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Global Water Law Systems and Water Control

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I. WATER LAW

Water is a fundamental natural resource with complex characteristics. The ability to apply water for beneficial uses is as much subject to natural laws of the physical universe as the laws of human institutions. The greatest benefit from water is derived when it is used in combination with other natural resources (soil, mineral, or vegetative) and economic resources (labor and capital). The more efficiently it can be used in combination with other resources, whether by technological or institutional innovation, the greater the benefit to the water user and to society.

A quick review of water activities around the globe clearly indicates that this resourse has rapidly become one of the critical elements in determining local, national, and regional growth. In the past three decades, particularly the last five years, the trend has been away from treating water as a free good, subject to nearly unrestricted control, to a recognition of the resource as a capital commodity whose spatial and temporal availability dictate policy formulation and new directions in both macro and micro planning and development. Nations in all stages of development have accorded control and management of water resources a high priority.

Water laws are an expression of policy. Substantive provisions dealing with the use and development of water resources are the basis for establishing rules and regulations to implement the law. The underlying philosophy of each particular system of water law has a direct connection to the surrounding physical factors of its origin. Where water is plentiful, regulation is aimed at ameliorating the harmful effects of water (floods, salination, etc.). Where water is scarce, however, regulation is aimed at ensuring an adequate supply by providing, for example, that water is not owned by any one individual,

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but, rather, is owned collectively so that all might use what is available.

Over time distinct regional or national systems emerged which reflect particular physical conditions and social goals. Elaborate water laws and administrative systems evolved where the greatest needs and most serious natural constraints existed. Through adoption or imposition many of these sytems have also influenced or directed water use and control in other countries or regions. While retaining many of the basic characteristics of the original system, these variations have incorporated modifications to meet indigenous conditions. (See figure 1.)

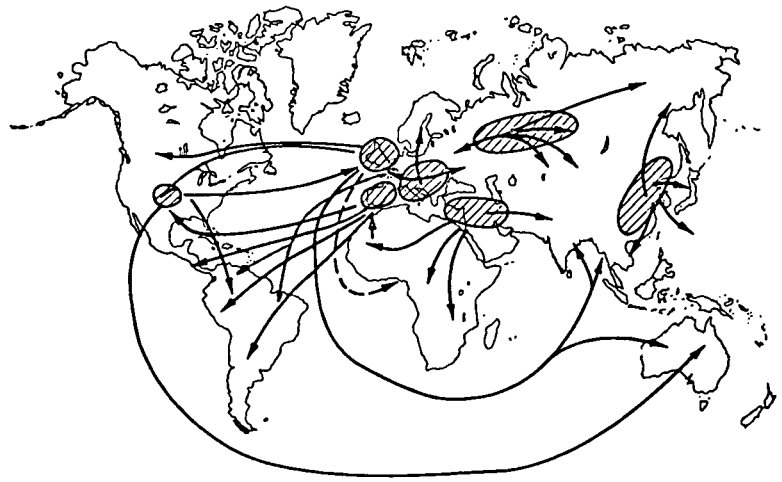

Figure I A Descriptive Map of Proposed Examination of Major Legal Systems (▨) and Their Variations or Paths of Influence (⟶). (This is not an Exhaustive Description but Only Indicative Categorizations.)

Water laws must be dynamic and should be the product of evolutionary processes. However, the water laws and organizational structures that at one point in time were designed to be solutions to particular problems often become the problem at a later time. Through inflexibility—lack of explicit policy provisions and gaps in subjects included—constraints to the introduction of new technologies and improved water management practices frequently emerge. Three key issues, in light of needed changes in the law, impede water resources optimization: (1) allocation and reallocation of water supplies; (2) integration of water quantity and quality control; and (3) management and conjunctive use of ground and surface waters.

Past practices have, in many countries, created vested rights in the continued use of a source of water. In most cases, efficiency in transmission by the purveyor of water (which may be the sovereign) or the user of the supply is low, due to costs of reducing seepage, evapotranspiration, percolation, and other system losses. The tasks facing most water decision makers are now more related to water reallocation than allocation, and how this can be done with a minimum of social disruption.

The problems and pressures are not only at the micro levels, but exist at the macro (policy and program) levels as well. Policies toward development and water resource use of one nation have a consequence upon its neighbors where such neighbors are hydrologically connected. A well-known example is the impact on Northwestern Mexico from the western reclamation policies of the United States. Further, technology has not only provided more efficient and effective means for using water in or out of the natural basin regime, but has also placed an additional task upon decision makers to prepare programs and promulgate laws and regulations with scientific awareness.

Projections in water demands, as many proclaim, should not remain bleak if rational remedial action is taken. It is not a matter of reaching a plateau of subsistence with our water supply. There is little reason why the development, use, and management of available resources cannot take place harmoniously with an enhanced quality of life if decisions executed and legal controls enacted are systematically made.

Water law and administration consist of a wide variety of alternative approaches which have evolved over time and under different demand situations. Identifying a set of these major systems provides the decision maker with a spectrum of alternative doctrinal and organizational approaches. These can be of value in preparing proposed legal machinery or evaluating present effectiveness in light of potential changes.

In September 1975, a conference was convened in Valencia, Spain to systematically describe and analyze the major systems of water law in the world. Among the water law systems reviewed were the Spanish, French, British, Italian, Soviet, Hindu-Bali, Moslem, Latin American, Israeli, and the variations found in both the United States and selected Asiatic countries. The relationship of water law to the human and

physical environment was discussed from the social, economic, and technical perspectives. Presentations concerning national water planning, drafting water codes, and bilateral and multilateral assistance available to developing countries in preparing or revising water codes and administrative arrangements concluded the conference.

The following summary of selected systems of water law and administration is based upon the reports prepared for the conference.[1] These systems have been arranged into three categories: customary, traditional, and modern water law systems.

II. SYSTEMS OF CUSTOMARY-RELIGIOUS BASE

These systems are represented by the Moslem system of water law and the Subak system for water administration in Bali, Indonesia. Both systems have in common their religious origin. In both, water is treated as part of man's cosmogony. Water is not subject to private appropriation in either system. Water is the object of a right to use, not own, the corpus, with the exception of the cases in which the Islamic law recognizes private rights in waters. This recognition is limited to small volumes of water contained in well-defined boundaries, such as the water contained in a cistern.

The Islamic water law is not a national system of water law in the western style.[2] Rather, it is a system of religious and traditional doctrines and uses. It goes beyond country boundaries pervading local customs. In turn, the religious element which gives commonality to the system is influenced by the particular uses of each place and locality. In this respect, it should be stressed that Islam did respect local practices, as long as they were not in opposition to the basic set of religious rules. The basic egalitarian concept of Islam prevails throughout all aspects of Moslem water law and is easily identified in the common water ownership and equitable apportionment principles of the law. Water is spread, for example, to enable all farmers to irrigate the maximum possible area of land. An-

1. For the complete text prepared by specialists in the various water law systems, see 1-4 PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON GLOBAL WATER LAW SYSTEMS (G. Radosevich, V. Giner, D. Daines, G. Skogerboe & E. Vlachos eds. 1976) (Colorado State University, Fort Collins) [hereinafter cited as PROCEEDINGS].

2. Maktari, *Islamic Water Law*, in 1 PROCEEDINGS at 295-308.

other reason is that taxes are based on irrigated land. Water rights are also attached to the land. With the spread of Islam, concepts of common ownership, and equitable apportionment, the appurtenancy principle and local administration spread to Spain and to regions of North and South America.

Great rivers are absolutely common property. Small natural rivers are predominantly for the use of the riparian, and artificial rivers are for the common use of those who dig them. Surplus waters are to be always offered for the use of other persons.

Water for irrigation is to be allocated on the basis of: (1) the crops; (2) the season; and (3) the local customs and the quality of the water. It is allocated by time and volume and the order of preference is: (1) thirst; (2) domestic uses; (3) irrigation and commerce; and (4) industry.

Rules against abuse and waste pervade the use of the waters. Any member of the community can claim judicial redress to establish or protect a water right. The most rational use of wells is restricted because every person does have the right to drill a well on his land, even when it affects the rights of other water users.

Islamic principles on national or provincial water administration are not very relevant in that the law says very little about high levels of administration. The Islamic law, as a prevailing system of belief and tradition, does not offer solutions for centralization of water management; but it has had a fundamental influence at local levels, where it results in a local authority controlling water rights. The administration and organization that does exist results from ancient customs. Local water masters carry out water administration.

Another system of customary-religious based law that is significant to local water use is the Subak.[3] The Subak is the traditional water management technique of Bali in the Indonesian Archipelago. It is based on the Hindu cosmogony. It survived the brief domination of Buddhist dynasties and was modified only slightly by Islam, which reduced the unit for water administration to the level of the village. The Subak

3. Wohlwend, *Hindu Water Law and Administration*, in 2 PROCEEDINGS at 536-85.

included not only one, but several villages for the purpose of water administration.

The Subak is basically a community of farmers that irrigates. The common bond is irrigation, and, for this reason, it encompasses several villages. The limits are not set by the village boundaries but by the irrigated lands. It is governed by rules of customary law.

Administration is through a Subak meeting (assembly) which has sovereign water jurisdiction and whose decisions are implemented by a chief water master. The latter is assisted by deputies, by assistants, and by criers, who control, respectively, each subunit of the water network, the end of the water network, and the distribution of water to individual users.

Water can never become an element of appropriation. It is subject only to the rights of use and is distributed in proportion to crop needs.

III. THE LATIN AMERICAN SYSTEMS

In Latin America there are two systems of water law.[4] The first is the traditional system, influenced by the riparian system of France and by the system of the Spanish Water Law of 1879.

Second are the modern water laws, inspired by the principles of comprehensive water management under the control of the state. These laws have attempted to translate principles of water management into principles of water law. They are the laws of Mexico, Panama, Colombia, Peru, Ecuador, and Chile.

The laws of each country in this vast region are easily the topic of a regional conference, so it is preferable to quote part of the abstract from the report by Dr. Joaquin Lopez to illustrate the range of differences that exist. It must be said that Dr. Lopez did not feel comfortable with his description of the Latin American systems even in a three hundred page report because there are still topics of importance that were not included.

> The countries of South and Central America which were colonized by Spain and Portugal have a system of water law with

4. Lopez, *Water Law and Water Administration in Latin America*, in 3 PROCEEDINGS at 699-848.

particular features. The judicial regulations of these countries have similarity of principles, norms, institutions, origins and customary uses respect[ing] waters. The system was influenced by the colonial legislation, the metropolitan legislation, the Civil Code of France and the Constitution of the United States. The laws for Indians, the laws of the "Siete Partidas" and the Spanish water law of 1866 were also influential. In Brazil the metropolitan legislation was constituted of several ordinances: the Alfonsianas of 1447; the Manoelinas of 1521; and the Philipinas of 1603.

The different legal criteria between the Spanish and Brazilian legislations determined the existence of marked differences between the system of the water law of Brazil and the system of the water law of the other Iberoamerican countries.

In the former colonies of Spain prevailed the principle by virtue of which the waters were common to all the people, modified in some degree by the principles of the French Civil Code; in Brazil, instead, the riparian system, of French and Anglosaxon ascendancy was followed.

Regarding their constitutional organization, some countries adopted a federal regime, while others adopted unitarian systems of government. Among the former, despite their federal systems, there are some countries in which the domain of the waters and the jurisdiction to regulate their use appertains to the Federal Government; and there are other countries in which these attributions correspond to the provinces.

The administration in the unitarian countries is carried out by decentralized national organisms, by autarchical entities, or by the central government. In the federal countries there are some which maintain centralized systems of legislation and administration of the waters; while in others the provinces are attributed broad faculties regarding water.[5]

The greatest problem in Latin America is the system for the administration of water resources which, in most countries, is highly fragmented. There are problems of interference and duplication of functions. The problem is twofold: on the one hand, lack of united decisionmaking processes; and, on the other, lack of adequate input from the water users. There is a significant lack of effective channels of communication from the users to the highest levels of administration. In most of the countries there is a lack of general coherent policies which, translated to the water resources field, would give criteria for

5. *Abstracts*, in 1 PROCEEDINGS at 45.

the guidance of the particular activities of each national water agency.

Significant attempts to overcome these constraints are represented in Mexico by united decisionmaking which is combined with the maximum possible user participation, in Cuba, where there is an autonomous institute for water administration, and in Ecuador, which has implemented a comprehensive scheme for water administration.

Water administration can be carried out by federal and state agencies, as in Argentina, or at a centralized center of autonomous decisions, as in Mexico. Attempts of regional structures for water administration are carried out in Brazil, where the input of the central government is very significant. In Venezuela, an attempt for comprehensive planning and management is at present being carried out. Peru has most of the responsibility for water management delegated to the General Directorate of Waters and Irrigation.

Examples of countries in which water administration is divided among several institutions are Uruguay, the Dominican Republic, Paraguay, Nicaragua, Guatemala, and El Salvador. In Chile, there is a proposal for the creation of an Institute of Water Resources which would be charged with the coordination of all water resources activities.

There is a growing awareness in South America of the importance of water resources for the developmental process. There are serious attempts at implementation of new legal systems for the most correct management of the resource. There are, however, difficulties created by the particular socio-economic structures of the Latin American countries. The subject deserves special attention, for new legal codes cannot be severed from the conditions of each country. If abstraction is made of the facts, the seeds for failure will accompany any intent of legal change. The law is not only an instrument for the change of a particular socio-economic milieu, it is also a consequence of it.

IV. SELECT SYSTEMS OF WATER LAW IN EUROPE[6] AND THE MID-EAST

A brief summary follows of the system of water law in the

6. For an analysis of the legal aspects of water quality management in Europe, see R. JOHNSON & G. BROWN, CLEANING UP EUROPE'S WATERS (1976).

United Kingdom, France, Spain, Italy, the Soviet Union, and Israel. These systems were selected due to their global influence or unique and potentially transferable features. They range from traditional to modern systems of water law.

In the United Kingdom statutory regulations have been enacted in the public interest.[7] England has placed a high premium on water as resource needs have transformed the plentiful commodity into an item of scarcity.

For this reason, common law has been substituted by statutory law. The provisions which have evolved from traditional common to modern laws have been designed: (1) to secure an adequate supply of water both in quantity and quality; (2) to satisfy all needs and prevent waste; (3) to secure water quality and pollution control; (4) to promote flood control and land drainage; (5) to clean the rivers of the country; (6) to assure recreational, wildlife, and fisheries opportunities; and (7) to protect the interests of affected water users.

Under common law the rivers are considered in the public domain and cannot be owned. Ownership is significant only in relation to waterbeds. The beds of tidal rivers are owned by the Crown. The use of water in riparian land is an incident of the right of ownership. The quality and quantity of the water cannot be diminished, unless authorized by grant, statute, or prescription. Rights regarding artificial watercourses are always acquired by grant or arrangement. Underground water can be freely used, according to the English absolute-ownership rule. Many changes were made in the common law after the enactment of the Water Resources Act of 1963 and its coming into operation on July 1, 1965. It is now necessary to obtain a license for the use of inland underground waters. Exceptions are given for small abstractions, riparian domestic or agricultural uses, and abstraction of underground water for household use. The Act has substituted for the common law rights of the riparians a system of compulsory licensing. Rights to the use of waters are legally protected and administered. Water authorities are given broad powers for the control of the use and abuse of water rights. Under the common law, water was not to be impaired

7. Richardson, *Systems of Water Law and Organization in the United Kingdom*, in 2 PROCEEDINGS at 309-408.

in quality. Water pollution control laws have been enacted which strengthen and further define the common law concept in the context of new and projected uses.

The evolution of water administration in the United Kingdom is important in that it illustrates the dynamic growth and maturation process of a national system of water law. From the 1945 and 1963 Water Resources Acts to the present 1973 and 1974 Acts, the concept of the river basin authorities has been developed and tested under centralized to decentralized control. All functions associated with the water cycle are under the control of a single authority in any one region which attempts to closely correlate to a natural hydrological unit. This leads to an integrated system of water management combining water quantity and quality control and conjunctive use of ground and surface waters. The guidelines of these control and management activities are set by water policies elaborated by the Secretary of State and by the Minister of Agriculture, Fisheries, and Food. The intent is to jointly promote a water policy for water management in England and Wales. The regional authorities execute the policy.

There is a National Water Resources Council which consists of a chairman appointed by the Secretary of State, the chairman of the water authorities and other members appointed by the Secretary of State, and the Minister of Agriculture, Fisheries, and Food. The Council assists and gives advice in water-related matters to the Ministers requiring it, assists and controls in the effective performance of duties of the water authorities, and must elaborate a scheme for training and education in water-related functions.

There are nine regional water authorities in England and one in Wales. The area of a water authority may be different for the performance of different functions, but the intent is to organize around natural watersheds where possible, with, however, alterations in the boundaries where social and economic reasons prevail. Water authorities are presided over by a chairman appointed by the Secretary of State, and consist of two or four members appointed by the Ministry of Agriculture, and a variable number of representatives of the local population. The water authorities provide an integrated control system for water within the confines of national policy laid down by the

ministries, and can take every necessary action to insure the best use and administration of the water.

In France the waters are considered a source of life, and the legislature has recognized, with reluctance, private appropriation.[8] Common rights have been readily recognized in favor of the riparian owners of watercourses. The need to legislate pollution control has produced a deep change in the system of water law, as well as in the system for water administration. France has abandoned the old system of water classification which was based on the navigability or floatability of the waters. Waters were public that were navigable or floatable. At present, water resources can be declared public because of their utility or importance for uses considered vital by the state for the socioeconomic well-being of the population. Waters can be declared public because of their relevance to agriculture, industry, domestic uses, and navigation as well as for their damaging potential, as when the waters can produce dangerous floodings, according to the Law of December 16, 1964. This new classification includes the waters that were considered public in the old system; and, at the same time, broadens the category to include waters that, even when not navigable or floatable, do have public importance, either for their utility or for their dangerous potential.

There are also "mixed" watercourses in which the waters are public and the beds are private. Public and mixed watercourses are part of the general category of public waters. Private waters are a residual category. They are what is left after the former two categories have been determined.

Private property rights are recognized over springs and underground waters, but with important limitations. These limitations derive from several facts. For example, a landowner cannot make free use of spring water that, even when arising on his land, is used by towns or other domestic needs. The use of underground water is subject to health regulation. The right to underground water is only acquired in the abstracted water. The consequences are quite similar to the application of the English rule. Flowing, nonpublic waters are common waters

8. Depox, *The French Water Law*, in 2 PROCEEDINGS at 409-15.

subject to common use. For the use of public waters authorization is required. Navigation always has preference.

France has also developed an extensive system for the protection of water against pollution. Water administration at the national level is spread among several ministries due to the public or nonpublic nature of the waters according to the uses to which they are dedicated. For concrete management, it is unified at basin level. The interministerial coordination is carried out by the Ministry of the Quality of the Human Life under the Decrees of March 2, 1971 and June 1975. The important decisions are taken by the interministerial Committee for the Action for Environment. Final decisions or arbitrations are taken up by the Prime Minister. At the basin level, water administration is carried out by basin agencies in which local interests have representation.

Spanish water law proclaims all water flowing in natural beds as being public property.[9] The category of flowing waters is interpreted broadly to include large as well as small rivers and arroyos. Spring waters flowing in natural beds are also considered public. Also classified as public waters, flowing or not, are waters located on lands of the public domain, or lands affected by public water works. The waters, which do not flow in natural waterbeds and which are located in private lands, are private property. The Spanish water law thus combines two criteria: (1) waters flowing in natural waterbeds are public; and (2) if the waters do not flow in natural waterbeds, their condition depends upon the legal conditions of the lands in which they are located.

The allocation of public waters for individual or private uses is by concession from the Ministry of Public Works. These concessions are not required for limited domestic or natural uses such as water for thirst and washing, but are a necessary prerequisite to uses of "special developments." A priority in allocation is set out in Article 160 of the Water Act of 1879, placing uses in the following order—towns, railways, irrigated agriculture, navigation channels, mills and other factories, and aquatic life and habitats. Public waters are totally administered by the Ministry of Public Works through the Directorate

9. Arrieta, *Spain's Legal Water Ordinance System*, in 1 PROCEEDINGS at 234-94.

of Water Works. The country is divided into ten basin administration entities which provide logical management consistent with the natural flow regime.

The agencies for water administration at basin level are: the Water Commissioner and the Hydrographic Confederation, integrated by the individual users; Communities of Irrigators; and Central Syndicator of the Basin. It can be said that, through this sytem of organization, Spain has greatly harmonized the need for unified decisionmaking at central level with the requirement of participation of the local water users. Central decisions are conveyed in each river basin through the Water Commissioner. User and local institutional inputs are furnished through the Hydrographic Confederation. The disputes on water can be solved by Special Administrative Courts, by the Civil Courts, or by the Criminal Courts, depending on the kind of issue.[10]

In spite of a very workable system for water allocation and management, it is important to take note of changes in the Spanish law. Conditions and demands have so significantly developed in the country that, with the advances of technology, the law is required to evolve to a new plateau. Presently, a draft of a modern Spanish water code is being discussed which places emphasis upon the two major deficiencies under the old law—conjunctive use of both ground and surface water and integration of water quantity and quality control. Thus, Spain is rapidly moving toward a more modern system of water law.

Italy defines as public all the waters which have or can have qualities useful for satisfaction of needs of the public and general interest.[11] This classification is influenced by the magnitude, volume, flow, or width of the waters, as well as by their relationship to the hydrological system of which they form a part. The administrative authority determines the particular condition of each corpus of water, trying to assure adequate protection to pre-existing water rights.

The public waters are listed in registers of public waters. Nonpublic (private) waters are a residual category whose use

10. Fairen-Guillen, *The Process of the Tribunal of Water of Valencia*, in 1 PROCEEDINGS at 136-58.

11. Caponera & Burchi, *Italian Water Law System*, in 1 PROCEEDINGS at 193-233.

is also regulated by the laws. These waters are springs or waters wholly within lands under private ownership. Public waters are allocated to use through a permit system which includes an elaborate review of the application to determine the appropriateness of the use and quantity requested.

Water administration is delegated throughout several different levels: national, regional, provincial, and municipal. The centralized administration of prewar Italy gave way to a more fragmented system. Nevertheless, a resources approach has been retained in the juridical arena. Italy's water courts are composed of a Supreme Tribunal for Public Waters and eight regional courts.

It was pointed out by Dr. Caponera that even though the Italian water law functions well, the lack of continuity between basins as physical units for water control and the political entities of water administration act as a constraint on the best use of the water. This constraint remains even though the existence of a Ministry of Public Works offers a unitary center of decision.

The basic principles of Soviet water law are contained in the Fundamentals of Water Legislation of the U.S.S.R., in force since September 1, 1971.[12] They contain the basic concepts and conditions for water use and control. In their elaboration, water codes have been adopted by each of the 15 Republics of the Union. There are, in addition, many subsidiary normative acts.

The law regulates state agencies, state and public enterprises, organizations, and individual citizens in connection with water ownership, management, use, conservation, control, and protection against the harmful effects of the waters. Thus, regulation refers only to water resources available as separate natural water bodies. When waters are no longer part of the environment, they are regulated by other bodies of law.

The policies are to ensure the most rational and economical use of the waters; to preserve, maintain, and improve water bodies; and to prevent the harmful effects of the waters. The basic principles of the law are: (1) exclusive state ownership;

12. Kolbasov, *Soviet System of Water Law*, in 2 PROCEEDINGS at 416-52.

(2) national and comprehensive use; (3) priority of domestic uses; (4) strict requirement of water pollution control; (5) development of technology for water conservation; (6) registration and control of water uses; (7) adoption of the basin as the hydrologic unit for water administration; and (8) active participation of the population in water uses. It is considered fundamental that water resources, within basins, form a definitive and economical unit. Water administration is carried out through several levels of government and through agencies of general state administration, agencies of special state administration, and agencies of branch administration.

An examination of the water laws and administrative organisms of Israel provides an excellent opportunity to observe the dynamic role and process of change served by a legal resources control system placed under extreme needs to optimize scarce water supplies.[13] Many other examples exist in national or subgovernmental jurisdiction in the case of federated systems, but the laboratory process of developing water laws found in Israel illustrates the ultimate role in extensive and intensive water control through formalized laws and regulations. All waters, regardless of their form or location, are under the strict control and jurisdiction of the state. The state holds the water in trust for the citizens of Israel and is dutybound to allocate and administer this limited resource in the most beneficial and efficient manner possible. This power and duty is placed with the Ministry of Agriculture and under the specific jurisdiction of the Water Commissioner.

The general proposition that water is public property entitles every citizen of the country to the right to use the resource. However, an important feature of this right is the set of conditions placed upon its exercise. Water is allocated for use by term and reviewable permit. The process of application and final actions for water use insure that the proposed use is beneficial to the individual and country. The results of the use must be within the range of maximum output, and other users should not be unreasonably affected if the proposed use is approved. All water rights are registered, which enables effective

13. Tamir, *Legal and Administrative Aspects of the Water Laws of Israel*, in 3 PROCEEDINGS at 849-911.

administration and the ability to prepare appropriate water plans and projections. The important feature of this modern code is the policy declaration that provides the basis for subsequent administrative operation. The policy reflects the national goals, just as water serves as an input to achieving them.

Administratively, the law empowers the Water Commissioner or his agents with the right of exclusive control over withdrawals as provided in the permits. The Commissioner can cancel or amend any permit and permanently or temporarily alter or suspend uses under it. All water use is metered and water fees charged according to volumetric uses, with rates varying throughout the country to reflect different uses and use conditions. The Water Commissioner also has full power to prevent degradation to the nation's water quality. Water pollution control is imperative and infractions are dealt with quickly.

In addition to the Water Commissioner, there are numerous boards and authorities to provide advice and assistance in water matters. Water users play an important role as members of many of the entities. Disputes are under the jurisdiction of a Special Tribunal for Water Affairs. Any person who feels aggrieved by the actions of a government official or of another water user can bring his case before this Tribunal.

V. WATER LAW IN THE UNITED STATES

Although many other papers in this work describe the legal aspects of water control in the United States, their focus is upon particular issues or problem areas. Thus, a brief overview is provided here to enable some comparison between the other major systems discussed.

Water law in the United States is a federated system of complex proportions.[14] Federal (national) and state water laws exist in both the water quantity and quality aspects of this resource. At the federal level, jurisdiction over water originates with the Constitution. The property, commerce, general welfare, treaty, and compact clauses provide the basis for federal involvement in navigation, pollution abatement, and allocation and management of water resources. Particular laws

14. Radosevich & Daines, *Water Law and Administration in the United States*, in 2 PROCEEDINGS at 453-502.

have been enacted to provide the substantive control and organizational structures to carry out federal policies and programs.

State water laws are less cognizant of the hydrologic aspects of water resources. Each state, being an autonomous political entity, has rights to develop policies, laws, and organizations according to local and state needs. Thus, there are virtually 50 separate water law systems for quantity and quality control, often with lack of uniformity between states causing interstate conflicts. The states are primarily concerned with methods of allocation, distribution, and administration of ground and surface waters given the wide variety of geographical conditions in the country.

Ownership of water is either public, as in the case of the federal government jurisdiction over certain classes of water, or public or state in the case of rights over water vested in state control. The use of water depends upon the state systems of water law and ranges from common law right in the riparian system to a permit, license, or decree under the appropriation system. A form of contract water rights is becoming increasingly popular.

The past 10 years have witnessed the emergence of federal involvement from water development to management in the national and regional interests. Population shifts in a mobile society, industrialization, energy development, increased needs for food and fiber, conflicts and complementarities of water use with the interface of economic sectors, and new technologies have brought about this involvement. States, faced with the same issues at a more concentrated and grassroots level, have likewise been experiencing a significant evolution in their quantity and quality control laws with an emphasis upon developing planning and management capabilities to make conscious decisions based upon an evaluation of alternatives, impacts, and opportunity costs.

Water administration at the federal level is under the jurisdiction of the Water Resources Council and a multitude of ministerial land departments and departmental agencies, bureaus, and authorities. State administration is hierarchical from central control at the political jurisdictional level down to the level of hydrologic units within the state. Normally, water

quantity and quality control is vested in different agencies. The water law systems in the United States are in a dynamic and evolutionary process brought about by changing conditions and can constantly benefit by an awarness of experiences of other nations.

VI. ASIATIC SYSTEMS

Professor Clark, a well-known expert in water law systems of Oceania and Asiatic regions, has repeatedly proclaimed the difficulty of summarily discussing this topic due to the great diversity that exists between countries in the region.[15] This single topic was the subject of a meeting of experts in the field held in Bangkok, Thailand in 1967, convened by the Economic Commission for Asia and the Far East.

To summarize the complexity of these systems, Mr. Clark states in the abstract to his report:

> Water legislation in Asia has been profoundly influenced by Common Law, Civilian and Roman-Dutch models. There is thus great diversity in the theoretical bases for water administration, but a common pattern of relying on administrative bodies to allocate and adjust private rights to use water. In this sense, systems of judicial apportionment of rights, through litigation, are most uncommon.
>
> There is remarkable similarity in the techniques used for granting and controlling rights to water, although the primary emphasis of the legislative schemes naturally differs with the hydrological problems encountered. There is increasing reliance on techniques of multi-objective planning, but care must be taken in adapting systems of environmental planning to the different economic and social goals of developing countries.[16]

The range of features in the law extend ownership from state to public to private; acquisition of rights according to custom without administrative intervention to systems granting permits or concessions; allocations according to a nonpreference or to limited preference of user classes; and administration under centralized to decentralized systems. A major concern of many systems is with water removal, as in flood and drainage programs, rather than water allocation.

VII. SUMMARY

In summary, the water law systems illustrate a wide range of approaches in control of allocation, distribution, and regula-

15. Clark, *The Asian Region*, in 2 PROCEEDINGS at 503-35.

16. *Abstracts*, in 1 PROCEEDINGS at 39.

tion of the resource under diverse conditions. Ownership of the resource extends from state ownership in the U.S.S.R., to public ownership in the vast majority of countries, to some private ownership, as found in Spain and other countries. Often the lack of a water policy inhibits the control and management of the government agency administering the laws. It is recommended that the "policy" should be given serious attention in any attempt to stimulate water-use efficiency and promote formation of collaborative efforts among water users.

Allocation of water likewise varies considerably, extending from: no evidence of a right; to customary rights; to government concessions, permits or titles; to court decrees. The success of public irrigation programs will partly depend upon the assurance of continued water availability to the water users in order to elicit their willingness to invest time and money beyond the present practice. While the assurance of right or privilege should be definable and dependable, it must also be flexible to react to changing demands and technologies.

From an examination of the systems, the following statements can be made:

1. There is a clear tendency towards the public ownership of all water. This tendency is dramatically exemplified by the legislative amendments of France and the United Kingdom. The public character of the waters has always been a strong component of the Spanish, North American, and Israeli systems. As water resources become relatively scarce, public pressures for regulation demand more state activity in the field. The opposite of public ownership of water in the realm of state activity is state ownership, as found in the Soviet Union. The conclusion is, however, the same—a direct correlation between the degree of state control and "scarcity" of resources regardless of ownership.

2. The basin as a unit of water management is recognized as an imperative for improved and rational management.

3. Where water users have a voice in the decisionmaking process by means of direct input at various levels of that process, greater continuity and realism exists in resource use.

4. The value of a unitary or coordinated system of water decisionmaking is discernable from the documents analyzed. It is observed that unitary decisionmaking does not imply the

subjugation of local interests at provincial, state, or regional levels. Adequate mechanisms for harmonic integration can be devised.

5. Some countries, like Italy, Spain, and Israel, do have special courts for water problems. As water conflicts become more technical and complex and water issues involve more people and interests, the need for special water courts becomes increasingly apparent.

6. The increase in the role of the state in water resources management, the increasingly public nature of water law, and the growing relative scarcity of water demand a redefinition of the concept of "acquired" water rights.

7. The problems of improving water-use effectiveness, especially for developing countries, demand the development of new forms of compensation for the condemnation of land and water-related resources. Vested rights should not be a permanent constraint to optimum water use.

8. In light of the growing complexity and interrelatedness of water problems, it is imperative for water law specialists to have an interdisciplinary foundation and communication network.