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COMPARATIVE APPROACHES TO GROUNDWATER MANAGEMENT

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GROUNDWATER:
ALLOCATION, DEVELOPMENT
AND POLLUTION

Fourth Annual
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COMPARATIVE APPROACHES TO GROUNDWATER MANAGEMENT

I. Salient Characteristics of the Principal Legal Systems (an overview) (See esp. R. David & J. Brierly, The Major Legal Systems in the World Today, 2d ed, Free Press/Macmillan, 1978)

A. The Common Law

1. includes England and Wales and Great Britain's former possessions.
2. emphasizes litigation and the concept of judicial precedent (mandatory and persuasive authority).
3. evolved principle of absolute and virtually unqualified ownership of property, including the unfettered use thereof.

B. The Civil Law

1. includes, inter alia, the Nordic countries, continental Europe, Latin America, the Francophone countries of Africa and Asia, the Lusophone countries of Africa. The Soviet Union and the Eastern European countries operate a variant on the Civil Law system.
2. is characterized by idealization of the comprehensive, systematic approach, tracing its origins to the Roman Law.
3. emphasizes logical analysis of legislation over precedent (especially over "accidental" litigation), epitomized by respect for the learned jurist.
4. But rights in property are also firmly vested.

C. Muslim Law

(see also Food and Agriculture Organization of the United Nations (FAO), Water Laws in Muslim Countries, vol. 1, Rome, Irrigation and Drainage Paper 20/1 by Dr. D. Caponera, 1973, pp. 1-42).

1. includes the Arab countries, Iran, Afghanistan, Pakistan, Bangladesh and several black African countries.
2. is characterized by the non-separation of church and State.
3. Legislators and administrators (all secular authority) can only govern matters not determined by Islamic Law, though modern governments have ways of overcoming this limitation, subject to religious reaction.
4. developed an extraordinary focus on water: "From water we made every living thing" (Koran, Prophets XXI, 30i). The notion that water is a free good has filtered down even to countries only lightly influenced by Islam: "Water for the rural people shall be free" (attributed to H. E. Life President, Ngwazi, Dr. H. Kamuzu Banda of Malaŵi).

D. Law in China

1. Must be understood in the context of the traditional emphasis on the Li.
2. The "legalist school", with its concern for law (Fa), has been revived under the Peoples Republic regime.

Nonetheless, there is still no legal profession (in our sense) in China.

3. China is today a fully "Administrative State", but tradition is still strong, especially away from the centers of government power.

E. "Tribal Law"

1. Includes the interior regions of most Asian and African countries. Sometimes not very developed with respect to water as such; real property rights clearer.
2. Characterized by "right to use" principle, based on tradition administered by village headmen. Real property ownership notion weak if not absent entirely.
3. Fast disappearing under governments bent upon development and modernization but still what most rural people understand and respect.

F. Hybrid Systems

1. Many countries have adopted and retain most of an originally alien legal system (Common Law, Civil Law or Muslim, or some combination of these).
2. Prevails in certain formerly dependent territories (e.g., India, The Philippines, Puerto Rico) but also Japan.
3. Usually means the reception of foreign forms, procedure and one or more components (e.g., the French Civil Code) but retention at base of earlier system.

- G. Relevance to Water Law in general; groundwater law in particular.

1. Preoccupation with ownership in western legal systems, leading to difficulty in attaining conjunctive use, aquifer protection and conservation.
2. Generally: neglect, until recently, of groundwater management, except in Islamic Law.
3. Widespread: inclusion of groundwater rights with superjacent real property rights, or at least a preference in favor of the land owner.

II. The first of three selected cases: The Republic of Turkey
(See esp., FAO, Water Law in Selected European Countries,
vol. 1, Rome Legislative Studies No. 10, 1975, pp. 211-253;
FAO, Groundwater Legislation in Europe, Rome, FAO Legislative
Series No. 5, 1964, pp. 138-146)

A. Introductory Observations

1. General Familiarization

2. Water resources development has been given priority
for the past 25 years; major dams have been con-
structed and acreage under irrigation has increased
significantly.

3. Turkish population is 98% Sunni Muslim, but since
1928, Turkey is no longer a Muslim State.

B. The Blend of Traditional Islamic and Civil Law Approaches

1. The Ottoman Empire's leaders saw themselves as the
champions of Islam (ghazi), based on the Shari'ah
which governed what we call secular as well as re-
ligious affairs. The Empire's losing struggle with
the western powers and the political thought associated
with the French Revolution gradually led to the
westernization of what we now call Turkey. In 18th and
19th Centuries, a sweeping reform program (tanzimat)
began the process of separation of Church and State
(culmination in 1928 with repeal of the provision
of the 1924 Constitution which made Islam the State

religion) and resulted in the Ottoman Civil Code (Majelle-i-Andam-Adliya), the official codification of the Moslem Law as understood and applied in the region. (Later codes--Commercial, Criminal and Procedure--were made on western models, but not the Majelle). Under the Majelle, in the Islamic tradition, water (along with pastureland and fire) were confirmed to be free, a common good (Mubah) (Arts. 1234 and 1235). Everyone (Naas) is entitled to the use of a public good, subject to the rights of prior users (Majelle, Arts 1234 and 1235). Prior authorization is, thus, not normally required under Islamic principles for the acquisition of a surface water use right. Where there is conflict, adjudication is the normal course. Turkey has no special water courts; the ordinary courts will apply local, including village, customary rules and regulations where the national legislation is not controlling. In any event, water rights were, and are limited to the amounts one can put to beneficial use (Turkish Civil Code of 1926, Art. 644).

2. The Majelle codified a kind of prior appropriation custom which allowed, under some circumstances, private persons to acquire use rights to public waters, subject to the protection of prior rights. That is, priority in time was the rule (Arts. 1265, 1267, 1269). If one or more rights go so far back that no one knows their origin, these enjoy im-

memorial status (Kadeem) with priority over non-Kadeem rights (Arts. 6, 166; Supreme Ct of Turkey, 6th Sec., 5.3.1955, case No.1186).

3. The Majelle recognized and regulated three kinds of use right, which had been customary: 1) the right of thirst (haq-al-chafa, plus the watering of animals), which was accorded absolute priority; 2) the right to irrigate (haq-al-shirb); and 3) the right to operate mills (Arts. 1267 and 1265). The current statutory regime contains no equivalent, this customary right is still legally recognized, including by the courts. The Majelle had regulated the use rights in water (a free good) on a case by case basis; water, not "owned" by anyone, was not declared to be in the "public domain" or under any formal classification system.
4. The Majelle was replaced in 1926 by the new Turkish Civil Code ("TCC"; Law No. 743/1926). A principal influence was the Swiss Civil Code, which in turn had been based on the German and French models. Innovations included the placing of surface waters in the Public Domain (per the doctrine of State ownership of "natural wealth and resources". Turkish Constitution of 1924, Art. 130), the vesting of groundwaters in the private domain of the overlying landowner, and the introduction of western doctrine of ownership of water.

5. The Civil Code governs, of course, private relationships to include conflicts in connection with their use of a public good. The code did not provide the usual definition of "public waters"; instead, those "unowned things" (and public property) were placed under State control and disposition. Waters benefitting the public (along with land not suitable for agriculture, rocks, hills, mountains and springs arising therefrom) are deemed to be "unowned" unless proven otherwise (TCC, Art. 641). Therefore, if water is not benefitting the public, it comes under the private realm and is, consequently, more fully regulated by the Code. Questions about public-benefit use are to be decided by judicial precedent and the opinion of jurists.
6. In addition, the TCC provides that land ownership carries with it ownership of that which is above and below the surface (including springs)--to the extent that such is beneficial to the landowner (Art. 644). Thus, surface waters may be privately owned, provided that they are not appropriated, of public interest or exceed the landowner's beneficial use.
7. Where private water ownership rights are deemed to be not in conflict with the public interest, they are registered in the Land Register (TCC, Arts. 632, 752, 911-912). They may, however, be junior to the rights of others.

C. Underground Waters

1. In 1960 underground waters were vested by law in the

State; henceforth, groundwater was to be public in principle, separating groundwater from land ownership (Law No. 138/1960, amending Art. 679 of the TCC).

2. A special Law was enacted in the same year regulating the use of groundwater (Law No. 167 /1960), consistent with the new policy. Underground waters are defined as all underlying stagnant and flowing waters as well as aquifers or water-bearing strata wherefrom the withdrawal of water affects the aggregate of the resource (Ibid., Art. 2). The original Civil Code provision had assimilated groundwater to spring water, applying the same ownership regime to both (TCC, Art. 679). Spring waters, not defined but under the Civil Code (Art. 644), appurtenant to the land on which they rise and flow, the same as for surface waters, were not affected by these changes.
3. But private appropriation rights are only exceptionally exclusive and are subject to many limitations in their exercise on the basis of general public interest, easements and servitudes (TCC, Art. 641, 653, 666, 679, 682-684, 752).
4. Permits are now required for the drilling of any well (thus exempting dug wells), or for the excavation of galleries (Karez) (Law No. 167/1960 , Arts. 8 and 5). Depth limits are fixed for various zones, which can be modified subsequently to protect the resource (Groundwater Regulations of 20 July 1961, ("GW Regs"), Art. 4). Permits are not transferrable and are site specific (GW Regs, Art. 8). Any groundwater exploration also

must be by permit, issued for a one-year period (Law No. 167/1960, Art. 9). After exploitable groundwater is found, the holder of the drilling or exploration permit may immediately abstract water for use, subject to the requirement of application for a water use permit within one month (Ibid., Art. 10). In light of the groundwater found to be available from the well, the permissible quantity term may be changed (GW Regs. Art. 12). Any modification of an existing well, such as deepening or enlarging it, requires a special permit (Law No. 167/1960, Art. 11).

5. Groundwater use permits contain conditions and terms limiting the use right, including maximum quantity, approved use and mode of operation. Because Turkey has as yet no special use category for the water supply for industrial plants and ancillary activities (such uses are still regarded as municipal, or domestic), the ordinary rules for groundwater exploration and abstraction permits are applicable. Although there is a lack of provisions preventing the waste or misuse of surface waters, groundwater users are subject to the sometimes strict conditions of their permits; non-observance can result in cancellation as well as prosecution (Ibid., Arts. 4, 5 and 18).
6. The owner of a private well is under an obligation to keep the water free of contamination; nonetheless, if the owner fails in this regard municipalities are empowered, at the owner's expense, to take all

necessary measures (Law No. 1593/1930, General Health Protection, Art. 239). Protected zones may be established to protect drinking water sources. The land involved is expropriated, with compensation, by the Municipality within which the supply is situated; such land may not thereafter be used for any other purpose (Ibid., Arts. 237 and 238). And cemeteries are cited with consideration for possible harmful effects on water supplies (Ibid., Art. 212). The Majelle provisions covering prohibited areas (Harim), such as around well sites, remain in force for areas established prior to 1926. For springs and wells, the prescribed area is 80 Arshin, and for galleries (Karez), 100 Arshin (Majelle, Arts. 1281-1282, 1285; a cubit, is .76 meters). one Arshin , / Ownership of the land within the Harim is in the owner of the spring, well or Karez (Ibid., Art. 1286).

7. The GW Regs require that proper measures be taken to protect groundwater and associated works, in particular to prevent polluted surface waters from being mixed with spring or well waters during exploration, use or improvement activities; the combining of a well's low-quality waters with good water from another level of the well must also be prevented. Protection measures must be set forth in studies and plans required to be submitted under the Regs. Operations are required to be executed in full

compliance with the specifications as approved.

The engineer, hydrogeologist or geologist in charge of the project is held responsible. Subsequently, during use, the permittee is responsible for any failure to take or sustain required protective measures.

D. Groundwater Management

1. Turkey does not have a central water authority or explicit water policy statements. Comprehensive sectorial planning is, however, coordinated by the State Planning Organization, within the Office of the Prime Minister. The five-year development plans plus the annual implementation programs provide the framework for water resources development, control and protection. Hydrologic and hydrogeologic information and data are provided by various agencies (but particularly by the General Directorate for State Hydraulic Works) and collated and reconciled during the planning process for individual basin master plans.

2. The Ministry of Power and Natural Resources (created in 1964) now has principal authority for water.

The Minister carries out his "groundwater development" responsibilities chiefly through the General Directorate for State Hydraulic Works ("GDSHW"). The Minister may declare "groundwater exploitation areas" (Law No. 167/1960, Art. 3). In such areas, the locations and numbers of permitted wells, the depth and other characteristics, as well as the amounts of water that may be with-

are regulated drawn/(Ibid., Art. 4). Outside declared groundwater exploitation areas, landowners are free to prospect for groundwater and to apply the waters found to meet their own needs. Only if the wells are drilled and beyond the depth established by Regulations must permits be obtained (Ibid., Art. 5).

3. The GDSHW maintains a central water resources inventory, conducts planning, and, among other things, coordinates development activities at the national level. GDSHW also prepares the basin master plans for submission to the State Planning Organization. Permits for groundwater exploration, abstraction and well modification are issued by GDSHW. GDSHW is, like a number of other technical agencies, decentralized. Its Regional Directorates (usually corresponding to river basins; there are no river basin commissions) are duplicates on a smaller scale of their headquarters' organization.
4. The Ministry of Health and Social Assistance has control over water quality and, consequently, is, inter alia, empowered to establish the protected zones around water sources (Law No. 1593/1930, Arts. 200, 235, 237-238).
5. Turkey is divided into 67 Provinces, each headed by a Governor responsible to the Minister of the Interior. Administrative authority is ultimately completely centralized, but powers are delegated to the Governors. For example, on behalf of the GDSHW, a Provincial

Governor may issue underground water use permits (Law No. 167/1960, Art. 8). There are also Counties, Districts and Villages with administrative responsibilities within their jurisdictions, including water resources generally. Moreover, Provincial and District Capitals are "Municipalities" with conservation, drinking water and sewerage responsibilities (Law No. 1580/1930, Municipalities, Art. 19; Law No. 1593/1930, General Health Protection, Arts. 15 and 18; Law No. 831/1926, Water, as amended, Art. 1).

6. Certainty of Groundwater Rights.

- a. Holders of groundwater rights, now subject to a permit regime (along with hydropower and fishing, for example), have the protection of their "concession". The rights granted may be modified, terminated or cancelled only in accordance with the terms and conditions of the permits. On the other hand, water rights not under the permit regime are permanent. These may, however, have servitudes imposed.
- b. Expropriation (usually with adjudication) can take place. Compensation is required in expropriation cases, except where there is special public interest. For example, public exploration or control wells may be made on private land without the requirements of expropriation or compensation; however, if such wells are turned into exploitation wells, expropriation with compensation is required.

The right to use water from such a well may be leased to individuals or corporations, with the expropriated landowner given preference (Law No. 167/1960, Art. 7). Where a landowner fails to obtain an adequate supply on his own property without unduly high cost, he may gain access to water from the wells of his neighbors, where their wells are not fully utilized in meeting their own requirements (Ibid., Art. 6).

7. "Safe Marginal Limit". An interministerial committee decides among use applications when the requests of several applicants, plus prior allocations, equals or exceeds the pre-determined safe marginal limit of an aquifer (Ibid., Art. 14; GW Regs. Art. 15). The phrase is defined as the quantity of water which can be withdrawn continuously without unfavorably affecting the groundwater level (Law No. 167/1960, Art. 2).
8. Specifications for all groundwater exploration activities are established by the Minister of Power and Natural Resources (Ibid., Art. 4). A licensing requirement for drillers is of recent origin. Under the GW Regs (Art. 9), anyone engaging in well construction must first be certified on the basis of a formal test. Certificates issued are either First Grade or Second Grade, depending on the applicant's experience. Certificate holders are under a duty to comply with all regulations and instructions, to furnish technical data and to keep the required registers.

D. Outlook.

1. Water resources and water-related activities are gradually coming under administrative control. A new, more comprehensive water code has been drafted and is under consideration. Reconciliation of the provisions on groundwater and spring waters is expected to be one result. The overlapping of administrative authority may not be resolved. Water users' association are on the increase as projects become more complex and costly. Industrial uses of water are rapidly increasing, especially in Western Turkey.
2. Groundwater rights in particular are now subject to control and modification, with more attention recently to water quality aspects.

III. The Federal Republic of Germany. (see esp. FAO, Groundwater Legislation in Europe, Rome, Legislative Series No. 5, 1964, pp. 65-73).

A. Introductory Observations.

1. General Familiarization.

- a. The Federal nature of the system.
- b. The role of the European Communities.

2. Water resources in West Germany are governed at both the Federal and the Land levels. The principal legislation in force is the Federal Water Management Act of 27 June 1957. The various Länder have enacted Water Acts in implementation of the Federal statute (Act of Baden-Württemberg / of 25 February 1960; Act of Bavaria of 26 July 1962; Act of Berlin of 23 February 1960; Act of Bremen of 13 March 1962; Act of Hamburg of 20 June 1960; Act of Hesse of 6 July 1960; Act of Lower Saxony of 7 July 1960; Act of Northrhine-Westphalia of 22 May 1962; Act of Rhineland-Palatinate of 1 August 1960; Act of the Saar of 28 June 1960; Act of Schleswig-Holstein of 25 February 1960).

B. The Ownership question.

1. With respect to groundwaters the West German Legislation is all but silent. Groundwater is not subject to being "owned", according to the prevailing view. Bavaria's and Hamburg's water acts do, however, state that ownership of real property includes the property's groundwater resources. Even so, the landowner is

obliged to allow the officially approved public uses of such waters.

2. The Federal Act (Art. 2) requires a license or concession from the competent water authorities for any use of underground waters; "use", here is defined as intake, catchment, transmission to the surface, the diversion of groundwaters, and the raising or lowering of their level. But the Federal Act (Art. 33, para. 1), as exceptions, recognizes free use of groundwaters for household and agricultural purposes. Most of the water acts of the Länder provide for their high or supreme water authorities to require licenses or concessions for such Article 33 uses where, for water management reasons, controls are necessary.

C. Groundwater Prospecting and Abstraction.

1. The Federal Act does not deal with well construction, except to provide that the Länder, where water management requires, may establish a well depth below which control may be exercised; where groundwater is struck unintentionally, or without authorization, the wells may be closed (Art. 35). Several Länder have required such controls (see esp. Baden-Württemberg Act, Art. 37; Rhineland-Palatinate Act, Art 42; Hesse Act, Art. 39). The Rhineland-Palatinate Act, for example, authorizes the High Water Authority to issue a protective ordinance where drilling is deemed likely to disturb water behavior. Under such ordinances the allowable depth is specified and super-

vision of the works is placed under the local water authority (Art. 42, para. 1). Any unforeseen discovery of groundwater must be reported immediately and the work stopped pending administrative decision (Art. 42, para. 2); if the works will have an unavoidable prejudicial effect on groundwaters the authorities may close down the works (Art. 42, para. 3).

2. In addition, West Germany is under an international duty to take measures to protect groundwaters along the Rhine River where these are likely to be adversely affected by improvement works on the Upper Rhine (Agreement between France and Germany concerning Improvement of the Upper Rhine, 1956).
3. Where there is more than one application for a groundwater license, and the supply is deemed insufficient to meet all requests at the time, the Länder have provided for the favoring of the request(s) promising the greatest benefit to the public interest. All things being equal, the landowner's application will be granted or, if the landowner has not filed, the first application received is granted. On the other hand, the application that will result in the least inconvenience to third parties, or the greater "soundness" of the applicant can be deciding factors; one Land gives priority to an already existing enterprise (Baden-Württemberg Act, Art. 18).
4. Where existing uses become conflicting, in terms of quantity or quality, or if the public interest so requires, use rights may be modified, including with

respect to duration. However, users whose rights are thus curtailed are eligible for compensation (Fed. Act, Art. 18 ; the procedure is regulated in detail by each Land. See esp. Baden-Württemberg Act, Art. 19).

5. "Water Protection Zones". The Federal Act (Art. 19) establishes the procedure for creating water protection zones where the public interest is deemed to so require. Among the objectives of such zones are, especially, to allow recovery of groundwater volume, to restrict or prohibit a variety of practices, and to oblige the landowners to submit, for example, to water and soil behavior studies.
6. Non-damaging, Sparing and Economical Use. The German Watercourses policy is to achieve economical and sparing use of water; licenses and concessions are, moreover, to be conditioned so as to preclude injurious third party effects (Fed. Act, Art. 5, para. 3). And licenses and concessions are not to be granted where the public interest in public water supplies would be prejudiced (Ibid., Art. 6). In implementation, Baden-Württemberg's Act (Art. 14) obliges users not to use water so as to employ or withdraw water unnecessarily, to waste water, or to prejudice third parties. Nevertheless, concessions may be granted by the Länder where the proposed use's advantages are found to offset , at least to a large extent, the damage caused to third parties (Fed. Act, Art. 8; Baden-Württemberg Act, Art. 15).

7. Obligations under Permits. A permit is not a requirement for Article 33 uses (see sec.B 2, above), but for all other uses the granting of a license or concession is required and may be limited by conditions and specific obligations. The prevention of, or compensation for damage to third parties is a case in point (Fed. Act, Art. 4, para. 1). The grant may also be made subject to subsequent administrative measures for water use control (Ibid., Art. 5, para. 2). By operation of the Act, anyone using water in excess of the traditionally consecrated amounts is obliged to submit to controls. The authorities are given access to property and installations for the purpose of ensuring compliance with conditions; users are under a duty to provide all the manpower, blueprints and equipment needed by the inspectors, and must submit to technical investigations (Ibid., Art. 21, para.1).
8. Permit Termination. Licenses and Concessions are always revocable for not adhering to the purpose and manner of use stipulated. Licenses need not be granted for a definite period, but concessions--granted only after a formal hearing--are made for definite periods only (Ibid., Arts. 7 and 8).

D. Groundwater Management.

1. The preparation of Water Management Plans are the responsibility of the administrations of the Länder, following guidelines imposed by the Federal Government (Ibid., Art. 36). Groundwater always receives special attention in these plans.

2. A separate registry is required for each water resources category. Licenses, concessions, long-standing (existing) rights and authorizations, and water protection zones must be recorded (Ibid., Art. 37). The Länder, as usual, implement this requirement with specificity by special regulations (see, e. g., the Baden-Württemberg Act, Art. 115).
3. Implementation of German water policies and laws is the responsibility of the designated "water authorities", usually a Land ministry acting as the water authority under the legislation. In Bavaria, for example, it is the Ministry of the Interior; in Lower Saxony, the Ministry of Agriculture; in the Saar, the Ministry of Public Works and Buildings. These are called the "Supreme Water Authorities". "High Water Authorities", at the next lower level, are in practice the administrative Heads of Districts; the "Ordinary Water Authorities" are the county administrations, which have water management offices as technical support. As exceptions, Hamburg, Bremen and Berlin have designated the Building Trade Senators as their water authorities.
4. Administrative Competence in Groundwater Matters.
 - a. Using Land Baden-Württemberg as the illustration, routine questions of law are, with exceptions, decided by the Ordinary Water Authorities (Baden-Württemberg Act, Art. 96, para. 1).
 - b. Bringing to the surface and the diversion of groundwater (as well as intake and catchment)

matters reside with the High Water Authorities, where the volume exceeds 5,000M³ daily, as is the maintenance of the Water Registers (Ibid., Art. 114). The establishment and regulation of water protection zones is their responsibility where the zone is not confined within the territorial jurisdiction of one Ordinary Water Authority. In addition, High Water Authorities are empowered to issue water quality regulations, unless their applicability needs to be beyond the particular District.

- c. The Supreme Water Authority is competent where matters involve more than one District, and gives overall supervision. Such statutory delegation is regarded as having the merit of not requiring parliamentary action whenever regulatory changes are called for in light of technological progress or changed circumstances. Coordination and consultation are required between, for example, the competent mining authority and the competent water authority when a water use permit is needed as part of a mining exploitation scheme (Ibid., Art. 98, para 1; Fed. Act, Art. 14).

E. Pollution and Groundwater.

1. The Water Acts of the Länder contain quite modern pollution prevention and control provisions. The water authorities have powers to regulate, e.g., transport and storage of fuels, oils and other substances capable of water pollution (Baden-

Württemberg Act, Art. 25). Excavations or other digging works are to be suspended or prohibited where groundwater pollution may result (Ibid., Art. 37).

2. The more general Federal Act stipulates that where the grant of a permit implies authorization to introduce foreign substances into groundwaters, a condition must be attached to the effect that there will be no harmful pollution. And there is a blanket provision that discharge or placement into groundwaters of substances is prohibited unless there is no danger of pollution or other harmful effect on groundwater quality; this provision also applies to the installation of liquid or gas pipelines (Fed. Act, Art. 34).
3. Above all, it is contemplated that groundwater pollution problems will be managed under the provisions for protective zones, where activities deemed harmful may be restricted or prohibited, and users and landowners are obliged to tolerate protection measures (See *ibid.*, Art. 19).

F. Outlook

1. Policy and directives emanating from the EEC Council of Ministers will increasingly impose obligations on the member States, including with respect to groundwater. The Communities' basic groundwater

directive was adopted nearly five years ago and focused on contamination (Council, 17 Dec. 1979 Directive concernant la protection des eaux souterraines contre la pollution causée par certaines substances dangereuses (80/68/CEE), Journal officiel des Communautés européennes, No. L 20/43 26 Jan. 1980). The objective is "efficacious protection of the Community's subterranean waters". In brief the Directive deals with the regulation of the direct and the indirect discharge of "dangerous substances" into groundwater. The approach is to stop discharge of substances on list I (the "black" list) and to limit discharges of substances on list II (the "gray" list) (Ibid., Art. 3). "Subterranean waters" are defined as "all waters found beneath the surface of the soil within the saturation zone that are in direct contact with the soil /ground/ or the subsoil" (Ibid., Art. 1, para. 2a).

2. The intensity of water use in the many industrial and population centers grows higher. The pressure on groundwaters and their vulnerability to contamination is increasing. Awareness of the problems is, however, unusually strong. Technical people have been listened to; the legal and institutional measures are largely in place. The costs associated with prevention and cleanup of surface waters are staggering. One groundwater aquifer is seen as

"not only the most important fresh water reservoir in Europe but also the indivisible asset of a number of European countries" (Council of Europe, Consultative Assembly, Recommendation 629 (1971) on the pollution of the Rhine valley water-table, reproduced in Yearbook of the International Law Commission, 1974, vol. II, Part Two, U.N. pub. Sales No. E.75.V.7 (Part II), p. 349).

IV. MalaWi.

A. Introductory Observations

1. General Familiarization
2. Groundwater is only lately becoming of importance as a rural village supply and for dry season irrigation.
3. "Public water" includes "all underground water" and excludes only "any stagnant pan or swamp wholly contained within the boundaries of any private land" (Laws of MalaWi, Cap. 72:03, Water Resources Act of 1969, Sec. 2).

B. The Water Resources Legal Regime

1. MalaWi's legal system is based on the British Common Law, except in "traditional areas" where indigenous custom is generally applied initially by the traditional courts. Full respect is afforded notice, hearing and other aspects of due process.
2. Since passage of the current Water Resources Act (1969). MalaWi is under a modern permit system. Previously unlicensed existing uses were, however, recognized for users who filed for recording within six months (Ibid., Part IV, §§ 8 and 9). The legal regime is unified, without special rules for groundwater rights.
3. The Minister "may grant to any person the right to divert, dam, store, abstract, or use public water from such sources and in such quantity, for such period, whether definite or indefinite, and for such purpose as may be specified in the water right, subject

to such terms and conditions as he may deem fit."

(Ibid., § 10 (1)).

4. Suspension and Modification. If the Minister is of the opinion that "the supply of public water from any source or in any area is insufficient or is likely to become insufficient," he may "at any time and from time to time, by notice in writing . . ., suspend or vary all or any rights to abstract or use water from that source, or in that area, for such periods as he may deem necessary, and thereupon such rights shall cease for the period of suspension or shall be exercisable only as so varied, as the case may be" (Ibid., Part V, § 11 (1)). And no right to compensation shall arise or accrue by reason of such suspension or variation (Ibid., § 11 (2)).
5. Taking for a Public Purpose. The Minister, "satisfied that public water is required for a public purpose," may by notice in writing "determine or diminish" any water right involved "to the extent that such water is required for the aforesaid public purpose, and thereupon the right shall cease or shall be exercisable only as so diminished . . ." (Ibid., § 12 (1)). In such cases, the water right holder(s) are entitled to such compensation "as may be reasonable in all the circumstances, and in the absence of agreement the High Court shall determine the amount . . ." (Ibid., § 12(3)).
6. If a water right holder fails "to comply with any condition, express or implied, subject to which the right was granted, or has abstracted or used

public water for a purpose not authorized by the grant" the Minister may on notice require the holder "to remedy such default within such period as shall be specified in the notice, and if the holder fails or neglects to remedy the default within the period specified the Minister may declare the right to be determined" (Ibid., § 14).

7. If "full beneficial use" of a water right has not been made for the preceding two years, the Minister may, after giving the holder the "opportunity of making representations," on notice "and having regard to the investment in capital works and the long term national interests involved in the undertaking . . . " declare the right determined, diminished or modified (Ibid., § 15).

C. Groundwater Quality

1. Again, no distinction is made between surface waters and groundwaters. If any person "pollutes or fouls any public water"^{he}/shall be guilty of an offence (Ibid., § 16 (1)). "Polluting or fouling" is defined as "the discharge into, or in the vicinity of public water, or in a place where public water is likely to flow, of any matter or substance likely to cause injury whether directly or indirectly to public health, livestock, animal life, fish, crops, orchards or gardens which are irrigated by such water or any product in the processing of which such water is used or which occasions, or which is likely to occasion, a nuisance"(Ibid., § 16 (2)).

2. The recent pollution regulations require "/e/very borehole and every well, intended for use as a source of water supply to the public" to be constructed so as to prevent "any deleterious matter from entering the aquifer" (Water Resources (Water Pollution Control) Regulations, 1978, § 3. Govt. Notice No. 31, The Malaŵi Government Gazette Supplement of 17 Mar. 1978).
3. In addition, no person may, without the Minister's consent, "build a septic tank or pit-latrine within a distance of 220 yards from a borehole (Ibid., § 2 (a)).
4. Other provisions of the pollution regulations clearly contemplate surface water situations.

D. Groundwater Management

1. Most of the water sector functions at the national level have been concentrated in a new Water Division of the equally new Department of Lands Valuation and Water ("DLVW") (Malaŵi Dept. of Information, Malaŵi Yearbook, 1979). The Department forms part of the Office of the President and Cabinet; the President, thus, became "the Minister" for purposes of the exercise of statutory authority.
2. The Water Division, DLVW, includes a Water Resources Branch within which is "groundwater services," staffed by hydrogeologists. The Branch is responsible for the extensive village borehole project which is providing domestic supplies in several rural areas.

3. A statutory Water Resources Board grants water rights (surface and underground) and effluent discharge consents--all subject to the "Minister's" ratification. Renewals, easements, modifications, diminutions and terminations are also within its purview. The Board is chaired by DLVW's Controller (Head) and is supported by a small secretariat in the Water Division. (Water Res. Act, esp. §§ 4, 10, 17-21 and Schedule, Constitution and Proceedings of Board; Subsidiary Legislation, Cap.72:03, Water Regulations, 1969). The Board is quite active, meeting regularly to deal with its substantial agenda.
4. MalaWi's two major cities, Blantyre and Lilongwe, have their own Water Boards (Laws of MalaWi, Cap.72:01, The Waterworks Act of 1926 and Subsidiary Legislation, Cap.72:01, Proclamation of Lilongwe Water-Area and Water-Board; Cap.72:02, The Blantyre Waterworks Act of 1962), but their rights to use water are obtained from the more recently created national Water Resources Board.

E. Outlook

1. The donor-assisted hydrogeological studies and rural borehole program is bringing MalaWi's groundwater subsector into sharper focus. A number of legal and institutional adjustments are under consideration.
2. In such a relatively well watered country of such modest growth potential, groundwater is unlikely to become a major concern in the intermediate future. Nonetheless, as a result of its rapid population growth, and its agricultural

and urban uses, Malawi^{is}/gradually turning to
groundwater. Sanitation and sewage conditions, and
future prospects, render the contamination problem
of immediate concern to Government.

V. Groundwater Management Doctrine Internationally (selected)

A. The Mar del Plata Conference of 1977

(Report of the United Nations Water Conference . . . ,

U. N. pub. Sales No. E.77.11.A.12, 1977)

The U. N. Water Conference made numerous technical recommendations on groundwater management--all with legal and institutional implications.

1. For example, need for the regular and systematic collection of hydrogeological data was stressed (Recommendation 2; 3(c), (f), (l), (o); 4 (b)), as was efficiency and efficacy in regulation and distribution of the resources, emphasizing integrated aquifer utilization (Recom. 10(a) and (b). See also, Recom. 68 (d), (e), (g), and (n); 81 (g); 101 (e)).
2. Pollution of groundwater resources received attention (Recom. 39 (a)); the application of land-use planning as a tool for preventing pollution, "especially in the case of ground-water", was urged (Recom. 39 (o)). Many, if not most of the general recommendations are as applicable to groundwater as to surface water.

B. The Caracas Conference of 1976

(International Assoc. for Water Law, Recommendations of the Caracas Conference on Water Law and Administration, AIDA II, Mar. 1977)

The International Association for Water Law ("AIDA") was appointed to hold a preparatory meeting to the U. N.

Water Conference on water law and administration.

This Conference, held in Caracas in February, 1976, brought forth several groundwater-related statements among its final recommendations.

1. For example, the AIDA II concluded that "the legal dichotomies between surface and ground water and between public and private 'ownership' of water need to be resolved in favour of a rational management approach, which should take into account the entire hydrologic cycle and the need to respond with flexibility to emergency situations and variations in supply and demand" (at p. 2).
2. The Conference recommended with respect to groundwater, that governments "undertake systematic hydrogeological research . . . in order to provide the necessary base concerning the quantities and conditions of availability, as well as the quality, of ground water, in order to make possible the formulation of implementing legislation for the attainment of optimum sustained yields and at least minimum quality standards for all water resources at local, national and international levels" (Recom. 16 a), at pp. 9-10).
3. AIDA II also recommended the integration of "the management of ground water with all other available water resources, including for example the employment, where practicable of aquifers for the seasonal storage

of surface waters and the creation or improvement of ground water recharge catchment areas to minimize losses of rainfall and to capture excess surface runoff" (Recom. 16 b), at p. 10).

4. Again, many of the general statements apply to the status and circumstances of groundwater.

C. The Dakar Meeting of 1981.

(Experiences in the Development and Management of International River and Lake Basins, Proceedings of the United Nations Interregional Meeting of International River Organizations . . . , U. N. pub. E.82.II.A.17, 1983)

1. International river commissions and interested States participated in an interregional meeting in May, 1981, to take up their concerns with respect to the management of shared water resources. Few such commissions have, formally or otherwise, groundwater within their terms of reference. That groundwater problems existed, or were anticipated, became evident from the discussion.
2. Under Topic II of the Meeting, "Progress in cooperative arrangements", the rapporteur pointed out that "official awareness of the interaction of the 'underground environment' with the surface (and the atmosphere) is only recently becoming widespread. Conjunctive use and protection . . . in the same system will become imperative in many shared basins as it has become in many internal basins . . . " (the Proceedings, at p. 11 para. 32; see also *ibid.*, pp. 72-73).

3. Conclusion No. 6 of the Dakar Meeting states:

"Those co-operating States that have not yet included ground water as a part of the shared water resources system need to recognize this part of the hydrologic cycle as intimately linked to the quantity and quality of their shared surface waters

Concerned Governments may thus apprise themselves of the specifics of the interactions throughout the system, or portion thereof, with a view to benefiting from conjunctive use and to adopting the indicated conservation and protection measures for the underground environment" (at p. 14).