Principes for Transboundary Groundwater Pollution Control

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International groundwater law has been a stepchild of international water law, which is still predominantly concerned with surface waters. The significant new doctrines which, starting from the premise of the areal unity of the river basin or river system assume the right of basin states to an equitable share in the basin's waters, pertain to groundwater only insofar as it is connected with surface water. Here groundwater shares in the progress of the law vicariously, through the back door. But, of course, not all groundwater is connected with surface streams or lakes. The so-called fossil waters have been likened to minerals, and it has been suggested that rules analogous to mining law may apply to them. This underscores the fact that the aquifer with the land overlying it, rather than the river basin, is the basic unit of groundwater regulation, and that principles unifying the management of surface and underground waters have not yet been satisfactorily enunciated. In municipal law, the evolving conjunctive use of surface and underground waters may produce rules adaptable to international situations. It is likely, however, that in international practice the areal unit of this coordinated management will be neither the river basin nor the aquifer, but an artificial unit comprising both or parts of both, whose boundaries will be determined by the range of mutually felt effects of water use. The extent of groundwater pollution would then become an important, if not the most important, factor in establishing the areal limits of this international unified management of transfrontier water resources.

Just as the evolution of rules for apportioning transfrontier groundwaters lags behind that for transfrontier surface waters, so the effective regulation of transboundary groundwater pollution lags behind (and even further behind) the evolution of rules for transfrontier surface water pol-

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1. International Law Ass'n., Helsinki Rules on the Uses of the Waters of International Rivers, Report of the 52nd Conference held in Helsinki on Aug. 20, 1966, 7–8 (1967). Art. II defines an international drainage basin as determined by "the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus."


It is true that the surface water rules are still chiefly conventional, but some of these conventions in Europe and in North America are important and elaborate instruments that deal exclusively with transfrontier pollution, including provisions for standard-setting and for enforcement. By contrast, there are very few treaties concerned with government pollution and then only indirectly, as part of the regime of frontier surface waters. They are areally narrow and lack any standards. There are cogent reasons for this slow progress; they rise from the special character of groundwater pollution.

The Special Character of Groundwater Pollution

Some day it will be possible by remote sensing equipment to "lift the lid" off an aquifer and find out exactly what is happening beneath. At present, although new and frightening examples of groundwater pollution turn up every day, the extent, the sources, and the pathways of contamination are not well known and are poorly understood. Groundwater is polluted when pollutants are discharged into an aquifer's intake or recharge area (land surface), into wells tapping the aquifer, or into surface streams that feed it, while polluted groundwater in its turn may contaminate surface water. The sources of pollution are frequently more numerous and more widely distributed than in the case of surface water contamination and, while many of them arise from water-related activities, others have nothing whatever to do with water use per se. There is a close connection between groundwater quantity and quality, and one of the aspects unique to groundwater pollution is that a transboundary injury may be at least partially self-induced, for, if a state depletes its own part of an aquifer faster than the natural recharge, pollutants may infiltrate from a part of the aquifer across the border.

There are other important differences between ground and surface water pollution. Groundwaters store contamination, and the process is often irreversible. Cleanup and retrieval are difficult, costly and often impractical. Measures of control and enforcement appropriate for surface waters

4. See e.g., Great Lakes Water Quality Agreement, Nov. 22, 1978, United States–Can., 30 U.S.T. 1383, T.I.A.S. No. 9257, text also in INTERNATIONAL GROUNDWATER LAW, supra note 2, at 362; Switzerland–France, Convention on Protection of Lake Leman Waters Against Pollution (1962), text in Organization For Economic Co-operation and Development, Environmental Protection in Frontier Regions 418 (1978), and in INTERNATIONAL GROUNDWATER LAW, supra note 2, at 458.


may be irrelevant because the course of the pollutants cannot be traced or the polluters positively identified. Monitoring is far more difficult and expensive than in the case of surface water, because wells have to be dug, and if these wells are scattered haphazardly over an aquifer, many localized plumes of contamination will be missed.7

Data Collection and Exchange, Notification and Consultation

In view of these difficulties, the first need in transboundary pollution control is to develop rules for the collection and dissemination of information. So far, few countries have any data base from which the magnitude of groundwater contamination can be determined. This poses a dilemma: untold damage may be done on the one hand by delaying regulation until enough substantive information is gathered and, on the other, by establishing standards and controls on the basis of too little information. There is no question, however, that data gathering must be undertaken on a continuing basis and of a most detailed kind. This is spelled out, for example, in the Recommendations of the U.N. Water Conference at Mar del Plata in 1977, which called specifically for the establishment of data-gathering networks for groundwater quality, the systematic indexing of such data to determine gaps in knowledge, and the determination of "the variables of aquifers."8 The U.N. Interregional Meeting of International River Organizations at Dakar in May, 1981 urged those co-operating states that have not yet included groundwater as part of the shared water resources system to entrust their international river and lake organizations with the collection of hydrogeologic data.9

There is no longer any doubt that modern treaty practice incorporates the duty to exchange information and to notify other states of potentially harmful effects,10 and the international regulation of pollution appears to

7. According to the U.S. Environmental Protection Agency, "generally, basin-wide monitoring detects a problem only when contamination has reached a stage where water quality changes are regional in nature." PROPOSED GROUND WATER PROTECTION STRATEGY, supra note 6, at III-8.
9. U.N., Intergovernmental Meeting of Int'l River Organizations, Dakar, Senegal, 5-14 May, 1981, para. 47 (vi), Final Report of the Meeting (June 1981). The International Boundary and Water Commission (IBWC) is already carrying out such data exchange and an aerial surveillance program. See Utton, supra note 2, at 170. The difficulties and expense of the task of collecting hydrogeologic data are illustrated by the fact that the Commission of the European Communities completed in 1979 a voluminous study of the underground water resources in the Community, with 10 country reports and 152 maps, but has no funds to print and disseminate the results. See O.J. EUR. COMM. (No. C 60) 6 (1981).
be progressing toward the concept that states sharing a resource bring their information-gathering methods to a comparable degree of expertise. This raises the question whether data must be provided as a matter of course on existing situations or only when a country is undertaking some measure or activity. In a 1980 report by the OECD Environmental Committee on application of information and consultation practices for preventing transfrontier pollution, alternative procedures were put forward: one concerning the dissemination of data on activities or measures, the other taking the form of routine communication, notably within international commissions or organizations, of data concerning pertinent aspects of the environmental policy of the country providing the information.

The duty to exchange information should not become a coverup for doing nothing except order more studies. This has been a Canadian criticism of the U.S. attitude to the acid rain problem. The OECD Recommendation of 1974 on Principles Concerning Transfrontier Pollution would obligate countries to provide early information, enter into consultation at the request of the affected or potentially affected countries, and diligently pursue it.

11. See e.g., Art 10 of the EEC directive on protection of groundwater against pollution spells out the type of data to be supplied. European Economic Community, *Council Directive On the Protection of Groundwater Against Pollution Caused by Dangerous Substances*. 23 O.J. EUR. COMM. (No. L 20) 43 (1980); text also in *INTERNATIONAL GROUNDWATER LAW*, supra note 2, at 330. The establishment of nuclear reactors in border regions of western Europe has recently brought forth a number of agreements and recommendations that could apply to the prevention and control of groundwater contaminants. The bilateral agreements all contain provisions for exchange of information and consultation, and the EEC has intervened by proposing the introduction of a Community consultation and arbitration procedure on plans to site nuclear power stations in frontier areas. These treaties are noted in 22 NUCLEAR L. BULL. 34-35 (1978); 25 Id. 38-41 (1980). On the Community consultation and arbitration proposal, see O.J. EUR. COMM. (No. C 147) 10 (1981).

12. Organization for Economic Co-Operation and Development, Report by the Environmental Committee, *Application of Information and Consultation Practices for Preventing Transfrontier Pollution*, text in OECD, Transfrontier Pollution and the Role of States 8, 10 (1981) §§ 5 and 6 (b). This report also proclaims that information and consultation should respect the sovereignty and legitimate interests of the participating countries, and not make a decision by one country to undertake a potentially polluting activity entirely dependent on the prior consent of the exposed country. *Id.* at p. 11, sec. 9 (a).


14. Text in 14 INT’L LEG. MAT. 242 (Nov. 21, 1974). This procedure has been followed in the case of a Canadian power plant on the Poplar River which may adversely affect groundwater on the U.S. side. In 1977 the International Joint Commission established the International Poplar River Water Quality Board. In 1979 the Board urged the two countries to monitor the plant’s boron emissions for impact on surface and groundwater, and in September 1980 this resulted in a U.S.-Canadian agreement setting up a bilateral monitoring committee. See Caponera and Alheritiere, *Principles for International Groundwater Law*, in *INTERNATIONAL GROUNDWATER LAW*, supra note 2, 25 at 49; 2 Int’l Env’t. Rep. (BNA) Current Rep. 859 (Sept. 12, 1979) and 3 Id. at 466 (Sept. 8, 1980).
Classification and Standards

Once an adequate data base has been established for a transboundary groundwater resource, the next task is classification. Should the resource be preserved from pollution altogether (a "non-degradation" policy)? Should it be, if at all possible, restored to its original or near-original state? Should it be classified according to the level of contamination present and the use to which it is currently put, and earmarked for a similar use in future? Circumstances suggest that all three approaches may be validly employed. There is widespread support for the idea that, because groundwater is such a valuable source of water supply for drinking and because its pollution can rarely be reversed, all aquifers with water of potable quality, whether currently used or unused, should be preserved in their present state. The U.S. Safe Drinking Water Act of 1974, for example, provides for the designation of an entire aquifer as a sole source if it is the only or principal drinking water source for an area; to date only a few sole-source designations have been made, but one of them is for an interstate aquifer.\textsuperscript{15} Non-degradation, however, may be inapplicable where an aquifer or part of it has been irretrievably contaminated. Pollution often moves slowly and in narrow plumes, such that parts of an aquifer may be badly affected and others not. This suggests that different levels of quality may be established for different parts of an aquifer and various uses segregated according to their potentiality for contamination.

The classification of aquifers provides a basis for the establishment of standards and the adoption of management practices, recharge zone protection, land use regulation and other measures for groundwater protection. The obligation to develop norms for water quality seems already established in international law. Two recent examples of its expression are contained in Articles IV and V of the 1978 Great Lakes Water Quality Agreement\textsuperscript{16} and in the 1979 Athens Resolution of the Institut de Droit International,\textsuperscript{17} which states in Article VII.1(f):

States bordering the same hydrographic basin shall . . . establish by common agreement environmental norms, in particular quality norms for the whole or part of the basin.

They are only beginning to be developed for groundwater, however. In this direction, the EEC has gone furthest in progressing toward a com-

\textsuperscript{15} Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f-300j (1976). Section 300h-3 is the "sole source" provision.

\textsuperscript{16} Great Lakes Water Quality Agreement, supra note 4.

The Council Directive on the Protection of Groundwater Against Pollution Caused by Dangerous Substances'8 groups pollutants according to their toxicity into a "black" list for those considered most dangerous, whose direct discharge or injection underground would be prohibited altogether, and a "grey" list of less toxic substances whose discharge, whether directly or indirectly, would be governed by authorization. Member states may make exceptions under a system of prior authorization for discharges into aquifers which are isolated from the biosphere and unusable for any other purpose. This comprehensive EEC directive, therefore, provides for both receiving water standards and effluent standards. The attainment of standards, however, is far more difficult for groundwater than for surface water, in particular because of the difficulty of monitoring and tracking pollutants to their source.

Other measures which help to achieve or preserve the desired quality of water may include, depending on circumstances: well spacing; regulation of pumping rate; isolation and sealing off of contaminated wells; monitoring and regulation of irrigation practices; establishment of minimum flows in surface streams interconnected with transboundary aquifers, and control of surface diversions; establishment of salt-water barriers in coastal areas where sea water intrusion is a problem; and artificial recharge of aquifers with water of a specified standard of purity.19

**Land Use Regulation**

For the fullest protection of a groundwater resource some land use regulation is essential, especially in the critical recharge area of an aquifer. Such measures may have to include regulation of activities right down to the level of the individual householder and pose delicate problems of encroachment upon national sovereignty, local government, and private property.

Generally, the activities covered should include broad-scale operations such as pesticide and fertilizer application; major new housing developments; mining; oil and gas recovery; disposal of hazardous wastes; municipal landfills; and any activity that strips a critical recharge area of its vegetative cover. While such regulation is an essential element in the protection of aquifers for drinking water supply and other high-quality

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19. Some of the measures are already contained in bilateral treaties. For example, the minimum-flow requirement for surface streams (which helps maintain groundwater levels in valley and lake basin alluvium and hinders the infiltration of pollutants into underlying aquifers) goes back more than a century in some European agreements, although it was not established with groundwater in mind. See Teclaff & Teclaff, *supra* note 5, at 86–87.
uses, prohibiting certain land uses cannot be a blanket requirement. It must be consonant with the use to which the groundwater is or will be put and, therefore, tailored to the individual aquifer or segment of aquifer, for it would be futile, for example, to prohibit animal feedlot operations in an area irreversibly contaminated by salt water intrusion.

Concepts of zoning for groundwater use and protection are by no means new in domestic law, and are finding their way into international and interprovincial agreements. The idea of limited use zones assigned to specific activities and specific means of waste disposal so as to contain the most polluting activities within the smallest possible compass and to isolate them from areas of natural resource value is to be found, for example, in the 1978 Great Lakes Water Quality Agreement (although the boundary of such a zone may not transect the international boundary). It is also implicit in the EEC’s 1979 directive on the protection of groundwater against pollution caused by certain dangerous substances, which has the effect of prohibiting certain activities altogether and permitting others only where an aquifer or part of an aquifer has been rendered permanently unsuitable for use for domestic or agricultural purposes.

Hazardous waste disposal is actually and potentially perhaps the most serious source of pollution of groundwater and should receive top priority as a subject of international concern. The EEC has addressed the problem in its 1979 groundwater directive and also in its directive of 20 March, 22.

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21. The harim or prohibited area around a well is a centuries-old device in Moslem water management. See D. Caponera, Water Laws in Moslem Countries (FAO Agricultural Development Paper No. 43) (1973). More recently, several countries have established critical zones of groundwater depletion. See Tecloff, An International Comparison of Trends in Water Resources Management, 7 ECOLOGY L.Q. 881, 892 (1979). The concept of a “designated international groundwater area” as a basis for apportionment of groundwater to prevent excessive depletion has been developed by Utton, in International Groundwater Management: The Case of the U.S.-Mexican Frontier, supra note 2, at 176–77. Minute No. 242 of the International Boundary and Water Commission establishes a protective and regulatory groundwater pumping program for a zone extending 5 miles on either side of the international border. Text in 69 Dept. State Bull. 395 (1973) and in INTERNATIONAL GROUNDWATER LAW, supra note 2, at 360. The areal limits of a zone for groundwater pollution protection may have to be much wider, extending over the recharge area or even the entire aquifer. Entire aquifers have been designated as “sole sources” under the Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f–300j (1976).


24. Id., especially the provisions on indirect discharge and disposal or tipping of substances which might lead to indirect discharge, Arts. 4 (1), 5, and 10.
1978 on toxic and dangerous waste, which requires detailed record-keeping and the storage, treatment and deposit of such wastes only under permit. Some countries, because of their special hydrogeological situation (e.g., the Netherlands), have no storage facilities for toxic wastes and must send them to other countries for storage. In at least one case, this has resulted in a water pollution problem for a third country. Conversely, a state may be required by the terms of a surface-water treaty to dispose of its hazardous wastes at risk to its own citizens. The reason why the Rhine Chlorides Convention of 1976 is virtually a dead letter is that France refused to bury the wastes of its Alsace potash mines by means of a deep-well injection system on its own territory.

Remedial Measures

As numerous horrifying cases of hazardous waste pollution have shown, groundwater contamination may have existed for a long time undetected and may not be traced to any identifiable source. In this type of situation it is not possible to apply the polluter-pays principle after the damage has been done and force an individual polluter to accept liability. Other means must be found to provide for clean-up of the contamination. In the United States the Superfund Act of 1980 creates a $1.6 billion fund, subsidized 87.5 per cent by taxes on the petroleum and certain chemical industries and 12.5 per cent by the U.S. Treasury, to cover the costs of cleanup and remedial action resulting from the release of hazardous substances into the environment. It has already been used for cleanup of old waste sites causing groundwater contamination and awards have been made to states under federal-state cooperative agreements. A somewhat similar concept was already in existence in the lease agreements negotiated with private contractors in the United States for the storage and disposal of radioactive wastes, whereby the lessee undertakes to pay


27. The German Democratic Republic has offered the Benelux countries a waste disposal facility whose site assessment is disputed, located in the immediate vicinity of the water supply of Lubeck, in the German Federal Republic. See Written Question No. 1687/79 to the Commission of the European Communities and answer in 23 O.J. EUR. COMM. (No. C 126) 82 (1980).


regular and specified amounts into an escrow fund for perpetual care of the waste. The European Economic Commission, in its Council Directive of 1978 on toxic and dangerous waste, also requires that the cost of disposing of such waste be borne by the holder and/or previous holders or producers of the waste, and provides further that the yield of levies charged may be used to finance control measures and research. So far, however, the concept does not seem to have been applied in relation to transboundary groundwater pollution, but a similar idea has been incorporated in the 1977 Franco-Swiss agreement concerning recharge of the Genevese aquifer, which establishes a financing procedure to ensure by means of advance payments proportional to the amount of water pumped, an aquifer level adequate for normal operation of installations throughout the year.

The superfund and similar concepts make no provision for compensation for pollution damage, and the individual victim or potential victim of transboundary pollution until recently had little hope of access to administrative and judicial proceedings in another country. This situation is slowly changing. It is very important for the individual groundwater user to have such access, because groundwater contamination often is highly localized and affects only small numbers of people, even though the injury may be devastating, as in the case of toxic pollutants. The OECD has elaborated the principle of equal right of access in its Guidelines on Cooperation in Frontier Regions, and the 1979 Athens Resolution of the Institut de Droit International urges states, both for the sake of prevention and compensation, to conclude conventions concerning the jurisdiction of courts, the applicable law and the enforcement of judgments; to develop safeguards for individuals by granting non-discriminatory access to judicial and administrative procedures; and to set up compensation funds for damage the origin of which cannot be clearly determined.

32. Arrangement Relating to the Protection, Utilization and Recharging of the Franco-Swiss Genevese Aquifer, September 6, 1977, Council of State of the Republic and Canton of Geneva and the Prefet of Haute-Savoie (Unpublished); the French text is reproduced in INTERNATIONAL GROUNDWATER LAW, supra note 2, at 464, English summary at 461-63. This is a noteworthy example of an agreement between political subdivisions of states. It establishes liability on the part of the Canton of Geneva for any deterioration in the water quality of the aquifer due to defective maintenance or error in its operation of the recharge station.
34. Athens Resolution, supra note 17, Arts. VI and VII.1.i. These principles are finding their way into practice. In 1980 a Dutch trade association, seeking redress for Rhine River pollution,
Instruments for Implementation

Although awareness of the danger of groundwater pollution is increasing, the binding effect of remedial rules may be indefinitely delayed if left to the slow processes of creating customary international law. Even in the management of surface transboundary waters, with a longer history of development, few customary rules have gained general acceptance and even those lack precision.

To be effective, rules for the management of transboundary groundwater resources, including those concerning pollution, should be embodied in a convention or in parallel legislation of the countries involved. An agreement establishing parallel legislation might be preferable to the parties because it would leave them more discretion to reach agreed goals; nevertheless it would have to define these goals and establish some timetable. It may leave the establishment of machinery for the implementation of these goals to each party, except that there would be a need for a joint commission to supervise and report progress in the control of pollution, and might also be empowered to suggest means of harmonizing pertinent laws of the parties.

The European Economic Community has come a long way down this road of harmonization in its directives on drinking water, disposal of waste oils, titanium dioxide waste, toxic and dangerous waste, and groundwater protection, and it is now considering directives specifically on transboundary pollution. All of these directives contain elements which can fruitfully be taken into consideration in devising a transboundary groundwater protection policy. In view of the slow progress toward a comprehensive treaty between Mexico and the United States, it may be more practicable to try and resort to parallel legislation. The IBWC could be utilized as the supervising agency, but its areal jurisdiction would have to be greatly expanded and it would have to be given explicit power

filed suit in the administrative court of Strasbourg, France, to prevent the prefet of the Bas-Rhin department from issuing the annual discharge permit to the Alsace potash mines. 3 INT’L. ENV’T. REP. (BNA) CURRENT REP. 534 (Dec. 10, 1980).


36. This was suggested by R. D. Hayton in his Recommendation No. 10 On Institutional Arrangements. Hayton, Institutional Alternatives for Mexico–U.S. Groundwater Management, in INTERNATIONAL GROUNDWATER LAW, supra note 2, 135 at 144.
to survey, investigate, and monitor, as well as to suggest new laws and regulations.\textsuperscript{37}

A comprehensive treaty, though more difficult to achieve, may be more effective. Groundwater pollution protection as an area of treaty-making is a \textit{tabula rasa}, and the initial step should be to conclude an agreement to reach agreement (such as the U.S.–Canada Memo of Intent on Transboundary Air Pollution),\textsuperscript{38} setting forth the data and reports required as a basis for drafting the main instrument. Many questions must be resolved.

Should the treaty be a simple framework one, delegating details to its operating entity, or should it be a more detailed instrument? Are existing entities for surface water management competent under their enabling treaties to undertake the difficult and delicate task of groundwater pollution control? What should be the areal limits of an entity’s jurisdiction—the river basin? the aquifer? the frontier zone, however defined?

What functions should be allocated to the entity? What role should local and regional authorities in border areas play? What mechanisms should be established for settlement of disputes and can this task be left to municipal courts, or should it be the purview of a special court? These are all questions which require much study in relation to the specific circumstances of a border region, for very few principles have universal application in this field.

\textit{Institutions for Groundwater Protection}

The meager international practice shows that groundwater pollution prevention, if dealt with at all, is generally entrusted to all-purpose “water-economy,” “frontier river,” or “mixed” commissions.\textsuperscript{39} The existing international river basin commissions do not offer much hope of effective control of this unique problem; they are primarily consultative bodies with weak future planning machinery and no power to make binding decisions. Even entities specifically set up for surface-water pollution control have not been very effective. It took the International Commission for the Protection of the Rhine Against Pollution the better part of two decades to come up with a possible solution to the problem of chloride pollution, yet the resulting Convention is now moribund and the parties have resorted instead to inter-ministerial discussion.\textsuperscript{40} The recommendations contained in the 1974Draft European Convention for the Pro-


\textsuperscript{39} See Teclaff and Teclaff, \textit{supra} note 5, at 90–95.

\textsuperscript{40} \textit{Id.} at 89–90; and 4 INT’L ENV’T. REP., CURRENT REP. 629 (Feb. 11, 1981).
tection of International Watercourses Against Pollution confine the functions of an international commission to data collection, recommendations to the contracting parties on early warning systems, programs and objectives for reducing pollution, and studies on joint financing of large-scale projects for pollution control. A more promising approach is to be found in some interprovincial agreements, such as the interstate compacts establishing the Delaware and Susquehanna River Basin Commissions. Both of these institutions have quite broad powers; they can, inter alia, act outside the basin, operate projects, set standards, classify the basin waters, and issue orders enforceable in court, all of which powers pertain to ground as well as surface waters.

Even so, groundwater control is exercised within areal units of surface water management. This approach is entirely valid in the case of an aquifer or aquifers, such as the Rhine Valley water-table, underlying a major river which forms the frontier for much of its length. It is less appropriate to situations in which a long land frontier is transected by a few widely separated rivers and several large and important aquifers. On the other hand, the establishment of entities aquifer by aquifer may lead to an unfortunate division and duplication of responsibilities. To be effective, the commission implementing a groundwater protection treaty, whether a surface-water entity or one set up specifically for the purpose, should first of all have areal jurisdiction extensive enough to include all the aquifers transecting the frontier, or at the very least their recharge areas. The commission should have authority to survey the area under its jurisdiction and to promulgate standards of water purity as well as regulations for land use, especially for the protection of recharge areas. It ought not to be beyond the constitutional powers of the federal governments of Mexico and the United States to make a commission responsible by treaty for regulating land use over and around a transboundary aquifer. In the United States, in any case, federal government power to regulate pollution extends to groundwater without the need to invoke treaty power, and may be broad enough to include land use regulation directly connected with water management.

The commission should also have authority to monitor and enforce its rules. It may in addition act as a tribunal for the resolution of disputes and complaints of private parties. Alternatively, a special tribunal could be created to deal with complaints regardless of which side of the border

they come from. Special water tribunals are well known in municipal law, for example in Spain and Italy, and they also function well in Israel.\footnote{See Teclaff, Abstraction and Use of Water: A Comparison of Legal Regimes (U.N. Doc. ST/ ECA/154 (1972), 200–03. For an alternative procedure for resolving problems, see Art. 20 of the Franco–Swiss agreement on the Genevese aquifer, supra note 32. Disputes are to be brought first before the Franco–Genevese Regional Committee and then, if not resolved, before the French–Swiss Consultation Commission for Neighborly Relations.}

Regional and local entities can play a useful role as adjuncts to a commission of wider areal jurisdiction. Given well-defined and sufficient powers, such entities could go far toward the harmonization of land use regulation on both sides of a frontier and the resolution of transboundary groundwater contamination problems, which are apt to be highly localized.\footnote{44. OECD Recommendation, supra note 33, Part III. See also the discussion and examples of involvement of political subdivisions of states in the treaty-making process in Alheritiere, International Cooperation and Inland Waters: The Influence of Federalism, A.utton & L. teclaff, Water in a Developing World: The Management of a Critical Resource at 166 (1978).} The 1978 OECD Guidelines for Strengthening International Co-operation on Environmental Protection in Frontier Regions\footnote{45. Athens Resolution, supra note 17, Art. VIII. I.g.} recommend:

1) that countries encourage their regional and local entities to cooperate with their counterparts across the frontier in resolving environmental problems;
2) that they devise whatever bilateral or multilateral frameworks may be needed for carrying out joint action;
3) that they ensure that such transfrontier cooperation work as effectively as cooperation between provinces of the same country; and
4) that countries expressly empower officials in regional or local administration to establish all necessary contacts with their counterparts on the other side of the frontier.

The 1979 Athens Resolution of the Institut de Droit International addresses the same problem, but less forcefully. It merely urges states, in setting up international commissions, to provide for the participation of local authorities “if this proves useful.”\footnote{46. Athens Resolution, supra note 17, Art. VIII. I.g.} The practice of local authorities has already outdistanced such a timid proposal. Recently a French prefect ordered a new factory in a border area to apply German air quality standards and give German authorities access to application documents.\footnote{47. 3 INT’L ENV’T REP. (BNA), CURRENT REP. 405–04 (1980).} Transboundary cooperation could hardly go further.
PRINCIPIOS PARA EL CONTROL TRANSFRONTERIZO DE CONTAMINACIÓN DE AGUAS SUBTERRÁNEAS

La primera necesidad en el control transfronterizo de la contaminación es el desarrollo de reglas para la captación y diseminación de la información. En seguida, la clasificación de los acuíferos puede dar una base para establecer medidas para la protección de aguas subterráneas, incluyendo la reglamentación del uso de la tierra. El establecimiento de medidas protectoras y de saneamiento requeriría legislación paralela, tratados. Finalmente, las entidades que deben vigilar el progreso internacional del control de la contaminación deben tener suficientes facultades para promulgar y hacer cumplir las normas.

El Carácter Especial de la Contaminación Subterránea

Los senderos de la contaminación no son del todo conocidos. Los contaminantes pueden afectar el agua subterránea decargándola en la toma o en un área de recarga de un acuífero, en sus manantiales o en las corrientes superficiales que lo alimentan. Muchas fuentes de contaminación ni siquiera se originan en actividades relacionadas con el agua. En acuíferos transfronterizos los contaminantes pueden infiltrarse desde el otro lado de la frontera cuando un Estado reduce su parte de un acuífero más allá de la recarga natural.

A diferencia del agua superficial, las aguas subterráneas almacenan la contaminación. Su limpieza y recolección es difícil y costosa. También algunas zonas localizadas de contaminación hacen que los contaminantes sean difíciles de rastrear.

El primer requerimiento en el control transfronterizo de la contaminación es el desarrollo de reglas para la colección y diseminación de la información. Tanto la conferencia de las Naciones Unidas sobre Agua en Mar del Plata, en 1977, como la Reunión Interregional de las Naciones Unidas de Organizaciones Internacionales Ribereñas en Dacca, en 1981, hicieron un llamado en favor de la colección de datos hidrogeológicos. También la práctica moderna de los tratados incorpora el deber de intercambiar información y de notificar o otros Estados sobre efectos potencialmente dañinos.

La clasificación de acuíferos requiere determinar si un recurso debe ser preservado de la contaminación, reabastecido a su nivel original o reservado para un uso apropiado a su nivel de contaminación. Una opinión generalizada mantiene que todos los acuíferos con agua de calidad potable deben de ser preservados. La clasificación de acuíferos provee una base para establecer normas, prácticas de manejo, reglamentaciones para el uso de la tierra, y otras medidas para la protección del agua subterránea. La Comunidad Económica Europea ha desarrollado normas para la calidad del agua subterránea, agrupando los contaminantes de acuerdo con su toxicidad. Otras medidas que pueden ayudar a preservar la calidad deseada del agua incluyen el espacioamiento de pozos, la reglamentación de la tasa de bombeo y el sellado de los pozos contaminados.

Reglamentación del Uso de la Tierra

La reglamentación en el uso de la tierra ayuda a proteger un recurso de aguas subterráneas. Las medidas pueden incluir la reglamentación de aplicación de pesticidas y fertilizantes, desarrollo de viviendas, minería, petróleo y recuperación de gas, la destrucción de desperdicios peligrosos, los rellenos con desperdicios o cualquier actividad que le suprima a una área crítica de recarga su cubierta vegetal. El arrojar desperdicios peligrosos el la fuente más seria de contaminación de aguas subterráneas. Para responder a esto la EEC lleva registros detallados del tratamiento de desperdicios y requiere permisos para tirarlos.

Medidas de Saneamiento

El concepto de “fondos excedentes” provee un medio para financiar la limpieza de aguas subterráneas, pero todavía no ha sido aplicado a la contaminación transfronteriza de ellas. La dificultad en atribuir el origen de la contaminación a una fuente identificada hace muchas veces que no sea posible forzar a un contaminador individual a aceptar su responsabilidad. La Ley de Fondos Excedentes de los EUA de 1980 creó un fondo de 1600 millones de dólares, subsidiado principalmente por las industrias petroleras y químicas, para pagar el costo de la limpieza de sustancias peligrosas en el medio ambiente. Algunos contratistas privados, en sus convenios de arriendo, contribuyen también a fondos reservados para el cuidado perpetuo de desperdicios radioactivos. En Europa, la
EEC requiere que el que tiene y el que produce el desperdicio carguen con el costo de deshacerse en él.

Para compensar por los daños de la contaminación la víctima individual de la contaminación transfronteriza debiera tener acceso a los procedimientos administrativos y judiciales de otros países. Recientemente la OECD elaboró el principio de derecho igual de acceso. También la resolución del Instituto de Droit International de 1979, de Atenas, urgía a los Estados a celebrar convenciones acerca de la jurisdicción de los tribunales y la aplicación de la ley para fines de prevención y compensación.

**Instrumentos Para la Puesta en Practica**

Los países que comparten recursos podrían usar legislación paralela para el control de la contaminación. Las partes deberían definir metas y establecer calendarios. Una comisión conjunta podría supervisar y reportar el progreso individual de cada país. Si México y los EUA adoptaran legislación paralela la Comisión Internacional de Límites y Aguas sería utilizada como organismo supervisor.

Un tratado comprensivo aunque más difícil de lograr puede ser efectivo. La protección contra la contaminación de aguas subterráneas, como objeto de un tratado, es *tabula rasa*, de tal manera que el primer paso debiera ser el concluir un acuerdo para celebrar un tratado. El tratado mismo puede ser un instrumento detallado que establezca los requisitos específicos o un simple marco, que delega los detalles a algún organismo que lo aplique.

Una comisión efectiva para aplicar un tratado de protección de aguas subterráneas debe tener jurisdicción en el área de todos los acuíferos de la frontera. Debiera tener autoridad para inspeccionar el área de su jurisdicción y promulgar normas de calidad de agua, así como reglamentar el uso de la tierra. La comisión también debiera tener autoridad para verificar el cumplimiento y hacer valer sus propias reglas. Una entidad con tales poderes, bien definidos y suficientes, podría ir lejos en la resolución de problemas transfronterizos de la contaminación del agua subterránea.