

INTERNATIONAL COMMISSION ON IRRIGATION AND
DRAINAGE

COMMISSION INTERNATIONALE DES IRRIGATIONS ET
DU DRAINAGE

NINTH CONGRESS

R. 23

NEUVIEME CONGRES

QUESTION 31

LEGAL AND INSTITUTIONAL ASPECTS OF GROUND-WATER
DEVELOPMENT FOR IRRIGATION*

BERNARD J WOHLWEND**

SUMMARY

The need to regulate the extraction and use of ground-water resources appeared as a consequence of technological development which, while allowing for greater quantities of ground water to be more efficiently used, underlined as well the hydrological connections which exist among water wells sometimes kilometres apart and demonstrated that ground water constitute but one element of the hydrological cycle.

By the time ground-water legislation became necessary, the legal regime governing surface-water was well developed and had established the principle that, with the exception of large streams, water was to be regulated in the same way as the land to which it is riparian. Ground water was thus naturally made to fall within the dominion of the over-lying landowner and its use governed as a real property right. With the rapid increase in the consumptive use of ground-water resources, in particular for irrigation purposes, the existing legal regime soon became a major constraint to integrated water resources development and the legislator faced with the task of formulating water laws which not only regulate individual water uses, but can serve as a useful tool for the optimum conservation, development and utilization—or rational management—of the water resource as a whole.

There is no unique formula or legislative technique available to reach this objective and each State is bound to devise a solution in conformity with its own hydrogeological, climatic, economic, social and political characteristics. Because of the nature of water and of corresponding human needs, all water legislations are nevertheless articulated on a number of basic parameters which may, therefore, be usefully identified.

* Aspects juridiques et institutionnels de la mise en valeur des eaux souterraines pour l'irrigation

** Legal office, Food and Agriculture Organization of the United Nations, Rome.

The rational management of water resources requires a pre-established policy, or master water resources plan. Water legislation constitutes no end in itself but is the necessary instrument for policy implementation. It has thus for purposes to spell out as concisely as possible, the principles presiding over policy formulation, to establish the rules correspondingly governing water resources conservation, development and utilization, and to organize the constitution and functioning of those institutions responsible for water law enforcement.

As master water resources plans are based on physical data and constitute a synthesis of sectorial plans and projects, water laws have to provide for the collection of hydrological and water demand data and for the central co-ordination of project planning in order to establish optimum water balances.

Such an integrated approach is bound to encroach on traditional private water rights in order to protect those of the community; water laws have, therefore, to establish such a system of water rights administration that beneficiaries can feel secure in their development investments while individual rights of use remain under permanent central control in order to ensure their global beneficial character. The essential features of such a system consist in a clear separation between ownership and use rights; the establishment of beneficial use criteria; the subjection of water rights to fixed-term, quantitative and qualitative conditions of use; and the establishment of a water pricing system. As regards ground water in particular, exploration and drilling activities must be licensed and controlled and the construction, operation and maintenance of wells specially governed within general water-works conservation and protection measures.

Another fundamental element of water legislation concerns the organization of a central water resources administration capable of horizontally integrating all sectorial water resources plans and projects and of vertically controlling the implementation of the national policy down to the level of the individual user.

Finally water resources laws need to provide for implementation measures and in particular for the flexible times-pace introduction of the new water resources administrative machinery, the protection of existing water rights, the determination of priorities, the collection of water rates and charges and the organization of water jurisdictions and procedures. Experience has shown that a water resources law establishing basic principles assorted with a well structured administration and providing for subsidiary regulations to govern technical and related special matters with maximum flexibility is the best way to ensure the rational management of the national water resources capital.

RESUME

La nécessité de réglementer l'extraction et l'utilisation des ressources hydrauliques souterraines est apparue comme conséquence du développement de la technologie qui tout en permettant une exploitation plus efficace des eaux souterraines en des quantités toujours plus grandes, a également souligné les rapports hydrogéologiques existant entre des puits souvent

éloignés de plusieurs kilomètres et a démontré que ces eaux ne constituent qu'un élément du cycle hydrologique.

Lorsque le besoin de réglementer les eaux souterraines se fit sentir, le régime juridique régissant les eaux de surface était déjà fort élaboré et avait consacré le principe selon lequel ces eaux devaient, à l'exception des cours d'eau à grand débits, être régies de la même façon que les fonds dont elles sont riveraines. Les eaux souterraines furent donc tout naturellement intégrées dans le patrimoine du propriétaire du fonds sous lequel elles se trouvent et leur utilisation réglementée en tant que droits réels. L'augmentation rapide des utilisations consommables des ressources en eau souterraine en particulier pour l'irrigation fit bientôt du régime juridique existant une entrave à la mise en valeur intégrée des ressources hydrauliques et posa au législateur le problème de la rédaction de législations des eaux ne réglementant pas seulement les utilisations individuelles des eaux, mais pouvant servir d'instrument adéquat pour une protection, une mise en valeur et une utilisation optimale—ou gestion rationnelle—de la ressource dans son ensemble.

Il n'existe pas de formule ou de technique législative unique permettant d'atteindre un tel but et chaque Etat se voit contraint d'élaborer une solution qui soit conforme aux caractéristiques hydrogéologiques, climatiques, économiques, sociales et politiques qui lui sont propres. L'eau et les besoins humains correspondants étant ce qu'ils sont, toutes les législations des eaux sont néanmoins articulées sur un certain nombre de paramètres de base pouvant donc être utilement soulignés.

La gestion rationnelle des ressources en eaux nécessite une politique pré-établie, soit un plan général d'aménagement. La législation des eaux ne constitue pas une fin en soi mais sert de moyen nécessaire à la mise à exécution de toute politique. Ses buts sont donc de formuler de la manière la plus concise les principes présidant à l'élaboration d'une telle politique, d'établir les règles régissant corollairement la protection, la mise en valeur et l'utilisation des ressources en eaux, et d'organiser la mise en place et le fonctionnement des institutions chargées de la mise à exécution de cette législation.

De même que les plans généraux d'aménagement des eaux sont fondés sur des données physiques et constituent la synthèse de plans et projets sectoriels les lois sur les eaux doivent pourvoir au rassemblement de données hydrologiques et de celles concernant la demande en eau, ainsi qu'à la coordination centralisée de la planification des projets aux fins d'établir des bilans hydrologiques optimums.

Une telle orientation intégrée porte par définition atteinte aux droits d'eaux traditionnellement privés afin de protéger ceux de la communauté; les lois sur les eaux ont donc à établir un système d'administration des droits d'eau tel que les bénéficiaires puissent se sentir sûrs dans leurs investissements de mise en valeur tout en soumettant les droits d'eau individuels à un contrôle centralisé et permanent en vue d'en assurer globalement le caractère avantageux. Les traits essentiels d'un tel système consistent en une séparation évidente entre les droits de propriété et d'utilisation, en la définition de **critères** d'utilisation avantageuse, en la soumission des droits d'eaux à un **terme fixe** et à des conditions quantitatives et qualitatives d'utilisation, et en

la création d'un système de redevances. En ce qui concerne les eaux souterraines en particulier, les activités d'exploration et de forage doivent être autorisées préalablement et contrôlées, et la construction, l'exploitation et l'entretien des puits réglementé spécialement dans le cadre de dispositions générales sur la protection des ouvrages hydrauliques.

Un autre élément fondamental de toute législation des eaux couvre la mise en place d'une administration centrale des ressources hydrauliques capable d'intégrer horizontalement tous les plans et projets sectoriels et de contrôler verticalement la mise à exécution de la politique nationale des eaux jusqu'au niveau de l'utilisateur individuel.

Enfin, toute législation des eaux est appelée à contenir des dispositions réglementant son exécution et, en particulier, une mise en marche souple dans le temps et dans l'espace du nouvel appareil administratif en matière de ressources hydrauliques, la protection des droits d'eau existants, la détermination de priorités, l'établissement des tarifs des eaux et l'organisation de juridictions des eaux et leurs procédures. L'expérience a démontré qu'une législation des eaux établissant des principes de base et assortie d'un appareil administratif bien structuré prévoyant une réglementation subsidiaire des plus souples en vue de régir toutes questions techniques et spéciales connexes, constitue le meilleur moyen d'assurer la gestion rationnelle du capital national en ressources hydrauliques.

Technological development has demonstrated that ground water basically constitutes but one element of the hydrological cycle; and integrated development planning has taught us that efficient resources management ought to cover all the uses to which a given resource can be put. It follows that ground-water legislation, as the set of those legal norms which govern the use, by man, of ground water for its various purposes including irrigation, constitutes but a part of the discipline known as water resources law. It nevertheless remains that the dynamics of ground-water development, and hence of the evolution of ground-water legislation, may be considered as appropriate illustrations of modern tendencies within their respective disciplines.

The wide diversity of climatological conditions governing the occurrence of water in the various phases of the hydrological cycle on the one side, and the diversity of human societies and the recent transfer from a subsistence to a market economy on the other, constitute the basic parameters on which the co-existence of man and water is articulated. Whereas in humid areas, ground water has until recently been put to limited use, this resource has, since time immemorial, been the mainstay of human life in arid zones. It follows that the rules governing the use of ground water have first developed in desert and semi-desert areas, usually travelled through or inhabited by the populations of traditional civilizations. This latter statement finds its relevance in the fact that all traditional legal systems—whether Pre-Columbian, Hindu, Chinese, Talmudic, Canonic or, more recently, Moslem—from which modern legislation has developed, have considered water, both surface and underground, as a common good not subject to appropriation but to rights of use exclusively.

Dominated by the principle of community or public interest, these legal systems, whether customary or codified, have always been repugnant to individual real property rights and have administered possessory or use rights by reference to the collectivity, as represented by the head of the social group. As regards water resources in particular, another fundamental principle—purely legal this time—which has opposed private appropriation is related to the fact that, being a transient, quantitatively undefined commodity, water cannot *per se* satisfy all the constitutive requirements of an ownership right (the thing, *res*). This is why, with the appearance and crystallization of individual land ownership rights, water—both surface and underground—became considered as an appurtenance of the under- and overlying land and made to follow the legal regime of the latter. Thus, the landowner became, by extension, the owner of the water resources to which he was riparian.

This transformation is fundamental in that, by transferring the dominion over water from the collectivity to the individual, water resources were made to fall within the private patrimonium, which concept constitutes the central element of European continental legislation. Suffice it to recall the qualitative definition of the right of ownership as has become established in the Napoleonic Civil Code "... *utendi, fruendi et abutendi*", and its spatial extension as regards land ownership "... *usque ad coelum, usque ad inferos*" which thus encompasses ground water.

As at Roman Law, however, the concept of community or public interest was maintained for certain surface flowing waters which, because of their importance for the whole community, were classified as "public waters" and made to escape private appropriation. Originally distinguished on the basis of a quantitative criterion (large streams), as later adopted in the Common Law of England, the major use of these watercourses for navigation purposes subsequently established the qualitative criterion of navigability, as institutionalized by French Law. Whereas the Common Law of England has stood closer to Roman Law principles according to which flowing water basically escapes the ownership regime and related riparian rights remain private rights of use subject to State control, the continental Civil Law system being repugnant to anything falling outside the ownership regime, institutionalized the dual classification of private and public waters and made the latter category to fall within the Public Domain, that is under State ownership.

The essential difference between the two systems is that, whereas at *Common Law* flowing waters in fact remained under the Roman community regime (*res communis, res publicae*) allowing only for rights of use, themselves limited by the requirement that the natural flow remain undisturbed or that uses be reasonable, at *Civil Law* riparian rights to private waters became full ownership rights and rights to use public waters subjected to the prior authorization, permit, license or concession regime.

The Civil Law system later extended to Latin America (Spanish Law), West and North Africa, part of the Middle East and Asia; the Common Law system was introduced in North America, East and Southern Africa, the Indian Sub-continent and Australia. Riparianism developed well in the Eastern United States where water is plentiful; it fared less well in the

Western United States where water shortage made riparianism an uneconomic proposition. With the Western American Gold Rush, riparianism was soon replaced by the prior appropriation system which, by affording full protection to prior established water rights with a quasi-ownership status, allowed for unprecedented land reclamation and development. In Australia, as well, riparianism was soon abandoned for similar reasons, but replaced by a system of administrative control over water uses, or institutionalized State Control. Of importance though it is the fact that both systems kept ground water resources within the full dominion of the owner of the over-lying land.

Under the impulse of economic development, the practically uncontrolled use of ground water, rapidly increasing needs for more water, in particular for consumptive uses, such as irrigation, and improved abstraction methods, have caused a proliferation of concurrent and competitive uses which compelled States to introduce ground-water regulations in order to replace the hitherto private litigation system afforded by Civil and Common Law. Three main legislative methods can be identified in this respect.

One method, which has been followed by countries with a non-consolidated water legislation, has consisted in the promulgation of ground-water laws aiming at solving this new problem as a unique and isolated one. Belgium, Cyprus, Denmark, France, the Netherlands and Turkey may be cited as examples. All these legislations have tended toward the limitation of exclusive private ownership rights in favour of a form of central administrative control over ground-water uses, thereby creating a formal separation between ownership (*nuda proprietas*) and use rights. In certain cases, private ownership rights have been suppressed altogether by the transfer of the resource from the private patrimonium to the community, or by its incorporation into the Public Domain (nationalization). In other cases, only quantitative or geographical limitations to the use of ground water could be introduced because of strong opposing vested interests.

Another method, which has been adopted by countries with a consolidated surface water legislation, has allowed for existing rules to extend to, or to incorporate, ground water. The Australian States of Victoria and New South Wales, or New Mexico in the United States, are examples. In the latter case, ground water was thus equally subjected to the prior appropriation system and, in the former, to the existing administrative control system. Here again, only quantitative and geographical limitations to ground-water ownership have been introduced, still leaving a part of the resource in the private dominion of the landowner. The recent legislations of the United Kingdom and of France illustrate the extension of the permit system to abstractions of water in excess of a statutory minimum and the institution of administrative control over ground-water uses within declared water areas or basins.

The third and most recent method has presided over the promulgation of consolidated water-resources laws which, either by vesting the overall water resource in the community as in Australia and South Africa, or by incorporating it into the Public Domain as in Germany, Israel or Peru for instance, have institutionalized central administrative control over water resources conservation, development and use.

Irrespective of the legal technique used and whatever the political motivation, these tendencies which are present in all modern systems of law—be

it Civil, Common, Socialist (^{with} ~~which~~ its water economy concept) or Statutory Moslem Law—reflect more a situation of fact than one of choice. Indeed, the interrelationship between surface, ground and atmospheric waters need not to be further demonstrated; the finite nature of the resource by reference to an ever increasing demand is well established; and the parallel evolution of water legislations irrespective of their particular ethico-ecological base have clearly demonstrated the necessity, objectively, to always further limit naturally egocentric individual rights and prerogatives in favour of the general interest by recognizing, legally as well, to each natural resource—and to water in particular—its fundamental nature as a component of the Wealth of the Nation. Of particular significance in this respect is the gradual disappearance of the prior appropriation system whatever its form or place of implementation and its replacement, under the influence of modern resources management imperatives, by one form or another of centralized administrative control. Similarly, riparianism is also gradually being modified, not so much because of its private monopolizing effect as in prior appropriation, but because the numerous limitations which have progressively burdened riparian rights have finally led this system to constitute a basic constraint to development. A number of countries with a long tradition of riparianism have recently reformulated their water legislation, as in Ecuador, Iran, Mexico or South Africa for instance, or are in the process of drafting new consolidated water resources acts, as in Argentina, Ethiopia, Jamaica, Libya, Luxembourg or Turkey for example.

What may be learned from these developments is no doubt that the new technically and economically accepted concept of integrated water resources development has to find its legal/institutional sanction as well. Once water is considered as one natural resource requiring adequate conservation, development and use control, neither can it be split hydrographically nor can ground, surface or atmospheric water uses each be administrated in isolation. Once this is realized, there is no choice left but for the State to assume its obligation to control water resources conservation and development and to centrally administer water use rights in the interest of the whole community and, in order to do so, to formulate the required policy.

Water legislation constitutes no end in itself but is the necessary instrument for policy implementation. The purpose of a water law is, therefore, to spell out as concisely as possible the principles presiding over the national water resources policy, to establish the rules correspondingly governing water resources conservation, development and utilization, and to organize the constitution and functioning of those institutions to be charged with water law enforcement.

Whereas each State promulgates laws formulated in accordance with its own legal system, itself governed by a great variety of ethico-historical, climatological, technical, economic and political imperatives, and although legislative techniques and law implementation procedures may differ widely from country to country, it nevertheless remains that, water and related human needs remaining fundamentally the same, a number of parameters on which all water laws are articulated can be identified and may serve as useful guidelines for all those—engineers, economists, lawyers and politicians—who may one day be called upon to contribute in the formulation of a basic water resources law. These are briefly discussed herebelow, at this

time with particular reference to ground water and to the utilization thereof for irrigation purposes.

There are many ways of approaching the regulating process required for ground-water management. From a practical point of view, it may be stated that the need to regulate ground-water uses usually becomes evident only once the situation of fact has considerably deteriorated. Irrigation constituting the major consumptive use of water, and abstractions of ground water for this very purpose having traditionally been left to the discretion of the land owner, unchecked drilling, abusive pumping and waste of water have naturally led to aquifer perforation, excessive drawdowns and salinization until the resource threatens to become quantitatively and qualitatively unusable. This had led some States to take conservation measures in order to prevent further deterioration. The problem is, however, far from being that simple. Whereas ground water need to be conserved and although existing water supplies for irrigation can be used more economically, new irrigators cannot be denied the water they need, nor can other than irrigation needs of water (domestic and urban consumption for instance) be left unsatisfied.

In addition, national development imperatives as well require that the resource be parallelly developed, usually in combination with surface water (recharge and drainage) in order to accommodate for priority uses which may well be competitive with irrigation requirements. A first parameter may therefore be defined as the need to incorporate ground water within the purview of a *national water resources conservation, development and utilization policy*

It may be remembered, however, that a national policy, in respect of whatever natural resource or field of development in the widest sense of the term, is never final but constitutes a continuing process of elaboration, itself conditioned by a wide diversity of constituting elements. These may, for the purposes of this brief analysis, be grouped into three main categories, the first of which may be defined as a second parameter and labelled *water resources inventory*. Unlike surface water which is usually better known, ground-water data without which no development policy may be rationally evolved are either non-existing or inadequate and therefore need to be collected. This data collecting function requires a number of measures which constitute a first limitation to the customary autonomy of users; in order that ground-water bodies may be identified, the landowner must be compelled to allow for the necessary topographic and geological surveys to take place on his land, for his current uses of water to be quantitatively measured and qualitatively analysed, and this on a permanent basis; he may further be required to submit to specified drilling and test pumping procedures, or even to contract for ground-water exploration with a qualified drilling firm. Conversely, data collected need to be centrally compiled, analysed and disseminated, a procedure requiring a corresponding administrative function.

Once the water resource, including ground water, is identified to a workable extent, and before options on its various uses may be made, a central inventory and evaluation of corresponding economic needs—present and future—need to be organized. Considering that water constitutes an essential resource for practically all sectors of the economy, corresponding inputs will, therefore, have to be carefully co-ordinated with a view to avoiding

duplication or the development of competing and concurrent uses. It is on the basis of such a double inventory (water resource—corresponding economic needs) that central planning and co-ordination will suggest possible policy options. This second category, which may be called *water resources development planning and co-ordination*, constitutes a third parameter. Measures correspondingly required, and having, therefore, to be regulated, include the centralization of water resources development planning with the concurrent obligation for each sectoral administrative unit—or major user—to submit its water resources plans and projects thereto, and for individual users to proceed accordingly for each particular use of water with the competent authority. As concerns the use of ground water for irrigation, the administrative unit responsible at the national level acts as the “Water master for irrigation”—itself under the central administrative unit or “national water master”.

The third category, and fourth parameter, may be designated under the generic term of Water Bank—or better, Banker. Indeed, the mere inventory of the resource and of corresponding needs assorted with central planning and co-ordination will remain a dead letter if resulting measures are not permanently supervised and adjusted to the fast developing situation of fact. The central water administration, or Water Banker, must be in a position not only to maintain the ledger of what water there is, both quantitatively and qualitatively, and of how much thereof is used, how and for what purpose, but also to control each use by issuing and being able to speedily modify conditions of use as required. In other words, a *central water rights administration* need to be set up and enabled to perform its functions.

This particular function, no doubt, constitutes the fundamental substance of any water legislation. However, to be effective, water rights administration must be viewed as a means of implementation of the water resource policy and not as an end in itself. Furthermore, water rights administration cannot but be based on some form of licensing procedure which, in turn, is conditioned by a variety of factors.

The first and fundamental factor entails the necessary separation between absolute dominion over water, or ownership rights, and rights of use, or water rights. It should be remembered that, as a matter of law, the owner holds a superior right which, by implication, includes that of use. The method of effectuating this separation is a matter of policy and may take a variety of forms. Of importance is not the method or legislative technique followed, but the requirement to limit, or even to abolish ownership or quasi-ownership rights in water so as to make central water rights administration effective while affording the user a maximum of security in his right to use. A licensing procedure which would limit itself to recognizing use rights once and for all, as has been done in some occasions, would however miss this objective. For purposes of administrative convenience, though, quantitatively limited uses of water remain free of prior authorization, permit or license requirements; these generally cover domestic, household and, sometimes, small irrigation uses.

Another important factor is the time limit which must attach to use rights so that the administration may modify and adjust those rights to changing economic, technical, political and other circumstances while guaranteeing to the holder a temporary exclusive right use sufficient to stimulate his

entrepreneurial initiative by ensuring amortization requirements of his investment. As a matter of practice, authorizations are granted for short-term, permits for medium-term and licenses or concessions for long-term uses; irrigation water rights usually fall under the latter category.

In addition to those provisions governing the suspension, modification, termination and cancellation of the authorization, permit, license or concession, conditions of use need to contain all the rules required to ascertain that the authorized use will be reasonable, efficient and harmless to the resource, as well as the obligation for holders to regularly make quantitative and qualitative data on their uses available to the central administration and, where applicable, to pay corresponding water fees and charges.

The use of ground water^{is}, however, preconditioned by exploration and drilling operations which, being highly specialized and potentially harmful, need to be strictly controlled. Ground-water exploration is, therefore, subject to a prior authorization or permit, generally of a short-term duration, which contains all the necessary conditions regulating the location of trial wells, drilling and pumping test specifications and procedures, hydrogeological data collection and reporting. In addition, drillers ought to have the necessary professional skills and are, therefore, usually required to obtain an official drillers' license.

Water use authorizations, permits, licenses or concessions, further contain such provisions as are required to ensure the proper construction, maintenance and protection of waterworks and related equipment. For wells and underground galleries in particular, borehole spacing and prohibited areas around and along those structures need to be carefully specified and controlled.

Finally, where a new ground-water source is developed together with an irrigation network to replace a number of individual wells, conditions of use specify individual shares in the water or irrigation turns, either in relation to crop or to land surface requirements. Where irrigators are organised in water users' associations, though, one water use license or concession for the entire supply may then be delivered to the association which, in turn, may itself regulate water distribution among its members.

A fifth parameter covers the institutional aspects of water resources administration and may be analyzed following three levels of integration. Water resources conservation, development and use policy-making constitutes the hierarchically highest function *at the national level*. As water concerns nearly all branches of government, water policy decisions have, by necessity, to emanate from an inter-ministerial forum, and a National Water Board, Committee or Commission is usually established for this purpose.

One Government department or agency is correspondingly set up and entrusted with water policy implementation. The basic functions of this agency, or National Water Agency, are to centrally maintain the water resources inventory, to ensure integrated water resources development planning and to maintain overall control over water resources conservation, development and use activities. At the same time, this agency functions as the executive secretariat of the national policy-making body, and one form or another of physical link between the two is, therefore, necessary. One possibility is for the head of the national water agency to be a member (Secretary) of the policy-making body.

A matter requiring special consideration concerns the status to be given to the national water agency. In all countries, it can be observed that a number of government departments have long been dealing with water matters and have thus developed specialized skills and competences in their particular sector, or main use of water. While their activities will necessarily have to be pursued and should not be duplicated, an adequate distribution of functions between the central water agency and existing government departments needs to be achieved in the water resources field. In countries experiencing skilled manpower shortages, this matter is of particular relevance. Considering that policy making and executive functions can easily be separated, a possibility is to entrust the national water agency with such functions as central water resources inventory, conservation and development planning co-ordination and rights administration, and to leave actual conservation and development operations to existing executive government departments. This modality is considered in general preferable to the creation of an integrated policy and executive water agency or authority which is bound to duplicate and hence to enter into conflict with established competences; but it requires that this agency be placed hierarchically at a higher level than executive government departments in order to be able to effectively direct and control their activities. An adequate interim solution is to make use of one existing government department, the major water user (often the Ministry of Agriculture), as the nucleus for the creation of such an agency; however, in order to avoid an undesirable imbalance of administrative powers, this solution ought to be of a transitory nature.

Although water cannot be limited by geographical or administrative boundaries, water resources are affected by varying climatological conditions and by the location of uses. Furthermore, since it would be administratively unsound to centralize all water resources operations at one geographical point, the national water agency ought to have branches established at the *regional (basin, sub-basin, provincial)* level. It is, therefore, necessary to equip local governments with the needed inputs to help draw-up and implement regional water master plans and to effectively control major water allocations and uses. Another possibility is to create self-governing basin or water district State agencies or authorities, a usually successful solution provided central control is maintained by the national water agency.

Finally, individual water uses having to be regulated and controlled, water masters and inspectors are appointed *at the user's or local level*. In this particular respect, it is to be emphasized that, in the absence of codified legislation, customary practices in water uses for irrigation are usually highly developed and that the required local institutions not only are in existence but, generally, have undisputed authority. In these cases, the mere institutionalization of existing organizations (customary water masters and water users' associations) satisfactorily meets initial requirements.

A sixth and last parameter requiring consideration covers a number of issues related to water law implementation. One of the most difficult issues concerns the protection of acquired or vested rights, that is rights of use lawfully exercised, before the promulgation of the new legislation, by virtue of a legal title or by acquisitive prescription. There is no doubt that existing rights are to be protected, but the various techniques followed in this respect do not meet the same ends. One mode has been to simply exonerate

existing uses from the newly introduced licensing procedure and thus to dispense with the past; as a result, these rights have become privileged as compared to new uses, a solution falling short of equity. Another mode has been to subject existing rights to the new licensing procedure, but to grant these rights an absolute priority in time; although more equitable in absolute terms, this technique, by granting existing uses a priority or principle, still privileges acquired rights by reference to possibly concurrent or competitive, but more beneficial, new uses. A third technique favours the fully equal treatment of existing and new uses by subjecting both to the new licensing procedure on the basis of the beneficial use principle. This method normally calls for compensation by means of alternative sources of supply and reduces cash compensation requirements to a minimum while ensuring the aggregate beneficial use of the water resource as a whole. A form of protection is nevertheless afforded to existing uses in that new uses may be licensed only once all vested rights have been covered by the relevant title.

Another issue concerns priorities, either among different uses, by area or in time. It is not uncommon for legislations to enumerate priorities among uses. Undoubtedly, domestic and household consumption require priority, not to say absolute priority. This is universally recognized and legislative statements to this effect may be considered declaratory rather than constitutive. With respect to the other uses of water, it should be remembered that laws are supposed to be made to last whereas physical conditions, economic requirements and technology are bound to change rapidly. It is, therefore, considered that, with the exception of domestic and household uses (such as the Traditional Right of Thirst in Moslem water law for instance), priorities among uses should not appear in a water law; nevertheless, the central water administration should be empowered to issue regulations to this effect as may be required. Priorities by areas are generally required but concern emergency situations or economic planning requirements and water law implementation proper and, as such, are better dealt with on an *ad hoc* basis; the central water administration should nevertheless be enabled, by law, to issue corresponding regulations. As to priorities in time, these constitute a reminiscence of the prior appropriation doctrine and, in addition to being in contradiction with the beneficial use principle, should be disregarded; whatever time-space security is required is afforded by the conditions of use attached to the water right authorization, permit, license, or concession which furthermore enable the central water administration to act with the maximum flexibility in the public interest.

Another important issue concerns water pricing. It is usually considered that water should pay, in particular since the capital investment required for the large-scale water developments of today exceeds by far private investment capacities and necessitates State financial intervention. In a number of countries, it is often considered that water not being subject to appropriation—be it private or public—cannot be sold, hence directly generate monetary revenue. Irrespective of the conceptual approach, it nonetheless remains that, as a matter of principle, investment in water resources activities must be productive and that government developed water supply systems constitute a definite service to users. Where water cannot be quantitatively charged for, the service of making water available—including waterworks construction and maintenance costs—can nevertheless be taxed. It may furthermore be remembered that water pricing can be, and is used as a useful

incentive for efficient water use and as an effective deterrent against misuses, waste and pollution.

The administration of justice in the field of water resources constitutes a further issue. Before the introduction of State control practices and legislation, water disputes have usually been handled by the regular courts of law; only rarely, as in Finland, Italy, South Africa and Spain for instance, ~~where~~ special water courts ~~had been~~ established. With the centralization of water administration in the hands of the State, public law statutes and administrative regulations are gradually substituting the traditional norms of Common and Civil Law, and administrative procedures parallelly replace judicial proceedings. As a result, public administrations are consolidating their judicial competences up to the highest instances, leaving to the judiciary or regular courts of law, law applicability and interpretation matters only. There is also a tendency because of the highly specialized aspects of water resources development, to appoint technical assessors to the Bench and thus to create special courts as has been done in the Labour Law field for example. Whatever the technique followed, it is important to ensure that water users have their rights of use adequately protected against both private and public interferences and that appeal procedures are provided as well against administration needs to be enabled to prevent and act against the wrong or harmful actions of users. Water laws, therefore, usually include appropriate penalty clauses

tributive decisions by which users may feel wronged. At the same time, the adminis-

One last issue which ought to be considered as well relates to law implementation proper, or Law enforcement. Most of the time, it will not be feasible to fully implement the law at once over the whole national territory for the simple reason that water resources inventory and licensing of existing uses require considerable time, manpower and money while water resources development is bound to proceed according to plan. It is, therefore, customary to view water laws as "ambulatory legislation", that is as gradually introducing a new legal regime in selected geographical or hydrological zones while maintaining existing legal provisions in the others. In practice, water areas or drainage basins are declared as water districts wherein the new law is applied. Once the first district or water resources development project area is fully controlled, a second, then a third district is declared, and so on until the whole national territory is covered. One advantage of this procedure is the possibility for the central water administration to test on a small scale the worth of the newly introduced legal regime and to correct the same as required. Water laws thus usually include a section covering such transitory provisions.

To conclude, two further issues are briefly discussed. The first one concerns pollution, on water quality control, a certainly not unimportant subject in current environment protection-oriented legislations. The intention here is not to minimize existing and alarming environment degradations, and water pollution in particular, but to see how water legislation can and should contribute to man's corrective action in this respect. The fundamental issue is to find a balance between the natural resources conservation versus development alternatives, this in order to arrive at their "rational management". It is furthermore evident that, due to the great diversity of ecological situations and economic development requirements, each State has to arrive at its own particular solution. Should, however, each State take due

cognizance of its own existing and potential environmental problems and endeavour to seek its own optimum course of action towards their solution, first at the level of each natural resource, such actions would undoubtedly contribute substantially in the keeping of a healthy human environment - may be far below world environmentalists' standards, but at least in a certainly effective way.

The other issue relates to flexibility requirements in the drafting of water laws. Since water resources policy options and development requirements will often vary, and while amendments to basic laws should remain as few as possible, water laws should contain only basic concepts and criteria for water resources control and empower the water administration to subsidiarily regulate, on that basis, technical and procedural matters. Experience shows that a basic enactment, assorted with a well structured water resources administration enabled to act with the maximum flexibility, is the best way to ensure the rational conservation and development of the national water capital.

SELECTED BIBLIOGRAPHY

- (1) ALONI, SAUL, "Modern water legislation and development," U.S.G.P.O., Washington, D.C., Water for Peace, Vol. 5, 1967.
- (2) BURDON, DAVID, J., CAPONERA, DANTE A., and HRABOVSKY, J.P., "Groundwater's role in social and economic development: An example based on FAO's Near East Regional activities on ground water development and use," FAO, Rome, Dec. AGL:MISC : 71:8, 13 Apr 1971.
- (3) CALVERT, N.H., "The control of abstractions and impoundings of water under the Water Resources Act, 1963," U.S.G.P.O., Washington, D.C., Water for Peace, Vol. 5, 1967.
- (4) CANO, GUILLERMO, J., "National water laws and administration as elements of water development," U.S.G.P.O., Washington, D.C., Water for Peace, Vol. 5, 1967.
- (5) CAPONERA, DANTE, A., "Towards a new methodological approach in environmental law," Nat. Resour. J., Apr 1972, v 12, n 2. (The University of New Mexico, School of Law).
- (6) CAPONERA, DANTE, A., "Water laws in Moslem countries," FAO Irrig. and Drain. Pap. No. 20/1, FAO, Rome, 1973, pp 223.
- (7) CAPONERA, DANTE, A., "Water law principles in the Chinese legal system," Indian J. Int. Law, Oct 1960, and Jan. 1961, Vols. 1,2 and 3.
- (8) CLARK, STANFORD D., "Guidelines for the drafting of water codes," To be published by EFACE in Cooperation with FAO, Bangkok, and distributed under U.N. Sales Numbers.
- (9) DEWSNUP, R.L., JENSEN, D.W. and SWENSON, R.W., "A summary - Digest of State Water Laws," National Water Commission, Arlington, Virginia, May 1973.
- (10) DOWLING, G.A.R., "Water law in the Republic of South Africa," U.S.G.P.O., Washington, D.C., Water for Peace, 1967, Vol. 5.
- (11) ELLIS, HAROLD, H., "Water rights and regulation in the eastern United States," U.S.G.P.O., Washington, D.C. Water for Peace, Vol. 5, 1967.
- (12) FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS, "Legislative and administrative provisions in European countries to ensure proper distribution of water resources," Doc. ECA: WR (68/34(4) Rev 1, FAO, Rome, July 1968.
- (13) FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS, "Ground-water legislation in Europe," FAO Legislative Ser. No. 5, Rome, 1964.

- (14) FOX, IRVING R. (ed.), "Water resources law and policy in the Soviet Union," Water Resources Center, University of Wisconsin, The University of Wisconsin Press, Madison, Milwaukee and London, 1971.
- (15) MALAKOFF, E.R. "Water pollution control—National legislation and policy," Doc. LA:MISC/67, FAO, Rome, Dec 5, 1967.
- (16) McCUTCHAN, A.I. & HOCKING, J.R., "The administrative and legal framework in Australia," U.S.G.P.O., Washington, D.C., Water for Peace, 1967, Vol. 5.
- (17) TECLAFF, L.A., "Abstraction and use of water : A comparison of legal regimes," United Nations, New York, 1972. (UN Sales No. E.72.II.A.10).
- (18) TRELEASE, FRANK, J. , "The role of water law in developing the American West," U.S.G.P.O., Washington, D.C., Water for Peace, Vol. 5, 1967.
- (19) UNITED NATIONS ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST, "Water legislation in Asia and the Far East," Wat. Resour. Ser. No. 31 and 35, ECAFE, Bangkok, 1967 and 1968, (UN Sales No. 67. II. F. 11 and E.69.II II.F.6.)