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Water-Supply Stringencies—Features, Antecedents and Obstacles to Resolution

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WATER-SUPPLY STRINGENCIES—FEATURES, ANTECEDENTS AND OBSTACLES TO RESOLUTION

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I. BACKGROUND

Numerous recent articles in both the popular and technical press constitute a fairly compelling argument that many areas of the United States approach all too rapidly water-supply stringencies having aspects of dilemma.[1] The argument is readily conceded; the pertinent inquiry is to examine the principal roots of the stringencies.

It can generally be stated that present practices of water-supply management involve acquired habits some of which run counter to the realities of hydrology. These habits all too often take the form of policies and decisions which look towards selected effects rather than comprehensive objectives. Specifically, a resolution of foreseeable stringencies of supply must contend with illogical concepts for allocating available supplies among uses both present and prospective, with circumscribed and, in many instances, inadequate institutional concepts, and with inflexible water law. It can thus be said that any success in resolving foreseeable stringencies at a still relatively early time—and thus precluding a later generation of more complex stringencies—may be measured in terms of breaks from traditional concepts and procedures. Solutions both bold in scale and novel in purpose are required.

A. *The Problem of Quantity*

Whenever in the past we have outgrown a water-supply facility, we have usually been able to tap some new and uncommitted source not far away. Somewhat abruptly, however, we now find the reserve source "just over the hill" to be already in use, and we further find ourselves racing a neighbor to a remote source not easily accessible and perhaps literally over the horizon. In short, whereas once we could run away from a stringency of water supply, no longer can we presume space in which to run.

The optimal solution lies in the repeated use of the yield from each local source.[2] Even so, many centers of large water demand necessarily will reach out farther and farther to assure themselves

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1 See, e.g., A. Piper, Has the United States Enough Water? (U.S. Geol. Survey Water-Supply Paper 1797, 1965).

2 See generally Aulenbach, Water—Our Second Most Important Natural Resource, 9 B.C. Ind. & Com. L. Rev. 535 (1968).

dependable supplies. The following three examples illustrate the scope of interregional transfers of water, and some of the problems involved.

In California, about three-fourths of the aggregate stream runoff[3] originates in a part of the state having only about one-fourth of the water demand. By transporting water from water-rich areas to water-poor areas—that is, by a transport system having a 600-mile span—the projected state-wide demand over the next several decades can be met within the boundaries of the State. First stages of the system are currently under construction.[4] The planning and accomplishment of this task has been made possible only by an enlargement of the authority and capability of state administrative institutions during a time span of some 20 years to a scope far greater than rests in corresponding institutions in most of the nation. Major changes have included a more-than-tenfold increase of technical staff in the state's Department of Water Resources, especially in skills not previously of concern; also, authorization of a $1.75 billion issue of bonds, approved by the electorate in 1960.

The central Arizona region has for years used virtually all the flow of the Gila River and its tributaries, and perforce has "mined" additional water from the ground in relatively large volume. Temporary relief, but only temporary relief, from the region's supply stringency is offered by a proposed import from the mainstem Colorado River about 300 miles away. Construction of the import facility by the federal government has been proposed but as yet has not been authorized.[5] The alternative, a "go-it-alone" construction by the State of Arizona, would pose overwhelming problems of institutional adequacy. Financial, administrative, and technical capabilities far beyond those that rest in existing institutions of the state would be required.

The most extreme interregional water-transport scheme thus far proposed, the so-called NAWAPA scheme, would integrate major water sources and water-use areas over all western North America—in Canada, the United States, and Mexico.[6] Fanciful as it now may seem, this bold suggestion may become credible within a few decades. Implementation of this plan, however, would entail enormous difficulties. International administrative institutions of unprecedented scope would be needed even to launch investigative and design stages.

It should be evident that interregional transfers of water are no easy matter. The very scope of any such plan calls for far-reaching changes in present institutions and for vast construction projects. In addition to size alone, it is important to point out two other aspects

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[3] See id. at 540-41.

[4] California Department of Water Resources, The California Water Plan (Bull. No. 3, 1957).

[5] U.S. Dep't of the Interior, Pacific Southwest Water Plan (1963).

[6] Ralph M. Parsons Company, North American Water and Power Alliance: Water and Power Plan (prelim. report, April 1964).

of interregional transfers. First, the cost per unit of deliverable water is very much greater in the instance of an interregional transfer than ordinarily has attached to water developed locally. Second, the urgency for, and magnitude of, interregional transfers have been projected according to present levels of efficiency in the use of local supplies. The conclusion to be drawn from this discussion is that the immediate challenge in water-supply management is optimum reuse of local supplies. The purpose of concentration upon optimal reuse is, of course, to minimize water costs over the long term and to scale down and defer interregional transfers (inevitable though such transfers are). In meeting this challenge, a principal objective arises, namely, water quality control.

B. *The Problem of Quality*

We have long pretended to the irresponsible luxury of using most water but once in each locality, then separating gross pollutants in the solid state by "primary treatment" and passing a still polluted effluent downstream. This we could do with a comforting assumption that, because the "assimilative capacity" of the receiving stream or lake was adequate, the remaining pollutants could (and commonly did) disintegrate by oxidation and bacterial action within a short interval of space or time.[7]

Forced to retreat from this assumption, we now undertake to lessen the "oxygen demand" of primary effluent by "secondary treatment" of wastes—that is, by starting the disintegration of the pollutants before discharge to the receiving waters. In couple with such treatment, it has been widely assumed that regulation of streamflow by storage in, and release from, reservoirs could assure all the required dilution and assimilative capacity. Even this assumption now fails in light of the following dilemma:

(1) Present methods of water treatment are not always effective. In effluent from both metropolitan and rural areas, residues from certain industrial chemicals and from most agricultural chemicals, particularly herbicides and pesticides, not only are difficult to detect but also resist disintegration by the conventional methods of waste treatment. Currently, intensive research seeks economic and acceptable means for "tertiary" treatment to disintegrate such intractable residues.[8]

(2) Effluent from conventional treatment of domestic waste contains nutrients—principally nitrates and phosphates—that may

[7] For a comprehensive discussion of industrial water pollution control, see Hines, Controlling Industrial Water Pollution: Color the Problem Green, 9 B.C. Ind. & Com. L. Rev. 553 (1968).

[8] Further help may come from the chemical industry itself. For example, the detergent industry, through the Soap and Detergent Association, has launched a voluntary transition to a "soft" product that disintegrates under conventional "secondary" treatment.

trigger a "bloom" of algae in the receiving water, and so impose still another demand for oxygen. Such additional demand may well mean that the stream's assimilative capacity has been exceeded. Even in so voluminous a receiving water as Lake Erie, extensive areas are now seriously advanced in the degenerative process of "eutrophication."[9] This excessive demand for oxygen inversely affects the degree to which the disintegration of pollutants from an effluent may take place.

(3) Even if our streams are regulated to the utmost, and disregarding the constraint of cost, it is doubtful that they can deliver fresh pure water in amounts sufficient for projected supply requirements.[10] Paradoxically, the greater the quality control for the purposes of maximizing supply, the greater the demand for water for purposes of diluting and assimilating waste.

Obviously such problems of water quality must be resolved if the problem of water quantity is to be eased through repeated reuse. But there is no ready, single course to this end—no panacea to palliate our traditional impatience with small measures. If we are to resolve the problems, the break from present water management concepts and procedures must be made. But such a break encounters a two-faced obstacle: On the affirmative side, we rely on a principle that each individual can enjoy an absolute and timeless right to take and to use water,[11] and couple that principle with administrative and legal institutions to enforce the rights between individuals.[12] On the negative side, we fail in large part to foster, or even authorize, management of a water source jointly by all its users both to achieve and to defend optimum benefit despite natural variance in the yield of the particular source. To a considerable extent, the principle of an absolute, timeless right precludes easy adjustment to changes in purpose of use.

This principle is deep-rooted in the law, both in the common law and the "riparian doctrine," which prevail in the East, and, more significantly, in the "appropriation doctrine," which governs water rights in the western parts of the United States. Unlike the copiously watered East, the West has traditionally been beset with severe natural water stringencies. It is thus more important to examine in what manner the appropriation doctrine impairs resolution of the quantity and quality problems outlined above.

II. Antecedents of Water-Supply Stringencies

Oversimplified, the appropriation doctrine breaks down into these component principles: (1) ownership of the "corpus" of water rests in

[9] A. Beeton, Indices of Great Lakes Eutrophication (Univ. of Michigan, Great Lakes Research Div., Pub. No. 15, 1966).

[10] See Aulenbach, supra note 2, at 547-48.

[11] See Davis, Australian and American Water Allocation Systems Compared, 9 B.C. Ind. & Com. L. Rev. 647, 676, 688-89, 705-09 (1968).

[12] See Hines, supra note 7, at 575-90; Davis, supra note 11, passim.

the State or in the "public";[13] (2) an individual person, a corporate agency, or a public agency can appropriate water for use;[14] (3) among such appropriators, "the first in time is the first in right" and the right to use is in the nature of a property;[15] and (4) the use must be "beneficial" and the magnitude of the right is limited to the extent of the benefit.[16] Literally, each such appropriative right is virtually a guarantee that the conditions of flow in the source stream, or of yield from another kind of water source, will remain as on the priority date of the particular appropriation. In principle, each appropriation is in an absolute amount that, in perpetuity, is preemptive against all junior appropriations. As applied to a stream source, the system would theoretically meet a deficiency in flow by suspending withdrawals in the reverse order of their priority dates, until flow was balanced by the residual high priority demand.

The seeming definitiveness of the appropriative system is deceiving. Its theoretic simplicity is complicated by numerous factors, specifically, by the wide variability of yield from different water sources, not only from season to season, but also from year to year; by varying rates of withdrawal for unlike uses; by the differences in the degree to which water is consumed by dissimilar uses; and by changing purposes of use, especially progressive changes over a term of years. These complications reflect to a large degree the evolutionary development of the appropriative system.

The origins of the system rest in the practice of placer mining a century and more ago.[17] In such mining the concern was with the rate of flow, *i.e.*, cubic feet per second, or "miner's inches," available to operate "hydraulic giants" and sluices—the greater the flow the larger and more numerous the giants might be, and the greater the daily volume of placer gravel processed. As the rate of flow diminished seasonally, the scope of mining was curtailed or the operation was shut down for the duration of the low flow. Thus, volume taken per season or per year was not a factor in determining the magnitude of an early water right.

Similarly, early appropriations for irrigation were generally in terms of flow only, probably in part because of the antecedent just outlined, but probably also because they did not involve large facilities for storing water. As security against the variable rates of flow in the

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13 E.g., N.M. Stat. Ann. § 75-1-1 (1968) ("All natural waters flowing in streams and watercourses, whether such be perennial, or torrential, within the limits of the state of New Mexico, belong to the public. . . .").

14 E.g., N.D. Cent. Code § 61-04-02 (Supp. 1967).

15 E.g., Wash. Rev. Code Ann. § 90.03.010 (1962).

16 E.g., Wyo. Stat. § 41-2 (1959) ("Beneficial use shall be the basis, the measure and limit of the right to use water at all times. . . .").

17 See 3 H. Farnham, Waters and Water Rights 2017-20 (1904).

source stream, and in consideration of the vast acreage of land serviced and of the rudimentary manner of cultivation, the rate claimed was almost inevitably the maximum at which water could be applied to the land. Compared with present-day standards for good irrigation practice, some early rates were indeed large.

By about the end of the nineteenth century, irrigation agriculture had occupied most of those lands in the western states which could be served without large facilities for storing water. Orderly administration of water rights had become an obvious necessity and the several states set about doing so.[18] Agencies were created, commonly an office of State Engineer, and all "vested" rights then existing were recognized. An agency was to receive applications and to grant permits for additional rights. Because action could not practicably be long deferred, applications were commonly granted "subject to existing rights."[19] Yet agency staffs were usually too small for exhaustive fact finding and rights outstanding at any one time were often out of proportion to the supply of the source stream. Thus, under the appropriative system, "natural-flow" rights in numerous western basins were perfected in an aggregate flow-rate amount exceeding actual streamflow throughout the driest years of record, and during considerable parts of most other years if not all.

In effect, then, state administration of water rights was built upon a foundation of vested natural-flow rights. In the twentieth century, however, private and governmental agencies, both Federal and State, constructed numerous water storage facilities whereby the flow of many streams was, and is now, regulated to some degree.[20] From such streams, water could be delivered to users at rates greater than the natural dry-season flow, or could even be held over from a wet year to a dry year. A right to store water was commonly measured in terms of a rate of flow intercepted, a rate generally as large as practicable in relation to other commitments against the stream. The volume of water that could be held in storage at any one time was of course limited by reservoir dimensions, and was generally a matter of public record if not stated in a permit to store.

Storage was undertaken for diverse purposes—in regard to irrigation, not only to serve new lands, but also to assure a full supply to antecedent natural-flow lands within the particular service area. When storage was sufficient, water for irrigation could be delivered as needed for an optimum rate of growth of the crop over a growth season which continued after natural-flow rights would have been deficient.

[18] The development of state administration of water rights is outlined in 1 Waters and Water Rights §§ 20-24 (R. Clark ed. 1967).

[19] Wash. Rev. Code Ann. § 90.03.010 (1962).

[20] See R. Martin & R. Hanson, Reservoirs in the United States (U.S. Geol. Survey Water-Supply Paper 1838, 1966).

Under such practices, the practical basis for limiting an irrigation water right became the gross yearly volume deliverable per acre irrigated, rather than a flow rate as had been the traditional measure of a natural-flow right. In order to assimilate storage practices into the existing administration of water rights, it became necessary to reduce all water rights involved to common and equitable terms.

To that end, in regard to most western streams, an adjudicatory action redefined the several vested rights therein, as well as those subsequent appropriations which may have been granted under applicable statutory procedures. The great bulk of rights so decreed were irrigation rights. Generally each such right was redefined in terms of a yearly or seasonal volume allowance per acre, and a correlative flow rate which commonly was less than claimed to have been vested. In certain instances, the decreed flow rate was no more than a theoretical average that would deliver the decreed volume within the defined irrigation season. In truth, the seasonal volume allowance became the practical measure of the right.

For purposes of administrative convenience, the allowed volume per acre customarily was, and has continued to be, stated as a "not-to-exceed" limit[21] that either is uniform over all of a stream's service area or differs among a few diverse soil types or physiographic subdivisions of the service area, but is uniform within each such type or subdivision. An additional allowance may or may not be decreed on account of conveyance loss in each ditch system. Obviously, the "not-to-exceed" limit tends to be as great as has been justified by the weight of evidence during the adjudication for serving the more permeable soils, in the more adverse locations, under the less efficient cultivation practices. But the "not-to-exceed" qualification is generally ineffectual and the maximum limit becomes, in effect, an absolute and inflexible measure of the right.

This is so since virtually no irrigator will continually apply to his land a seasonal volume of water substantially less than the decreed limit, unless, of course, supply is deficient. Should he do so, he would, in theory, risk forfeiture of that part of the right not exercised during some relevant statutory period, commonly five years or more.[22] Though forfeiture does pose a theoretical threat, it is actually minimal; unless evidence is compelling, the courts have been most reluctant to declare an abandonment or a statutory forfeiture, since that remedy is in the nature of a taking of property without compensation.[23] As a result, forfeiture, whether invoked or not, provides no remedy to the in-

21 See, e.g., N.M. Stat. Ann. § 75-5-17 (1968).

22 E.g., Idaho Code Ann. § 42-222 (1948) (5 years).

23 "Forfeiture or abandonment of water rights is not favored and is not to be presumed, and all intendments are to be indulged in against a forfeiture." Hodges v. Trail Creek Irrigation Co., 78 Idaho 10, 16, 297 P.2d 524, 527 (1956).

flexibility which decreed "not-to-exceed" limits lend to the appropriative system. This inflexibility tends to foster, or prolong, inefficient irrigation practices. Likewise, the inflexibility renders the system incapable of adjusting to the variability of yield, of rates of withdrawal, of consumption, and of purposes of use.

III. Some Limitations and Contradictions

So far discussion has been general and has outlined the antecedents of the inadequacy of the appropriation doctrine as the basis for an efficient water management system. This inadequacy can further be illustrated by reference to several specific limitations and contradictions which may presently be found in appropriative system jurisdictions.

Use dissipates or destroys some water, the proportion dissipated ranging from less than five percent of withdrawal for most industrial uses to about a third, or locally more, of withdrawal for irrigation. The water not dissipated ordinarily becomes a "return-flow" increment to the original, or another, water-supply source. Time lapse between withdrawal and return commonly is brief in the case of municipal or industrial uses (re-cycling use excepted), but considerable in the case of irrigation use.

Rates of consumption or of return flow may significantly affect the appropriated rights of water users. For example, a high return rate may well mean that junior appropriative rights have been perfected in the return flow from senior rights upstream. In such a situation, and in the event of short supply, literal application of the appropriative doctrine could shut off a junior appropriator without advantage to senior appropriators. Likewise, a nonconsuming use, whatever the priority of its appropriation, cannot affect appropriators downstream. Ideally, appropriative rights would reflect varying rates of consumption and of return flow, but under present systems this is all too often not the case. As a corrective measure, the priority date of appropriation conceivably might be applied only to the part of the withdrawal that is consumed in use, with some other schedule of precedence applying to the return-flow component. There is, admittedly, no simple basis for such a schedule.

In addition to consumption, virtually all use of water degrades the return-flow component in some respect—by an increase in concentration of dissolved or entrained solids, or by a change in temperature, usually a rise. In general, however, responsibility for maintaining the quality of water is ill-defined, aside from relatively strict and common prohibitions against the discharge of certain intractable or toxic substances into waters that are potentially usable. In fact, such responsibility has been ignored in considerable part or tacitly ascribed

to the "public." The appropriative system does not pretend to defend water quality, as conceivably it might by a hypothetical schedule of preferences inverse to the degree in which the return-flow component is degraded. In similar manner, the common law and riparian doctrines involve the unreal presumption that no user degrades the quality of water passing to subsequent users.[24]

Currently the nation is designating a water quality standard for each principal stream, whereby future degradation of quality would be minimal and, hopefully, present serious degradation in certain streams might be alleviated.[25] Certain such standards of which this writer is informed seem more ideal than realistic. Enforcement of the standards is by enlargement of the authority resting in an administrative institution and is punitive in concept. Responsibility for achieving the standards is, in some instances, not as yet explicit.

A different, and perhaps better, approach is taken in the Ruhr industrial district of Europe.[26] There a government institution publishes water quality standards for successive reaches of the streams, operates treatment works to achieve those standards, and assesses fees against each industry in proportion to the load of pollutants discharged by that industry into a stream. Each industry has the option of diminishing or eliminating its fee by pre-treating its effluent partially or wholly. This feature of options has much to commend it. No full counterpart option appears in United States practice.

A number of the appropriative-system statutes specify the uses considered to be "beneficial" and designate a preference among them—generally domestic or municipal, livestock, irrigation, and industry in that sequence.[27] Such designation determines a preferential purpose of use whenever the yield of a water source is insufficient for all relevant water rights, or determines a priority sequence among unlike uses for which applications to appropriate may pend at the same time. It does not, however, convey to a junior applicant for a high-preference purpose an unqualified privilege of condemning a right which is senior in time but subordinate in purpose. In the opinion of the writer, principal agencies of government should have the prerogative of condemning a water right under the checks and balances of a procedure in eminent domain. Further, purposes which have but recently been urged to be in the public interest—for example, recreation based on a stream or a lake, or preserving a stream reach in its wild state as an aesthetic resource—are virtually unrecognized as "beneficial."[28] Even though

[24] Cf. W. Hutchins, Background and Modern Developments in State Water-Rights Law § 16.2, in 1 Waters and Water Rights (R. Clarke ed. 1967).

[25] Water Quality Act of 1965, 79 Stat. 903, amending 33 U.S.C. § 466 (1964).

[26] H. Koenig, Water Supply and Wastewater Treatment in the Ruhr District (Int'l Conf. on Water for Peace, paper No. 290, May 1967).

[27] E.g., Ore. Rev. Stat. § 540.140 (1963).

[28] But see Tex. Rev. Civ. Stat. art. 7470 (Supp. 1967) ("public parks, game pre-

nonconsuming, such purposes may not be clearly defendable against potential applications that might be both junior in time and water-consuming in type, but "beneficial" by traditional definition. Still further, although appropriative-system statutes generally provide that place of withdrawal or purpose of water use may be changed, such flexibility is ascribed only to the stated "beneficial" purposes.[29] Thus, a use whose beneficialness is contestable in any degree under traditional definitions can become wholly vulnerable should the user modify his facilities even slightly. For the reasons here summarized, and numerous others, the appropriative system generates little incentive toward using water prudently. Rather, it tends to foster and perpetuate improvident use.

Altogether, therefore, adjustment of water rights to accommodate changing purposes of use, especially progressive change over a term of years, faces serious obstacles. In western states, where appropriative rights commonly equal or exceed ordinary flow of the streams and in very large part are irrigation rights, any proposal for a substantial new use of water would face a Hobson's choice in multiple—a difficult conversion of a pre-existing right or rights, a new storage facility, or a vulnerable priority.

It has been suggested repeatedly that western water rights are subject to the "law of the market place."[30] In other words, a new use for a superior economic return can, and appropriately should, purchase any water rights needed. But here we face contradictions of law, tradition and reality. Because, as a practical matter, irrigation water rights are commonly welded to the land irrigated,[31] there is no free market in the rights alone—in consequence, no widely accepted standards of value. Economic analysis of potential agricultural return from land with and without water, or of agricultural return in comparison to industrial return from the same water commonly is not definitive because starting assumptions are in part intangible.

Water as a commodity is ascribed no intrinsic value, its "cost" being little more than that of retiring debt incurred for works to intercept that water and transport it to place of use. Yet water is necessary to life, to foods that sustain life, and to fiber that provides part of the clothing and shelter of humans. In such uses, the essentiality of water would seem to be beyond price and above value.

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serves, recreation and pleasure resorts . . ." included in the list of authorized uses); Ariz. Rev. Stat. Ann. § 45-147 (Supp. 1967).

[29] E.g., Nev. Rev. Stat. § 533.370 (1959).

[30] See Davis, supra note 11, at 694-95.

[31] E.g., Wyo. Stat. § 41-2 (1959) ("Water being always the property of the state, rights to its use shall attach to the land for irrigation. . . ."). Statutes often provide that appropriated rights may be transferred to others for use on other lands if the transfer is made "without detriment or injury to existing rights." Wash. Rev. Code Ann. § 90.03.380 (1962).

But for so long each year as it is available, water customarily is applied generously, even wastefully, in irrigation agriculture; such usage may well be inherent in the decreed water right. The inescapable alternative to such usage is a greater cost for labor to apply the water meticulously. There is, however, no incentive to adopt the alternative. Indeed, as the general costs of farm labor mount, efficiency in the use of irrigation water tends to be driven downward; concurrently, any overly generous basis for a decreed right tends to become entrenched more firmly. Moreover, the competitive position of agricultural products has been so weak that an acceptable cost of labor for using water efficiently is severely constrained, commonly to the barest minimum. In contrast, the competitive position of manufactured goods is sufficiently strong that cost of labor has been under relatively little constraint and has been virtually synonymous with "value added."

In this maze of contradictions, what would be a free-market "value" of water used to grow lettuce and out-of-season melons in the Pacific Southwest versus that used in connection with manufacture of a consumer product whose essentiality is questionable? Are such values chargeable against the total volume of water taken from the source or against the component consumed in use or incorporated into the product? Should a negative value—that is, a fee—be assessed against polluted effluent? We sorely need fresh, sound concepts and a scope of administration that can interject order into this confused field. Again, the indicated direction lies toward optimum efficiency in the use of water, a goal that is becoming inevitable even though its attainment will weaken the basis of many decreed water rights.

Traditionally, municipal supply systems in the United States sterilize all the water they deliver, even though no more than a small percentage of the total delivery requires such sterilization. This practice is often coupled with a prohibition against dual distribution systems in accord with public health standards. Also traditionally, waters containing municipal wastes that have been treated—in some instances treated only minimally—become a component of the supply to a succeeding system down-basin, and there are resterilized for redistribution. Many nondomestic purposes, in the aggregate the major part of all, could, however, be served with nonsterile water or even with minimally treated sewage. A pioneer example of such service is Bethlehem Steel Company's Sparrow Point steel plant near Baltimore, Maryland, whose process water is reclaimed from sewage.

Certain local stringencies on sources of pure fresh water—stringencies such as can only become more numerous and more severe with time—could be eased substantially by judicious separate delivery of nonsterile or reclaimed water for appropriate classes of nondomestic use. To be practical, such separate delivery would be to some limited

part of each water service area, as established by appropriate and discriminate zoning. In addition, zoning becomes a credible means toward segregating intractable wastes, and treating or disposing of those wastes separately, as would be most feasible. Separate disposal of intractable wastes is not new but commonly has been of local extent only. A pioneer example of a subregional system (not based on zoning, however) is the current proposal by the United States Bureau of Reclamation of a master drain to collect agricultural wastes from all the San Joaquin Valley, California.

In general, zoning may be considered distasteful, but its capabilities might outweigh disadvantages if applied as a local means of easing prospective water-supply stringencies. Commensurate authorization by legislation or regulation would be necessary in many areas, as would an appropriate administrative institution.

Finally, reference has been made to existing region-wide and interregional systems for conveyance from water-rich to water-poor areas. The inevitable trend will be toward ever greater quantities of water conveyed ever greater distances to localities of principal water use. Countering this are reservations, by statute in several states,[32] whereby the so-called areas of origin are guaranteed sufficient water for ultimately realizing their full economic and social potentials. The intent of such reservation is obvious. Unfortunately some have been expressed in terms so general that, in effect, the area of origin holds a power of veto over projects to develop water that is currently surplus.

IV. Bases for Resolving Obstacles

We must devise more comprehensive policies and institutions for managing water supplies. Essential to the attainment of such a goal is the creation of a reasonable limitation upon the timeless run of water rights as they are now recognized—of the virtually dimensionless right that in theory issues from the riparian and common law doctrines, and of the absolute and commonly over-generous right under the doctrine of prior appropriation. Periodic reappraisal of individual rights against total water-supply commitment and requirement should be the controlling general policy.

In the more copiously watered East, generally the province of the common law and riparian doctrines, provided first that the aggregate potential water yield usually is greater than the aggregate of existing uses, and provided further that relatively little water is consumed, a system of term licenses, issued under the police power, is suggested to cover the withdrawals of substantial size. Renewal of a license from term to term should be assured to the licensee, to the

[32] E.g., Ariz. Rev. Stat. Ann. § 45-153 (1956). For a reciprocal provision, see Nev. Rev. Stat. § 533.515 (1957).

extent a valid use continues. However, each renewal would involve review and adjustment of provisional terms that might be advisable to restrain overdrafts or excessive interference between withdrawals. In regard to treatment and disposal of wastes incidental to the use of water, responsibility would be stated explicitly. Several eastern states now follow variants of such a procedure.[33]

In the poorly watered West, generally the province of the prior-appropriation doctrine, where commonly the aggregate of existing uses is at least intermittently greater than the natural yield of the water sources, and where a substantial part of withdrawn water is consumed in use, another procedure seems more feasible. Specifically, the police power might be invoked for periodically verifying, and as necessary adjusting, the magnitude of each withdrawal in relation to the continuing use, to interim changes in the capability of flow-regulating works, and to local overdraft or interference among withdrawals. Again, the review would define or redefine responsibility in regard to management of "return flow" and of waste load.

Alternatively to such procedures under the police power, and to the writer preferably, there might be created at the initiative of a competent administrative institution, or of water users acting collectively and voluntarily, a system of water-supply authorities or conservancy districts. Each such authority or district would have jurisdiction over a whole stream basin or other natural water-supply unit and would exercise all participating water rights jointly, for optimum basin-wide advantage. A precedent for this sort of water management institution was set by the State of Oregon in its ground water code adopted in 1955.[34]

Assuming imaginative executive leadership, the authority or district just outlined might resolve the preceding contradictions and relax the limitations. Specifically, in taking steps to relieve a water-supply stringency, it might disregard priorities that were not relevant hydrologically, even though those priorities were junior. It might adapt water rights to changing purposes of use, especially progressive change which, over a term of years, overreached the literal terms of early water rights. It might educate water right holders to the need, and so establish incentive, for more efficient use of water. To the end of minimizing the quality degradation of return flows, the authority or district could launch a concerted attack of a scope beyond the capability of any individual user of water. Enlarging this potential, it might take the initiative toward comprehensive management of water quality, provided it had authority for levying fees to finance necessary works. In similar vein, it could establish novel practices such as the

[33] E.g., Iowa Code Ann. § 455A (Supp. 1966).
[34] Ore. Rev. Stat. §§ 537.505-.795 (1963).

separate delivery of sterile and nonsterile water when and where appropriate, or establish use zones according to multiple standards of water quality.

Ideally, the water-supply authority or conservancy district would be permitted wide discretion, constrained only by general statute. At the initiative of, or by the consent of, participating water users, it would manage the common water source as a consolidated facility, to suit conditions peculiar to the locality. In such a manner it could in large part escape the rigidity of conventional water law.

Procedures such as those just outlined would advisedly risk the disadvantages of a considerable new bureaucracy in behalf of the potential advantage of better long-term management of the nation's water destiny. Effectiveness would depend on the wisdom in which the administrative institutions were designed, and in which the enabling statutes were framed. But, as has been stated, we must ultimately have more comprehensive and knowledgeable water management.