a study prepared by the Secretariat in 1977, of the nature of instances of *force majeure*:

"... the material causes giving rise to events or occurrences termed *force majeure* may vary. *Force majeure* may certainly be due to a natural disaster like an earthquake, but also to situations having their roots in human causes such as a war, a revolution, mob violence etc. Moreover, certain causes that eventually may give rise to *force majeure* may originate from natural as well as from human causes. For instance, a fire may be man-made but also be provoked by a thunderbolt; a situation of absolute economic necessity amounting to *force majeure* may be due to a drought by lack of rain but also to disruption in world commodity markets or mismanagement of the national economy, etc." ("'*Force majeure*' and 'fortuitous event' as circumstances precluding wrongfulness: survey of State practice, international judicial decisions and doctrine" (*Yearbook ... 1978*, vol. II (Part One), p. 66, document A/CN.4/315) para. 4.)

whether natural, man-made or a combination of the two, may be treated in a single article or set of articles. Nevertheless, the Commission may wish to consider whether the draft articles relating to this subtopic should contain not only primary rules setting forth the obligations of watercourse States but also secondary rules specifying the consequences of the breach of those obligations. For while watercourse States may well bear obligations in respect of hazards and dangers whose causes are entirely natural, the consequences of breaching those obligations may not be so extensive as those that would follow from the breach of rules requiring watercourse States to refrain from causing or exacerbating harmful water-related hazards or dangers.[10]

6. Indeed, it is precisely the potential for harmful, or even catastrophic, extraterritorial consequences of a State's use of a watercourse (or even of other resources)[11] that makes co-operation between watercourse States essential. The Panel of Experts on the Legal and Institutional Aspects of International Water Resources Development emphasizes in its report the necessity for States to "organiz[e] themselves to deal with [harmful effects of the use of water] in a rational manner on the basis of technical information and careful, integrated basin, or system, co-operation and planning".[12] It continues:

The conditions most often giving rise to . . . complaints and creating the need for deliberate international planning (in order to satisfy or forestall complaints) are those that cause, in other States, shortage of surface or ground-water supply; flooding; siltation; salinization; depletion of fish and elimination of breeding areas; eutrophication; excess vegetation; concentrations of salts or other chemicals, untreated sewage, radio-active substances, oil or other waste products (introduced from ship or shore); changes in temperature; blockage of passage (fish, vessels and timber); the diminishing of scouring; and, of course, changes in flow. Thus, even the otherwise innocent and beneficial use of fertilizers, the attempt to control the invasive water hyacinth, the construction of weirs for water storage and flood control, the drainage of a swamp, the cooling of a thermoelectric plant, or the return of irrigation water to the river may produce damaging results in other parts of the basin. Although the harm occurs most often downstream, among the numerous exceptions to this general rule are the effects in boundary streams and lakes. Some conditions are likely to be felt both upstream and downstream, particularly when fishing, navigation or timber floating is involved.

The aspects discussed above are only illustrative of the kinds of problems that have greater prospect of solution once the States sharing the same water resources system accept the necessity of active international co-operation or collaboration to achieve their own objectives more effectively. . . .[13]

7. Another factor that may contribute to water-related dangers and which therefore makes co-operation between watercourse States increasingly important is the phenomenon of global warming.

About 35 per cent of the continental U.S. experienced severe drought conditions in 1988. . . .

. . .

Western parts of the Soviet Union were also hot and dry in 1988. China showed the variability of weather, with some areas of the north-central and south-central regions receiving torrential rains and much of eastern and south-eastern China being abnormally dry. The monsoon in India, which had largely failed in 1987, came back in 1988 with the heaviest rains in 70 years. Bangladesh experienced one of the most devastating floods in its history; three quarters of the land was under water, and loss of life was heavy. Torrential rains also caused extreme flooding in the Sudan in August [of 1988].

. . .

The intense drought, heat, and other extreme weather triggered renewed concern over global climate changes caused by the greenhouse effect, whereby gases—primarily carbon dioxide—trap the Sun's radiant energy in the lower atmosphere and warm the air near the Earth's surface. Although there was vigorous debate among atmospheric scientists over direct linkage of the 1988 drought to the greenhouse effect, there was irrefutable evidence of the continued rise worldwide in levels of atmospheric carbon dioxide and other trace gases as a result of a century of human industry. Three major international organizations—the International Council of Scientific Unions, the United Nations Environment Programme, and the World Meteorological Organization—issued a report calling for immediate action in developing policies for responding to climatic change. The report also urged approval and implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer. . . .[14]

Scientists and other observers have predicted that global warming could lead to especially severe conditions in countries with tropical climates.

. . . Semi-arid areas like much of sub-Saharan Africa might suffer from even lower rainfall. Many semi-arid areas are already marginal for agriculture, are highly sensitive to changes in climate, and have had severe droughts and famines for the last several decades. Tropical humid climates could become hotter and wetter, with an increase in the frequency and severity of tropical storms. Floods, which between 1968 and 1988 killed more than 80,000 people and affected at least 200 million more, could worsen. Natural disasters such as floods, now unusual, could become increasingly common.

Indeed, climate disruption caused by the greenhouse effect may already be evident. Global temperatures in 1988 were again at or near the record for the period of instrumental data, with temperatures elevated by 0.7°F relative to the average for the 30-year period beginning in 1950. The five warmest years in this century all occurred during the 1980s. Moreover, the rate of global warming for the past two decades was higher than any in recorded history. . . .[15]

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[10] Article 6 of part 2 of the draft articles on State responsibility, proposed by Mr. Riphagen (*Yearbook . . . 1984*, vol. II (Part Two), p. 100, footnote 322) gives an indication of the possible range of consequences, i.e. of the elements of reparation *lato sensu*.

[11] According to the Panel of Experts on the Legal and Institutional Aspects of International Water Resources Development:

". . . the development or exploitation of resources other than water by one State in the system may cause a substantial impact on the quantity or quality of water available for development or utilization by another State in the system. The logging off of the headwaters area of a stream in one State may trigger serious land erosion that causes a heavy burden of silt to be carried downstream into another State and a detrimental alteration in the natural timing of flow, thereby adversely affecting the downstream State's uses." (United Nations, *Management of International Water Resources: Institutional and Legal Aspects*, Natural Resources/Water Series No. 1 (Sales No. E.75.II.A.2), para. 42.)

The Panel of Experts refers in this connection to a working paper on the relationship between water and other natural resources prepared by G. J. Cano (see ILA, *Report of the Fifty-third Conference, Buenos Aires, 1968* (London, 1969), annex, pp. 531 *et seq.*).

[12] United Nations, *Management of International Water Resources* . . ., para. 50.

[13] *Ibid.*, paras. 51-52.

[14] *1989 Britannica Book of the Year* (Chicago, Encyclopaedia Britannica, Inc., 1989) pp. 159-160; see also p. 195.

[15] D. A. Wirth, "Climate chaos", *Foreign Policy* (Washington, D.C.), No. 74 (1989), pp. 9-10. Wirth observes: "The greenhouse effect, if unchecked, is likely to cause unpredictable disruptions in the balance of power worldwide, exacerbating the risk of war" (*ibid.*, p. 10). See also the report of the World Commission on Environment and Development:

"Environmental threats to security are now beginning to emerge on a global scale. The most worrisome of these stem from the possible consequences of global warming caused by the atmospheric build-up of carbon dioxide and other gases. . . ." (World Commission on Environment and Development, *Our Common Future* (Oxford, Oxford University Press, 1987), p. 294.)

These phenomena indicate that demands for fresh water are likely to intensify in some regions of the world, while other areas may experience increased flooding. It is submitted that the Commission should bear these factors in mind in its consideration of the subtopic of water-related hazards and dangers.

8. The balance of this chapter will be divided into two sections, in each of which the Special Rapporteur will survey authorities on different kinds of natural hazards or conditions. The first section will deal with floods and related problems, and the second will treat other water-related problems and conditions. As these problems have been discussed in reports previously submitted to the Commission,[16] the surveys of authorities presented below will be illustrative only and no attempt will be made at exhaustive coverage. The chapter will conclude with the submission of a proposed set of articles on water-related hazards and dangers. While the articles to be proposed will cover both man-made and natural incidents, as explained above, the following survey will not deal with pollution as such,[17] since that subject was covered in the fourth report.[18]

A. Floods and related problems

General observations

9. Because floods and other water-related hazards are often factually interrelated, international agreements and other authorities frequently deal with them together. These factual interrelationships and the consequent legal ones provide the basis for the grouping of a number of different problems in this section of the report. The problem that has received by far the most attention in treaties as well as in the work of international organizations is that of floods. This is probably due to the fact that floods consistently rank at the top of the list of natural disasters.[19] Section A will therefore focus on that particular hazard but will also deal with the following situations: ice conditions; drainage problems; flow obstructions; siltation; and erosion. Section B will then take up the problems of saline intrusion, drought and desertification.

10. As already indicated, floods constitute one of the world's most serious natural hazards.[20] They occur annually in many parts of the world—for example, India, Pakistan, Bangladesh and China—and have struck countries on nearly every continent.[21] Losses of life, property and income caused by floods in some parts of the world are extremely high. In the South-East Asia region as a whole, floods annually destroy more than 10 million acres of crops and cause property losses of more than $1 billion.[22] There have been floods which have caused the death of more than 1 million people, have left as many as 10 million homeless and have inundated up to 10 million acres of agricultural land.[23] In South-East Asia alone, there is a heavy loss of life from floods every year, and floods appear to be increasing in severity in the Asian subcontinent and Africa.[24]

11. Developing countries have been particularly hard hit by floods.

> . . . In South-East Asia thousands of people drown annually and floods destroy more than 10 million acres of crops each year. Flood losses, already large, are getting larger owing to the continual movement of population and economic activities onto flood plains. This process is exemplified by Bangladesh, most of which is in the Ganges-Brahmaputra delta. . . .[25]

But floods can strike developed and developing countries alike:

> . . . more than 20 per cent of the population of Hungary, Iraq, Japan, Malaysia, Netherlands and Senegal lives in areas that may be inundated by major floods.[26]

To the same or similar effect, see SIPRI and UNEP, *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*, A. H. Westing, ed. (Oxford, Oxford University Press, 1986); P. H. Gleick, "The implications of global climatic changes for international security", Background Paper No. 14 prepared for the Workshop on Developing Policies for Responding to Climatic Change, held at Villach, Austria, from 28 September to 2 October 1987.

[16] See especially the third report of Mr. Schwebel (*Yearbook . . . 1982*, vol. II (Part One), pp. 151 *et seq.*, document A/CN.4/348), paras. 337-379. See also the first report of Mr. Evensen (*Yearbook . . . 1983*, vol. II (Part One), pp. 185-186, document A/CN.4/367), paras. 177-182.

[17] Two of the subjects to be considered, siltation and salt-water intrusion, could be regarded as forms of pollution; beyond those subjects, however, pollution is not dealt with in the present report.

[18] A/CN.4/412 and Add.1 and 2 (see footnote 1 above), paras. 38-88 and chap. III, sect. C, article 18 [19].

[19] For example, one study reports that floods caused nearly 40 per cent of the total loss of life from all natural disasters during the 20-year period after 1947. See L. Sheehan and K. Hewitt, "A pilot survey of global natural disasters of the past twenty years", Natural hazard research, Working Paper No. 11 (University of Toronto, Canada) (1969) (mimeographed).

[20] See United Nations, *Guidelines for Flood Loss Prevention and Management in Developing Countries*, Natural Resources/Water Series No. 5 (Sales No. E.76.II.A.7), pp. 2-9 ("The magnitude of the world flood problem").

[21] See table 1 in the study cited in the previous footnote, documenting "significant historical flood events" in Asia, North and South America, Europe and certain island States. With regard to Africa, see, for example, the report of particularly heavy flooding in the Sudan in 1988 (footnote 24 below *in fine*).

[22] W. R. D. Sewell and H. D. Foster, "Flood loss management in developing countries: A model for identifying appropriate strategies", in United Nations, *River Basin Development: Policies and Planning*, Natural Resources/Water Series No. 6 (Sales No. E.77.A.4), vol. 1, p. 84 (Proceedings of the United Nations Interregional Seminar on "River Basin and Interbasin Development" (Budapest, 16-26 September 1975), hereinafter "Budapest Seminar").

[23] United Nations, *Guidelines for Flood Loss Prevention* . . . (see footnote 20 above), p. 1.

[24] See the discussion, in paragraph 7 of the present report, of the possible relationship between the phenomenon of global warming and increased flood activity. As already noted, Bangladesh experienced particularly severe flooding in 1987 and 1988. In the 1988 flood, nearly three quarters of the country was inundated. According to government reports, more than 2,000 people died as a result of the floods, many more suffered from waterborne diseases, and at least 30 million were believed homeless (*1989 Britannica Book of the Year*, pp. 154 and 159). See, generally, the report prepared in 1988 by the Joint Task Force of the Government of Bangladesh and the United Nations, "The 1988 floods in Bangladesh: impact, relief and recovery" (SG/CONF.4/1). The death toll from floods that submerged many areas in India's north-west provinces was estimated at thousands, and hundreds of thousands of residents in four affected States of India had to be evacuated; 9,000 towns and villages were said to be affected (*The New York Times*, 3 October 1988, p. A1). See also the report on hurricane Gilbert in *The New York Times*, 1 October 1988, p. A3. "Torrential rains also caused extreme flooding in the Sudan in August [of 1988]" (*1989 Britannica Book of the Year*, p. 159).

[25] United Nations, *Guidelines for Flood Loss Prevention* . . . (see footnote 20 above), p. iii.

[26] *Ibid.*

12. Increases in flood loss can be expected in the future as greater use is made of flood plains, particularly in developing countries, for agricultural, industrial and urban development.[27]

Flood plain occupancy poses a major dilemma. On the one hand flood plains provide attractive locations for various human activities, notably agriculture and transportation. Taking advantage of the rich alluvial soils, some of the world's great civilizations developed in the bottom lands of major rivers, notably along the banks of the Tigris and Euphrates, the Nile, the Indus and the Yangtze. The flat lands in river valleys also provide transportation corridors and building sites for homes and factories. . . . Not surprisingly, therefore, flood plains have become the focus of a considerable portion of the world's settlements and economic activities.

Flood plain occupancy, however, can be costly and in some cases may lead to disaster, for once in a while the river may overflow its banks and exact a heavy toll of property damage, income loss, and perhaps loss of life as well.[28]

13. Deforestation in upland watersheds has been identified as a major cause of increased flooding in the countries of South and South-East Asia and Latin America.[29] In India, for example, 20 million hectares are flooded annually, partly as a result of upland deforestation, resulting in flood damage in excess of $1 billion annually in the Ganges plain alone.[30]

14. Five types of floods have been recognized. These are: (*a*) floods caused by melting snow; (*b*) floods caused by ice-jams and ice breaking up; (*c*) conventional storm floods; (*d*) cyclonic storm floods; and (*e*) rain-induced mud flows.[31] Of course, other factors, such as upstream embankments (reducing the total area of the flood plain) and land-use practices, and the deposition of large quantities of sediment (thus reducing the carrying capacity of a river channel) can also contribute to a more regular cycle of flooding.

15. When the problem of floods affects more than one country, experience has demonstrated that the most effective method of dealing with it is through international co-operation.[32] At minimum, co-operation is necessary in the collection and exchange of data relating to hydrological conditions.[33] But effective flood-control and disaster-prevention programmes entail higher levels of co-operation. These may be achieved by building upon the data-exchange relationship, step by step, through the development of forecasting and warning systems, and ultimately the joint planning and execution of flood prevention and control works.[34]

16. The report on flood control presented to ILA in 1972 by the Committee on International Water Resources Law provides an interesting historical perspective upon human experience with floods, describes their causes and effects and lists typical preventive measures:

Floods and their disastrous effects upon the adjoining lands have occupied and vexed mankind since immemorial times. Together with the need for irrigation, water control was one of the decisive factors of the rise of the first civilizations originating in the river valleys of the Nile, the Tigris-Euphrates, the Indus and the Hoangho . . .

The periodic floods occurring in these river valleys have been converting large tracts of naturally dry lands into fertile fields by transforming inundation into regulated irrigation. But at the same time, these floods can be the causes of catastrophes in many parts of the world. . . . Large amounts of money have to be spent every year to provide relief for flood-affected people and to repair public works. Permanent damage is done by floods when they leave behind swamps as a potential for disease and epidemics, or when stagnating flood and its subsequent evaporation during the dry season causes the accumulation of harmful salts, thus laying waste vast stretches of good land.

It appears at first sight that flood control is primarily a problem of science and technology, and that its execution is an object of municipal legislation and administration.

Of the various causes of floods, the most important are: intense and prolonged rainfall, thunderstorms, hurricanes, cyclones, snowmelts, ice jams, slips from mountain sides and overtopping and failure of tanks, reservoirs, dams, bursting of lakes causing a sudden release of large volumes of water, choking up of tributaries by the main rivers at their outfalls, heavy rainfall synchronizing with the spill of the rivers, inadequate and inefficient drainage in low lying and flat areas, silting of river beds due to large amounts of silt brought down by the rivers, earthquakes, land slides and erosion, flooding in the lower reaches and deltas due to heavy silting at the mouths of the rivers, synchronizing of high tides and floods in the channels, creating of bars due to littoral drifts and lack of proper controlling structures to regulate the distribution of water in different channels in the deltaic regions.

Some of the usual methods which have been developed to minimize the damage created by floods are the following:

(1) Construction of dikes, flood walls, levees, or embankments to protect lands from flood waters and keep flood waters within the usual main channel.

(2) Increasing the discharge capacity of the main channel by either straightening or widening or deepening or by a combination of all the three.

(3) Diverting part or whole of the flood waters in excess of the carrying capacity of the main channel.

(4) Constructing reservoirs to withhold flood waters temporarily and release them later on in such quantities as the channel is capable of carrying.

(5) Taking steps to decrease the rate of discharge by improved land use practice, e.g. afforestation, substitution of erosion inducing crops by soil protecting crops.

(6) Use of flood forecasting and issue of early warnings to minimize loss to life and property.[35]

17. While floods are often associated with purely harmful consequences, it should not be forgotten that some kinds of flooding can have certain beneficial effects as well. In some countries, either historically or at

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[27] Sewell and Foster, *loc. cit.* (footnote 22 above), p. 84.

[28] United Nations, *Guidelines for Flood Loss Prevention* . . . (see footnote 20 above), p. 1.

[29] United Nations, *Overall Socio-economic Perspective of the World Economy to the Year 2000* (Sales No. E.90.II.C.2), para. 364.

[30] *Ibid.*, citing World Bank, Development Committee, *Environment, Growth and Development*, publication No. 14 (Washington, D.C., 1987), p. 5.

[31] United Nations, *Guidelines for Flood Loss Prevention* . . . (see footnote 20 above), p. 13. See also part II of the report of the Committee on International Water Resources Law, relating to flood control (rapporteur, F. J. Berber) (ILA, *Report of the Fifty-fifth Conference, New York, 1972* (London, 1974), p. 44).

[32] This conclusion is borne out by the numerous international agreements and other authorities reviewed below.

[33] This form of co-operation would already be required by article 10 (Regular exchange of data and information), provisionally adopted by the Commission at its fortieth session; for the text of this article and the commentary thereto, see *Yearbook . . . 1988*, vol. II (Part Two), pp. 43 *et seq.*

[34] See Sewell and Foster, *loc. cit.* (footnote 22 above), p. 91. For examples of such strategies for the minimization of flood damage, see the methods identified in the report of the Committee on International Water Resources Law (para. 16 below).

[35] ILA, *Report of the Fifty-fifth Conference* (see footnote 31 above), pp. 43-45.

present, floods are an annual occurrence[36] and may serve to irrigate agricultural land, and even enrich it through sediment deposition (see para. 46 below).

In some cases man has learned to live with such periodic inundations of the flood plain and has turned them to economic advantage. In most cases, however, floods are regarded as a hazard rather than as an advantage. Flood hazards in the third world countries [have] become [a] serious problem for overall development since recovery from flood damage in these countries [is] much more difficult.[37]

1. State practice

(a) *State practice as reflected in international agreements*[38]

18. One form of evidence of international custom is the appearance of similar provisions in a wide range of international agreements.[39] There is indeed a broad array of treaties that contain provisions concerning floods. Many of these agreements also address, often in the same article, ice conditions such as ice-jams (which may block river flows and subsequently release them, leading to flooding) and ice-floes;[40] some also deal with problems of flow obstruction, siltation and erosion.

(i) *Floods*

19. Treaty provisions concerning floods are collected and systematized most usefully in part II of the report presented to ILA in 1972 by the Committee on International Water Resources Law.[41] Only illustrative examples will be referred to here.

20. A number of agreements require consultation, notification, the exchange of data and information, the operation of warning systems, the preparation of surveys and studies, the planning and execution of flood-control measures, and the operation and maintenance of works. Perhaps most frequent are provisions requiring the monitoring of river levels, regular reporting, and warning of any sudden change that may give rise to flood danger. Illustrative is article 20 of the 1963 Treaty between Hungary and Romania concerning the régime of the Hungarian-Romanian State frontier and

[36] Bangladesh, for example, is subject to annual flooding by overbank spills due to drainage congestion, rainfall run-off and storm-tidal surges (Bhuiya, "Environmental aspects of floods and flood-control measures of Bangladesh", paper presented at the 1989 Bangladesh Flood Seminar (see footnote 8 above).

The nilometer of Ancient Egypt was a device that measured human welfare in terms of the level of the River Nile. See, for example, Curry, "Questioning the nilometer", paper presented at the 1989 Bangladesh Flood Seminar, p. 2, figure 1. The scale ranged from "hunger" at 12 "ells" of water (one ell is equivalent to 1.1 metres or 45 inches), through "suffering" (13 ells), "happiness" (14 ells), "security" (15 ells) and "abundance" (16 ells), to "disaster" (18 ells). Thus, while extremely low levels of water were equated with an insufficient food supply and high levels with prosperity, extremely high water levels meant terrible misfortune.

[37] Kahn, *loc. cit.* (footnote 8 above), p. 37.

[38] Complete references to the international instruments cited in the text or in footnotes are given in an annex to the present report.

[39] This is especially true when bilateral agreements "deal with matters generally regulated by international law", as opposed to "treaties which deal with matters which are clearly recognized as within the discretion of the States . . .". An example of the former category "would be treaties on riparian rights as there are requirements of international customary law about riparian States' duties toward others". (L. Henkin and others, *International Law: Cases and Materials*, 2nd ed. (St. Paul, Minn., West Publishing Co., 1987), p. 87.) See also G. H. Hackworth, *Digest of International Law* (Washington, D.C., 1940), vol. I, p. 17; and C. C. Hyde, *International Law Chiefly as Interpreted and Applied by the United States*, 2nd rev. ed. (Boston, Little, Brown and Co., 1945), vol. I, pp. 10-11.

On "the general international law significance of similar provisions contained in many separate treaties", specifically with regard to the law of international watercourses, see R. D. Hayton, "The formation of the customary rules of international drainage basin law", *in* A. H. Garretson, R. D. Hayton and C. J. Olmstead, eds., *The Law of International Drainage Basins* (Dobbs Ferry, N.Y., Oceana Publications, 1967), pp. 868-871. See also the *North Sea Continental Shelf* cases (*I.C.J. Reports 1969*, p. 3). The ICJ there recognized the possibility that a rule embodied in a treaty or treaties could pass into the general corpus of international law, and be

> ". . . accepted as such by the *opinio juris*, so as to have become binding even for countries which have never, and do not, become parties to the Convention. There is no doubt that this process is a perfectly possible one and does from time to time occur: it constitutes indeed one of the recognized methods by which new rules of customary international law may be formed. At the same time this result is not lightly to be regarded as having been attained." (*Ibid.*, p. 42, para. 71.)

Judge Lachs, in his dissenting opinion, declared that

> ". . . the general practice of States should be recognized as prima facie evidence that it is accepted as law. Such evidence may, of course, be controverted—even on the test of practice itself, if it shows 'much uncertainty and contradiction' (*Asylum*, judgment, *I.C.J. Reports 1950*, p. 277). It may also be controverted on the test of *opinio juris* with regard to 'the States in question' or the parties to the case." (*Ibid.*, p. 231.)

A memorandom dated 21 April 1958 by the State Department of the United States of America on legal aspects of the use of systems of international waters provides further support for the use of similar treaty provisions as evidence of a rule of general international watercourse law:

> "It is accepted legal doctrine that the existence of customary rules of international law, i.e., of practices accepted as law, may be inferred from similar provisions in a number of treaties.
>
> "Well over 100 treaties which have governed or today govern systems of international waters have been entered into all over the world. These treaties indicate that there are principles limiting the power of States to use systems of international waters without regard to injurious effects on neighbouring States. . . ." (*Legal aspects of the use of systems of international waters with reference to Columbia-Kootenay river system under customary international law and the Treaty of 1909*, 85th Congress, 2nd session, Senate document No. 118 (Washington, D.C., 1958), p. 63.)

See generally M. Akehurst, "Custom as a source of international law", *The British Year Book of International Law, 1974-1975*, vol. 47, p. 42; R. R. Baxter, "Treaties and custom", *Collected Courses of The Hague Academy of International Law, 1970-I* (Leyden, Sijthoff, 1971), vol. 129, p. 25; I. F. I. Shihata, "The treaty as a law-declaring and custom-making instrument", *Revue égyptienne de droit international* (Cairo), vol. 22 (1966), p. 51; and H. W. A. Thirlway, *International Customary Law and Codification* (Leyden, Sijthoff, 1972).

[40] As already noted (see para. 14 above), one of the five ways in which floods may be caused is by ice-jams and the break-up of ice.

[41] Part II of that report deals with flood control (ILA, *Report of the Fifty-fifth Conference* . . . (see footnote 31 above), pp. 43 *et seq.*). See also the consolidated report on international co-operation on flood management prepared by P. Chaperon for the Committee on Water Problems of ECE (WATER/R.143, 22 October 1986) and the note by the Secretariat on legal provisions contained in transboundary water agreements in the field of flood management (WATER/R.143/Add.1, 3 December 1986), which contain compilations of relevant provisions of international agreements relating to flood management.

co-operation in frontier matters, which provides:

Article 20

The two Parties shall transmit to each other in good time any information concerning the level of water and ice conditions in frontier waters which is of interest to the Contracting Parties if such information may serve to avert danger from floods or drifting ice. Similarly, they shall agree, if necessary, on a regular system of signals to be used during periods of high water or drifting ice. . . .

Another provision requiring the exchange of information with a view to averting flood hazards is the first sentence of article 17 of the 1958 Treaty between the USSR and Afghanistan concerning the régime of the Soviet-Afghan State frontier:

Article 17

The competent authorities of the Contracting Parties shall exchange as regularly as possible such information concerning the level and volume of water in frontier rivers and also concerning precipitation in the interior of the territory of the two Parties as might avert danger or damage from flooding. . . .[42]

21. A number of agreements emphasize the necessity of providing early warning of flood danger. For example, article 17 of the 1944 Treaty between the United States of America and Mexico relating to the utilization of the waters of the Colorado and Tijuana Rivers, and of the Rio Grande (Rio Bravo) from Fort Quitman, Texas, to the Gulf of Mexico provides:

Article 17

. . . Each Government agrees to furnish the other Government, as far in advance as practicable, any information it may have in regard to such extraordinary discharges of water from reservoirs and flood flows on its own territory as may produce floods on the territory of the other.

. . .

Similarly, in article IV, paragraph 8, of the 1960 Indus Waters Treaty between India and Pakistan, each of the two States

agrees to communicate to the other Party, as far in advance as practicable, any information it may have in regard to such extraordinary discharges of water from reservoirs and flood flows as may affect the other Party.

To the same effect is article 8 of the 1955 Agreement between Yugoslavia and Hungary,[43] which provides as follows:

Article 8

The local authorities of the Contracting Parties shall advise each other, by the quickest possible means, of any danger from high water or ice and of any other danger which may arise on watercourses which form the State frontier and watercourses and water systems intersected by the State frontier.

22. The 1952 Agreement between Poland and the German Democratic Republic concerning navigation in frontier waters and the use and maintenance of frontier waters calls for the parties not only to take precautionary measures against and warn of flood danger but also to take concerted action to remedy any dike failure. Chapter III of the Agreement, entitled "Principles of co-operation in precautionary measures against flooding and ice-floes", provides in article 21 as follows:

Article 21

Each Contracting Party shall take precautions against flooding on its own territory in accordance with its applicable provisions and shall where necessary inform the other Party of the danger of a burst in any dike.

If a dike bursts, the two Parties shall immediately combine their efforts to repair the damage, furnishing technical facilities and the necessary labour.

The Party which asks for assistance shall bear the cost involved.

23. Some agreements include very specific requirements concerning the monitoring of water levels during periods of high water. For example, Protocol No. 1, relative to the regulation of the waters of the Tigris and Euphrates and of their tributaries, annexed to the 1946 Treaty of friendship and neighbourly relations between Iraq and Turkey, provides in article 3 as follows:

Article 3

. . .

During periods of high-water the levels of water observed every day at 8 a.m. by the stations equipped for telegraphic communication, such as Diyarbakir, Cizre, etc., on the Tigris and Keban, etc., on the Euphrates, shall be communicated by telegram to the competent authorities designated by Iraq for this purpose.

The levels of water observed outside periods of high-water shall be communicated to the same authorities by means of bi-monthly bulletins.

The cost of the above-mentioned communications shall be defrayed by Iraq.

A similar provision is found in the 1956 Treaty between France and the Federal Republic of Germany concerning the settlement of the Saar question. Under article 9 of annex 8 the authorities of the two countries are to maintain a water-level reporting service. In particular,

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[42] An identical provision is contained in article 14 of the 1957 Treaty between the USSR and Iran concerning the régime of the Soviet-Iranian frontier and the procedure for the settlement of frontier disputes and incidents. The following are further examples of treaty provisions concerning the exchange of data and information with a view to averting flood danger:

The 1961 Treaty between Canada and the United States of America relating to co-operative development of the water resources of the Columbia River Basin provides that "Hydrometeorological information will be made available to the entities in both countries for immediate and continuing use in flood control and power operations" (annex A, para. 2).

The 1964 Agreement between Bulgaria and Greece on co-operation in the utilization of the waters of the rivers crossing the two countries provides for the parties to exchange the necessary data and information, in order "that measures may be taken in time to prevent the flooding of lands under cultivation . . ." (art. 4).

The 1948 Agreement between Poland and the USSR concerning the régime on the Soviet-Polish State frontier provides in article 19, first sentence:

"*Article 19*

"The competent authorities of the Contracting Parties shall exchange information concerning the level and volume of water and ice conditions on frontier waters, if such information may help to avert the dangers created by floods or floating ice. . . ."

See also the 1927 Agreement between Germany and Poland regarding the administration of the section of the Warta forming the frontier, and traffic on that section.

[43] The Agreement includes the statute of the Yugoslav-Hungarian Water Economy Commission. See also article 1, para. 2 (*m*) and (*n*), of the statute.

Article 9

. . .

2. As soon as a flood warning alert is transmitted by the Sarrebourg station on the upper course of the Saar, the operations of the Saar flood warning service at Saarbrücken shall be set in motion. From that time onward, the competent reporting services shall remain in constant touch with each other until notice of the end of the alert is transmitted by the Saarbrücken station.

3. With a view to expediting the transmission of reports, the Federal Republic of Germany shall maintain a special telephone line between the competent office at Sarreguemines and the inland navigation office at Saarbrücken. The said telephone line shall run along the tow-path as a cable and shall accordingly be situated on French soil upstream from kilometre 75.617 (as measured on the left bank).

24. Reflecting the importance that States attach to the proper functioning of monitoring and early-warning systems, some agreements allow one party to inspect gauging stations on the territory of the other party. For example, article 3 of the above-mentioned Protocol No. 1 to the 1946 Treaty between Iraq and Turkey provides in pertinent part as follows:

Article 3

Turkey shall install permanent observation stations and shall ensure their operation and maintenance. The cost of operation of these stations shall be defrayed in equal parts by Iraq and Turkey, as from the date of entry into force of the present Protocol.

The permanent observation stations shall be inspected at stated intervals by Iraqi and Turkish technical experts.

. . .

25. A number of agreements provide for the parties to take joint measures to avert flood damage. Among these is the 1969 Convention between France and the Federal Republic of Germany concerning development of the Rhine between Strasbourg/Kehl and Lauterbourg/Neuburgweier, article 9 of which provides as follows:

Article 9

1. On the basis of the findings of the Commission to Study Flooding of the Rhine, the Contracting Parties shall as soon as possible conclude an Agreement concerning measures to be taken for protection against flooding and apportionment of the resulting costs, taking into account the contributions of all kinds to be expected from the other States concerned.

. . .

26. Similarly, the 1964 Agreement between Poland and the USSR concerning the use of water resources in frontier waters provides for the parties to "take co-ordinated action with a view to the elimination or reduction of danger resulting from floods, drifting ice and other natural phenomena . . ." (art. 8, para. 2).[44]

27. The 1958 Agreement between Czechoslovakia and Poland concerning the use of water resources in frontier waters provides in article 8 for the parties not only to provide each other with reports on high water, drifting ice and other hazards (para. 1(*c*)) but also to "come to agreement on what joint steps are to be taken for the elimination or reduction of danger in the event of floods or drifting ice and on how the costs thereby incurred are to be met" (para. 2).

28. A large number of agreements call for co-operation between watercourse States in the preparation and exchange of surveys and studies relating, *inter alia*, to flood control. The 1961 Treaty between Canada and the United States of America relating to co-operative development of the water resources of the Columbia River Basin,[45] for example, contains the following pertinent provisions:

Article XV Permanent Engineering Board

. . .

2. The Permanent Engineering Board shall:

(*a*) assemble records of the flows of the Columbia River and the Kootenay River at the Canada-United States of America boundary;

(*b*) report to Canada and the United States of America whenever there is substantial deviation from the hydroelectric and flood control operating plans and if appropriate include in the report recommendations for remedial action and compensatory adjustments;

. . .

ANNEX A

PRINCIPLES OF OPERATION

General

. . .

2. A hydrometeorological system, including snow courses, precipitation stations and stream flow gauges, will be established and operated, as mutually agreed by the entities and in consultation with the Permanent Engineering Board, for use in establishing data for detailed programming of flood control and power operations. . . .

. . .

29. Another of the many examples of treaties containing this kind of provision is the 1956 Agreement between the USSR and the People's Republic of China on joint research operations to determine the natural resources of the Amur River Basin and the prospects for development of its productive potentialities and on planning and survey operations to prepare a scheme for the multipurpose exploitation of the Argun River and the Upper Amur River.[46] Annexes I and II of the Agreement contain the following provisions of present interest:

ANNEX No. 1

. . .

Research operations shall be carried out as indicated in the following sections:

I. STUDY OF NATURAL CONDITIONS

. . .

[44] Cf. the 1955 Agreement between Yugoslavia and Hungary, together with the statute of the Yugoslav-Hungarian Water Economy Commission, which empowers the Commission "to draw up . . . regulations for protection against flooding and ice and such other regulations as may be necessary" (art. 4, para. 2).

[45] See also the 1944 Treaty between the United States of America and Mexico, arts. 6, 12 (*d*), 13 and 16.

[46] See also the 1959 Agreement between the United Arab Republic and the Sudan for the full utilization of the Nile waters (art. IV, paras. 1 and 2) and the 1960 Protocol concerning the establishment of the Permanent Joint Technical Commission; the 1926 Agreement between South Africa and Portugal regulating the use of the waters of the Kunene River for the purposes of generating hydraulic power and of inundation and irrigation in the Mandated Territory of South West Africa (arts. 8, 9 and 10); and the 1959 Agreement between Nepal and India on the Gandak River irrigation and power project (arts. 1 and 3).

3. SURVEYS OF WATER AND WATER POWER RESOURCES

Study of the water power potential of the Amur River and of the main rivers of the Amur River Basin and preparation of preliminary proposals relating to possible outline schemes for the regulation and use of its waters, with a view to the construction of hydro-electric power stations, the improvement of navigation conditions, the prevention of floods, the execution of land-improvement projects and the development of the fishing industry.

. . .

ANNEX No. 2

. . .

Planning and survey operations shall be carried out as indicated in the following sections:

A. Survey operations

1. Hydrometric operations to study the régime of the Argun and Amur Rivers from the source to the Maly Khingan range, and of their main tributaries on both banks.

The purpose of the hydrometric operations shall be to provide data to determine the variations in the level and flow of the rivers, their winter flow, their solid flow and the chemical composition of the water.

2. Geodetic and topographical operations:

. . .

(*c*) Surveys of flood areas of water reservoirs of top-priority projects, on the scale 1:25,000;

. . .

3. Engineering and geological surveys:

. . .

(*g*) Exploration of flood areas, for top-priority projects;

. . .

B. Planning operations

. . .

4. Evaluation of the economic consequences of regulating the flow of water in order to reduce the frequency and scale of flooding of economically valuable territory on both banks caused by sudden rises in the river level and to create favourable conditions for land improvement.

. . .

6. Estimation of losses due to flooding under different variants of the scheme.

. . .

(ii) *Ice conditions*

30. It has been seen that States, in their agreements, often deal with floods and ice conditions together. The present section contains some additional illustrations of provisions concerning the latter problem.

31. Ice conditions may give rise to flood hazards or may pose dangers of their own, such as obstruction of navigation and threats to such structures as piers and bridges. The manner in which ice conditions cause flooding is explained in a United Nations study as follows:

Floods caused by ice jams and ice breaking up also occur in the early spring. They often occur at constriction points such as at a sharp bend, gorge, bridge crossing or any other physical obstacle. They may also occur where the gradient of a channel changes from steep to gentle, or at the point where a stream discharges into a lake. In Canada and the USSR such floods typically occur when the ice and snow in the headwaters of northward flowing streams melt more rapidly than the ice and snow in the lower reaches.[47]

32. Chapter III of the 1952 Agreement between Poland and the German Democratic Republic concerning navigation in frontier waters, already referred to in connection with concerted action against flood danger (para. 22 above), contains detailed provisions requiring co-operative action in relation to ice conditions:

Article 19

The two Contracting Parties undertake to exercise joint vigilance and to co-operate with each other to prevent the formation of potentially dangerous ice barriers. The technical direction of works for protection against ice shall be undertaken by the Polish Party.

The Polish Party shall inform the German Party in good time of the place and time of ice clearance operations on the frontier sector of the river Oder, the middle and lower reaches of the Oder, and the Nysa Luzycka (Lausitzer Neisse).

Ice-breaking operations shall proceed upriver from the mouth of the Oder. Where necessary, and provided that no danger to the lower reaches of the river is entailed, local ice barriers may be demolished by blasting.

The Polish Party shall take into account, in carrying out ice-breaking operations, the wishes and requirements of the German Party, with a view to preventing any danger to German territory. The German Party shall provide the Polish Party at its request with appropriate technical facilities (ice-breakers and blasting operatives) for the ice clearance operations. The competent authorities of the two Contracting Parties shall agree on the extent of the technical facilities which each Party shall be required to provide for ice-breaking purposes.

Article 20

In the event of damage or accident during blasting operations, each Party undertakes to come to the other's assistance, subject to reimbursement of the expenses entailed in the provision of such assistance.

Article 22

The labour costs involved in operating the ice-breakers used shall be borne by the Party to which the ice-breakers belong.

Where labour is employed in blasting operations carried out by one Party at the other Party's request, the two Parties shall divide the cost of such works equally between them.

33. An example of a treaty provision that addresses the problem of ice-floes is article 8 of the 1958 Agreement between Yugoslavia and Bulgaria concerning water economy questions:[48]

Article 8

The frontier and local authorities of the Contracting Parties shall advise each other, by the most rapid possible means, of any danger from high water or drifting ice and of any other danger which may arise on rivers and tributaries followed or intersected by the State frontier.

34. Some agreements call upon the parties to take positive measures, including the construction of works of various kinds, with a view to providing protection against hazardous ice conditions. An illustration of such a provision is found in the 1967 Treaty between Austria and Czechoslovakia concerning the regulation of water management questions relating to frontier waters, article 4 of which provides in pertinent part that

(2) The Contracting States shall, in accordance with their domestic regulations, promote the construction in their territory of hydraulic

[47] United Nations, *Guidelines for Flood Loss Prevention* . . . (see footnote 20 above), p. 13.

[48] See also the 1956 Treaty between Hungary and Austria concerning the regulation of water economy questions in the frontier region, which requires parties to "notify each other as quickly as possible of any danger of flood or ice . . . in connection with frontier waters which comes to their attention" (art. 11); the 1960 Treaty between Finland and the USSR (art. 17); the 1956 Agreement between the USSR and Czechoslovakia concerning the régime of the Soviet-Czechoslovak frontier and the procedure for the settlement of frontier incidents (art. 19); and the 1950 Treaty between the USSR and Hungary concerning the régime of the Soviet-Hungarian State frontier and Final Protocol.

installations and facilities to provide protection against the danger of flooding and ice along the frontier waters; . . .

(iii) *Drainage problems*

35. Like ice conditions, problems of drainage can be closely related to flooding. After noting other injurious effects of poor drainage, the present section briefly reviews treaty provisions dealing with this problem.

36. A helpful summary of the kinds of problem that can be caused by insufficient drainage is provided in the third report of Mr. Schwebel:[49]

Adequate drainage of surplus waters is an ancient problem [citing treaties dating from 1816]. Lack of it ruins soils, keeps groundwater tables injuriously high and causes standing, stagnant water, or local flooding.[50] It is not surprising in this context that drainage and flood prevention have often been linked in State practice, since improved drainage increases the flow of water in the watercourse into which the drains discharge. Uncontrolled discharges of drainage waters can mean the inundation of the territory of downstream system States. Drainage has thus been the subject of system-State agreement for the purpose of flood control or prevention.[51]

37. Such an agreement is the 1928 Treaty between Austria and Czechoslovakia regarding the settlement of legal questions connected with the frontier described in article 27, paragraph 6, of the Treaty of Saint-Germain-en-Laye of 1919. Article 29 of that instrument provides in relevant part as follows:

Article 29

1. The Contracting States shall promote the construction of such works as are designed to protect the frontier waters and the contiguous flood area against damage by floods, and ensure the draining and irrigation of the adjacent territory, or as the case may be, regularize the flow of water, provide the frontier communes with water, and ensure the utilization of the waterpower supplied by the frontier waterways.

2. In order to enable such works to be constructed in a businesslike way and in conformity with sound engineering principles, the Contracting States agree as to the following principles:

. . .

(*b*) When systematically regularizing a frontier waterway . . ., care shall be taken to secure as far as possible the normal outflow of medium high water . . . Care shall also be taken . . . to avoid any excessive draining of the land situated on one side or the other, and to facilitate the employment of muddy water on this land and its irrigation during periods of drought.

. . .

The 1967 Treaty between the same parties (see para. 34 above), after requiring that they provide protection against flooding and floating ice, stipulates that they shall also take measures "to ensure that frontier waters are kept clean and to construct hydraulic installations and facilities for the drainage or irrigation of adjoining territory . . ." (art. 4, para. 2).

38. Drainage problems are also addressed by the 1960 Treaty between the Netherlands and the Federal Republic of Germany concerning the course of the common frontier and boundary waters.[52] This agreement illustrates how a general obligation to consider the interests of the neighbouring State and to avoid injuring it may have as one of its concrete applications the duty to provide for adequate drainage:

Article 58

1. The Contracting Parties undertake to give due regard, in the performance of their tasks in the field of water management, to the neighbouring State's interests in the boundary waters.[53] To that end, they agree to take or to support all measures required to establish and to maintain within the sections of the boundary waters situated in their respective territories such orderly conditions as will mutually safeguard their interests, and they shall neither take nor tolerate any measures causing substantial prejudice to the neighbouring State.

2. In performing the obligations undertaken in paragraph 1, the Contracting Parties shall in particular take or support, within an appropriate period of time, all measures required:

(*a*) To secure and maintain the adequate drainage of the boundary waters, to the extent required in the interest of the neighbouring State;

(*b*) To prevent inundations and other damage resulting from the inadequate servicing of sluices and weirs;

. . .

3. In addition, the Contracting Parties shall endeavour, within the limits of their financial resources, . . . to participate financially, where such participation is equitable, in measures taken in respect of the boundary waters within the territory of the neighbouring State.

These provisions illustrate how the interrelated phenomena of inadequate drainage and floods (inundation) may be treated together and demonstrate a willingness to enter into the kind of co-operation that is necessary in dealing with these common problems.

39. The 1956 Agreement between Yugoslavia and Albania concerning water economy questions[54] contains in article 1 the following relevant provisions:

Article 1

. . .

2. The provisions of this Agreement shall apply to all water economy questions . . . and in particular to:

. . .

(*c*) The discharge of water, drainage and similar measures;

(*d*) Protection against flooding;

. . .

(*i*) Protection against soil erosion;

. . .

40. In the 1960 Indus Waters Treaty, article IV, paragraph (4), provides that Pakistan shall "maintain in good

[49] See document A/CN.4/348 (footnote 16 above), para. 356.

[50] Mr. Schwebel notes (*ibid.*, footnote 620): "Waterlogging and 'salinization' of once fertile soil is a well-known consequence of inadequate drainage. This is the case in the Indus Basin . . ." and refers to resolution VII of the World Food Conference, entitled "Scientific water management: irrigation, drainage and flood control" (*Report of the World Food Conference*, Rome, 5-16 November 1974 (United Nations publication, Sales No. 75.II.A.3), pp. 10-11).

Frequent reference to problems created by "ponding", due to insufficient drainage after floods, was made at the 1989 Bangladesh Flood Seminar. This phenomenon not only destroys crops but also can give rise to water-borne diseases and their vectors.

[51] Mr. Schwebel cites, *inter alia*, article 8 of the 1843 Convention between Belgium and the Netherlands on regulation of the drainage of the Flanders waters; and article I, sect. 4, article IV, sect. 2, and article V of the 1905 Convention between the Netherlands and Prussia concerning the Dinkel and Vechte rivers.

[52] See also article I, section 4, of the 1905 Convention between the Netherlands and Prussia concerning the Dinkel and Vechte rivers, which provides: "The draining of surplus water shall be carried out in such manner as to prevent, as far as possible, any overflowing of the banks of the lower reaches of the Dinkel river. . . ."

[53] The expression "boundary waters" is defined in article 56 of the Treaty as "surface waters . . . which cross or, in some of their sections, form the frontier between Germany and the Netherlands".

[54] The Agreement includes the statute of the Yugoslav-Albanian Water Economy Commission and the Protocol concerning fishing in frontier lakes and rivers.

order its portions of [certain] drainages . . .". The same article further provides:

(5) If India finds it necessary that any of [those] drainages . . . should be deepened or widened in Pakistan, Pakistan agrees to undertake to do so as a work of public interest, provided India agrees to pay the cost of the deepening or widening.

(6) Each Party will use its best endeavours to maintain the natural channels of the Rivers, as on the Effective Date, in such condition as will avoid, as far as practicable, any obstruction to the flow in these channels likely to cause material damage to the other Party.

These provisions once again evidence a recognition of the interrelationship between flooding, drainage and flow obstructions.

(iv) *Flow obstructions*

41. Flow obstructions may be caused by ice, may inhibit drainage or cause erosion, and may ultimately lead to flooding. However, they may also be unrelated to these other conditions, constituting a hazard, in their own right, to such activities as hydropower generation and navigation, and may even cause the displacement of river channels. Obstructions of the flow of a watercourse may result from human activity, but they are often caused by events such as landslides and earthquakes, by natural log-jams, or by such processes as the accumulation of sediment or of debris. Most treaties addressing the other hazards and conditions dealt with in this chapter also provide for measures to be taken in respect of flow obstructions. In addition to the provisions already mentioned, the following are illustrative.

42. In the 1961 Treaty between the USSR and Poland concerning the régime of the Soviet-Polish State frontier and co-operation and mutual assistance in frontier matters, article 16, paragraph 3, provides that the parties "shall jointly take the necessary steps to remove any obstacles which may cause displacement of frontier rivers, streams or canals or which may obstruct the natural flow of water, navigation and timber-floating along them" and that, if joint works must be undertaken for the purpose of removing such obstacles, "the appropriate authorities of the two Parties shall decide how the works are to be executed. The expenses involved shall be divided equally between the two Contracting Parties unless a special agreement is concluded on this question".

43. In the 1963 Treaty concerning the régime of the Hungarian-Romanian State frontier and co-operation in frontier matters, Hungary and Romania agreed, in article 16, to ensure that their frontier waters are kept in good condition and to "take the necessary steps to remove any obstacles which may cause displacement of the beds of frontier rivers or streams or a change in the position of canals or which obstruct the natural flow of water" (para. 2). They agreed further that "[s]hould a frontier river, stream or canal shift its bed spontaneously or as a result of some natural phenomenon, the Contracting Parties must, jointly and on the basis of equality, undertake the work of correcting the bed if that is found necessary" (para. 4).

44. These agreements demonstrate the importance States attach to protection against damage caused by flow obstructions.

(v) *Siltation*

45. Less dramatic but sometimes equally harmful are accumulations of sediment, which can also change the course of entire rivers. Many watercourses carry heavy sediment loads, as evidenced by the formation of large deltas by the world's major rivers. The annual loads of the Paraná in South America and the Ganges-Brahmaputra system in Bangladesh are each approximately 250 million tons of dry solids.[55] Silt accumulations can create navigational and other hazards and can even divert a river from its original channel. The sediment carried by watercourses can gradually fill in reservoirs, smother spawning beds, clog or damage water-supply intakes and treatment plants, and foreclose recreational uses.[56] The introduction of sediment into watercourses can result from natural causes (e.g., heavy runoff), human conduct (e.g., land-use practices such as overgrazing or deforestation, leading to erosion)[57] or both.

46. Sedimentation can be both a cause and an effect of flooding. It can cause a river to overflow its banks by filling the river-bed, thus reducing its carrying capacity. While floods can cause widespread damage through the silt they transport, the same sediment can also have beneficial effects:

Catastrophic sediment movements which disrupt agricultural patterns and transport facilities are a major result of large-scale flooding. Sediment is also an essential component of soils, and an agent of transport of nutrients and essential minerals. Thus sediment is both a hazard and a resource and contingency planning for flood events requires provisions for sediment management.[58]

47. Efforts to remedy siltation problems are further complicated when the sediment originates in another country. Whether the causes of sedimentation are natural or not, watershed management to stabilize headwater areas may be necessary to curb its harmful effects. Not only is prevention generally more efficient than cure, but efforts to eliminate sediment build-up are often overwhelmed by the volume of silt being transported.[59] This is not to say, however, that elimination of the problem at its source is a simple matter:

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[55] With regard to the Paraná, see Hayton, "The Plata Basin", in Garretson, Hayton and Olmstead, eds., *op. cit.* (footnote 39 above), p. 440, note 374. Concerning the Ganges-Brahmaputra system, see J. Riddell, "The role of dredging in flood alleviation", paper presented at the 1989 Bangladesh Flood Seminar (footnote 8 above).

[56] These and other adverse effects of siltation are described in Mr. Schwebel's third report, document A/CN.4/348 (see footnote 16 above), paras. 366-367.

[57] "Dredging and placer mining for precious metals and stones, or dredging for sands and gravels, can result in considerable sediment load . . ." (*ibid.*, footnote 631).

[58] Kranck, "Sediment movement associated with flood events", paper presented at the 1989 Bangladesh Flood Seminar (see footnote 8 above), p. 29. See also Mr. Schwebel's third report:

". . . irrigation by inundation has from ancient times depended upon the annual deposit of silt upon agricultural lands for partial renewal of fertility; stemming the transport of silt has major significance for the downstream State dependent upon this 'gift' of nature. . . ." (Document A/CN.4/348 (footnote 16 above), para. 366.)

[59] In his third report, Mr. Schwebel states:

"The Plata international watercourse system in South America suffers exceedingly from the problem of siltation. . . . The Paraná's annual silt load is about 250 million tons, two of the results of which are the choked delta where it meets the Uruguay River to form the Plata River and the constant dredging required in the area of the port of Buenos Aires. . . ." (Document A/CN.4/348, para. 367.)

See also Riddell, *loc. cit.* (footnote 55 above). The author notes that, while it is unlikely that removal of the sediment is a practical proposal in all situations, and specifically in the case of Bangladesh, dredging may provide a useful solution in critical areas.

. . . Corrective measures may require extensive and unceasing effort on the part usually of an upstream State whose own uses of the watercourse may be insignificant or unaffected [by the silt]. Clearly, concerted action and contribution by the system States to be benefited by the measures are called for. . . .[60]

48. An early agreement that addresses the problem of siltation is the 1892 Treaty between Switzerland and Austria-Hungary for the regulation of the Rhine from the confluence of the Ill, upstream, to the point downstream where the river flows into the Lake of Constance, article XVII of which provides as follows:

Article XVII

The Swiss Federal Council and the Government of Austria-Hungary shall make every effort, in the catchment basins of the tributaries of the Rhine, to carry out corrective measures, construct dams and execute other works calculated to retain sediments in order to reduce drifting in the bed of the Rhine as much as possible and to maintain a regular course for that river in the future.

Each Government reserves the right to determine the time of execution and the extent of the various measures to correct the flow; nevertheless, the work shall be undertaken as promptly as possible and shall be actively pursued, beginning with the tributaries which cause the greatest damage owing to their heavy load of sediment.

49. To the extent that harmful siltation results directly or indirectly from human conduct, it would fall within the definition of pollution proposed in paragraph 1 of article 16 [17] submitted in the fourth report.[61] While some of the effects of siltation are similar to those of the introduction of chemicals into a watercourse, other effects are more akin to those produced by flow obstructions. This may explain why States have sometimes dealt separately with problems of siltation and pollution.

(vi) *Erosion*

50. Soil erosion can have a number of harmful effects on watercourses and their use. As noted (paras. 45-46 above), it produces sediment, whose deposition can result in flooding, the filling in of channels and other harmful effects. Erosion may also cause damage to the banks and beds of watercourses. In recognition of these problems, States have included in their watercourse agreements provisions designed to avoid harmful erosion.

51. An illustration of a treaty whose scope is specifically defined to include the problem of erosion is the 1958 Agreement between Yugoslavia and Bulgaria concerning water economy questions.[62] Article 1 of that accord provides that it shall apply to all water-economy questions, and in particular to:

. . .

(*h*) Protection against soil erosion in forested and agricultural areas (afforestation, soil conservation, the erection of retaining-walls and silting control);

. . .

52. The 1960 Indus Waters Treaty between India and Pakistan includes a general safeguard clause concerning activities designed, *inter alia*, to promote drainage and to conserve soil against erosion:

Article IV

. . .

(3) Nothing in this Treaty shall be construed as having the effect of preventing either Party from undertaking schemes of drainage, river training, conservation of soil against erosion and dredging, or from removal of stones, gravel or sand from the beds of the Rivers: Provided that:

(*a*) in executing any of the schemes mentioned above, each Party will avoid, as far as practicable, any material damage to the other Party;

. . .

53. Finally, the 1969 Convention between France and the Federal Republic of Germany concerning development of the Rhine illustrates the concern of States for protecting watercourse channels against erosion. In that agreement, the two States undertake to develop jointly "[t]he course of the Rhine downstream from the Iffezheim barrage with a view to preventing or remedying erosion of the river-bed" (art. 1, para. 1).

(b) *State practice as reflected in diplomatic correspondence and other official papers dealing with specific cases*

54. The foregoing review of the practice of States as reflected in their agreements reveals a widely shared concern of long standing for the prevention and regulation of the different events, conditions and other problems that have been considered. Evidence of State practice in the form of diplomatic communications and official papers is not so readily available, as it is often not published. None the less, that which has been discovered offers further support for the proposition that States regard such hazards and dangers as floods as matters that are governed by rules of general international law.

55. Diplomatic exchanges between the United States of America and Mexico concerning two separate problems provide illustrations of the views taken by States regarding their mutual rights and obligations in such cases. The first is the Rose Street canal case, which concerned the channelling of surface runoff from Douglas, Arizona, into Mexico.[63] It is described in the following passages of a note to the United States Secretary of State (Acheson) from the Ambassador of Mexico (de la Colina), dated 1 October 1951:

I have the honor to inform Your Excellency that for several years, without any authorization therefor, part of the surface runoff caused by rains has been diverted artificially by a canal extending from the United States to Mexico east of the city of Douglas, Arizona, and crossing to the east of the Mexican town of Agua Prieta through areas which formerly were outside the boundary of the town but which now, because of the town's growth, are within its limits.

The rains that fell during 1948 destroyed part of the Mexican embankment of the canal and caused damage to private properties. Since then, during each rainy season, the roads from Agua Prieta to its airport and its municipal cemetery are cut off, and the properties and even the lives of the persons who live near the canal are endangered.

The Mexican authorities are suggesting three solutions to this problem:

One solution, and without doubt the most effective, consists in the construction of a new diversion canal more removed from Agua Prieta.

[60] Mr. Schwebel's third report, document A/CN.4/348, para. 366.

[61] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), chap. III, sect. C.

[62] A similar approach is taken by the 1955 Agreement between Yugoslavia and Romania concerning questions of water control on water control systems and watercourses on or intersected by the State frontier, together with the statute of the Yugoslav-Romanian Water Control Commission (art. 1(*i*)).

[63] See M. M. Whiteman, *Digest of International Law* (Washington, D.C.), Vol. 6 (1968), pp. 262-265.

With this in view, the two Sections of the International Boundary and Water Commission have proceeded to make the necessary topographical surveys. Since the canal was constructed by the United States, with no agreement whatever with my country, and since its location has been the principal cause of the damage sustained by our nationals, my Government considers that it devolves upon Your Excellency's Government to finance the necessary work and to pay the damages. The second solution lies in the reconstruction in Mexican territory of the damaged embankment of the canal and the recognition by the Government of the United States of its obligation to pay the costs connected therewith. The third and last solution consists in closing up the canal and constructing a small levee to protect the city of Agua Prieta, along the dividing line, although this diversion would cause damage to the city of Douglas and its inhabitants.

Obviously, the first of the above-mentioned solutions is the most equitable and desirable, and therefore my Government would like Your Excellency's Government to meet the costs of planning and constructing the new canal and of indemnifying the Mexican citizens who have sustained damage.

My Government takes the liberty of suggesting that Your Excellency's Government authorize the United States Commissioner to hold conversations with the Mexican Commissioner in order to reach an agreement on the points set forth above.

56. The United States replied to the Ambassador of Mexico in a note dated 5 February 1952, which described the results of informal discussions that had been held between the officials of Douglas and Agua Prieta:

> . . .I am informed that in the year 1919 the City of Douglas undertook the construction of a drainage canal known as the Rose Street Ditch for the purpose of preventing flood damage. The officials of Agua Prieta expressed an interest, and all construction was suspended while representatives of the two cities conferred. The Mexican officials participating in the discussions, according to my information, consented to resumption of construction and even persuaded the City of Douglas to extend the canal, at considerable expense to itself, from the boundary line southward for approximately 1500 feet so that it would discharge into the large arroyo where its flood waters now flow. All parties on both sides of the border seemed to be satisfied at the time and, I believe you will agree, most cordially took advantage of the canal for many years. Hence a question of damages does not seem to arise.
>
> The present unfortunate situation appears to have developed from the expansion of the City of Agua Prieta toward and beyond the flood arroyo. With the simultaneous expansion of the city of Douglas, the existing drainage canals have become inadequate and represent a matter of concern to both cities. As a consequence the International Boundary and Water Commission undertook informal studies and surveys in 1949 and 1950, and the results suggest the desirability of constructing new flood control works in each of our two countries.
>
> My Government agrees that the International Boundary and Water Commission should continue its studies with the intention of bringing them to a conclusion and of submitting a joint report as early as possible in this year. This report might include recommendations not only concerning remedial measures but also with respect to an equitable division of costs between our Governments . . .

57. In a note dated 24 March 1955, the Ambassador of Mexico (Tello) advised the United States Secretary of State (Dulles) that the situation had not yet been remedied and that, in order to protect Agua Prieta from floods, Mexico would "begin building certain protective works to prevent the entry into Agua Prieta of rain water collected by the Rose Street canal in Douglas". The Ambassador noted that United States authorities might wish to take measures "to prevent consequences which the return of such water might have in the city of Douglas" and stated: "my Government reserves the right to present a claim for the damage which the residents of Agua Prieta have suffered thus far . . .".

58. On 12 May 1955, the United States Assistant Secretary of State (Holland) wrote the following to the mayor of the city of Douglas concerning the flooding problem and the protective works to be built by the Government of Mexico:

> The Department understands that the problem results from the unnatural discharge into Mexico of flood waters originating near Douglas through works constructed by Douglas. There appears to be no occasion nor justification for an international project. In the opinion of both the United States and Mexican Sections of the International Boundary and Water Commission, the problem can be remedied by each city taking entirely feasible and relatively inexpensive steps to prevent the unnatural discharge of flood waters into the other. . . .
>
> . . . Since neither the United States nor the city of Douglas would have the right, without the consent of the Government of Mexico, to divert water from its natural course in the United States into Mexico to the detriment of citizens of the latter country, there would seem to be no doubt that Mexico has the right to prevent water coming into Mexico through the Rose Street canal by the construction at any time of a dike on the Mexican side of the international boundary. On the other hand, the principle of international law which obligates every state to respect the full sovereignty of other states and to refrain from creating or authorizing or countenancing the creation on its territory of any agency, such as the Rose Street canal, which causes injury to another state or its inhabitants, is one of long standing and universal recognition.

Mexico subsequently placed an earth embankment across the canal on the Mexican side of the boundary and the city of Douglas took measures that would be adequate to deal at least with normal storm runoffs.[64]

59. This exchange indicates a recognition of the principle that one State may not, through the alteration of natural runoff patterns (or "diver[sion] [of] water from its natural course"), cause appreciable harm to another State, and that a State threatened by such harm may take appropriate and reasonable precautionary measures. Similar principles were involved in a case that arose only several years later, involving the construction in Mexico of a highway across the Smugglers and Goat Canyons.[65]

60. On 20 May 1957, the United States Commissioner on the International Boundary and Water Commission informed the Mexican Commissioner that the construction of a highway in Mexico posed a flood danger to the United States. The highway, which paralleled the boundary, crossed two canyons that drain northward from Mexico into the United States. It was constructed of earth fill "up to 60 feet in height without culverts" and, according to the United States Commissioner, was "subject to failure [and] could result in flows at the mouths of the canyons at rates greatly exceeding those of natural flows. At the mouths of the canyons in the United States there are residences and properties which would be seriously damaged by such flows". The United States Commissioner concluded by stating:

> . . . I will appreciate an examination of the problem by your Section, and, if the conditions found are as reported to me, that appropriate arrangements be made with the proper authorities in Mexico to take such remedial measures as required to eliminate this threat to interests in my country.

61. The State Government of Baja California, Mexico, drew up a plan for culverts but the plan was considered inadequate by engineers of the United States Section of the International Boundary and Water Commission and was finally abandoned. The State Government prepared a new set of plans which the United States Section considered as appearing adequate with certain suggested modifications.

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[64] *Ibid.*, p. 265, referring to a memorandum dated 11 July 1955 addressed to the United States Commissioner on the International Boundary and Water Commission by engineer Friedkin of the United States Section of the Commission.

[65] *Ibid.*, pp. 260-262.

62. In a note dated 29 July 1959 addressed to the Mexican Minister of Foreign Relations (Tello), the United States Ambassador (Hill) observed that culverts which had been installed were being covered by embankment fill, rendering compliance with the State Government's plan increasingly unlikely. The note continued:

> In the opinion of engineers of the United States Government who are closely familiar with the recent construction, the embankment at Arroyo de San Antonio [Goat Canyon] will fail in certain circumstances of flood, and the modifications made at the Arroyo de las Cabras are not adequate to ensure its security. It too must be expected to fail in certain circumstances. Since the rainy season in that area begins as a rule in November, when considerable runoff in the arroyos must be anticipated, the matter is not only grave but urgent.
>
> My Government has accordingly instructed me to urge the Government of Mexico to take appropriate steps to prevent the damage to property and the injury to persons that are likely to result from the improper construction of the highway. I urge particularly that further construction at the Arroyo de las Cabras be suspended until arrangements can be made by the Government of Mexico for adoption of features essential for the security of the embankment in that canyon, and that the embankment at the Arroyo de San Antonio be opened to prevent the accumulation of flood water pending installation of similar modifications at that canyon.
>
> In view of the foregoing, I am instructed to reserve all the rights that the United States may have under international law in the event that damage in the United States results from the construction of the highway.

63. While some steps towards remedying the situation were thereafter taken, part of the highway was subsequently washed away when water was captured behind the embankments as predicted. Legislation was later passed in the United States authorizing the Secretary of State to enter into an agreement with the Government of Mexico for the joint construction, operation and maintenance by the two States of an international flood control project. Such an agreement was concluded on 19 June 1967.[66]

64. Heads of State and other government officials sometimes make statements concerning the rights and obligations under international law of their States and others with reference to specific cases or situations. While not as illuminating as diplomatic exchanges with reference to a specific problem, these statements do indicate the position of the Government in question with reference to the situation being addressed.

65. At the opening session of the 1989 International Seminar on Bangladesh Floods, the President of Bangladesh delivered an address in which he stated in part, with reference to that country's flood problems:

> . . . these problems need co-operation and integrated approach of all the countries of this region. Nowhere is interdependence more vital than in the rational use and management of internationally shared rivers. Shared rivers are archetypical examples of [the need for] co-operation on the basis of equity, mutual trust and respect. . . . Bangladesh has agreed upon the formation of joint study teams and task force[s] [with neighbouring countries] to study and suggest ways and means for harnessing, developing and rationally managing this vitally important resource. . . .
>
> . . . The requirement of co-operation has now transformed from political concession or morality into international legal duty. An act contrary to this legal order is a breach of international obligation.[67]

[66] International Boundary and Water Commission, United States and Mexico, Minute No. 225. See also the statement by the President of the United States on the agreement, in *Weekly Compilation of Presidential Documents* (Washington, D.C.), vol. 3, No. 27, 10 July 1967, p. 981.

[67] Address by Hussain Muhammad Ershad, President of the People's Republic of Bangladesh, *loc. cit.* (footnote 8 above), pp. 8-9.

2. Declarations, resolutions and recommendations adopted by intergovernmental organizations, conferences and meetings

66. This emphasis on the need for co-operation in addressing flood problems is reflected not only in the agreements surveyed above but also in the work of international organizations, which will be reviewed in the present section.

67. The Mar del Plata Action Plan, adopted in 1977 by the United Nations Water Conference, contains recommendation E, "Natural hazards".[68] In this recommendation the Conference recognized the need in many countries to strengthen programmes for the reduction of losses associated with floods within the framework of programmes for land and water management and for disaster prevention and preparedness generally. It further called upon countries to provide effective flood protection by means of structural and non-structural measures; to develop flood forecasting and warning systems as well as measures to combat and evaluate floods; and to improve the collection of data on flood damage.

68. At its forty-second session in 1987, the Economic Commission for Europe adopted a set of principles on co-operation in the field of transboundary waters[69] and recommended that ECE member Governments apply them in formulating and implementing their water policies. As stated in the preamble to the principles, they "address only issues regarding control and prevention of transboundary water pollution, as well as flood management in transboundary waters . . .". Principles 2 and 2(*a*), set forth under the rubric "Co-operation", provide in relevant part as follows:

> **Co-operation**
>
> 2. Transboundary effects of natural phenomena and human activities on transboundary waters are best regulated by the concerted efforts of the countries immediately concerned. Therefore, co-operation should be established as practical as possible among riparian countries leading to a constant and comprehensive exchange of information, regular consultations and decisions concerning issues of mutual interest: objectives, standards and norms, monitoring, planning, research and development programmes and concrete measures, including the implementation and surveillance of such measures.
>
> 2(*a*). On the basis of the principles of reciprocity, good faith and good-neighbourliness and in the interest of rational water-resource management and protection of these resources against pollution, riparian countries are called upon to enter into consultation if a riparian country so desires, aiming at co-operation regarding:
>
> — Protection of ecosystems, especially the aquatic environment;
>
> — Prevention and control of transboundary water pollution;

[68] *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. I, paras. 62-65. See also "Improved efficiency in the management of water resources and developments in co-operative action in the field of shared water resources: report of the Secretary-General" (E/C.7/1989/6), part one, sect. I. F, "Improved efficiency in the management of natural hazards: floods".

[69] See decision I (42) adopted by ECE on 10 April 1987 (*Official Records of the Economic and Social Council, 1987, Supplement No. 13* (E/1987/33), chap. IV).

— Protection against such dangerous hazards as accidental pollution, floods and ice drifts in transboundary waters; and

— Harmonized use of transboundary waters.[70]

69. Recommendations concerning "Reduction of flood risks", "Monitoring and data processing", "Exchange of information", and "Warning and alarm systems" are set forth in principles 9 to 12, respectively. They provide in part as follows:

Reduction of flood risks

9. For transboundary water subject to risk of flooding, contracting parties should draw up programmes, jointly if necessary, in order to reduce the risk of floods and ice drifts.

9(*a*). Such programmes involve both harmonized construction measures along the waters and non-structural measures. The latter may comprise mutual information and notification (warning and alarm systems) before and during floods caused by precipitation and ice jams; relocation; flood mapping and zoning. When construction measures are envisaged, the entire river basin that may be affected should be investigated to avoid shifting problems onto other river sections as a result of measures taken elsewhere. In principle, activities that may increase the risk of flooding should be offset by measures which diminish these risks. The joint preparation of mathematical models for the simulation of floods is to be recommended as well as their application in designing measures and joint flood-control strategies.

Monitoring and data processing

10. Contracting parties should establish and implement co-ordinated programmes for monitoring and observation of transboundary water quality, transboundary water pollution, accidental pollution, floods and ice drifts. Likewise, common methodologies should be agreed upon for data processing and evaluation procedures.

. . .

Exchange of information

11. Contracting parties should, by means of transboundary agreements or other relevant arrangements, provide for the widest possible exchange, as early as possible, of data and information regarding transboundary water quality and quantity relevant to the control of water pollution, accidental pollution, floods and ice drifts in transboundary waters.

11(*a*). In addition to supplying each other with information on events, measures and plans at the national level affecting the other contracting parties, as well as on implementation of jointly harmonized programmes, contracting parties should maintain a permanent exchange of information on their practical experience and research. Joint commissions offer numerous opportunities for this exchange, but joint lectures and seminars serve also as suitable means of passing on a great deal of scientific and practical information.

. . .

Warning and alarm systems

12. Contracting parties concerned should set up and operate efficient warning and alarm systems to counteract special cases of pollution such as pollution from accidents, negligence and offences and to reduce risks of floods and ice drifts. In such emergency cases, parties involved could consider the possibility of mutual assistance on an agreed basis.

12(*a*). Warning and alarm systems should consist of a small number of main communication centres, whether permanently manned or rapidly made operational which, on the basis of the national reporting system, would ensure the speediest possible transmission of data and forecasts following previously determined patterns.

12(*b*). Warning and alarm systems on transboundary waters should moreover be operated efficiently to permit early undertaking of corrective and protective measures, containment of damage and reduction of risks from natural phenomena and human activities on transboundary rivers.

12(*c*). In this connection, contracting parties should inform each other of measures taken on their territory to reduce or eliminate causes of accidental pollution, floods and ice drifts.

70. The Interregional Meeting on River and Lake Basin Development, held at Addis Ababa in 1988,[71] recognized, in one of its recommendations on legal and institutional aspects, the importance of the affirmative participation of watercourse States, on an equitable basis, in maintaining international watercourses in good order:

> . . . a basin State's right to an equitable share in the uses of the waters of an international drainage basin may be conditional upon that State's willingness, on a reciprocal basis, to participate affirmatively in the reasonable measures and programmes necessary to keep the system of waters in good order (equitable participation).[72]

71. More generally, in paragraph 3 of its resolution 42/169 of 11 December 1987, entitled "International decade for natural disaster reduction", the General Assembly decided to designate the 1990s as "a decade in which the international community, under the auspices of the United Nations, will pay special attention to fostering international co-operation in the field of natural disaster reduction"[73] and in paragraph 7 the Assembly called upon "all Governments to participate during the decade in concerted international action for the reduction of natural disasters".

72. The Council of OECD adopted on 8 July 1988 a decision on the exchange of information concerning accidents capable of causing transfrontier damage.[74] This decision, which relates principally to accidents at "hazardous installations",[75] calls upon member countries to

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[70] See also decision B (41) on co-operation in the field of transboundary waters, adopted by ECE at its forty-first session (1986), especially recommendation 10 concerning the establishment of early warning systems and agreement on measures to prevent floods and to limit their downstream impact (reproduced in United Nations, *Two Decades of Co-operation on Water: Declarations and Recommendations by the Economic Commission for Europe* (1988) (ECE/ENVWA/2), p. 24). With regard to national water policy, see the ECE Declaration of Policy on the Rational Use of Water, adopted by ECE at its thirty-ninth session (1984) in its decision C (XXXIX), principle 3 of which provides:

"3. In formulating and adopting a future-oriented national water policy . . . special emphasis should be given to:

. . .

(*f*) Measures to combat harmful effects of water: flooding, soil erosion, etc." (*Ibid.*, p. 15.)

[71] See the Proceedings of the United Nations Interregional Meeting on River and Lake Basin Development with Emphasis on the Africa Region, Addis Ababa, Ethiopia, 10-15 October 1988 (hereinafter "Addis Ababa Meeting") in United Nations, *River and Lake Basin Development*, Natural Resources/Water Series No. 20 (Sales No. E.90.II.A.10).

[72] *Ibid.*, part one, chap. I, Report of the meeting, recommendations, B, para. 4.

[73] See also General Assembly resolution 43/202 of 20 December 1988 on the same subject.

[74] *European Yearbook*, 1988, vol. XXXVI, p. 40. See also the decision-recommendation adopted by the OECD Council on 8 July 1988 concerning provision of information to the public and public participation in decision-making processes related to the prevention of, and response to, accidents involving hazardous substances (*ibid.*, p. 47).

[75] The expression "hazardous installation" is defined in appendix II, subpara. (*a*), of the decision as:

"(*a*) . . . an industrial installation which contains more than the threshold quantity of any of the hazardous substances mentioned in Appendix III and in which are used, stored or produced such hazardous substances which are capable, in the event of an accident, of causing serious damage to human health or the environment, including property, outside the installation site, with the exclusion of military or nuclear installations;" (*ibid.*, p. 45).

"exchange information and consult one another, on a reciprocal basis if so desired, with the objective of preventing accidents capable of causing transfrontier damage and reducing damage should such an accident occur" (para. 1). In appendix I to the decision, detailed regulations are set forth for the exchange of information relating to the prevention of, and the response to, accidents at hazardous installations. Member States are enjoined to enter into consultations with a view to organizing emergency plans (title C, para. 9) and to transmit an emergency warning to exposed countries immediately "[i]n the event of an accident or imminent threat of an accident capable of causing transfrontier damage" (title D, para. 11). Appendix III to the decision contains a list of threshold quantities of specified hazardous substances. This list is to be reviewed and updated on a regular basis (para. 5 of the decision).

3. Reports and studies prepared by intergovernmental and international non-governmental organizations

(a) *Intergovernmental organizations*

73. The Office of the United Nations Disaster Relief Co-ordinator has prepared a useful study entitled "Water: resource and hazard", concerning protection from natural disasters in general and water-related disasters in particular.[76] In addressing prevention in relation to water-related disasters, the study makes the following observation under the heading "International co-operation and co-ordination":

> In the case of inter-state or international rivers, any failure on the part of river management and other authorities concerned to harmonize or co-operate in river improvement schemes, especially dam or channel enlargement or the construction of entirely new channels or embankments in higher reaches, will inevitably have adverse effects upon people living in downstream areas. . . .[77]

The study goes on to discuss preparedness for water-related disasters and makes the following suggestions concerning early warning systems:

> One important aspect of preparedness is forecasting and early warning. An effective flood warning system must be based on reliable forecasting. Flood forecasting involves the use of precipitation stations (rainfall gauges), stream flow gauges, weather radars, synoptic meteorological networks, reconnaissance aircraft and meteorological satellites. Warnings are disseminated through radio, television, local emergency communication facilities, sirens and visual signals, such as different colour lights placed in elevated locations.[78]

74. A report prepared by the Joint Task Force of the Government of Bangladesh and the United Nations, entitled "The 1988 floods in Bangladesh: impact, relief and recovery",[79] deals, *inter alia*, with strategies for flood control in Bangladesh. Under the heading "International", the report states the following:

> Co-operation between the riparian countries would ensure optimum use of flood control techniques so as to minimize the adverse consequences of floods. Attention in this regard is drawn to the joint work in pre-disaster planning of the participating countries of the UNDRO/World Meteorological Organization Panel on Tropical Cyclones, for in such storms the greater part of the damage is again caused by water. Major aspects of this approach which require consideration might include:
>
> (*a*) Impact on water flows of environmental degradation and accelerated soil erosion in the Himalayas, and possible corrective measures to reduce sediment load and runoff, such as reafforestation;
>
> (*b*) Impact of measures to regulate river flows in the basins, for both flood control and augmentation of dry-season flows;
>
> (*c*) Impact of obstructions on the natural flow of water;
>
> (*d*) Water management and planning.
>
> Since the catchments comprise areas in Bhutan, China, India and Nepal, the President of Bangladesh visited three of these countries in September/October (and is likely to visit the fourth soon) seeking their co-operation in finding a long-term solution to the problem of floods through a regional approach. As a result of these visits, joint task forces and study teams were set up and they are expected to submit their reports within six months.[80]

75. The Interregional Meeting of International River Organizations held at Dakar in 1981 stressed, in one of its conclusions on the topic "Progress in co-operative arrangements", the importance of concerted action to deal with water-related hazards and dangers:

> 5. The prevention and mitigation of floods, droughts and other hazards natural and man-made, are increasingly of concern to the co-operating States because of the numerous changes that are taking place at accelerating rates within the watersheds; therefore, new or strengthened activities must be undertaken to deal effectively with the detrimental effects of water-related hazards and conditions. The international river and lake organizations are appropriate bodies for initiating studies and recommending measures, contingency plans and warning systems, as well as for conducting the necessary ongoing review of conditions and the adequacy of measures undertaken.[81]

76. The Economic Commission for Europe in 1976 issued a report prepared under the auspices of the ECE Committee on Water Problems on the basis of the replies of Governments to a questionnaire adopted by the Committee.[82] The following conclusion was drawn from Government responses to questions on the topic "Principles and main trends of international agreements on flood control":

> International flood control agreements concluded by those countries which replied to the questionnaire aim at the establishment of a co-operation which in all cases refers to an exchange of information on the development of a flood situation and, in most cases, [to] the establishment of joint, co-ordinated plans for the construction of protective works and to mutual commitments resulting therefrom.

(b) *International non-governmental organizations*

77. Apart from the work of previous Special Rapporteurs of the Commission, the set of seven articles on flood control adopted in 1972 by the International Law Association[83] still constitutes the only major effort at stating

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[76] UNDRO/87/3. See also the Draft Code of Conduct on Accidental Pollution of Transboundary Inland Waters (ENVWA/WP.3/R.1, 30 March 1988), prepared by government rapporteurs pursuant to a decision taken by the Senior Advisers to ECE Governments on Environmental and Water Problems.

[77] UNDRO/87/3, para. 48.

[78] *Ibid.*, para. 49.

[79] SG/CONF.4/1 (see footnote 24 above).

[80] *Ibid.*, paras. 115-116.

[81] United Nations, *Experiences in the Development and Management of International River and Lake Basins*, Natural Resources/Water Series No. 10 (hereinafter "Proceedings of the Dakar Meeting") (Sales No. E.82.II.A.17), part one, Report of the meeting, para. 49, conclusion 5.

[82] *Rational Methods of Flood Control Planning in River Basin Development* (United Nations publication, Sales No. E.76.II.E.26).

[83] These articles and the comments thereon appear in part II of the report of the Committee on International Water Resource Law (see ILA, *Report of the Fifty-fifth Conference* (footnote 31 above), pp. 43 *et seq.*).

the general legal rules governing these problems and formulating recommendations in relation to them. The articles read as follows:

Article 1

In the context of the following articles,

1. "Floods" means the rising of water levels which would have detrimental effects on life and property in co-basin States.

2. "Flood control" means the taking of all appropriate steps to protect land areas from floods or to minimize damage therefrom.

Article 2

Basin States shall co-operate in measures of flood control in a spirit of good neighbourliness, having due regard to their interests and well-being as co-basin States.

Article 3

Co-operation with respect to flood control may, by agreement between basin States, include among others:

(*a*) collection and exchange of relevant data;

(*b*) preparation of surveys, investigations and studies and their mutual exchange;

(*c*) planning and designing of relevant measures;

(*d*) execution of flood control measures;

(*e*) operation and maintenance of works;

(*f*) flood forecasting and communication of flood warnings;

(*g*) setting up of a regular information service charged to transmit the height of water levels and the discharge quantities.

Article 4

1. Basin States should communicate amongst themselves as soon as possible on any occasion such as heavy rainfalls, sudden melting of snow or other events likely to create floods [or] dangerous rises of water levels in their territory.

2. Basin States should set up an effective system of transmission in order to fulfil the provisions contained in paragraph 1, and should ensure priority to the communication of flood warnings in emergency cases. If necessary a special system of [transmission] should be built up between the basin States.

Article 5

1. The use of the channel of rivers and lakes for the discharge of excess waters shall be free and not subject to any limitation provided this is not incompatible with the object of flood control.

2. Basin States should maintain in good order their portions of watercourses including works for flood control.

3. No basin State shall be prevented from undertaking schemes of drainage, river draining, conservation of soil against erosion and dredging, or from removal of stones, gravel or sand from the beds of its portions of watercourses provided that, in executing any of these schemes, it avoids any unreasonable interference with the object of flood control, and provided that such schemes are not contrary to any legal restrictions which may exist otherwise.

4. Basin States should ensure the prompt execution of repairs or other emergency measures for minimization of damage by flooding during periods of high waters.

Article 6

1. Expenses for collection and exchange of relevant data, for preparation of surveys, investigations and studies, for flood forecasting and communication of flood warnings, as well as for the setting up of a regular information service shall be borne jointly by the basin States co-operating in such matters.

2. Expenses for special works undertaken by agreement in the territory of one basin State at the request of another basin State shall be borne by the requesting State, unless the cost is distributed otherwise under the agreement.

Article 7

A basin State is not liable to pay compensation for damage caused to another basin State by floods originating in that basin State unless it has acted contrary to what could be reasonably expected under the circumstances, and unless the damage caused is substantial.

78. The World Commission on Environment and Development (often referred to as the "Brundtland Commission" after its Chairman, Gro Harlem Brundtland of Norway), an independent body established in 1983 by the General Assembly to study and report on proposed strategies for sustainable development, submitted its report in 1987.[84] In chapter 11, entitled "Peace, security, development, and the environment", the Commission makes the following pertinent observations:

The importance of early warning

Since it is often uncertainty and insecurity that prompts international conflict, it is of the utmost importance that Governments become aware of imminent environmental stress before the damage actually threatens core national interests. Governments are usually not well equipped with this kind of foresight.

It would be highly desirable if the appropriate international organizations, including appropriate United Nations bodies and regional organizations, were to pool their resources—and draw on the most sophisticated surveillance technology available—to establish a reliable early warning system for environmental risks and conflict. . . . Such a system would monitor indicators of risks and potential disputes, such as soil erosion . . . and uses of commons that are approaching the thresholds of sustainability. The organizations would also offer their services for helping the respective countries to establish principles and institutions for joint management.[85]

Also of interest for present purposes is the following excerpt from chapter 12, entitled "Towards common action: proposals for institutional and legal change":

Assessing global risks

The future—even a sustainable future—will be marked by increasing risk. The risks associated with new technologies are growing. The numbers, scale, frequency, and impact of natural and human-caused disasters are mounting. . . .[86]

In the same chapter, the Commission stated a number of general legal principles, among which the following are of relevance to the present inquiry:

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[84] The report was transmitted to the General Assembly by the Secretary-General in the annex to his note of 4 August 1987 (A/42/427). Citations from the report in the present document are from the printed version: World Commission on Environment and Development, *Our Common Future* (Oxford, Oxford University Press, 1987).

[85] *Ibid.*, p. 302.

[86] *Ibid.*, p. 323. See also the Environmental Perspective to the Year 2000 and Beyond, prepared by the UNEP Intergovernmental Intersessional Preparatory Committee on the Environmental Perspective to the Year 2000 and Beyond and adopted by the Governing Council of UNEP at its fourteenth session, in June 1987 (*Official Records of the General Assembly, Forty-second Session, Supplement No. 25* and corrigendum (A/42/25 and Corr.1), annex II, also contained in the annex to General Assembly resolution 42/186 of 11 December 1987); see especially parts III. D (Security and environment) and IV. A (Assessment). The latter section contains the following recommendations:

"92. Countries, particularly developing countries, should be assisted, through international co-operation on environmental assessment, with the participation of the United Nations system and with the United Nations Environment Programme playing a leading role, in establishing effective national monitoring systems, geographic information systems and assessment capabilities, and improving data compatibility. *In order for this to take place, technical co-operation among countries regionally and globally has to increase significantly**."

> . . . States have a responsibility towards their own citizens and other States:
>
> . . .
>
> — to prevent or abate significant environmental pollution or harm;
>
> . . .
>
> — to undertake or require prior assessments to ensure that major new policies, projects, and technologies contribute to sustainable development . . .
>
> . . .[87]

79. The Brundtland Commission established an international group of experts on environmental law, which prepared a report on legal principles and recommendations on environmental protection and sustainable development, published in June 1986.[88] Among the legal principles adopted by the Experts Group[89] are several that are of present interest. As these provisions were set forth in the Special Rapporteur's fourth report,[90] only excerpts will be reproduced here. Article 4, entitled "Environmental standards and monitoring", provides in subparagraph (*b*) that States shall, *inter alia*,

> (*b*) establish systems for the collection and dissemination of data and regular observation of natural resources and the environment in order to permit adequate planning of the use of natural resources and the environment, to permit early detection of interferences with natural resources or the environment and ensure timely intervention . . .

Article 14 concerns the general obligation to co-operate on transboundary environmental problems, and specifically "in preventing or abating a transboundary environmental interference or significant risk thereof" (para. 1). To the extent possible, this co-operation is to be aimed at "maximizing the effectiveness of measures to prevent or abate a transboundary environmental interference" (para. 2). Finally, article 19 deals with emergency situations and provides that in such cases:

> 1. . . . the State . . . under whose jurisdiction the interference originates shall promptly warn the other States concerned, provide them with such pertinent information as will enable them to minimize the transboundary environmental interference, inform them of steps taken to abate the cause of the . . . interference, and co-operate with those States in order to prevent or minimize the harmful effects of such an emergency situation or other change of circumstances.

The articles goes on to provide, in paragraph 2, that States are under an obligation to develop contingency plans "in order to prevent or minimize the harmful effects of an emergency situation or other change of circumstances . . .". The comment on article 19 states that "many treaties", a large number of which concern international watercourses, afford support for a duty to provide prompt warning to "potential victim States" in the case of such emergencies, even those that do not threaten human health or life.[91] Also cited in support of the duties to warn and to co-operate in preventing and minimizing transboundary emergency situations are, *inter alia*, the *Corfu Channel* case[92] and principle 9 of the "Principles of conduct in the field of the environment for the guidance of States in the conservation and harmonious utilization of natural resources shared by two or more States", adopted by the Governing Council of UNEP in 1978.[93]

80. To summarize, intergovernmental and international non-governmental organizations alike have recognized the need for co-operation, and indeed for collaboration, in the prevention and mitigation of water-related hazards and dangers and other so-called "harmful effects" of water (e.g., erosion, waterlogging and ice conditions). Some of the instruments reviewed have also recognized a broad range of largely procedural obligations, the purpose and effect of which are to prevent and alleviate harm and to avoid disputes. Thus, according to a number of these instruments, watercourse States are under an obligation not only to co-operate and exchange information relating to the kinds of problems under consideration but also, with a view to preventing or mitigating these problems, to engage in consultations, to warn of dangers and to work jointly in the preparation of contingency plans as well as the planning and execution of relevant measures and works.

4. Studies by individual experts

81. In an article dealing with environmental disasters in international law,[94] Edith Brown Weiss discusses international legal obligations concerning "man-induced environmental disasters having significant transboundary effects, natural disasters affecting shared natural resources, and disasters which affect important natural and cultural resources impressed with elements of common patrimony".[95] Addressing both natural disasters and those caused by human activities, she considers the subjects "Preventing environmental disasters", "Minimizing damage and providing emergency assistance" and "Compensating for injuries from environmental disasters". She finds that "the duty to prevent environmental disasters . . . comes within the principle of State responsibility and constitutes customary international law", although "efforts to define acceptable safety standards and practices have been lagging in many important areas".[96] Brown Weiss also concludes that "[t]he duty to minimize environmental injury by giving prompt notification, providing information [warning], and co-operating in minimizing injury is now part of customary international law and is encompassed within the principle of State responsibility".[97] As to compensation, Brown Weiss states:

> . . . There appears to be a consensus that under international law breaches of obligations . . . to prevent accidents and to minimize damage incur responsibility for resulting injuries and that even if no breaches occur, States may be liable for injuries resulting from ultra-

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[87] World Commission . . . , *op. cit.*, p. 331.

[88] Experts Group on Environmental Law of the World Commission on Environment and Development, *Environmental Protection and Sustainable Development: Legal Principles and Recommendations* (London, Graham and Trotman, 1987).

[89] *Ibid.*, pp. 25-33.

[90] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), para. 75.

[91] Environmental Protection . . . , *op. cit.* (footnote 88 above), p. 117.

[92] *I.C.J. Reports 1949*, p. 4.

[93] UNEP, *Environmental Law. Guidelines and Principles*, No. 2, *Shared Natural Resources* (Nairobi, 1978).

[94] E. Brown Weiss, "Environmental disasters in international law", *Anuario Jurídico Interamericano, 1986* (Washington, D.C., 1987), p. 141.

[95] *Ibid.*, pp. 141-142. The author explains that "common patrimony . . . includes world natural and cultural heritages, international gene banks, and similar resources" (p. 142).

[96] *Ibid.*, p. 152.

[97] *Ibid.*

hazardous activities or the release of highly dangerous substances. Whether they may be liable under international law for injuries resulting from other kinds of accidents is not settled.[98]

A collective work on disaster assistance[99] contains a chapter on the relevance of international law to the prevention and mitigation of natural disasters. Among the conclusions reached by the author of the chapter, J. W. Samuels, are the following:

> ... general responsibility concerning natural disasters falls within the realm of international human rights law. In particular, States bear obligations to prevent and mitigate natural disasters as part of the responsibility flowing out of article 11 of the International Covenant on Economic, Social and Cultural Rights. The agreed right of all persons "to an adequate standard of living, including adequate [food], clothing and housing, and to the continuous improvement of living conditions", and the consequent obligation of States "to take appropriate steps to ensure the realization of this right", ought to translate into a threefold developing responsibility:
>
> A State's legal obligation to assist another in time of natural disaster.
>
> A State's legal obligation to prepare for disaster relief within its own territory and to take preventive measures in order to minimize the suffering resulting from natural disasters.
>
> A State's obligation to accept relief for its people from other States after the occurrence of a natural disaster, if its own resources are inadequate.[100]

82. The importance of co-operation between watercourse States in dealing with water-related hazards and dangers was emphasized by W. R. D. Sewell and H. D. Foster in a study prepared for the Budapest Seminar (16-26 September 1975).[101] Referring to the special problems presented when the watercourse causing flood damage is an international one, the authors identify possible prevention strategies and offer several examples of instances in which they have been implemented:

> **The role of international co-operation**
>
> An unfortunate feature of water management, in many parts of the world, is the tendency of countries to adopt independent strategies for dealing with flood-related problems. Experience has shown, however, that there may be a considerable advantage to be obtained through international co-operation. A wide variety of opportunities exist. These include bilateral or multilateral arrangements, whereby countries sharing a common river basin agree to co-operate in some phase of the planning, policy-making or implementation process. As a minimum they might co-operate in the collection of data about hydrological conditions. Such an arrangement, for example, has been worked out between Egypt and the Sudan. This might be extended to the development of warning systems, as has been the case in the Danube Basin. A higher level of commitment is involved in joint planning ventures, such as those in the Lower Mekong where Laos, Cambodia, Thailand and Viet Nam have been co-operating for almost three decades. There may also be opportunities for the construction of flood control facilities in one country to be used mainly for the protection of flood plain lands in the other one(s). An illustration is the construction of the dams on the Columbia River, in Canada, in part to protect communities in the United States' portion of this river basin.
>
> A second type of co-operation is that extended through the various international agencies, notably those relating to the United Nations ...[102]

83. In a paper prepared for the Addis Ababa Meeting, in October 1988, Robert D. Hayton addresses several topics of interest for the present survey.[103] The paper examines recent bilateral and multilateral efforts relating to a number of subjects, including the exchange of hydrometeorological and associated data and information, the prevention of land degradation and desertification and the alleviation of flood risks. On the subject of flood risks, Hayton describes recent action taken by Plata Basin countries which illustrates the importance States attach to the exchange of data and information and flood forecasting:

> ... In 1983, Paraguayan and Argentine officials at the technical level met in Asunción to confer about the problem of high waters in both the Paraguay and Paraná Rivers. It was concluded that all available information on the upper reaches of the two basins, including changes in reservoir levels, should be compiled; the information needed from Brazil, where the headwaters of both rivers are located, was to be officially requested. The information is to be processed and fed into a model so as to permit flood stage forecasts. Shortly thereafter, Argentina and Brazil met to discuss expansion of the exchange of meteorological and hydrological information in light of the 1982 and 1983 floods in the principal rivers of the Plata Basin.[104]

Hayton later surveys examples of co-operation in addressing flood problems in various parts of the world:

> The recent co-operative undertakings for the Zambezi Basin, the Middle Paraná and the Great lakes sub-basin ... have as a major component the alleviation of flood risks. In the other basins in Africa, the Amazon basin, the Plata Basin and the river systems of Europe, among others, Governments are continuing to incorporate flood control in their co-operative efforts. Flood control is also one of the objectives of the Canada-United States Columbia River Treaty. Canada (largely upstream) is entitled to downstream power benefits as the *quid pro quo* for having accepted substantial flood control obligations. ...[105]

Summarizing his overview of recent co-operative action with regard to international watercourses, Hayton notes that States are becoming increasingly aware of the interrelationships between the various elements of the biosphere:

> In numerous instances, including those described briefly above, system States have agreed to, or have undertaken, concrete measures for the study of the condition and operation of their shared water resources, and the land and other resources linked with those waters. Such studies are now being broadened to include the social and economic dimensions of land and water use and conservation. [The direct and indirect influences of human activities on an area's natural resources, and the mounting costs of corrective action, are generally appreciated.]
>
> [At the diplomatic level, there has been a long-standing reluctance of those not schooled in the reciprocal linkages between man and his environment to embrace land degradation and water body protection as integral parts of the challenge to develop, use, protect and control shared water resources in an optimum manner. Fresh water was not to be confused with or related to land, or to air or maritime waters (e.g. estuaries), since that would expand the dimensions of use regulation, which might have to be co-ordinated, if not shared, with another sovereign. But the reluctance has given way before the irrefutable evidence that the hydrologic cycle, disquieting in itself for some, acts and interacts with associated natural and human resources, and ignores man-made boundary lines. It is now acknowledged widely that management of this "fugitive resource", water, cannot be satisfactorily undertaken without certain land use controls, for example, range management and land-fill restrictions, and the protection of the integrity of

[98] *Ibid.*, p. 150.

[99] L. H. Stephens and S. J. Green, eds., *Disaster Assistance: Appraisal, Reform and New Approaches* (New York, New York University Press, 1979).

[100] J. W. Samuels, "The relevance of international law to the prevention and mitigation of natural disasters" (*ibid.*, p. 263).

[101] Sewell and Foster, *loc. cit.* (footnote 22 above), pp. 84 *et seq.*

[102] *Ibid.*, p. 91.

[103] R. D. Hayton, "Developments in co-operative action concerning shared water resources", *River and Lake Basin Development* (see footnote 71 above), pp. 362 *et seq.*

[104] *Ibid.*, pp. 376-377.

[105] *Ibid.*, p. 377.

the so-called "vessels"—the lake and river beds, watershed slopes and other geologic features, along with man's hydraulic works and canals in the drainage basin. International watercourses are no exception.][106]

It is precisely this kind of co-ordinated and comprehensive resource management that is essential if human populations are to be spared the ravages of water-related disasters and other more subtle forms of harm.

84. Problems of flooding and siltation are discussed by the same author in a study on the Plata Basin.[107] He makes the following observations concerning the watercourses comprising the Plata system:

> Vast tracts along the rivers and even whole areas between rivers in the Basin are subject to unexpected and seasonal floods. The Paraná deposits staggering quantities of silt annually, which encumber its own channels, push its delta steadily further into the mouth of the Uruguay and create mammoth, shifting mud banks in the Rio de la Plata; constant, large-scale dredging by Argentina scarcely keeps pace with the accumulation. The port of Buenos Aires, artificial to begin with, is in permanent peril. Unless elaborate measures far upstream in at least two basin States are undertaken, neither flooding nor silting can be eliminated, or even minimized. The urgent necessity for basin-wide collaboration, including compensation and contribution, could not be more dramatically demonstrated.[108]

These conclusions underscore the necessity of co-operation, and indeed of active "collaboration", between watercourse States in preventing and mitigating water-related hazards, dangers and related problems.

85. A final study that should be mentioned in this brief survey is one by Thomas Bruha,[109] which deals principally with emergencies caused by modern industrial accidents but is none the less relevant to the present inquiry. In this study, Bruha examines the rules of international law "concerning the protection of human beings and the environment against environmental emergencies linked to technological development".[110] In tracing the evolution of this field of law, he observes that the rules relating to protection against emergencies and humanitarian relief—particularly with regard to natural disasters—have their roots in the writings of the most prominent natural law theorists dating from the beginning of the seventeenth century.[111] According to Bruha, these jurists—including Suárez, Grotius, Wolff and de Vattel—explicitly or implicitly characterized this body of law as an undeniable element of a "social international law"[112] which is directed towards the promotion of the *bonum commune generis humani*. Of particular interest in this connection is the work of Emer de Vattel who, writing shortly after the 1755 Lisbon earthquake that resulted in 30,000 deaths, had the following to say about what he described as a general principle of the natural law (*principe général d'assistance mutuelle*).

> . . . Each State owes to every other State all that it owes to itself, as far as the other is in actual need of its help and such help can be given without the State neglecting its duties towards itself. Such is the eternal and immutable law of Nature.[113]

Bruha reviews numerous international instruments relating to environmental emergencies. He concludes that, even in the absence of such contractual duties, certain minimum obligations have become part of the corpus of general international law. These include the substantive duties of preventing serious harm to another State and seeing to it that other States are not placed under a significant risk of harm[114] and the procedural duties of entering into consultations, upon request, with any potentially affected State, for the purpose of agreeing upon international safety measures and the "means necessary to eliminate or minimize emergency risks produced through hazardous activities of the [source] States (joint or co-ordinated warning and monitoring systems, emergency plans, etc.)".[115] These principles would seem to be equally applicable to natural hazards and dangers, at least those that are caused in part through human intervention. With regard to measures to be taken in the event of an emergency, Bruha

> infers from the internationally guaranteed human rights a legal duty of States affected by an emergency to call for and facilitate international assistance whenever such help is necessary to prevent or minimize injuries to human health within [their] territory.[116]

86. To recapitulate, the works surveyed above emphasize the importance of international co-operation in dealing with floods and other water-related hazards and dangers. The studies confirm the existence, as a part of the corpus of general international law, of a number of obligations relating to these problems. Some of these obligations are derived from international humanitarian law and have their roots in the writings of such natural law thinkers as Grotius and Suárez. The most prominent of the duties identified by individual experts are in large measure subsumed under the general obligation to prevent or, as the case may be, to minimize injury. The constituent elements of this general duty have been recognized as including the following obligations: to exchange information relating to conditions bearing on the problem involved; to enter into consultations, on

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[106] *Ibid.*, p. 390. The passages in square brackets are from the original version of the paper (ECA/NRD/IMRLBD/3) and were not reproduced in the publication cited in footnote 71 above.

[107] R. D. Hayton, "The Plata Basin", *in* Garretson, Hayton and Olmstead, eds., *op. cit.* (footnote 39 above), pp. 298 *et seq.*

[108] *Ibid.*, p. 401. The footnote to the quoted passage reads in part as follows:

> "The Paraná's annual load of silt is c. 250,000,000 tons, which has formed the broad delta that effectively chokes the river's flow. The Bermejo River is the main contributor of the silt. In the Rio de la Plata ships imperceptibly run aground in 30 feet of fine ooze that semi-floats on the bottom; vessels with bottom water intakes don't enter. . . ." (P. 440, note 374.)

[109] T. Bruha, "Internationale Regelungen zum Schutz vor technisch-industriellen Umweltnotfällen" (International rules designed to protect against environmental emergencies linked to technological development), *Zeitschrift für ausländisches öffentliches Recht und Völkerrecht* (Stuttgart), vol. 44 (1984), p. 1.

[110] *Ibid.*, p. 62 (the quotation is from the English summary).

[111] *Ibid.*, p. 6.

[112] Bruha observes that the social principle of mutual kindness and helpfulness (*das soziale Prinzip der "gegenseitigen Liebe und Hilfsbereitschaft"*) stands in the centre of the leading natural law thinking of modern international law. He cites the works of Francisco Suárez, Hugo Grotius, Christian Wolff and, in particular, Emer de Vattel (*ibid.*, pp. 6-7, footnote 19).

[113] E. de Vattel, *The Law of Nations or the Principles of Natural Law Applied to the Conduct and to the Affairs of Nations and of Sovereigns*, vol. 3 (Washington, D.C., Carnegie Institution, 1916) (transl. of 1758 ed. by C. G. Fenwick), book II, chap. I, sect. 3; cited by Bruha, *loc. cit.*, pp. 6-7, footnote 19; Bruha also refers to chap. I, sects. 2 and 5.

[114] Bruha, *loc. cit.* (footnote 109 above), p. 55.

[115] *Ibid.*, p. 63 (quotation from English summary).

[116] *Ibid.*

request, with potentially affected States in order to establish safety measures; to afford prompt notification of dangers; and to co-operate in the mitigation of damage. Furthermore, publicists have observed that, as part of its obligations under international human rights law, a State has the following specific duties in relation to water-related disasters: to prepare for disaster relief within its own territory; to take preventive measures in order to minimize human suffering; and to call for and to accept relief from other States (or international organizations) if its own resources are inadequate to provide satisfactorily for its population. In addition, some scholars subscribe to the view that a State may be liable for injury to another State that results from ultra-hazardous activities or from the release of highly dangerous substances in its territory.

87. More broadly, the works surveyed above underscore the necessity for active basin-wide collaboration in preventing and mitigating water-related hazards, dangers and other problems. It is all too often the case that disasters or other harmful effects in one watercourse State result from phenomena in another watercourse State or States. Scholars and other experts recognize that the co-operation and collaboration necessary to address these problems may entail, as part of the duty of equitable participation, contribution or the provision of compensation by watercourse States that are the beneficiaries of protective measures taken beyond their borders.

88. A final point that cannot be omitted from this brief summation is that, according to veteran observers, it is now widely acknowledged that the kind of international watercourse management that is necessary to protect against flooding and other harmful effects of water must include certain land-use regulations. Among the examples that could be cited are forestry regulations, restrictions on range use and land-fill practices, and requirements for the protection of river and lake beds, hydraulic works and geologic features such as watershed slopes. It is submitted that article 8, as provisionally adopted by the Commission at its fortieth session,[117] should be interpreted to prohibit land-use practices that result in harm to other watercourse States (through flooding, for example), or a significant risk thereof.[118] Article 8 reads:

Article 8. Obligation not to cause appreciable harm

Watercourse States shall utilize an international watercourse [system] in such a way as not to cause appreciable harm to other watercourse States.

The construction suggested above would require that a land-use practice having the effects described be considered a "utilization" of an international watercourse. Indeed, a land use that causes, for example, erosion, resulting in abnormally high quantities of sediment being washed into a watercourse, would seem to be as much a "use" of the watercourse as the dumping on land of toxic waste that finds its way into a transboundary river or aquifer. To ensure that such land-use practices are adequately covered, however, it is submitted that the articles on water-related hazards and dangers should specifically refer to them.

5. Decisions of international courts and tribunals

89. The decisions of international courts and tribunals that are relevant to the present subtopic have been examined in previous reports of the Special Rapporteur;[119] the aim of the present section, therefore, is merely to recall briefly certain of their aspects.

(a) *Judicial decisions*

90. The *Corfu Channel* case,[120] of course, dealt with the right of innocent passage through ocean straits and not with international watercourses. One of the principal questions before the ICJ, however, was whether Albania had an obligation to warn the United Kingdom of a known danger to its warships, namely the presence of mines in Albania's waters. The Court found that the British vessels were indeed exercising their right of innocent passage in transiting the Straits of Corfu, and concluded that the mines could not have been laid without Albania's knowledge. It continued:

> The obligations resulting for Albania from this knowledge are not disputed between the Parties. Counsel for the Albanian Government expressly recognized that ... "if Albania had been informed of the operation before the incidents of October 22nd, and in time to warn the British vessels and shipping in general of the existence of mines in the Corfu Channel, her responsibility would be involved ...".[121]

It should perhaps be underscored that Albania did not challenge the proposition that it had a duty to warn other States of a danger of which it had knowledge. Having found that Albania had knowledge of the minefield, the Court held that Albania was internationally responsible to the United Kingdom for the loss of life and damage to the two British warships that was sustained when the vessels struck mines in the straits on 22 October 1946. The Court's discussion of the obligations of Albania arising from its knowledge of the danger posed by the minefield offers valuable lessons for the present subtopic:

> The obligations incumbent upon the Albanian authorities consisted in notifying, for the benefit of shipping in general, the existence of a minefield in Albanian territorial waters and in warning the approaching British warships of the imminent danger to which the minefield exposed them. Such obligations are based, not on the Hague Convention of 1907, No. VIII, which is applicable in time of war, but on certain general and well-recognized principles, namely: elementary considerations of humanity, even more exacting in peace than in war; ... and every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.
>
> In fact, Albania neither notified the existence of the minefield, nor warned the British warships of the danger they were approaching.
>
> ...

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[117] *Yearbook ... 1988*, vol. II (Part Two), pp. 35 *et seq.*

[118] This statement is not intended to include the very slight risks (albeit of great harm) that are posed by, for example, the construction of a soundly engineered dam.

[119] See the second report, *Yearbook ... 1986*, vol. II (Part One), pp. 113 *et seq.*, document A/CN.4/399 and Add.1 and 2, paras. 102-133; and the fourth report, document A/CN.4/412 and Add.1 and 2 (footnote 1 above), paras. 83-87.

[120] Judgment of 9 April 1949, Merits, *I.C.J. Reports 1949*, p. 4. The case is discussed in the second and fourth reports of the Special Rapporteur: document A/CN.4/399 and Add.1 and 2, paras. 108-110; and document A/CN.4/412 and Add.1 and 2, para. 83.

[121] *I.C.J. Reports 1949*, p. 22.

In fact, nothing was attempted by the Albanian authorities to prevent the disaster. These grave omissions involve the international responsibility of Albania.

The Court therefore reaches the conclusion that Albania is responsible under international law for the explosions which occurred . . . in Albanian waters, and for the damage and loss of human life which resulted from them, and that there is a duty upon Albania to pay compensation to the United Kingdom.[122]

It is significant that the Court based Albania's duties not upon conventional law but rather upon principles that, even in 1949, it considered to be "general and well recognized". In enumerating those principles, the Court gave pride of place to "elementary considerations of humanity", a principle which is certainly applicable as well in the context of water-related hazards and dangers that are known to a watercourse State. The Court stressed that these considerations are "even more exacting in peace than in war", lending further support to the applicability of the principle to water-related dangers and emergency situations that arise in peacetime. The obligation of every State "not to allow knowingly its territory to be used for acts contrary to the rights of other States" would, of course, apply to hazards, dangers and other "harmful effects of water" that are brought about or intensified by some human agency.

91. The Court reaffirmed the duty to warn of the danger posed by a minefield in the case concerning *Military and Paramilitary Activities in and against Nicaragua*,[123] quoting and relying upon the passage of the *Corfu Channel* judgment referring to "elementary considerations of humanity", set forth above.[124]

(b) *Arbitral awards*

(i) San Juan River *case*

92. In the *San Juan River* case,[125] Costa Rica and Nicaragua submitted to arbitration certain questions relating to the Treaty of 15 April 1858 concerning the delimitation of their common boundary. The arbitrator,[126] in his award of 22 March 1888, made the following observations, which are pertinent to the present subtopic:

The Republic of Costa Rica cannot prevent the Republic of Nicaragua from executing . . . within her own territory . . . works of improvement, *provided* such works of improvement do not result in the occupation or flooding or damage of Costa Rica territory, or in the destruction or serious impairment of the navigation of the said River or any of its branches at any point where Costa Rica is entitled to navigate the same. The Republic of Costa Rica has the right to demand indemnification for any places belonging to her on the right bank of the River San Juan which may be occupied without her consent, and for any lands on the same bank which may be flooded or damaged in any other way in consequence of works of improvement.

. . .

. . . The natural rights of the Republic of Costa Rica alluded to in [article VIII of the treaty] . . . are to be deemed injured in any case where the territory belonging to the Republic of Costa Rica is occupied or flooded . . . .[127]

The award clearly recognizes that it is unlawful for one State to cause flooding damage to another and that such an internationally wrongful act entails the obligation to make reparation to the injured State.

(ii) Gut Dam *case*

93. A second international arbitration involving the question of flooding damage is the *Gut Dam* arbitration between Canada and the United States of America.[128] The claims tribunal established by the parties[129] "received 230 claims on behalf of United States citizens for flooding and erosion damage to property in the United States allegedly caused by a Canadian dam [the Gut Dam] built across the international boundary in the international section of the St. Lawrence River".[130] A few words about the background and factual context of the arbitration may be of assistance in arriving at an accurate understanding of its legal effect.

94. Canada had sought permission from the United States in 1900 for the construction of the part of the dam which would be situated in United States territory. This consent was given in 1902 by legislation enacted by the United States Congress, which provided however that work was not to be commenced on United States territory until plans had been approved by the United States Secretary of War. In 1903 the Secretary, Elihu Root, approved Canada's plans subject to two conditions. The

[122] *Ibid.*, pp. 22-23.

[123] *Nicaragua* v. *United States of America*, Merits, judgment of 27 June 1986, *I.C.J. Reports 1986*, p. 4.

[124] *Ibid.*, p. 112, para. 215. The Court decided this point by a vote of 14 to 1, with Judge Oda dissenting (*ibid.*, pp. 147-148, para. 292, subpara. 8). Indeed, not even Judge Oda disagreed with the duty to warn of a known danger. He dissented only because, in his view, having recognized the validity of the United States' multilateral treaty reservation, the Court should have "ceased to entertain the Application of Nicaragua in so far as it is based on Article 36, paragraph 2, of the Statute [of the Court]"; and since the Court, in his view, could have remained seized of the case "only in relation to the alleged violation by the United States of the 1956 Treaty of Friendship, Commerce and Navigation between the two Parties", the Court's decision relating to the mines was one "concerning a breach of obligations *erga omnes* under customary international law [which] is out of place in this judgment" (*ibid.*, p. 214, paras. 1-2).

[125] See J. B. Moore, *History and Digest of International Arbitrations to which the United States has been a Party* (Washington, D.C., U.S. Government Printing Office, 1898), vol. II, p. 1964; the award is summarized in *Yearbook . . . 1974*, vol. II (Part Two), pp. 190-191, document A/5409, paras. 1038-1041.

[126] The arbitrator was Grover Cleveland, President of the United States of America.

[127] Paras. 6 and 10 of the award (Moore, *op. cit.*, pp. 1965-1966).

[128] See the report of the Agent of the United States before the Lake Ontario Claims Tribunal, which took three decisions in this case, on 15 January, 12 February and 27 September 1968. The report and excerpts from the decisions are reproduced in *International Legal Materials* (Washington, D.C.), vol. VIII (1969), pp. 118 *et seq.* (periodical referred to in the present section as *ILM*). See also the following discussions of, and reports on, this case: "Arbitration of Lake Ontario (Gut Dam) claims", *External Affairs* (Ottawa), vol. XX (1968), p. 507; "The Gut Dam arbitration", *Netherlands International Law Review* (Leiden), vol. XVI (1969), p. 161; M. M. Whiteman, *Digest of International Law* (Washington, D.C.), vol. 3 (1964), pp. 768-771; *Yearbook . . . 1974*, vol. II (Part Two), p. 294, document A/CN.4/274, paras. 78-82. See also the Special Rapporteur's fourth report, document A/CN.4/412 and Add.1 and 2 (footnote 1 above), para. 86 and footnote 187.

[129] Agreement of 25 March 1965 between Canada and the United States of America concerning the establishment of an international arbitral tribunal to dispose of United States claims relating to Gut Dam. The tribunal established under the agreement was the Lake Ontario Claims Tribunal. For a map indicating the location of Gut Dam, see *ILM*, vol. IV (1965), p. 472.

[130] *ILM*, vol. VIII, p. 118.

first was that if the dam materially affected the water levels of Lake Ontario or caused "any injury to the interests of the United States", Canada was to make such changes to the project "as the Secretary of War may order". The second condition provided as follows:

> [If] the construction and operation of said dam shall cause damage or detriment to the property . . . of any . . . citizens of the United States, the government of Canada shall pay such amount of compensation as may be agreed upon between the said government and the parties damaged, or as may be awarded the said parties in the proper court of the United States before which claims for damage may be brought.[131]

A careful reading of the second condition reveals that it did not, strictly speaking, require Canada to make reparation to the United States for any damage caused by the dam, but only provided that Canada was to pay United States citizens such compensation as might be agreed upon between Canada and the injured United States citizens, or as might be awarded by a "proper" United States court—presumably a court having jurisdiction over the parties (including Canada) and the subject-matter of the proceedings.

95. The dam was completed in 1903 and remained in place until early 1953, when it was removed in connection with preparations for the St. Lawrence Seaway project. In the years 1947 to 1952, however, "considerable property damage was caused by erosion and inundation incident to excessively high water levels of Lake Ontario".[132] This was especially true in 1951-1952, when the high level of Lake Ontario and the St. Lawrence River "in combination with storms and other natural phenomena caused extensive flooding and erosion damage to the north and south shores of all of the Great Lakes including Lake Ontario". United States citizens who owned affected property "believed that at least part of the damage was caused by Gut Dam".[133]

96. After unsuccessful attempts to negotiate a settlement of their claims with the Government of Canada, the injured United States property owners filed several lawsuits against Canada in United States courts.[134] In each of the suits, which were ultimately dismissed, "the Canadian Ambassador to the United States addressed a communication to the court suggesting the immunity of his government from suit without its consent, [and] that its consent had not been given . . .".[135] While this position would seem to have rendered illusory the second condition quoted above, the Government of Canada later agreed to resolve the United States citizens' claims through arbitration. The questions before the tribunal concerned such matters as the class of persons entitled to compensation under the 1903 agreement, whether the obligations of Canada were temporally limited, whether the dam had caused the damage complained of, and the amount of compensation that was due.[136]

97. In the arbitration proceedings, Canada initially argued that a proper interpretation of the 1903 agreement would result in its being obligated to compensate only the owner of Galops Island.[137] The tribunal rejected this argument in its first decision, of 15 January 1968, holding that "on a true interpretation of the Agreement, . . . [Canada's] obligation extended not only to the owners of Les Galops Island but to any citizen of the United States".[138]

98. Indeed, Canada had earlier informed the United States Secretary of State, Dean Acheson, that it "recognize[d] in principle its obligation to pay compensation for damages to United States citizens provided that they are attributable to the construction or operation of Gut Dam in the sense of condition number (2) in the instruments of approval of the United States Secretary of War of August 18, 1903 . . .".[139] According to this statement, then, Canada admitted its obligation to compensate United States property owners who could prove that their injuries had been caused by the dam. The question of causation was one of the points that was to have been decided by the tribunal.

99. As previously indicated, however, the case was ultimately settled.[140] The settlement, which was reached after negotiations entered into at the suggestion of the tribunal, "was without prejudice to the legal or factual position of either party".[141]

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[131] *Ibid.*, p. 120.

[132] Whiteman, *op. cit.* (footnote 128 above), p. 769, quoting from a United States Department of State memorandum of 12 May 1960.

[133] *ILM*, vol. VIII, p. 121.

[134] These actions were brought against the Government of Canada in the United States District Court for the Northern District of New York. One of the suits purported to be a class action on behalf of well over a thousand claimants. Process was served on the Canadian Consul General in New York City. The suits were consolidated for trial and were ultimately dismissed on 24 May 1956 for lack of jurisdiction over the person of the defendant, due to ineffective service of process (see *Oster* v. *Dominion of Canada* (1956) (*Federal Supplement*, vol. 144 (1957), p. 746)); the judgment was affirmed *per curiam*, without opinion, *sub nom. Clay et al.* v. *Dominion of Canada* (1956) (*Federal Reporter*, 2nd Series, vol. 238 (1957), p. 400). The United States Supreme Court denied *certiorari* in 1957 (*United States Reports*, vol. 353 (1957), p. 936). United States citizens also sued the United States Government in an attempt to recover for their injuries, "on the theory that the granting of permission to construct part of the dam on United States territory made the United States liable for damages allegedly resulting from operation of the dam". This action, brought before the Court of Claims in 1956, was also dismissed (*Huther* v. *United States* (*Federal Supplement*, vol. 145 (1957), p. 916)). The information in this note is taken from Whiteman, *op. cit.* (footnote 128 above), pp. 769-770.

[135] Whiteman, p. 769.

[136] *ILM*, vol. VIII, pp. 133-140. Compare the opinion expressed by J. A. Beesley at the Colloquium 1973 of The Hague Academy of International Law to the effect that the Canadian authorities "had accepted liability in effect and were only arbitrating damages" (A.-C. Kiss, ed., *The Protection of the Environment and International Law* (Leiden, Sijthoff, 1975), p. 497).

[137] *ILM*, vol. VIII, p. 133. "Since the Government of Canada had received a release in the early part of the 20th century from the owner of this island, the necessary result of this argument would be that Canada had no liability whatsoever" (*ibid.*). Interpretation of "the agreement" was especially important because:

> "Unlike most . . . international agreements, the agreement under which Gut Dam was constructed was not formally incorporated in a single bilateral document or an agreed bilateral exchange of documents such as an exchange of notes. . . ." (*Ibid.*, p. 134.)

[138] *Ibid.*, p. 136.

[139] Letter dated 10 November 1952 from the Canadian Embassy in Washington to the United States Secretary of State, relating to proceedings pending against Canada in United States courts (*ibid.*, p. 139).

[140] Canada agreed to pay the United States $350,000 in full and final settlement of all claims, which had originally amounted to $653,386 (*ibid.*, p. 140).

[141] *Ibid.*, p. 118.

100. One must be careful in assessing the legal value of this arbitration in view of its unique factual and legal context. Canada did accept an obligation to pay compensation for injuries caused by the dam but its commitment, by its terms, ran in favour of private United States citizens and was only to pay such compensation as might be agreed upon between the citizens and the Canadian Government, or as might be awarded by a "proper" United States court. While Canada cannot, therefore, be said to have expressly agreed to make reparation to the United States for any damage caused to it by the dam, it must be borne in mind that the United States Government did not condition its approval of the Canadian project upon such an agreement. It presumably would have had the power to do so, since part of the dam was to be constructed on United States territory.

101. An evaluation of the legal effect of this case should also take several additional considerations into account. First, Canada did agree, in the first "condition" attached to the United States instrument of approval, to take such corrective action as the United States Secretary "may order" if the dam were found to have affected water levels or to have caused "any injury to the interests of the United States". Evidently, these measures would have prospective effect only; no mention is made of a duty to repair past damage or to pay compensation to the United States therefor. While the instrument of approval does not expressly refer to obligations of prevention[142] or reparation, it is submitted that even in the absence of the agreement Canada would have been bound, under general international law, to make reparation to the United States for damage caused by the construction or operation of the dam and that this would be so even if the dam had been located wholly in Canadian territory.[143] Indeed, no evidence has been discovered suggesting that Canada ever denied that it had such an obligation. The fact that Canada questioned its obligation to compensate the injured United States citizens on the facts of this case is not surprising, nor should it be taken as a denial of any obligations towards the United States under general international law. First, it was Canada's position, in its argument before the tribunal, that the "agreement" under which the Gut Dam was constructed consisted of a series of documents and acts and that "all of the correspondence when taken together demonstrated that the Governments mutually intended that only the owner of Galops Island was to be compensated in the event of damage".[144] Secondly, Canada believed that there should be some time-limit on its obligation, since the claims had been brought some 50 years after the agreement was entered into.[145] And finally, it should not be forgotten that water levels had risen generally in all of the Great Lakes during the years in question (see para. 95 above); the issue of causation, therefore, appears to have been a very real one.

(iii) Lake Lanoux *case*

102. The *Lake Lanoux* case[146] involved the question whether France, the upstream State, could execute a project that would alter the natural conditions of the hydrographic basin of Lake Lanoux. In the course of its decision, the arbitral tribunal observed, with respect to the limits upon France's freedom of action, that "there is a rule prohibiting the upper riparian State from altering the waters of a river in circumstances calculated to do serious injury to the lower riparian State".[147] On the other hand, the mere fact that the project would put France in a position to cause harm to Spain would not, according to the tribunal, entail the responsibility of France any more than would the establishment by France of an activity that posed a "technical risk" to Spain:

> ... Even if viewed solely from the standpoint of the relations of neighbours, the political danger alleged by the Spanish Government would be no more exceptional than the technical risk mentioned above. In any case, there is not, in the Treaty and Additional Act of 26 May 1866 or in the generally accepted principles of international law, a rule which forbids a State, acting to protect its legitimate interests, from placing itself in a situation which enables it in fact, in violation of its international obligations, to do even serious injury to a neighbouring State.[148]

This conclusion was based in part on the "well-established general principle of law that bad faith is not presumed".[149] It may be concluded by analogy from these statements that the mere establishment by a State of, for example, a dam, though it places the State in a position to cause harm to another watercourse State, is not "forbidden" by international law and, therefore, would not by itself entail the responsibility of the first State. At the same time, any appreciable harm actually caused to another State by reason of failure of the *situs* State to operate safely or maintain adequately the works in question would clearly entail the responsibility of the latter State under article 8 of the draft (see para. 88 above). Furthermore, there is ample precedent for requiring a State planning such an activity, or aware of such a danger, to provide notification (warning) and an opportunity to consult concerning any threat which the situation, existing or prospective, may pose to the other

[142] An obligation of prevention could be implied in the first condition, but the only expressly mentioned consequence of breaching such an obligation was the duty to make such changes in the works as would be called for by the United States.

[143] This result would follow from the principles underlying article 8, as provisionally adopted by the Commission at its fortieth session (see para. 88 above), including the principle *sic utere tuo ut alienum non laedas*, and the decision in the *Trail Smelter* arbitration, noted below. Without more evidence relating to the negotiations that led up to the "agreement", it cannot be concluded that the "acceptance" by the United States of these conditions amounted to a waiver of its right to reparation in the event that the dam resulted in appreciable harm to the United States. Indeed, it is highly unlikely that the United States Government would have waived this right before the dam was even constructed, since it would have had no idea of whether, and to what extent, the dam would cause damage.

[144] *ILM*, vol. VIII, pp. 133-134. See also the discussion of this point in para. 97 above and footnote 137.

[145] The tribunal ruled against Canada on this point in its second decision, entered on 12 February 1968 (*ibid.*, pp. 138-140).

[146] Original French text of the arbitral award in United Nations, *Reports of International Arbitral Awards*, vol. XII (Sales No. 63.V.3), pp. 281 *et seq.*; partial translations in *Yearbook ... 1974*, vol. II (Part Two), pp. 194 *et seq.*, document A/5409, paras. 1055-1068, and *International Law Reports, 1957* (London), vol. 24 (1961), pp. 101 *et seq.*

[147] Para. 13 (first subparagraph) of the award.

[148] Para. 9 (second subparagraph) of the award.

[149] *Ibid.*

State.[150] Thus, the above statements of the arbitral tribunal in the *Lake Lanoux* case should be viewed and understood in their legal context.

(iv) Trail Smelter *case*

103. The dispute that gave rise to the *Trail Smelter* case[151] concerned transfrontier air pollution; no international watercourse was involved. Nevertheless, the basic principle recognized by the arbitral tribunal is of broad significance, based as it is upon general principles of international law. In its second award, the tribunal stated that:

> . . . under the principles of international law, . . . no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.[152]

This statement may be regarded as an application of one of the holdings in the *Corfu Channel* case, and of the *sic utere tuo* principle, as well as one of the bases of principle 21 of the Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration).[153] All of these authorities, implicitly or explicitly, recognize that States must, in the words of principle 21 of the Stockholm Declaration, "ensure that activities within their jurisdiction or control do not cause damage to the environment of other States . . .". This principle applies with equal force to activities resulting in water-related hazards, dangers or other problems that would threaten or cause damage in other watercourse States.

104. The decisions summarized above provide a number of valuable insights into the principles that tribunals and States themselves have accepted as governing the kinds of problems under consideration. First, the ICJ has twice recognized a State's obligation to warn other potentially affected States of dangers known to it. It has also invoked the "general and well-recognized principle", expressed in the *sic utere tuo* maxim, that a State must not allow "its territory to be used for acts contrary to the rights of other States".[154] This would presumably include acts that, directly or indirectly, give rise to water-related hazards, dangers or other problems that cause damage to other watercourse States. The general principle *sic utere tuo* has been confirmed in a number of arbitrations, some of which dealt specifically with actual or potential problems of flooding. On the other hand, it has been recognized that international law does not prohibit a State, "acting to protect its legitimate interests, from placing itself in a situation which enables it in fact, in violation of its international obligations, to do even serious injury to a neighbouring State".[155] This very passage suggests, however, that causing serious injury to a neighbouring State through, for example, improper construction or operation of a dam could amount to a "violation of [the] international obligations" of the State in which the dam was situated.

B. Other water-related problems and conditions

1. Salt-water intrusion

105. The expression "saline intrusion", or "salt-water intrusion", refers to the infiltration of marine water into fresh water. This occurs most commonly at the mouths of rivers but can also affect groundwater aquifers. Saline intrusion can be caused by human action, natural phenomena or a combination of the two. Upstream diversion of water from a watercourse for irrigation purposes, for example, can alter the equilibrium between opposing fresh and salt water pressures at the interface between river and ocean, resulting in increased penetration of sea water upstream.[156] But "[n]ature accomplishes this infiltration without any assistance from man in most cases, above all during the dry or low-flow season".[157] The problem may also be exacerbated by storms in low-lying coastal areas.[158]

106. Salt-water intrusion is a serious problem affecting many international watercourses,[159] such as the

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[150] Indeed, this is required by the provisions of part III of the draft articles on the present topic and the authorities surveyed in the commentary to those articles, as well as the authorities catalogued in the relevant reports of the Special Rapporteur. See also, for example, Mr. Barboza's second report on international liability for injurious consequences arising out of acts not prohibited by international law (*Yearbook . . . 1986*, vol. II (Part One), p. 145, document A/CN.4/402), para. 14; "Survey of State practice relevant to international liability for injurious consequences arising out of acts not prohibited by international law, prepared by the Secretariat" (*Yearbook . . . 1985*, vol. II (Part One)/Add., p. 65, document A/CN.4/384, paras. 280-283); American Law Institute, *Restatement (Third) of the Foreign Relations Law of the United States* (St. Paul, Minn.), vol. 2 (1987), pp. 114-116, sect. 601, note 4; and the report of the Experts Group on Environmental Law of the Brundtland Commission, *Environmental Protection . . .*, *op. cit.* (footnote 88 above), pp. 98-119, arts. 16-19 and comments thereon.

[151] The awards of 16 April 1938 and 11 March 1941 in this case are reproduced in United Nations, *Reports of International Arbitral Awards*, vol. III (Sales No. 1949.V.2), pp. 1905 *et seq.*, and excerpted in *Yearbook . . . 1974*, vol. II (Part Two), pp. 192 *et seq.*, document A/5409, paras. 1049-1054. See the discussion of this arbitration in the second and fourth reports of the Special Rapporteur, document A/CN.4/399 and Add.1 and 2 (footnote 119 above), paras. 125-128, and document A/CN.4/412 and Add.1 and 2 (footnote 1 above), para. 85, respectively.

[152] United Nations, *Reports of International Arbitral Awards*, vol. III, p. 1965.

[153] *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972* (United Nations publication, Sales No. E.73.II.A.14), chap. I.

[154] *Corfu Channel* case, *I.C.J. Reports 1949*, p. 22.

[155] *Lake Lanoux* case; see footnote 148 above.

[156] Mr. Schwebel states in his third report:

> "If the reduced flow or pressure results from abstraction of water by a co-system State, the coastal system State or States may experience appreciable harm from what would be pollution as defined [earlier in the report] . . . ." (Document A/CN.4/348 (footnote 16 above), footnote 640.)

[157] *Ibid.*, para. 370.

[158] This is true, for example, in the case of Bangladesh. See B. M. Abbas, "River basin development for socio-economic growth: Bangladesh", paper presented at the Budapest Seminar of 1975, *loc. cit.* (footnote 22 above), vol. II, pp. 188-190. See also the conference brochure of the 1989 Bangladesh Flood Seminar (footnote 8 above), *passim*.

[159] The 1960 Treaty between Belgium and the Netherlands concerning the improvement of the Terneuzen and Ghent Canal and the settlement of various related matters provides, in article 32, for maintaining a specified proportion of fresh to salt water in a border canal.

Gambia[160] and the Ganges, Brahmaputra and Meghna systems which together form the Padma.[161] River flows that could otherwise be utilized for irrigation or other uses must often be allocated to "repelling saline intrusion from the sea".[162]

107. Whether it is caused by salt-water intrusion or irrigation, the salination of fresh water effectively converts it to brackish or salt water, making it unusable for many human needs.[163] While desalination technology exists, the process is at present quite expensive.

108. As an alteration of the quality of water which results from human conduct and which produces effects that are detrimental to, *inter alia*, human health, beneficial uses of water and the environment, salt water intrusion caused by human activity is a form of "pollution" within the meaning of paragraph 1 of draft article 16 [17] as submitted in the fourth report.[164] Since this may not be obvious, however, it may be worth emphasizing by making express reference to salt-water intrusion caused by human conduct in an article on the subject of water-related hazards and dangers. Equally if not more important, however, is the need for international co-operation and solidarity in dealing with the problem of saline intrusion resulting from natural phenomena such as drought or seasonally low water flows. This situation too should therefore be dealt with in the draft articles, especially since it would not be covered by the articles on pollution.

2. Drought and desertification

109. Most of the material in section A of the present chapter dealt with problems caused by an overabundance of water. Many regions of the world, however, suffer from precisely the opposite condition. Some areas can experience both drought and flood within the same 12-month period,[165] a cycle that can repeat itself on a regular basis.

110. Prolonged drought can result in aridity of agricultural and other land, leading in some areas to desertification. The latter phenomenon has been defined as the

> spread or encroachment of a desert environment into arid or semi-arid regions, caused by climatic changes, human influence, or both. Climatic factors include periods of temporary but severe drought and long-term climatic changes towards aridity. Human factors include the artificial alteration of the climate, such as degradation of the biological environment in arid regions by removing vegetation (which can lead to unnaturally high erosion), excessive cultivation, and exhausting surface or groundwater supplies for irrigation or industry, strip-mining, etc. ... The process is characterized by a declining groundwater table, salinization of topsoil and water, diminution of surface water, increasing erosion and the disappearance of native vegetation. ...[166]

The severe drought in the Sahel during the period 1968-1973 caused the Sahara desert to spread southward at an accelerated pace and focused international attention upon the problem of desertification.[167] In 1977, a conference on desertification was held under United Nations auspices at Nairobi. In a report prepared in 1983 at the request of the Economic and Social Council, the Secretary-General highlights the problem graphically: "[D]esertification is a world-wide phenomenon affecting over one third of the combined land area of the continents of Africa, South America and Asia."[168]

111. Problems of drought and desertification are likely to become more acute in the future due to the "greenhouse effect" and consequent global warming (see para. 7 above). As it is, more than one third of the world's arable land is situated in regions affected by drought.[169] The problem is most severe on the African continent, where it has been estimated that 50,000 to 70,000 square kilometres of arable land are lost to the advancing desert every year.[170]

112. The consequences of drought are many and varied. They range from lack of water for domestic, agricultural and industrial needs to environmental damage and outbreaks of disease due to contaminated drinking water or lack of proper sanitation. In the 1983 report referred to above (para. 110), the Secretary-General, noting that natural disasters such as floods and drought hamper the economic and social development efforts of many nations, called for the strengthening and integration of efforts to reduce the damage caused by these phenomena through both structural and non-structural measures, such as early warning systems and forecasting arrangements.[171] The importance of such measures, together with proper planning, was emphasized during the general debate at the United Nations Water Conference, in connection with natural hazards:

> 101. It was recognized that emergency measures could not be a substitute for pre-disaster planning and disaster prevention ...
>
> 102. A number of representatives drew attention to the tragic effects of the recent drought in the Sahel region which, in many instances, had irreversibly affected the ecosystem and induced desertification. While the cyclic drought had been of long duration, it was noted that the dimension of this catastrophe was due in great part to the weakness of the existing socio-economic structure and the lack of a water-related infrastructure capable of responding to the lack of precipitation. It was further noted that, contrary to generally held opinion, the main problem was not one of fundamental lack of water in the

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[160] See, for example, the information concerning the Yellitenda salt control bridge-dam, in the paper presented to the 1981 Dakar Meeting by the Gambia River Development Organization, "Technical note on the Gambia River Development Organization", in United Nations, *Experiences in the Development and Management* ... (footnote 81 above), p. 423; and the background paper by R. D. Hayton on topic II of the Dakar Meeting, "Progress in co-operative arrangements" (*ibid.*, p. 65, at p. 71).

[161] See, for example, the paper prepared by the Bangladesh Ministry of Power, Water Resources and Flood Control, "International rivers —the experience of Bangladesh" (*ibid.*, pp. 270 and 272).

[162] *Ibid.*, p. 272.

[163] In his third report, Mr. Schwebel states: "High salinity renders the waters unusable for domestic, municipal, agricultural and most industrial purposes" (document A/CN.4/348 (footnote 16 above), para. 371).

[164] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), chap. III, sect. C.

[165] This is true, for example, of Bangladesh, which experienced extremely severe floods in the late summer and early fall of 1988, only to be hit by a drought in the spring of 1989.

[166] *The New Encyclopaedia Britannica*, 15th ed. (Chicago, 1987), vol. 4, p. 32.

[167] *Ibid.*

[168] Report of the Secretary-General on the item "*Water resources: progress in the implementation of the Mar del Plata Action Plan*" (E/C.7/1983/11), para. 165.

[169] See the statement made in the General Assembly on 27 September 1983 by Mr. Pereira, President of the Republic of Cape Verde (*Official Records of the General Assembly, Thirty-eighth Session, Plenary Meetings*, vol. I, 7th meeting, para. 17).

[170] *Ibid.*

[171] E/C.7/1983/11, para. 261.

region. Assessment studies in fact showed that the potentially available supply, especially in relation to ground water, was quite sizable in so far as foreseeable needs were concerned.[172]

113. These considerations resulted in a set of recommendations of the Conference on the subject of drought loss management.[173] After declaring that the taking of steps to mitigate the effects of drought in affected areas was "a top priority", the Conference pointed to the "need to develop improved bases for planning land and water management ... in areas subject to severe drought".[174] Accordingly, it recommended that countries should:

...

(*b*) Make an inventory of all available water resources, and formulate long-term plans for their development as an integral part of the development of other natural resources ... These activities may require co-ordination with similar activities in neighbouring countries;

(*c*) Consider the transfer of water from areas where surplus in water resources is available to areas subjected to droughts;

(*d*) Intensify the exploration of ground water through geophysical and hydrogeological investigations and undertake on a regional scale large-scale programmes ...

(*e*) Determine the effect of drought on aquifers ...

...

(*k*) Strengthen institutional arrangements ... for the preparation and dissemination of hydrological, hydrometeorological and agricultural forecasts and for the use of this information in the management of water resources and disaster relief;

...

(*m*) Evolve contingency plans to deal with emergency situations in drought-affected areas;

(*n*) 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.[175]

114. The practice of States situated in drought-stricken regions demonstrates their determination to co-operate with a view to controlling the problem. For example, article 4 of the 1980 Convention creating the Niger Basin Authority provides that the Authority shall undertake activities relating to the "[p]revention and control of drought and desertification" (para. 2 (*c*) (iv) and (*d*) (iv)). A further illustration of this practice may be found in the Convention establishing the Permanent Inter-State Committee on Drought Control in the Sahel, among whose functions are the co-ordination of all action to combat drought and its consequences at the subregional level and the mobilization of available resources in order to finance operations within the framework of subregional co-operation (art. 4 (i) and (iv)).[176]

115. Problems of drought and desertification have received considerable attention at recent intergovernmental meetings, particularly with regard to the African region, where these conditions are especially acute. For example, one of the decisions of the First African Ministerial Conference on the Environment, held at Cairo from 16 to 18 December 1985, was to strengthen subregional co-operation in respect of environment and ecodevelopment, giving priority to the following:

...

(*b*) Efforts to combat desertification and desert advance in the south Saharan zone and the Gum Belt through programmes of ecological rehabilitation;

...

(*e*) Support to the River Niger Basin Authority for the integrated development of the river Niger basin, in order to use its waters and ecosystems rationally, and in particular to halt the drying up of its inland delta (Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria);

...

(*h*) Efforts to combat the spread of the deserts of southern Africa for the promotion of food production;

(*i*) Study and implementation of an integrated multi-purpose development plan for the basin of the Zambezi river (irrigation, navigation and energy) in order to use its waters rationally, combat desertification ...

...

(*l*) Consideration and implementation of the master development plan for the basins of the river Gambia (Gambia, Guinea, Guinea-Bissau and Senegal) and the river Senegal (Mali, Mauritania and Senegal), in order to use their waters and energy resources to combat desertification and prevent possible negative environmental effects;

...

(*q*) Design and implementation of a regional co-operation programme to combat desertification in the region covered by the Permanent Inter-State Committee on Drought Control in the Sahel, the Maghreb, the member States of the Economic Community of West African States, Egypt and the Sudan ...;

...

(*u*) Assistance to the States members of the Southern African Development Co-ordination Conference with programmes to halt individually and collectively the deleterious effects of the endemic drought in the region and to improve techniques for natural resource exploitation;

...[177]

116. At the Addis Ababa Meeting, in 1988, a report was presented by the Economic Commission for Africa on "Integrated river and lake basin management as a vehicle for socio-economic development in Africa".[178] In the discussion following the presentation of the report, a consensus view was expressed that, in the context of sub-arid zones in Africa, the integrated management of large basins was regarded as the only development strategy which could bring about the rapid economic growth needed to combat food deficits, drought and desertification.

117. As the foregoing survey indicates, problems of drought and desertification are among the most serious facing humankind. While they do not affect all inter-

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[172] *Report of the United Nations Water Conference* (footnote 68 above), part three, chap. V.

[173] *Ibid.*, part one, chap. I, paras. 66-68.

[174] *Ibid.*, paras. 66-67.

[175] *Ibid.*, para. 68.

[176] For further examples of treaty provisions addressing the problem of potential water shortages but without using the term "drought", see, for example, the 1959 Agreement between Nepal and India on the Gandak River irrigation and power project (art. 10) and Protocol No. 1 relative to the regulation of the waters of the Tigris and Euphrates and of their tributaries, annexed to the 1946 Treaty of friendship and neighbourly relations between Iraq and Turkey (fourth paragraph of the preamble).

[177] Cairo Programme for African Co-operation (UNEP/GC/14/4/Add.6, annex I), sect. E, para. 1.

[178] United Nations, *River and Lake Basin Development* (see footnote 71 above), p. 59.

national watercourse systems, these conditions are present or potentially present in most regions of the world: "From Djibouti, to China, to Portugal, to the United States of America, to the United Republic of Tanzania and in many other areas, drought is a major preoccupation."[179] In view of the clear need for regional and international co-operation in addressing these problems, it is submitted that they are fitting subjects for regulation in the present draft articles.

C. The proposed articles

118. The Special Rapporteur recommends that the problems addressed in the present chapter, as well as the problem of pollution or environmental emergencies (the subject of draft article 18 [19] as submitted in the fourth report),[180] be dealt with according to the type of action to be taken by watercourse States in relation to the specific kind of problem confronting them. The incidents, hazards, dangers and conditions involved fall into two broad categories: those that are actually or potentially of an emergency nature and those that are not. The measures required to deal with the former category of problems are qualitatively different from those necessary to address the latter. The former require, *inter alia*, the provision of data and information, preventive and precautionary measures, contingency planning, notification of any threat or actual incident or occurrence, emergency action to prevent and mitigate harm during an incident or occurrence and remedial action after the event. It is clear that all of these actions must be based on co-operation between watercourse States, as required by article 9 (General obligation to co-operate), provisionally adopted by the Commission at its fortieth session.[181] The kind of action required to deal with the second category of problems is generally of a less urgent nature but may still include implementation of preventive measures, exchange of data and information and co-operation in taking remedial measures; it might also include such forms of ongoing co-operation as the construction of protective works, the removal of sediment, and other kinds of maintenance operations.

119. With these factors in mind, the Special Rapporteur submits the following articles for the consideration of the Commission.

PART VI

WATER-RELATED HAZARDS, DANGERS AND EMERGENCY SITUATIONS

Article 22. Water-related hazards, harmful conditions and other adverse effects

1. Watercourse States shall co-operate on an equitable basis in order to prevent or, as the case may be, mitigate water-related hazards, harmful conditions and other adverse effects such as floods, ice conditions, drainage problems, flow obstructions, siltation, erosion, salt-water intrusion, drought and desertification.

2. Steps to be taken by watercourse States in fulfilment of their obligations under paragraph 1 of this article include:

(*a*) the regular and timely exchange of any data and information that would assist in the prevention or mitigation of the problems referred to in paragraph 1;

(*b*) consultations concerning the planning and implementation of joint measures, both structural and non-structural, where such measures might be more effective than measures undertaken by watercourse States individually; and

(*c*) preparation of, and consultations concerning, studies of the efficacy of measures that have been taken.

3. Watercourse States shall take all measures necessary to ensure that activities under their jurisdiction or control that affect an international watercourse are so conducted as not to cause water-related hazards, harmful conditions and other adverse effects that result in appreciable harm to other watercourse States.

Comments

(1) *Paragraph 1* lays down a general obligation of co-operation with regard to water-related hazards, harmful conditions and other adverse effects. Co-operation between watercourse States is essential to the prevention of the kinds of problem to which draft article 22 is addressed.

(2) Both the previous Special Rapporteurs, Mr. Schwebel and Mr. Evensen, in their versions of the present article,[182] included the phrase "as the circumstances of the particular international watercourse system warrant", or its equivalent, in paragraph 1. This phrase has been omitted from the version proposed above on the theory that it is implicit in the expression "on an equitable basis". The Special Rapporteur does not perceive a problem, in principle, with the inclusion of the phrase, except that he believes that qualifications of an already very general obligation should be kept to a minimum.

(3) Co-operation "on an equitable basis" also encompasses the duty of an actually or potentially injured watercourse State to contribute to or provide appropriate compensation for protective measures taken, at least in part, for its benefit by another watercourse State.[183]

[179] Mr. Schwebel's third report, document A/CN.4/348 (see footnote 16 above), para. 378.

[180] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), chap. III, sect. C.

[181] *Yearbook ... 1988*, vol. II (Part Two), pp. 33 *et seq.*

[182] See article 11 (Prevention and mitigation of hazards) proposed by Mr. Schwebel in his third report, document A/CN.4/348 (footnote 16 above), para. 379; and article 26 (Control and prevention of water-related hazards) proposed by Mr. Evensen in his first report, document A/CN.4/367 (footnote 16 above), para. 177.

[183] See, for example, the 1961 Treaty between Canada and the United States of America relating to co-operative development of the water resources of the Columbia River Basin, under which Canada is required to provide specified amounts of water storage capacity for flood control purposes and to operate storage dams in accordance with plans made in the Treaty. The United States is to compensate Canada, in the form of both downstream power benefits and money, for providing this protection (arts. IV-VI).

(4) Both article 8 as provisionally adopted at the fortieth session and the present article would apply to the harmful effects of water upon activities not directly related to the watercourse.[184] Examples of such effects are flood damage, siltation of river beds and ports and water-related diseases.[185]

(5) The use of the word "include" in *paragraph 2* is intended to indicate that the list of steps specified is not an exhaustive one. Additional measures or forms of collaborative action may be necessary in some instances in order for watercourse States to fulfil their obligations under paragraph 1.

(6) *Paragraph 3* is a combination of the formulations found in article 194, paragraph 2, of the 1982 United Nations Convention on the Law of the Sea, and in article 8 as provisionally adopted at the fortieth session. While it may be sufficient for the purposes of the present draft articles to refer to activities conducted in the "territory" of watercourse States, rather than those under their "jurisdiction or control", it is submitted that the meaning of the latter expression in the present context is sufficiently clear that it is juridically preferable. Furthermore, it is conceivable that the term "territory" might be under-inclusive in some cases and over-inclusive in others. Paragraph 3 would apply, for example, to uses of land or water which lead to such problems as flooding, siltation, erosion or flow obstructions in other watercourse States. As noted earlier in the present report, it is the view of the Special Rapporteur that this obligation is nothing more than a concrete application of article 8 (Obligation not to cause appreciable harm). The problem has been addressed by, *inter alia*, the International Law Association in its 1980 draft articles on the relationship between water, other natural resources and the environment, article 1 of which provides:

Article 1

Consistent with article IV of the Helsinki Rules, States shall ensure that:

. . .

(*b*) the management of their natural resources (other than water) and other environmental elements located within their own boundaries does not cause substantial injury to the water resources of other States.[186]

Paragraph 3, as proposed above, is somewhat broader than this provision, since the harm against which it is intended to protect would not be confined to "injury to . . . water resources".

[184] Cf. article 1 of the draft articles on the relationship between water, other natural resources and the environment adopted by the International Law Association at its fifty-ninth Conference, in 1980:

"*Article 1*

"Consistent with article IV of the Helsinki Rules, States shall ensure that:

"(*a*) The development and use of water resources within their jurisdiction do not cause substantial injury to the environment of other States or of areas beyond the limits of national jurisdiction; . . .

". . ."

(ILA, *Report of the Fifty-ninth Conference, Belgrade, 1980* (London, 1982), pp. 374-375.)

[185] Examples of such diseases are schistosomiasis (bilharziasis), river blindness, malaria and leptospirosis.

[186] See footnote 184 above.

Article 23. Water-related dangers and emergency situations

1. A watercourse State shall, without delay and by the most expeditious means available, notify other, potentially affected States and relevant intergovernmental organizations of any water-related danger or emergency situation originating in its territory, or of which it has knowledge. The expression "water-related danger or emergency situation" includes those that are primarily natural, such as floods, and those that result from human activities, such as toxic chemical spills and other dangerous pollution incidents.

2. A watercourse State within whose territory a water-related danger or emergency situation originates shall immediately take all practical measures to prevent, neutralize or mitigate the danger or damage to other watercourse States resulting from the danger or emergency.

3. States in the area affected by a water-related danger or emergency situation, and the competent international organizations, shall co-operate in eliminating the causes and effects of the danger or situation and in preventing or minimizing harm therefrom, to the extent practicable under the circumstances.

4. In order to fulfil effectively their obligations under paragraph 3 of this article, watercourse States, together with other potentially affected States, shall jointly develop, promote and implement contingency plans for responding to water-related dangers or emergency situations.

Comments

(1) The present article incorporates draft article 18 [19], entitled "Pollution or environmental emergencies", submitted in the fourth report.[187] As the first paragraph makes clear, it is intended to apply both to natural situations and to those resulting from human activities. In either event, the situation or danger will normally take the form of a sudden incident or event. The Commission may wish, at the appropriate time, to include a definition of "water-related dangers or emergency situations" in article 1 of the draft articles.

(2) *Paragraph 1* requires that immediate notification be given of a danger or situation originating in the territory of a watercourse State or of which that State has knowledge. "Notification" in this context includes the provision of both a warning and any information necessary to enable potentially affected States to deal with the situation. It will be noted that the States to be notified are not limited to watercourse States, but include any States that may be affected (such as coastal States that may be affected by a large oil spill into a watercourse).

(3) *Paragraph 2* applies principally to dangers and situations that result from human activities. The chief obligation with respect to those that are of natural origin is that of prompt notification, provision of information and the like.

(4) *Paragraphs 3 and 4* are derived largely from article 199 of the 1982 United Nations Convention on the Law of the Sea. The obligations contained in these paragraphs

[187] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), chap. III, sect. C.

also received support both in the Commission and in the Sixth Committee of the General Assembly.[188] The expressions "States in the area affected" and "other potentially affected States" are intended to include non-watercourse States that may, however, be harmed by a danger or situation covered by the article.

(5) A suggestion was made in the Sixth Committee that States benefiting from protective or other measures should be required to compensate third States for the measures taken.[189] The Special Rapporteur perceives no difficulties, in principle, with such an obligation, so long as the benefited State were required to contribute only on an equitable basis. This point deserves consideration by the Commission.

(6) A final point that the Commission may wish to consider is whether article 23 should include a provision requiring a State affected by a disaster to accept proffered assistance and not to regard offers thereof as an interference in its internal affairs. It will be recalled that several authors have highlighted this issue.

[188] With regard to comment in the Sixth Committee, see "Topical summary, prepared by the Secretariat, of the discussion in the Sixth Committee on the report of the Commission during the forty-third session of the General Assembly" (A/CN.4/L.431), sect. C, paras. 144-146.

[189] *Ibid.*, para. 146.

CHAPTER II

Relationship between non-navigational and navigational uses

(Part VII of the draft articles)

A. Introduction

120. While the present topic is chiefly concerned with the non-navigational uses of international watercourses, it is undeniable that such uses interact with navigational ones, to the extent that the latter exist. Navigation may affect or even foreclose non-navigational uses, and vice versa. For example, it may be necessary to restrict or even halt irrigation in order to maintain water levels sufficient for navigation; conversely, a dam would render a river impassable in the absence of some special provision for shipping.[190] Mr. Schwebel has noted that, as a practical matter, those responsible for overall management of water resources cannot ignore these interactions:

> . . . The interrelationships between navigational and non-navigational uses of watercourses are so many that, on any watercourse where navigation is practised or is to be instituted, navigational requirements and effects and the requirements and effects of other water projects cannot be separated by the engineers and administrators entrusted with development of the watercourse. . . .[191]

B. Navigation and the scope of the draft articles

121. The Commission has recognized the interrelationship between navigational and non-navigational uses in article 2, which it provisionally adopted as its thirty-ninth session.[192] Paragraph 2 of that article provides as follows:

Article 2. Scope of the present article

. . .

2. The use of international watercourse[s] [systems] 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.

Comment in the Commission and in the Sixth Committee on this provision and on article 1 as provisionally adopted at the thirty-second session[193] indicates a general understanding and acceptance of the necessity of addressing the question of the relationship between navigational and non-navigational uses. Since the focus of the draft articles is upon non-navigational uses, however, treatment of navigation should be limited to that which is necessary to preserve the integrity of the draft's provisions concerning those uses. This approach is emphasized by the negative formulation of article 2, paragraph 2.

C. Resolving conflicts between navigational and non-navigational uses

122. If a watercourse is used for navigation as well as for other purposes, it may happen that the two types of use conflict, or even become incompatible (see para. 120 above). The question would then arise whether there is

[190] In his first report, Mr. Schwebel made the following observations concerning the relationship between navigational and non-navigational uses:

> ". . . Navigation requirements affect the quantity and quality of water available for other uses. Navigation may and often does pollute watercourses and requires that certain levels of water be maintained; it further requires passages through and around barriers in the watercourse. . . ." (*Yearbook . . . 1979*, vol. II (Part One), pp. 158-159, document A/CN.4/320, para. 61.)

[191] *Ibid.*

[192] *Yearbook . . . 1987*, vol. II (Part Two), p. 25.

[193] Paragraph 2 of article 2 is nearly identical to paragraph 2 of article 1 as provisionally adopted in 1980 (*Yearbook . . . 1980*, vol. II (Part Two), p. 110).

some inherent priority or preference as between them. Earlier in this century it might have been correct to state that navigational uses enjoyed such a priority. Illustrative of this position is the 1921 Barcelona Convention and Statute on the Régime of Navigable Waterways of International Concern; article 10 of the Statute provides as follows:

Article 10

1. Each riparian State is bound, on the one hand, to refrain from all measures likely to prejudice the navigability of the waterway, or to reduce the facilities for navigation, and, on the other hand, to take as rapidly as possible all necessary steps for removing any obstacles and dangers which may occur to navigation.

. . .[194]

123. As other kinds of uses began to rival navigation in economic and social importance, however, States in effect recognized that a general assignment of absolute priority to any one use frustrated the achievement of optimum utilization of the watercourse. A resolution adopted by the Inter-American Economic and Social Council in 1966, which emphasizes a number of objectives of sound drainage-basin development, exemplifies this shift in attitude. It refers to the

. . . control and economic utilization of the hydrographic basins and streams . . . for the purpose of promoting, through multinational projects, their utilization for the common good, in transportation, the production of electric power, irrigation works, and other uses, and particularly in order to control and prevent damage such as periodically occurs as the result of . . . floods.[195]

124. The increasing importance of non-navigational uses, relative to navigation, and the resulting trend in State practice enabled Mr. Schwebel to conclude in his third report that "[t]here seems little doubt but that, today, navigation has been deprived of its preferential status".[196] Support for this position is found in article VI of the Helsinki Rules on the Uses of the Waters of International Rivers, adopted by the International Law Association at its fifty-second Conference, in 1966:[197]

Article VI

A use or category of uses is not entitled to any inherent preference over any other use or category of uses.

ILA offered the following explanation of this rule in its commentary to article VI:

. . . In the past twenty-five years . . . the technological revolution and population explosion, which have led to the rapid growth of non-navigational uses, have resulted in the loss of the former pre-eminence accorded navigational uses. Today, neither navigation nor any other use enjoys such a preference. . . .[198]

125. If the expansion and intensification of non-navigational uses have indeed dethroned navigation as the pre-eminent fluvial use, how is a conflict between navigational and other uses to be resolved under contemporary international law? It would seem that the answer follows clearly from the spirit, if not the letter, of the articles already adopted. Such a problem would be resolved in the same way as would a conflict between competing non-navigational uses: by considering all relevant factors, as provided in article 7 of the present draft, with a view to arriving at an equitable allocation of the uses and benefits of the international watercourse system in question. This applies not only to the question whether water levels sufficient for navigation must be maintained but also to other potential impacts of navigational uses, such as pollution of a watercourse. It must be remembered, however, that the régime resulting from this weighing process would be subject to the requirement of article 8 of the present draft that no appreciable harm be caused to a watercourse State[199] in the absence of agreement to accept such a consequence, perhaps in exchange for compensation or other concessions.

126. Since in each individual case all relevant factors must be considered to determine whether a particular use (for example, domestic consumption) is to receive priority over another use or uses (for example, industrial use), it seems inescapable that no one use can be accorded priority over others as a general rule.[200] To take any other approach in a framework instrument such as the present draft articles would be to foreclose the possibility of multi-purpose utilization and development of international watercourses. Watercourse States may wish, of course, to give priority to certain uses in watercourse agreements tailored to their needs and the characteristics of the international watercourse system in question. While this was not an uncommon feature of older agreements,[201] it is not an approach that is followed in most modern instruments.

D. The proposed article

127. In the light of the foregoing discussion, the Special Rapporteur submits the following draft article 24 for the Commission's consideration. The article would constitute part VII of the draft articles.

[194] See also, for example, article 5 of the Declaration of Montevideo, concerning the industrial and agricultural use of international rivers, adopted in 1933 by the Seventh International Conference of American States (reproduced in *Yearbook . . . 1974*, vol. II (Part Two), p. 212, document A/5409, annex I.A); rule II.4 (on which art. 5 of the Montevideo Declaration was based) of the resolution on "International regulations regarding the use of international watercourses" adopted by the Institute of International Law at its Madrid session, in 1911 (*Annuaire de l'Institut de droit international, 1911* (Paris), vol. 24, p. 366); and article 5 of the 1965 revised draft convention on the industrial and agricultural uses of international rivers and lakes prepared by the Inter-American Juridical Committee of OAS, (reproduced in *Yearbook . . . 1974*, vol. II (Part Two), p. 350, document A/CN.4/274, para. 379).

[195] Resolution 24-M/66, on control and economic utilization of hydrographic basins and streams in Latin America (reproduced in *Yearbook . . . 1974*, vol. II (Part Two), p. 351, document A/CN.4/274, para. 380).

[196] Document A/CN.4/348 (see footnote 16 above), para. 444. It goes without saying that, as Mr. Schwebel points out, "[s]ystem States may still establish any priority of uses by agreement . . ." (*ibid.*).

[197] ILA, *Report of the Fifty-second Conference, Helsinki, 1966* (London, 1967), pp. 484 *et seq.*, at p. 491.

[198] *Ibid.*, p. 491, first paragraph of the commentary.

[199] In the commentary to article 8, the Commission indicated that, while article 6 (Equitable and reasonable utilization) and article 8 (Obligation not to cause appreciable harm) should be regarded as being complementary, a use that caused appreciable harm would not, at least *prima facie*, be equitable (*Yearbook . . . 1988*, vol. II (Part Two), p. 36, para. 2 of the commentary).

[200] This position is supported by article VI of the Helsinki Rules and the commentary thereto (see para. 124 above).

[201] See, for example, the 1909 Treaty relating to boundary waters between Canada and the United States of America.

PART VII

RELATIONSHIP TO NAVIGATIONAL USES AND ABSENCE OF PRIORITY AMONG USES

Article 24. Relationship between navigational and non-navigational uses; absence of priority among uses

1. In the absence of agreement to the contrary, neither navigation nor any other use enjoys an inherent priority over other uses.

2. In the event that uses of an international watercourse [system] conflict, they shall be weighed along with other factors relevant to the particular watercourse in establishing equitable utilization thereof in accordance with articles 6 and 7 of these articles.

Comments

(1) The draft article serves two purposes. First, it provides that, as a general matter, no one use is to be accorded automatic priority over other uses. Secondly, it expressly states that navigation is no different from other uses in this regard. While, strictly speaking, the article could be confined to the former point (since navigation would presumably be included by implication), the Special Rapporteur agrees with his predecessors that the article should include an express reference to navigation. If navigation were not singled out, the title of the topic might give the impression that the draft articles were entirely without prejudice to that particular use, notwithstanding paragraph 2 of article 2. What is perhaps more important, the fact that navigation was in the past accorded preferential status militates in favour of a clear statement that such is not the case under the present draft articles.

(2) The opening clause of *paragraph 1* preserves any agreements that accord priority to navigation or to any other use. This clause is not strictly necessary, of course, but was included in recognition of the deference accorded navigation in certain treaties. The expression "watercourse agreements" was consciously avoided since it is conceivable that navigation could be referred to in other kinds of agreement, such as general treaties of amity.[202]

(3) *Paragraph 2* provides that any conflict between uses of an international watercourse [system] is to be resolved through a balancing of all relevant considerations, as called for by articles 6 and 7. For the sake of brevity, the full expression "international watercourse [system]" was not repeated.

[202] Indeed, the very title, "Friendship, commerce and navigation", which many of these agreements bear suggests this possibility. Of course, such an agreement would not bind non-party watercourse States (see art. 34 of the 1969 Vienna Convention on the Law of Treaties). Under article 5 of the present draft articles, however, a watercourse State could be entitled to participate in the negotiation of, and become a party to, such an agreement between other watercourse States if the agreement were negotiated and concluded after the entry into force of the present draft.

CHAPTER III

Regulation of international watercourses

(Part VIII of the draft articles)

A. Introduction

128. The outline of the topic contained in the fourth report[203] set forth a catalogue of "other matters" to be considered for inclusion in the draft articles. It was explained in that report that these were subjects suitable for treatment in the Commission's draft, or in annexes thereto, and that their inclusion would afford watercourse States needed guidance in connection with their efforts to develop international watercourse systems with a view to the optimal utilization of international water resources. With a view to the orderly consideration by the Commission of that material, the Special Rapporteur proposed that the first of these matters, regulation of international watercourses, be dealt with in 1989,[204] and it is accordingly taken up in the present chapter. The remaining material relating to the topic will be dealt with in the next report.

129. As used in the context of the present topic, the expression "regulation of international watercourses" has a specific meaning—namely, the control of the water in a watercourse, by works or other measures, in order both to prevent harmful effects (such as floods and erosion) and to maximize the benefits that may be obtained from the watercourse.[205] The present subtopic is

[203] Document A/CN.4/412 and Add.1 and 2 (see footnote 1 above), para. 7.

[204] *Ibid.*, para. 8.

[205] See also the definition contained in article 1 of the draft articles on the regulation of the flow of water of international watercourses adopted by the International Law Association at its fifty-ninth Conference, held at Belgrade in 1980. In the comment on that article, ILA referred to regulation as "moderating, increasing or otherwise modifying the flow of waters in a watercourse" (see the second report of the Committee on International Water Resources Law (Chairman/Rapporteur: E. J. Manner) on regulation of the flow of water of international watercourses, ILA, *Report of the Fifty-ninth Conference,*

(Continued on next page.)

thus broader than that dealt with in chapter I above, since the measures involved here include not only those designed to prevent harmful effects of water[206] but also those intended to create and enhance the many kinds of benefit water can provide. For example, regulation of the flow of water allows watercourse States to derive maximum beneficial use of the watercourse throughout the year, through storage of water during the wet season and its release in dry periods.

130. Regulation by one watercourse State of the waters of an international watercourse will often operate to the advantage of other watercourse States. For example, making the flow of water more consistent can prevent both floods and droughts, extend periods during which irrigation is possible, permit or enhance hydropower generation, alleviate siltation, dilute pollutants, prevent the formation of stagnant pools in which the malarial mosquito may breed, and sustain fisheries. However, regulation may also have adverse effects upon other watercourse States. For example, works carried out by an upstream State may reduce flow below that which is necessary to provide adequate scouring of the river bed in a downstream State. On the other hand, measures taken by a downstream State, such as the construction of a dam, may result in flooding damage in an upstream State, such as harm to agricultural lands and habitats.

131. The fact that river regulation is at once necessary for optimum utilization and potentially harmful makes co-operation between watercourse States essential. The numerous treaty provisions on the subject testify to States' realization of the importance of working together in this respect.

B. State practice as reflected in international agreements

132. The 1959 Agreement between the USSR, Norway and Finland concerning the regulation of Lake Inari contains detailed provisions that are instructive for present purposes. The Agreement authorized the USSR to regulate the lake by means of the Kaitakoski hydroelectric power station and dam within the limits of specified water levels.[207] The USSR undertook to ensure that the Kaitakoski hydroelectric power station and dam and the course of the Paatsjoki river between Lake Inari and the power station were in such condition that the discharge of water from Lake Inari could proceed at all times in accordance with regulations annexed to the Agreement (art. 2). According to these regulations, the flow of water from Lake Inari is to be continuous within specific limits of a daily mean discharge.[208] In order to prepare the lake to receive spring floods, so as to prevent it from rising above the maximum permissible water level, and to limit the volume of flood discharge and flood levels on the Paatsjoki river below the hydroelectric power station, the flow of water from Lake Inari is to be regulated on the basis of forecasts and recommendations drawn up by Finland in accordance with certain conditions.[209]

133. In the 1944 Treaty relating to the utilization of the waters of the Colorado and Tijuana Rivers and of the Rio Grande (Rio Bravo), the United States of America and Mexico agreed upon the joint construction of the following works for the regulation of those watercourses:

Article 5

...

I. The dams required for the conservation, storage and regulation of the greatest quantity of the annual flow of the [Rio Grande (Rio Bravo)] river in a way to ensure the continuance of existing uses and the development of the greatest number of feasible projects, within the limits imposed by the water allotments specified.

II. The dam and other joint works required for the diversion of the flow of the Rio Grande (Rio Bravo).

...

134. The 1959 Agreement between the United Arab Republic and the Sudan for the full utilization of the Nile waters provides, in article 2, for Egypt to construct the Sudd el Aali at Aswan as the first link of a series of projects on the Nile for over-year storage (para. 1), and for the Sudan to construct the Roseires Dam on the Blue Nile in order to permit utilization of that country's share of the waters (para. 2).

135. The 1971 Agreement between Finland and Sweden concerning frontier rivers contains, in its chapter 4, "Special provisions concerning water regulation". Article 1 of chapter 4 in particular provides that:

Article 1

Permission to regulate the flow of water from a lake or in a watercourse may be granted to any person wishing to achieve better water management with a view to promoting traffic, timber floating, the use of water power, agriculture, forestry, fishing, water supply, water conservancy or any other significant public interest.

The appropriate provisions of chapter 3 shall apply to projects falling within the scope of the first paragraph.

136. One of the main objectives of the 1969 Treaty of the River Plate Basin between Brazil, Argentina, Bolivia, Paraguay and Uruguay is "[t]he rational utilization of water resources, in particular by the regulation of watercourses and their multipurpose and equitable development" (art. I, subpara. (*b*)). The 1960 Indus Waters Treaty between India and Pakistan deals in detail in its

(*Footnote 205 continued.*)

Belgrade, 1980 (London, 1982), p. 363, para. 2 of the comment). To the same effect is the definition of "international river improvements" in article 2 of the Canadian International River Improvements Act of 1955 (*Revised Statutes of Canada, 1970* (Ottawa), vol. IV, chap. I-22, quoted in Mr. Schwebel's third report, document A/CN.4/348 (see footnote 16 above), para. 381).

[206] These effects were described in chapter I. As noted by the ILA Committee on International Water Resources Law, in its first report on regulation of the flow of water of international watercourses, submitted to ILA at its fifty-eighth Conference, too much water flow, if not regulated, may result in considerable damage to agricultural land as well as to the river bank itself. Too little flow, on the other hand, may intensify water pollution or interrupt such uses as navigation and timber floating. An uneven flow of water may also prevent the proper operation of hydroelectric power plants by making it necessary for them to be shut down during periods of insufficient water. (ILA, *Report of the Fifty-eighth Conference, Manila, 1978* (London, 1980), p. 221.)

[207] Article 1 of the Agreement gives a minimum level of 115.67 metres above sea level and a maximum of 118.03 metres above sea level.

[208] See para. 2 of the regulations, in annex 3 to the Agreement.

[209] *Ibid.*

annexure E with the question of storage of waters by India on the Western Rivers and with the construction and operation of storage works. The 1955 Convention between Italy and Switzerland concerns the regulation of Lake Lugano.

137. Protocol No. 1 to the 1946 Treaty of friendship and neighbourly relations between Iraq and Turkey relates to the regulation of the waters of the Tigris and Euphrates and of their tributaries. In the preamble to Protocol No. 1, the parties recognize the importance of the construction of conservation works "in order to ensure the maintenance of a regular water supply and the regulation of the water-flow of the two rivers with a view to avoiding the danger of floods during the annual periods of high-water"; illustrating a recognition of the importance of multiple uses, the parties also accepted the principle that such works "should, as far as possible, and in the interests of both countries be adapted to purposes of irrigation and the production of hydroelectric power".

138. The following are additional examples of treaties that include provisions dealing with regulation of international watercourses: the 1928 Treaty between Austria and Czechoslovakia regarding the settlement of legal questions connected with the frontier, especially article 19; the 1960 Frontier Treaty between the Netherlands and the Federal Republic of Germany, annex B of which concerns the regulation of streams and resultant future changes in the course of the frontier; the 1954 Agreement between Czechoslovakia and Hungary concerning the settlement of technical and economic questions relating to frontier watercourses, especially articles 2-7, 10 and 18; the 1950 Convention between the USSR and Hungary concerning measures to prevent floods and to regulate the water régime on the Soviet-Hungarian frontier in the area of the frontier river Tisza, especially articles 1-8; the 1957 Agreement extending the provisions of the Romanian-Soviet Convention of 1952, concerning measures to prevent floods and to regulate the water régime of the River Prut, to the Rivers Tisza, Suceava and Siret and their tributaries and to the irrigation and drainage canals forming or intersecting the Romanian-Soviet frontier, article 1; and the 1963 Protocol between Greece and Turkey concerning the final elimination of differences concerning the execution of hydraulic operations for the improvement of the bed of the River Meriç-Evros carried out on both banks, especially article 20.

C. Work of the International Law Association

139. As in the case of flood prevention and control, the only major effort at formulating general legal rules and recommendations relating to river regulation, apart from those of previous Special Rapporteurs, was made by the International Law Association. At its fifty-ninth Conference, held at Belgrade in 1980, ILA adopted nine articles on the regulation of the flow of water of international watercourses.[210] These articles read as follows:

Article 1

For the purpose of these articles, "regulation" means continuing measures intended for controlling, moderating, increasing or otherwise modifying the flow of the waters in an international watercourse for any purpose; such measures may include storing, releasing and diverting of water by means such as dams, reservoirs, barrages and canals.

Article 2

Consistent with the principle of equitable utilization, basin States shall co-operate in a spirit of good faith and neighbourliness in assessing needs and possibilities and preparing plans for regulation. When appropriate, the regulation should be undertaken jointly.

Article 3

When undertaking a joint regulation, basin States should settle all matters concerning its management and administration by agreement. When necessary, a joint agency or commission should be established and authorized to manage all relevant aspects of the regulation.

Article 4

Unless otherwise agreed, each basin State party to a regulation shall bear a share of its costs proportionate to the benefits it derives from the regulation.

Article 5

1. The construction of dams, canals, reservoirs or other works and installations and the operation of such works and installations required for regulation by a basin State in the territory of another can be carried out only by agreement between the basin States concerned.

2. Unless otherwise agreed, the costs of such works and their operation should be borne by the basin States concerned.

Article 6

A basin State shall not undertake regulation that will cause other basin States substantial injury unless those States are assured the enjoyment of the beneficial uses to which they are entitled under the principle of equitable utilization.

Article 7

1. A basin State is under a duty to give the notice and information and to follow the procedure set forth in article XXIX of the Helsinki Rules.

2. When appropriate, the basin State should invite other basin States concerned to participate in the regulation.

Article 8

In the event of objection to the proposed regulation, the States concerned shall use their best endeavours with a view to reaching an agreement. If they fail to reach an agreement within a reasonable time, the States should seek a solution in accordance with chapter 6 of the Helsinki Rules.

Article 9

The application of these articles to regulation for controlling floods is without prejudice to the application of the relevant articles on flood control adopted by the International Law Association in 1972.

While the above articles cover areas dealt with in other chapters of the present draft articles, they illustrate the manner in which the present subtopic interacts with others.

D. The proposed article

140. The extensive treatment of river and lake regulation in international agreements reflects the importance

[210] See the second report of the Committee on International Water Resources Law on regulation of the flow of water of international watercourses, *loc. cit.* (footnote 205 above), pp. 362 *et seq.*

States attach to the subject. In recognition of the important role played by regulation of international watercourses, the Special Rapporteur submits the following article for the consideration of the Commission.

PART VIII

REGULATION OF INTERNATIONAL WATERCOURSES

Article 25. Regulation of international watercourses

1. Watercourse States shall co-operate in identifying needs and opportunities for regulation of international watercourses.

2. In the absence of agreement to the contrary, watercourse States shall participate on an equitable basis in the construction and maintenance or, as the case may be, defrayal of costs of such regulation works as they may have agreed to undertake, individually or jointly.

Comments

(1) *Paragraph 1* represents a concrete application of the general obligation of co-operation contained in article 9 of the draft articles. In requiring watercourse States to work together in this regard, the paragraph recognizes the essential role that regulation plays in the development of international watercourses.

(2) *Paragraph 2* is proposed as a residual rule concerning cases in which watercourse States have agreed to undertake regulation works but have not provided for the sharing of the burden of such projects. The expression "participate on an equitable basis" is an application of article 6 of the draft articles and would mean in practice that watercourse States receiving benefits from a particular project should contribute proportionately to its construction and maintenance. In the view of the Special Rapporteur, the term "equitable" also means that such contributions would be required only to the extent that the watercourse State in question was in a financial position to make them.[211]

(3) The Commission may wish to consider whether a definition of the term "regulation" should eventually be included in article 1 of the draft articles. Possible models include the definition contained in article 1 of the articles adopted by ILA (see para. 139 above) and the following text proposed by Mr. Schwebel in his third report:

> "Regulation", for the purposes of this article, means the use of hydraulic works or any other continuing measure to alter or vary the flow of the waters in an international watercourse system for any beneficial purpose.[212]

[211] There would often be a role to be played in such cases by multilateral development banks.

[212] Document A/CN.4/348 (see footnote 16 above), para. 389, para. 3 of draft article 12 (Regulation of international watercourses).

Concluding remarks

141. The present report has covered the three subtopics scheduled for submission in 1989: water-related hazards and dangers; the relationship between non-navigational and navigational uses; and regulation of international watercourses. The Special Rapporteur intends to deal with the remaining aspects of the topic in his sixth report, to be submitted in 1990. The schedule having thus been maintained, the Commission should be in a good position to complete the first reading of the complete set of draft articles by the end of the current term of office of its members, in 1991.

ANNEX

Treaties cited in the present report*

ABBREVIATIONS

BFSP	*British and Foreign State Papers*
Legislative Texts	United Nations Legislative Series, *Legislative Texts and Treaty Provisions concerning the Utilization of International Rivers for Other Purposes than Navigation* (Sales No. 63.V.4).
A/5409	"Legal problems relating to the utilization and use of international rivers", report by the Secretary-General, reproduced in *Yearbook . . . 1974*, vol. II (Part Two), p. 33.
A/CN.4/274	"Legal problems relating to the non-navigational uses of international watercourses", supplementary report by the Secretary-General, reproduced in *Yearbook . . . 1974*, vol. II (Part Two), p. 265.

*The instruments are listed in chronological order, by continent.

AFRICA

	Source
Union of South Africa and Portugal: Agreement regulating the use of the waters of the Kunene River for the purposes of generating hydraulic power and of inundation and irrigation in the Mandated Territory of South West Africa (Cape Town, 1 July 1926)	League of Nations, *Treaty Series*, vol. LXX, p. 315; summarized in A/5409, paras. 96-99.
United Arab Republic and Sudan: Agreement for the full utilization of the Nile waters (Cairo, 8 November 1959) *and* Protocol concerning the establishment of the Permanent Joint Technical Commission (Cairo, 17 January 1960)	United Nations, *Treaty Series*, vol. 453, p. 51; summarized in A/5409, paras. 108-113. *Legislative Texts*, p. 148.
Upper Volta, Mali, Mauritania, Niger, Senegal and Chad: Convention establishing the Permanent Inter-State Committee on Drought Control in the Sahel (Ouagadougou, Upper Volta, 12 September 1973)	A/9178.
Benin, Cameroon, Ivory Coast, Guinea, Upper Volta, Mali, Niger, Nigeria and Chad: Convention creating the Niger Basin Authority (Faranah, Guinea, 21 November 1980)	United Nations, *Treaties concerning the Utilization of International Watercourses for Other Purposes than Navigation: Africa*, Natural Resources/Water Series No. 13 (Sales No. E/F.84.II.A.7), p. 56.

AMERICA

Great Britain and United States of America: Treaty relating to boundary waters and questions concerning the boundary between Canada and the United States (Washington, D.C., 11 January 1909)	*BFSP, 1908-1909*, vol. 102, p. 137; *Legislative Texts*, p. 260; summarized in A/5409, paras. 154-167.
United States of America and Mexico: Treaty relating to the utilization of the waters of the Colorado and Tijuana Rivers, and of the Rio Grande (Rio Bravo) from Fort Quitman, Texas, to the Gulf of Mexico (Washington, D.C., 3 February 1944), *and* supplementary Protocol (14 November 1944)	United Nations, *Treaty Series*, vol. 3, p. 313; summarized in A/5409, paras. 211-216.
Canada and United States of America: Treaty relating to co-operative development of the water resources of the Columbia River Basin (Washington, D.C., 17 January 1961)	United Nations, *Treaty Series*, vol. 542, p. 245; summarized in A/5409, paras. 188-200.
United States of America and Canada: Agreement concerning the establishment of an international arbitral tribunal to dispose of United States claims relating to Gut Dam (Ottawa, 25 March 1965)	United Nations, *Treaty Series*, vol. 607, p. 141; summarized in A/CN.4/274, paras. 78-82.
Brazil, Argentina, Bolivia, Paraguay and Uruguay: Treaty of the River Plate Basin (Brasilia, 23 April 1969)	United Nations, *Treaty Series*, vol. 875, p. 3; summarized in A/CN.4/274, paras. 60-64.

ASIA

Iraq and Turkey: Treaty of friendship and neighbourly relations *and* Protocol No. 1 relative to the regulation of the waters of the Tigris and Euphrates and of their tributaries (Ankara, 29 March 1946)	United Nations, *Treaty Series*, vol. 37, p. 226; summarized in A/5409, paras. 341-346.
USSR and People's Republic of China: Agreement on joint research operations to determine the natural resources of the Amur River Basin and the prospects for development of its productive potentialities and on planning and survey operations to prepare a scheme for the multi-purpose exploitation of the Argun River and the Upper Amur River (Beijing, 18 August 1956)	*Legislative Texts*, p. 280, No. 87; summarized in A/5409, paras. 318-320.
USSR and Iran: Treaty concerning the régime of the Soviet-Iranian frontier and the procedure for the settlement of frontier disputes and incidents (Moscow, 14 May 1957)	United Nations, *Treaty Series*, vol. 457, p. 161.
USSR and Afghanistan: Treaty concerning the régime of the Soviet-Afghan State frontier (Moscow, 18 January 1958)	United Nations, *Treaty Series*, vol. 321, p. 77; summarized in A/5409, paras. 386-398.

	Source
Nepal and India: Agreement on the Gandak River irrigation and power project (Kathmandu, 4 December 1959)	*Legislative Texts*, p. 295, No. 96; summarized in A/5409, paras. 347-354.
India, Pakistan and IBRD: Indus Waters Treaty 1960 (Karachi, 19 September 1960)	United Nations, *Treaty Series*, vol. 419, p. 125; summarized in A/5409, paras. 356-361.

EUROPE

Belgium and Netherlands: Convention on regulation of the drainage of the Flanders waters (Ghent, 20 May 1843)	*Legislative Texts*, p. 541, No. 155; summarized in A/5409, paras. 701-706.
Switzerland and Austria-Hungary: Treaty for the regulation of the Rhine from the confluence of the Ill, upstream, to the point downstream where the river flows into the Lake of Constance (Vienna, 30 December 1892)	*BFSP, 1891-1892*, vol. 84, p. 690; *Legislative Texts*, p. 489, No. 141; summarized in A/5409, paras. 810-817.
Netherlands and Prussia: Convention concerning the Dinkel and Vechte Rivers (Berlin, 17 October 1905)	*Legislative Texts*, p. 752, No. 210; summarized in A/5409, paras. 647-652.
Germany and Poland: Agreement regarding the administration of the section of the Warta forming the frontier, and traffic on that section (Poznan, 16 February 1927)	League of Nations, *Treaty Series*, vol. LXXI, p. 369.
Austria and Czechoslovakia: Treaty regarding the settlement of legal questions connected with the frontier described in article 27, paragraph 6, of the Treaty of Peace between the Allied and Associated Powers and Austria, signed at Saint-Germain-en-Laye on 10 September 1919 (Prague, 12 December 1928)	League of Nations, *Treaty Series*, vol. CVIII, p. 9; summarized in A/5409, paras. 891-892.
Poland and USSR: Agreement concerning the régime on the Soviet-Polish State frontier (Moscow, 8 July 1948)	United Nations, *Treaty Series*, vol. 37, p. 25; summarized in A/5409, para. 953.
USSR and Hungary: Treaty concerning the régime of the Soviet-Hungarian State frontier (Moscow, 24 February 1950)	*Legislative Texts*, p. 823, No. 226; summarized in A/5409, paras. 597-606.
USSR and Hungary: Convention concerning measures to prevent floods and to regulate the water régime on the Soviet-Hungarian frontier in the area of the frontier river Tisza (Uzhgorod, 9 June 1950)	*Legislative Texts*, p. 827, No. 227; summarized in A/5409, paras. 866-870.
Poland and German Democratic Republic: Agreement concerning navigation in frontier waters and the use and maintenance of frontier waters (Berlin, 6 February 1952)	United Nations, *Treaty Series*, vol. 304, p. 131; summarized in A/5409, paras. 907-914.
USSR and Romania: Convention concerning measures to prevent floods and to regulate the water régime of the River Prut (Kishinev, 25 December 1952)	*Legislative Texts*, p. 923, No. 251; summarized in A/5409, para. 791.
Czechoslovakia and Hungary: Agreement concerning the settlement of technical and economic questions relating to frontier watercourses (Prague, 16 April 1954)	United Nations, *Treaty Series*, vol. 504, p. 231; summarized in A/5409, paras. 536-542.
Yugoslavia and Romania: Agreement concerning questions of water control on water control systems and watercourses on or intersected by the State frontier, together with the statute of the Yugoslav-Romanian Water Control Commission (Bucharest, 7 April 1955)	*Legislative Texts*, p. 928, No. 253; summarized in A/5409, paras. 548-555.
Yugoslavia and Hungary: Agreement concerning water economy questions, together with the statute of the Yugoslav-Hungarian Water Economy Commission (Belgrade, 8 August 1955)	*Legislative Texts*, p. 830, No. 228; summarized in A/5409, para. 543.

	Source
Italy and Switzerland: Convention concerning the regulation of Lake Lugano (Lugano, 17 September 1955)	United Nations, *Treaty Series*, vol. 291, p. 213; summarized in A/5409, paras. 721-729.
Hungary and Austria: Treaty concerning the regulation of water economy questions in the frontier region (Vienna, 9 April 1956)	United Nations, *Treaty Series*, vol. 438, p. 123; summarized in A/5409, paras. 566-581.
France and Federal Republic of Germany: Treaty concerning the settlement of the Saar question (Luxembourg, 27 October 1956)	*Legislative Texts*, p. 658, No. 179; summarized in A/5409, paras. 996-1001.
USSR and Czechoslovakia: Agreement concerning the régime of the Soviet-Czechoslovak frontier and the procedure for the settlement of frontier incidents (Moscow, 30 November 1956)	United Nations, *Treaty Series*, vol. 266, p. 244; summarized in A/5409, paras. 1013-1019.
Yugoslavia and Albania: 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)	*Legislative Texts*, p. 441, No. 128; summarized in A/5409, paras. 498-502.
USSR and Romania: Agreement extending the provisions of the 1952 Convention, concerning measures to prevent floods and to regulate the water régime of the River Prut, to the Rivers Tisza, Suceava and Siret and their tributaries and to the irrigation and drainage canals forming or intersecting the Romanian-Soviet frontier (Bucharest, 31 July 1957)	Summarized in A/CN.4/274, para. 156.
Czechoslovakia and Poland: Agreement concerning the use of water resources in frontier waters (Prague, 21 March 1958)	United Nations, *Treaty Series*, vol. 538, p. 89; summarized in A/CN.4/274, paras. 157-163.
Yugoslavia and Bulgaria: Agreement concerning water economy questions (Sofia, 4 April 1958)	United Nations, *Treaty Series*, vol. 367, p. 89; summarized in A/5409, paras. 511-518.
USSR, Norway and Finland: Agreement concerning the regulation of Lake Inari by means of the Kaitakoski hydroelectric power station and dam (Moscow, 29 April 1959)	United Nations, *Treaty Series*, vol. 346, p. 167; summarized in A/5409, paras. 447-452.
Netherlands and Federal Republic of Germany: Treaty concerning the course of the common frontier, the boundary waters, real property situated near the frontier, traffic crossing the frontier on land and via inland waters, and other frontier questions (Frontier Treaty) (The Hague, 8 April 1960)	United Nations, *Treaty Series*, vol. 508, p. 15; summarized in A/5409, paras. 915-927.
Belgium and Netherlands: Treaty concerning the improvement of the Terneuzen and Ghent Canal and the settlement of various related matters (Brussels, 20 June 1960)	United Nations, *Treaty Series*, vol. 423, p. 19; summarized in A/5409, paras. 1009-1012.
Finland and USSR: Agreement concerning the régime of the Finnish-Soviet State frontier and the procedure for the settlement of frontier incidents (Helsinki, 23 June 1960)	United Nations, *Treaty Series*, vol. 379, p. 277; summarized in A/5409, para. 944.
USSR and Poland: Treaty concerning the régime of the Soviet-Polish State frontier and co-operation and mutual assistance in frontier matters (Moscow, 15 February 1961)	United Nations, *Treaty Series*, vol. 420, p. 161; summarized in A/CN.4/274, paras. 178-193.
Greece and Turkey: Protocol concerning the final elimination of differences concerning the execution of hydraulic operations for the improvement of the bed of the River Meriç-Evros carried out on both banks (Ankara, 19 January 1963)	Summarized in A/CN.4/274, paras. 206-210.
Hungary and Romania: Treaty concerning the régime of the Hungarian-Romanian State frontier and co-operation in frontier matters (Budapest, 13 June 1963)	United Nations, *Treaty Series*, vol. 576, p. 275; summarized in A/CN.4/274, paras. 216-227.

	Source
Bulgaria and Greece: Agreement on co-operation in the utilization of the waters of the rivers crossing the two countries (Athens, 9 July 1964)	Summarized in A/CN.4/274, paras. 269-272.
Poland and USSR: Agreement concerning the use of water resources in frontier waters (Warsaw, 17 July 1964)	United Nations, *Treaty Series*, vol. 552, p. 175; summarized in A/CN.4/274, paras. 273-278.
Austria and Czechoslovakia: Treaty concerning the regulation of water management questions relating to frontier waters (Vienna, 7 December 1967)	United Nations, *Treaty Series*, vol. 728, p. 313; summarized in A/CN.4/274, paras. 282-296.
France and Federal Republic of Germany: Convention concerning development of the Rhine between Strasbourg/Kehl and Lauterbourg/Neuburgweier (Paris, 4 July 1969)	United Nations, *Treaty Series*, vol. 760, p. 305.
Finland and Sweden: Agreement concerning frontier rivers (Stockholm, 16 September 1971)	United Nations, *Treaty Series*, vol. 825, p. 191; summarized in A/CN.4/274, paras. 307-321.

General conventions

Convention and Statute on the Régime of Navigable Waterways of International Concern (Barcelona, 20 April 1921)	League of Nations, *Treaty Series*, vol. VII, p. 35.
Vienna Convention on the Law of Treaties (Vienna, 23 May 1969)	United Nations, *Treaty Series*, vol. 1155, p. 331.
United Nations Convention on the Law of the Sea (Montego Bay, Jamaica, 10 December 1982)	*Official Records of the Third United Nations Conference on the Law of the Sea*, vol. XVII (United Nations publication, Sales No. E.84.V.3), p. 151, document A/CONF.62/122.