Winter 1965


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Recommended Citation

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Embodying the law as a living being, and endowing this creature with aims and motives, are favorite sports of philosophers and professors. Philosophers seek the goals of whole systems of law, while professors more commonly search the narrow confines of their specialties. Philosophers are likely to find a touchstone that pervades all human action, such as Bentham's principle of utility\(^1\) or von Jhering's social levers of reward and coercion.\(^2\) Professors are prone to refine these into policies of more specific application to their fields. Thus the law of torts is said to be shaped by man's desires to punish immoral or undesirable conduct, to prevent future accidents, to allocate risks to those who cause them, and to distribute losses as widely as possible.\(^3\) The precepts for our modern rules of civil procedure are given as "the just, speedy and inexpensive determination of every action."\(^4\) The more specific these policies become, the further they stray from universal truths with which all will agree, and the more they become the personal predilections of their author.

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This article is an outgrowth of work performed at the University of Wisconsin as a part of its cooperative program with the United States Department of Agriculture for the study of the legal and economic aspects of midwestern water law, directed by Professor Jacob H. Beuscher of the Law School and Mr. Harold H. Ellis of the Resource Development Economics Division, Economic Research Service, U.S. Department of Agriculture. The opinions expressed, of course, are those of the author and do not necessarily reflect the views of Messrs. Beuscher and Ellis or of their respective institutions or agencies.

This article was read in manuscript by Blair T. Bower, Consulting Professor of Civil Engineering and Economics, The University of New Mexico, Albuquerque, who made many helpful suggestions. Not all of these were followed, and none of the sins of omission or commission here committed should be laid at his door. See note 14 infra.

2. von Jhering, Law as a Means to an End (1872).
3. Prosser, Torts 12-17 (1955); Green, Judge and Jury 1, 19 (1930).
And as these policies in turn are translated into principles, and as principles are applied to legal rules, and rules to decisions, disagreement multiplies.

Therefore, this essay sets out a water law professor's credo, with the expectation that not all will agree that these policies are desirable, and that those who do will not follow them to the same result in the cases. But at least it can be said that the policies here enumerated can be found behind various statutes and cases and that they form the basis of some systems of laws for private rights of water use. If that credo were reduced to an oversimplified statement similar to those stated for torts or procedure, it might look something like this: water law should provide for maximum benefits from the use of the resource, and this end should be reached by means of granting private property rights in water, secure enough to encourage development and flexible enough for economic forces to change them to better uses, and subject to public regulation only when private economic action does not protect the public interests.

The three subsidiary policies are inextricably interwoven. The creation of property rights in water resources should be allowed only when the use of the right will tend to produce maximum benefits, and only when no overriding public interest makes it undesirable. The economic forces will operate on the rights so created. The public regulation will control the allocation of rights and their exercise and transfer when free use of property rights for private economic benefit will not produce a maximum social benefit.

Let it be hastily added that this statement does not reject the "Conservationist" position and accept a purely "utilitarian" approach. Both are there. If public recreational use of the water would produce its maximum benefit, the regulation in the public interest should prevent its allocation to private purposes. These policies are not absolutes. They contain not only weasel words but built-in conflicts. At most they are considerations that seem to have motivated some judges and legislators in the past and that may influence them in the future. They have been ignored by others, and expressly disavowed by some.

5. Private rights of water use are those rights held by individuals or corporate entities to withdraw water from its source, or to interrupt its flow. Public "rights" to water, as for navigation or recreation, private rights to water in place, and pollutive uses, are treated only obliquely, insofar as they may prevent the acquisition or limit the exercise of private rights of use. The law discussed is primarily state water rights law.
I

MAXIMUM BENEFITS

Few will disagree with the statement of the ultimate goal for water resource law. Most of us can accept the specific application to the water field of the general goal of all law set by John Dewey: “a plan for organizing otherwise independent and potentially conflicting energies into a scheme which avoids waste, a scheme allowing a maximum utilization of energy.” Roscoe Pound expressed much the same thought in this way:

What we are seeking to do and must do in a civilized society is to adjust relations and order conduct in a world in which the goods of existence, the scope for free activity, and the objects on which to exercise free activity are limited, and the demands on these goods and these objects are infinite. To order the activities of men in their endeavor to satisfy their demands so as to enable satisfaction of as much of the whole scheme of demands with the least friction and waste has . . . been what lawmakers and tribunals and jurists have been striving for . . . .

This goal lies behind government, law, and resource law, and is the general motive behind most human action. Economists translate this into the “maximization principle” of obtaining the largest possible “net social returns” from the use of a resource. This objective was once stated in terms of maximization of the product or revenue obtained from resource use; but today economists speak of “net social returns,” “aggregate social satisfaction,” or “maximum social product.” This addition of the social factor permits the inclusion of both public and private benefits, and makes room for human wants and desires that are not readily valued in money. The maximization principle does not mean that every possible immediate benefit should be wrung from a water resource, or that man should develop and use water compulsively, urged on by a famous engineer’s dictum that every drop of water that runs into the sea without ren-

What is to be maximized is welfare from water use, not water use itself. Put in another way, this goal is that water law should enable man to shape civilization along desirable lines. It should increase the standard of living of the people. Wealth and a high standard of living imply the ability to spend for luxuries, to forego certain tangible gains for the intangibles of pleasure.

The maximization principle is not an absolute. Some prefer the word "optimum" rather than "maximum."\textsuperscript{11} In either case, consideration must be given to factors other than a literal maximum stated in dollars. Participation in the benefits by a large number of the members of society is often desirable. The concentration of benefits in the hands of a few persons will not increase the standard of living of the many, and today most of us accept the idea that wealth must accrue to the benefit of a substantial portion of the populace. We may be willing to accept something less than the maximum to reach this optimum arrangement, or put another way, a value can be ascribed to an optimum distribution that will make the wider distribution produce the maximum benefit. Lastly, most of us will accept the principle that the recipient of an increase of wealth should ordinarily pay the costs which produce that increase, rather than pass them off on persons who do not participate in the benefits. Here again, a maximum reached by uncompensated expropriation may not be preferred over an optimum which at least leaves no one worse off.

Although the maximization principle is the cardinal concept of modern welfare economics, economists have not yet emerged with a magic litmus by which it can be ascertained that maximization has been or will be achieved. Some have attempted to take a given resource, a river with known potentialities of use, and discover that use or combination of uses producing the greatest economic product from a given expenditure of goods and services.\textsuperscript{12} In a more complicated fashion, others have tried to determine by linear programming the point at which the optimum ratio between expenditures and benefits is reached, out of all possible combinations of "inputs and

\textsuperscript{10} This dictum was attributed to Herbert Hoover by Chalmers, \textit{Future Water Requirements and Supplies in the South Platte Basin}, Proceedings, Western Resources Conference 107, 114 (1960).


\textsuperscript{12} The Value of Water in Alternatives Uses (Wollman ed. 1962).
Some economists try to eliminate the dollar as a measuring device, since market values fluctuate, and since the value to society of the product of a water resource project may not be reflected accurately by money. By using the technique of "indifference curves," they measure the relative welfare position of each combination of uses against other combinations, and reach a ranking of desirability of alternatives rather than a comparison based on the common denominator of the dollar.  

If a super-computer could locate this optimum point, a master plan for water development could be drafted from the results and projects could be constructed according to the plan. But the data for true maximization of all combinations of resources, capital and labor are unknown and unknowable. Computers have no better crystal balls than do humans. In the water rights field, planning cannot take the form of a blueprint for all future development. A water law cannot allocate all of the water at once to particular users for particular purposes. There are very few laws that are self executing in the sense that they control all conduct and leave no choice of action to the individual, or that dispose of their subject matter once and for all. A water law must operate over time. At best it should encourage desirable developments and prevent undesirable ones.  

Similarly, at best the science of economics can show that a particular action will tend toward maximization, though we may never be able to prove that it achieves it. Welfare economics is therefore most useful in determining the optimum direction of water use. Governmental planning for water development must be more con-

14. Interdisciplinary studies have their hazards. I have sometimes winced at expositions of law by my economist friends, but I am sure they will shudder at my economic terminology and theory. Competent expositions of the "new" welfare economics can be found in Heady & Timmons, Economic Framework for Planning and Legislating Efficient Use of Water Resources, Part II of Iowa’s Water Resources (1956); Castle, The Applicability of Marginal Analysis to the Problem of Water Allocation, in Ground Water and the Law, Report No. 5 of the Committee on the Economics of Water Development (Berkeley, Calif. 1956); Kneese, Water Resources—Development and Use (Federal Reserve Bank of Kansas City 1959).  
15. Ciriacy-Wantrup, Resource Conservation, Economics and Policies (1952). "In appraising [water] policies, it is useful to employ as criteria their effects upon significant conditions which facilitate or impede or increase in national income rather than focus on such an increase itself." Id. at 548. Castle, supra note 5, similarly urges establishing "guide lines" to maximization, although he urges a modified marginal analysis approach (value of products) rather than the benefit-cost ratio.  
cerned with generalities than with specifics. Water law, like all law, furnishes a guide for the ordering of future human conduct, as well as a mechanism for the solution of conflicts. In this sense, it can be made to serve as an instrument of planning. By encouraging some acts, but discouraging others, a state may use the actions of individuals to reach its own desired goals.

II

PROPERTY RIGHTS

A. Private Rights and the Maximization Principle

The suggested means for achieving the goal of maximum benefits are property, economics, and regulation. It should not be thought that some of these are legal and the others non-legal, for all are based on law. The law not only creates property rights and controls their exercise by public regulation; it also provides the basis for the operation of economic forces that govern transactions by individuals. The use by the state of economic forces is perhaps the most common of all legal processes—so common that its legal nature is almost obscured by its universality. There is a tendency to think of private enterprise and government regulation as opposites, yet private enterprise—property, transactions, contracts—is itself a mechanism established by law, a mechanism felt to be one of the most desirable methods of allocating resources, goods, and services.

The utilization of private initiative and the economic process has obvious advantages over complete public regulation. To the extent that the laws of economics operate as an allocative and regulatory force, there is no necessity for law that minutely regulates the activities of the people. Decisions as to the most productive or wisest use of property can be made by private persons, relieving public bodies of the need to make them for the people at every turn. The maximization principle is generally believed to be achieved, or approached, by free men in a capitalistic society when they make decisions on where and how they will employ their labor and capital. Ideally, public regulation operates on the fringes of such a system.

19. Ibid.
The institution most used in western civilization for allocating elements of man's environment to individuals is private property.\(^2\) The state creates in individuals or groups "rights, powers or privileges" to deal in certain ways with certain aspects of the natural resources upon which wealth depends. The forms of the interests that can be created are almost infinite. Where the resource is a "free good" available, like air, without cost, privileges to capture may be sufficient, but when conflicting demands create a scarcity, even a local or temporary scarcity, rights must be granted and corresponding duties imposed upon others. In using water, either for the purpose of obtaining its own values or to unlock the potential values in other resources, Englishmen and Americans historically tended to treat water as a free good outside the economic pattern. Most of the population centers of the English-speaking peoples have been in the humid regions, and demands for water were relatively slight in relation to the supply. Riparian law seems to be based upon an unspoken premise that if rights to use are restricted to those persons who have access to the water through the ownership of the banks, and if those persons restrict their demands on the water to reasonable uses, there is enough for all. In such a situation there is little need of precise laws and institutions for water allocation, other than a mechanism for settling the few disputes that do arise. But today we have come to realize that there is not enough water to permit the free exercise of all man's wants.\(^21\) Whenever the scarcity of the resource operates as a limiting factor on economic development, allocation of rights to the resource in some and duties to respect those rights in others becomes a necessity.\(^22\)

In the West, water was the limiting factor on development from the beginning. There was far more land than water, and water rights immediately took on the aspects of independent property rights of a certain and definite kind. These rights were suitable for the local conditions in the pioneering community, and the quick development of the mineral and land resources was fostered by giving almost unrestricted opportunity to appropriate water as private property and to move water to where it was most needed.

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Ground water law has had a similar history. Where such water was plentiful, the "free good" approach was utilized, although in a paradoxical fashion. By identifying ground water with the land and the minerals within it, and calling it the absolute property of the landowner, complete freedom to the owner to take it was granted. Rules of "reasonable use" and "correlative rights" were evolved to give the overlying landowners some protection against the major threat to their security, that of large withdrawals by cities.\(^2\) When serious problems of overdevelopment arose, the western solution was either the adoption of an appropriation doctrine strictly defining the rights and limiting withdrawals to the safe yield,\(^2\) or the freezing of correlative rights\(^2\) or reasonable uses,\(^2\) and similar solutions were adopted in some sections of the East by licensing of reasonable withdrawals.\(^2\) All of these legal devices tend to make the right to withdraw ground water a typical property right, fixed in quantity and protected from infringement.

In the water rights field, the goal of maximum benefits could conceivably be reached by complete and autocratic state control of all water resource use if all water users were regulated at every step by state officials. But this procedure is generally regarded as distasteful by Americans. It would mean that all decisions on who could use water, what purpose it could be used for, and when it could be used would be made by a bureaucracy acting in the best interests of the state with only secondary attention to the interests of the individual. It would not allow for nor make use of the tendency of the individual to act in his own best interests, making his own decisions on the maximization principle. It would not fit into our Anglo-American background, traditions, and institutions.

An ideal water law should give a water right those characteristics that will encourage and enable people to make the best decisions as to water use in their own interests and hence ultimately in the public interest. Private uses of water should be based upon property rights not dissimilar to the property rights in more stable and tangible as-
sets, and like other property rights they should be subject to regulation in the public interest. An analogy can be drawn between private water rights and private rights in land, allowing for dissimilarities in the physical natures of the two resources. Decisions as to whether land should be used to grow potatoes or corn, whether it should be put to use at all or left temporarily vacant, or whether it should be employed in one use or another, have enormous import for society and the state. When there is a question as to the best use for a particular tract of land, whether as a farm, as a residence, as an apartment site, or as a factory site, the law leaves the majority of such decisions to the property owner. The decision made by him will be shaped in part by location and suitability for a particular use, in part by economic considerations of return to the owner from various uses, in part by prices offered by persons seeking to buy the products of the land or to buy the land for uses other than that which the present owner conceives as the best. Yet not all decisions are left to the owner. By limiting the uses to which land can be put, i.e., by regulation of property uses through land use planning and zoning, the law charts a definite course for landowners to follow, and modern property law guides the development and use of the land into patterns deemed desirable not only by the individual owner but also by the state and the public. The law of water rights can similarly be such an instrument of planning. If water rights are given attributes of property, the people owning these property rights will tend to make the best decisions for themselves as to their proper use, and these decisions will on the whole add up to the best development from the state's stand-

28. Of course, water rights, both riparian and appropriative, have always been regarded as a part of the law of real property. Yet in many places they are an imperfect form of property, subject to many unique hazards and limitations that make it difficult for the regulatory forces of economics to play the part they should. This thesis has been developed by the author elsewhere. See Trelease, *A Model State Water Code for River Basin Development*, 22 Law & Contemp. Prob. 301 (1957); Trelease, *Desirable Revisions of Western Water Law*, in Resources Development: Frontiers for Research 203 (1959). Similar themes have been treated by economists. See also Ciriacy-Wantrup, *supra* note 15; Milliman, *Water Law and Private Decision-Making; A Critique*, 2 J. of L. & Economics 41 (1959); Fox, *Water—Supply, Demand and the Law* (Resources for the Future, Inc. 1960).

Better results [than detailed public regulation] would appear to follow from activities designed to correct the institutional defects . . . so that the private decisions of resource users are more likely to approximate the social ideal. This is not meant to infer that such institutional developments are easy to bring about; they are, on the contrary, very difficult, but they are also more fundamental, and give promise of more enduring and satisfactory solutions.

point. The state can influence the conduct of its citizens by defining the water rights and by placing limits upon them so that some forms of water use are encouraged, while others are discouraged or forbidden where such use would conflict with some overriding public interest.

B. The Acquisition of Rights

While we speak of granting private property rights in a resource, a more accurate description of the actual process is that of permitting individuals to acquire the rights. In this initial stage, rights can be granted or permitted, or withheld and denied.

Water allocation is the process of permitting individuals to use water, and water law establishes the nature of the permission given. It is a dual process of permitting some action, or action by some people, and of restricting other actions or some actions by others. Thus both the grant of a property right and the denial of property rights are part of the allocation process. This is true whether we speak of public rights or of private rights, of rights to use or the prevention of certain uses. The law that forbids an individual to initiate a particular water use is an allocation to some other person or class of persons, even the most restrictive locking up of streams or lakes in wilderness areas is the allocation to those nature lovers who visit the area, and even if all access by man were to be forbidden it would still be an allocation to future generations.

In this initial stage of creating rights, the maximization principle must be served in some way. Perhaps it could have been done by relying on our next mechanism, economic forces, by selling the water to the highest bidder, presumably the person who could produce from it the highest benefit. But we have chosen the "give away" principle for most of our natural resources, and it has not worked too badly.

Originally the pioneer western appropriators took the water "like they would berries from a bush or a rabbit on the plain." The water was simply given to any and all who would put it to a beneficial use. The miner used it to unlock the coffers containing the mineral wealth of the mountains and streams; the farmers turned the desert into rich croplands; the rancher took the water for stock water and

to irrigate the hay with which he could feed his cattle through the winter, cities brought in water supplies that enabled them to grow; railroads, power companies, manufacturers, and other industries received the water that enabled them to operate. The pioneers recognized that development in their private interests could also be development in the public interest. Water was used to produce wealth. The increase in the wealth of the citizens increased the wealth of the western states and the nation.

Today we are not so sure that all private action redounds to the public good, and states have turned to the third mechanism, public regulation, to control the acquisition of property rights. In most of the western states, a person desiring to make an appropriation must file an application for a permit with state water officials. The state water agency is empowered to deny the permit on various grounds, the most important of which is that the proposed use of water would not be in the public interest. Eastern states are placing similar restrictions on the exercise of riparian rights. Minnesota requires permits of riparians for almost all uses, and denies them when their issuance would be against the public interest. Wisconsin's agricultural permit law prohibits riparians from diverting water "to the injury of public rights in the stream," her power dam licensing and iron mining water use laws spell out the values and disadvantages to be considered. Similar laws exist in Maryland, Iowa, Mississippi and North Carolina. The Federal Power Commission requires its licensed projects to be adapted to a comprehensive plan for improving the waterway "for other beneficial public uses, including recreational purposes."

If a water regulatory agency had the super computer mentioned earlier, and had set up a master plan within which private development was to be fitted, it could scrutinize a proposed private water use as a piece to be fitted into a jigsaw puzzle. If the outlines of the project filled a vacancy in the plan, the use could be permitted.

30. The statutes are referenced and summarized in Trelease, Preferences to the Use of Water, 27 Rocky Mt. L. Rev. 133, 140 (1955).
Without such a plan, an agency trying to promote maximization by encouraging development that tends toward maximization must have some other guide.

C. Benefits and Costs

The economist's "benefit-cost analysis" can provide the agency with a useful tool: do the benefits to be derived from a projected use of water outweigh its cost? This is a derivative of the welfare economics approach: if society by initiating (or allowing) the project is better off than it would be if the project were not undertaken, an increase in welfare has occurred. The net benefits approach has been used extensively to justify the expenditure of government funds for public water control works. It has been criticized for several shortcomings. And while it can be used to ascertain whether welfare has been increased, it does not give us a basis for determining whether the maximum of benefits will be achieved.

But it can be used as a guidepost in determining whether a private water right should be allocated to a user for a particular use. If two or more persons seek the same water for inconsistent projects at the same time, the benefit-cost technique can be used to determine the most efficient, the one that comes the closest to the maximization ideal, the one that should be granted the water right. Where competition arises between users or uses of water, and the public interest is neutral, being affected not at all or affected equally by each, the water law should allocate the water supply to the most valuable use or to the user who will produce the most value. The benefit-cost analysis provides the allocating agency with a basis for comparison.

Where only one user seeks the right to water, he has presumably made his own benefit-cost analysis, and has determined that the marginal value of the water to him is greater than the value of the expenditures necessary to enable him to put it to use. If this private

39. The individual's opportunity costs from alternative investment possibilities are of no concern to a public agency regulating private conduct. In considering public projects, it is necessary to determine whether greater benefits would result from putting the capital, labor and concrete into dams or roads. See note 40 infra.
use does not entail detrimental effects to other water users or to the public, the project can be considered a step toward maximization.

The benefit-cost approach has been most highly developed in relation to public works, where the government is spending the money and must determine whether the expenditure is justified. The federal agencies most directly concerned combined to produce a study that became the focal point of discussion, if not the standard work, on the subject.\(^4\) It defines costs and benefits as follows:

\[
\text{Project costs} \quad \text{are the value of the goods and services (land, labor and materials) used for the establishment, maintenance, and operation of the project together with the value of any net induced adverse effects whether or not compensated for.}
\]

\[
\text{Associated costs} \quad \text{are the value of the goods and services needed, over and above those included in the project costs, to make the immediate products or services of the project available for use or sale.}
\]

\[
\text{Primary project benefits, or primary benefits attributable to a project, are the value of products or services directly resulting from the project, net of all associated costs incurred in their realization.}
\]

\[
\text{Attributable secondary benefits} \quad \text{are the secondary benefits attributable to a project from a national public point of view and are the values added over and above the value of primary benefits after taking account of expected conditions throughout the economy with and without the project.}\(^4\)
\]

Of course, time is an important factor in evaluating costs and benefits. A dollar's worth of benefit to be received in twenty years is not worth a dollar today, and a future cost or loss must be similarly discounted. All benefits and costs should be reduced to a common time basis. One difficulty in this process is forecasting future price levels and values.\(^4\)

Little has been written on the application of benefit-cost theory to the analysis of new private projects in order to determine their pub-


\(^4\) Green Book, supra note 40, at p. a.

\(^4\) See note 40 supra.
lic desirability. For the most part the transfer is obvious. The above definitions can be applied to a farmer's proposal to irrigate his field as well as to a large multipurpose government project. The direct expense for ditches or pumps and sprinklers are the project costs. If the irrigation would result in a consumptive use of the water and hence reduce power production at a downstream hydro-electric power plant, the loss in power is an "induced adverse effect" and must be counted as a social cost if the legal system permits this without compensation, or the price of purchasing the power company's permission must be added to the farmer's private costs if compensation must be paid. The primary benefits are the difference between the value of the irrigated crops and the crops formerly produced without irrigation, less the increased cost of harvesting or fertilizing. The secondary benefits are the net effects of increased purchasing in the local community, and possibly increased local tax revenues.

It will be noted that this public analysis of costs and benefits is not identical to the private analysis originally undertaken by the farmer in forming a determination to install the irrigation system. If the "induced adverse effects" need not be compensated for, the farmer will pay no attention to the loss to the power company. Despite the existence of secondary benefits, the operator will not undertake the project if the primary benefits do not exceed his costs, although a government might do so. Other social costs are not ordinarily considered by the entrepreneur in making his proposal for the use. If the depletion of the stream would destroy fishing values on a stream, a public loss will occur. On the other hand, if the project includes damming a stream with poor fishing, thereby creating a reservoir with good panfish potentials, a social gain will occur if the reservoir

43. The Green Book, supra note 40, states that the principles therein contained are applicable to federal programs, non-federal programs, or joint programs. Regan & Timmons, Current Concepts and Practices in Benefit-Cost Analysis of Natural Resource Developments, in Benefit-Cost Analysis, Report No. 3 of the Committee on the Economics of Water Resources Development (1954) point out that tax rates may have an effect in encouraging or discouraging private development, that businessmen may not invest in facilities that provide non-revenue producing social benefits, and may be more conservative in planning than governments. These factors may reduce the nearness of the approach to maximization but they do not militate against the use of the benefit-cost technique in allocating water to private users.

44. Nationally, these might not be counted, since it would make no difference whether a project was situated in Arizona or California. From the state of local point of view, it might be of primary importance. See Green Book, supra note 40, at 8.

is open to the public. Although these factors will not ordinarily appear in the calculations of the entrepreneur, they must be considered by a public body authorizing the use. Government intervention may be needed to prevent the inception of a project with undesirable social effects, or to condition its activities so that the losses do not occur. Social benefits should be counted in the project's favor.⁴⁶

A case by case examination of the costs and benefits of projects brought to the agency by private initiative does not preclude planning. Necessarily, government planning for private development can only take the form of generalized decisions, i.e., setting guidelines or outside limits with which proposals must conform. Certainly one such guideline would be multiple development. Water is not only a "flow" resource, it is a flowing resource. The economist's concept of a flow resource is a flow of units through time, one replacing the other. Next winter's snows will replenish the stream we deplete this summer. Water also flows through space; gravity and the hydrologic cycle pass it down from one user to the next. The water that floats a Fan Wing Royal Coachman into the view of a trout is diverted downstream into a field by an irrigation ditch. A large part of it sinks into the ground and joins the groundwater which seeps again into the stream. There it floats a boat on a reservoir before passing through a hydroelectric turbine. Below the power plant it is taken into a city water works and used by a householder, who returns it to the stream through a treatment plant and sewer. After treatment it is used by a manufacturer and again returned to the stream.

Maximum development, in modern times, means multiple develop-

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⁴⁶. It has been suggested that in the interests of maximization the public and private benefit-cost ratio might be more closely equated. Where a private development entails social costs, the loss might be recouped by properly adjusted taxes. Regan & Timmons, supra note 42, at 11-15. Where a private project could include public benefits at extra cost but the expenditures would not induce any extra private returns, they might be encouraged by government participation or reimbursement. See Hirshleifer, supra note 37, at 253-54.

⁴⁷. Economists classify natural resources into two categories: renewable and non-renewable. The latter are also called "stock" or "fund" resources. They may be exhausted. The former are termed "flow" resources. They are replenishable; a new unit succeeds each one used. Ciriacy-Wantrup, supra note 15, at 42-43. The conservation of a flow resource is advanced by all those actions directed toward a sustained yield management or toward increasing the sustained use. In other words, perennial or recurring benefits are usually to be preferred to temporary ones, and the greater the use over time, the greater the total benefits. The optimum goal for utilization of a flow resource would seem to be met, or approached, by any device that would prolong the use indefinitely, provided of course the capitalized value of the annual benefits exceeds total short term benefits.
ment, whenever the total net benefits of all consistent uses exceed those of a single use that forestalls the others. A water law should exploit this quality of water and encourage use of the same water in as many forms as possible. Multiple use reduces the scarcity of water if several users each use the same unit in turn instead of competing for it. The multiple use of the water increases its unit productivity and hence aids in achieving the maximization goal.

But multiple development is not assured by the market mechanism. Private persons and firms are usually interested in a single-purpose use, and multiple uses result from such private projects only accidentally or when other uses are a profitable byproduct. Multiple use is commonly thought of as the specialty of public development, but this need not be the only source. Much is achieved by accident—the pretty picture painted above could result without any market or governmental controls or government expenditure to bring about the result. But the accidents could happen the other way, and bring about opposite results, if the consumptive or pollutive uses occur upstream. The diversion, near its headwaters, of a large part of the stream into another basin could reduce the quantity of the water so as to render some of the uses impossible or infeasible. Extensive irrigation may consume a large quantity of water, or return unused water to the stream at the wrong time for use by others. The evaporation from reservoirs may have a similar depletive effect, and releases from storage may not coincide with the best time for other uses. Some uses of water do not consume it but instead render it unfit for other uses; a particularly offensive dumping of chemical wastes might destroy all down-stream uses except electric power production.

Much of the opportunity for multiple use depends upon the position of the various users on the stream. As uses increase, a new user can seek the position still available to him. But on an undeveloped

48. Occasionally writers have distinguished between multiple uses of three kinds: (1) simultaneous use as such as by boaters on water stored by a hydroelectric power company, (2) reuse by successive users, and (3) cycling, the reuse by a single owner. Treatment may or may not be involved in reuse or cycling. Sometimes the division of water among several demands occurring at the same time and place has been called multiple use. As used above, simultaneous use, reuse, and cycling are included in "multiple use," but the division of water among users is not.


50. This may be the equivalent to consumption, insofar as it removes the water from availability for downstream use. But as pointed out in note 5 supra, most pollutive uses are not treated as arising from "rights to pollute."
stream, no considerations of self interest control the location of the first use, or guarantee that it fits into the spot that will ultimately be the best for all. Optimum multiple use by private entrepreneurs, therefore, is certain only through the medium of central public planning and public control of the types of uses and their relative location on the streams. In the allocation of rights to a scarce supply the choice should go to those prospective uses which are most compatible with the foreseeable uses of others.

The benefit-cost technique should not be thought of as providing a new approach to water law. It has been implicit in the laws of many states for many years. Judges and water officials of the territory of New Mexico probably had never heard the phrase in 1910, but they intuitively reached for it and described it fairly well in choosing which of two applications for inconsistent projects should be granted a permit, and which should be denied on the statutory grounds that the project was “contrary to the public interest.” An obvious superiority in benefit-cost ratios, and a recognition of foregone benefits of multiple purposes as costs if one project were blocked by another, led the Utah court to prefer the multi-purpose project. The Federal Power Commission and a Court of Appeals grew lyrical over the beauties and recreational advantages of the Namekagon River and found the unique recreational features of the river to be of greater public benefit than a relatively small water power development. In Wisconsin, where “public rights” to the waters for recreational purposes are given great weight, the court has balanced the rights of the public to fish in a lake against a city’s proposal to fill in a part of it for a park, or for an auditorium site, holding that the disappointment to fishermen was negligible compared to the greater convenience of the public resulting from the use of the park or auditorium. The grant of a substantial area of harbor to a steel company for docks and loading facilities was approved when the court balanced the “trifling” interference with navigation against the increase in welfare of the city and of the entire state. And in permitting the acquisition of rights to use water, the Wisconsin legislature has actually enacted benefit-cost formulae into law. The legislature has instructed the Public Service

54. State v. Public Serv. Comm’n, 275 Wis. 112, 81 N.W.2d 71 (1957); City of Madison v. State, 1 Wis. 2d 252, 83 N.W.2d 674 (1957).
Commission to issue permits for power dams only when the following formula is satisfied: \( B_1 + B_2 > C_1 - A \), where \( B_1 \) is the economic need for electric power, \( B_2 \) is the recreational and scenic potentiality of the proposed flowage, \( C_1 \) is the loss of the recreational and scenic uses of the river in its natural state, and \( A \) represents the alternative recreational opportunities in other stretches of the river and in other rivers of the area.\(^6\) The Wisconsin statute permitting the use of water in refining taconite iron ore identifies costs as the adverse effects on public rights in the affected stream, and identifies benefits as the increased opportunities for employment and industrial development, plus increased income to local government and the state treasury.\(^7\)

The judges and officials deciding these cases have acted on obvious disproportions and assumptions that exact measurements and values were unnecessary. The legislative formulae are obviously incomplete. An economist might have much to add, for economics is more than "common sense disguised in uncommon language." As an expert witness supplied by a party, or a staff member of the agency, the economist could help in framing the formula and identifying elements of benefit and cost for consideration, and he could supply data for achieving a finer balance. None of this is to say that the water resources of the states should be turned over to the economists, or that formulae, push-button techniques, and computers can give all the answers. They can help the decision-making body to consider all factors, to give each its proper weight, and to reach an informed judgment.

**D. Intangible Benefits and Costs—Recreation**

The benefit-cost approach places primary emphasis on factors measured in terms of market values, such as the cost of machinery and cement, the price of potatoes, and the going wage rates. It has been criticized because of the variable nature of these factors and their unpredictability.\(^8\) Even more serious criticisms have been leveled at it because of the difficulty of fitting intangible or non-

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\(^7\) Ciriacy-Wantrup, The Role of Benefit-Cost Analysis in Public Resource Development, in Benefit-Cost Analysis, Report No. 3 of the Committee on the Economics of Water Resources Development (1954). Yet Ciriacy-Wantrup justifies the use of the technique in order to restrain the abuse of economic arguments, to force attention on the problems of resource development, to give a basis for understanding of intangible values, and for other purposes connected with public projects.
market values into a ratio expressed in dollars. The value of lives saved by a flood control project, the value of strengthened national defense, or the value of controlling cyclic depressions by public works programs are all of this nature.

In many areas today, the major intangible to be considered in a law for private development of water rights is public recreation. Many states are vacation lands and have important recreation industries. Many desire to foster and preserve outdoor recreation features as much as is possible. One of today's most important forms of pleasure is derived from outdoor recreation, which is almost always linked directly or indirectly to water use. Furthermore, as man overruns the world, he more and more tends to try to hold on to a part of his past, to attempt to preserve from destructive use the sources of simple pleasure founds in nature. The wilderness area set aside to foster this attempt may be incompatible with any water use in the area, and with other outside uses that have an effect within the area. In the balancing of costs and benefits, this recreational use of the land and water to the exclusion of all more mundane and pragmatic uses may often turn out to be the best use of the resource. If the long-term benefits from such conservation will exceed the long-term benefits from the beneficial use, the water should be saved for those purposes. Yet the over-zealous blocking, as a matter of principle or as the result of emotion, of a development that promises great economic values, in favor of mediocre recreational values, will actually lead to waste.

All states desire prosperity and wealth for their people. What are the net benefits of an iron ore treatment plant worth millions of dollars, that will create a payroll of a million and annual profits of hundreds of thousands, yet will destroy a wilderness area and ruin miles of a beautiful stream? If the irrigation of a dozen farms will increase productivity of the land and the farmers' incomes by fifty per cent, yet destroy five miles of trout water, what is the ratio of benefits to costs?

Some of those who have struggled with this problem see no hope of assimilating these market and extra-market values, and believe the two can only be weighed in subjective terms of value judgments. 59 For

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these the solution lies in improved techniques and procedures for obtaining informed decisions by legislatures and administrative bodies.\textsuperscript{60} To others this is no solution; it is felt that either the recreation benefits will be inflated beyond their real worth by "starry-eyed dreamers" or discounted in the face of dollar benefits by "cold-eyed realists." But even if recreational benefits are not themselves valued, some measure of their worth can be obtained from the value of tangible benefits foregone to obtain the intangible:

No intangible has infinite value. All intangibles have costs. The least that can be done is to specify and to make very clear to all concerned the cost of obtaining the intangible. As a minimum the intangible must be worth as much as it costs in terms of alternatives sacrificed if it is to be approved. Second, it is often possible to place a maximum on the intangible if it can be produced by alternative means. ... Such considerations may reduce the common tendency to consider intangibles as exceptions to economic calculus.\textsuperscript{61}

Nevertheless, there is a real movement to attempt to find a satisfactory common denominator between the two types of values. Most of these attempts have been in the direction of finding an acceptable method of assigning dollar values to recreational benefits.\textsuperscript{62} It has been urged that the problem is not too difficult despite the personal and emotional character of a recreational experience, that it is not different from the valuation of a rare work of art that provides pleasure of a similar character.\textsuperscript{63}

A number of methods of doing this have been suggested.\textsuperscript{64} Some have been put to use or have at least been the subject of experiment. Total expenditures for recreation have been a popular form of attempting to place a dollar value on recreation, but this has been criticized since many of the dollars spent for recreation would have been spent elsewhere if the recreational opportunity had not existed, and because gross expenditures are an untrustworthy index of contribution to the national product. However, the "value added" to the local

\textsuperscript{60} Report of President's Water Resources Policy Commission 57 (1950).
\textsuperscript{61} Milliman, \textit{Can People Be Trusted With Natural Resources?}, 38 Land Econ. 199, 216 (1962).
\textsuperscript{62} Ciriacy-Wantrup, Resource Conservation, Economics and Policies (1952); Green Book, supra note 40, at 43.
\textsuperscript{63} Clawson, Methods of Measuring the Demand for and Value of Outdoor Recreation 3 (Resources for the Future, Inc. 1959).
\textsuperscript{64} Economic Studies of Outdoor Recreation, Outdoor Recreation Resources Review Commission Study Report No. 24, 47-50 (1962).
economy by outdoor recreation expenditures (deducting from the gross the amount local suppliers must pay for what they sell) may be a reliable indication of the secondary benefits of the recreation in the region in question. It seems to be fairly well agreed that the measure of the primary benefit of a recreation opportunity is the value to the users. Two principal suggestions have been made as to how this can be ascertained. One is to assign "derived values" from admittance fees and user charges made in comparable private recreational enterprises. Another is to calculate "user expenditures," on the theory that the cost to a fisherman of his trip is a measure of its worth to him. But another economist has warned of the difficulties involved in this approach because of the generalized demand for recreation, with its elements of substitution (should the fisherman go to Crystal Lake or Trout Creek?) and of joint demand (for fishing and boating and scenic beauty). And some of the other methods suggested seem more suitable for determining benefits of recreational features of a public works project than for determining losses from the initiation of a project.

Perhaps a combination of two other suggestions might

65. Clawson, op. cit. supra note 63, at 6-8.

66. Methods of Evaluating Fish and Wildlife Benefits and Costs, Subcommittee on Evaluation Standards, Inter-Agency Committee on Water Resources (1959). (Proposed supplement to the "Green Book.") This is the method in use by the National Park Service for computing the value of a visitor-day at a park (currently fixed at $1.60) and by the Corps of Engineers in determining values of beach erosion works (value of visit to beach ranges from 25¢ at most of them to $2.25 at Waikiki and Atlantic City). Hearings on S. 1164 and S. 1221 Before the Senate Committee on Public Works, 85th Cong., 1st Sess. 122 (1957); Hearings Before the Senate Committee on Public Works, 86th Cong., 2d Sess. 144 (1960). See also S. Doc. No. 97, supra note 40. This approach was used as the starting point for deriving "value added" by recreational opportunities in The Value of Water in Alternative Uses (Wollman ed. 1962) which at pages 69-77 outlines the difficulties and their solutions. Kneese, in Appendix M, converts the added figures into benefit-cost terms.

67. Clawson, op. cit. supra note 63.

68. Loomer, Recreational Uses of Rural Lands and Water, 40 J. Farm Economics 1327 (1958). Loomer points out other difficulties: the lack of price data resulting from traditions of free use of recreational resources, and the need for research, both empirical and theoretical, before valid comparisons can be made between recreation and alternative uses of resources. An interesting example of empirical research into the values of primitive areas is found in Caldwell & Visser, Tourist Packer Services in Primitive Areas, 29 Land Econ. 351 (1953).

69. For example, other methods would consist of attempting to find from analysis of land prices the difference in value of a project with or without recreational features, and estimated demand schedules for determining how to get the greatest recreation use. See Green Book Supplement supra note 66, at 7, 11. Clawson, op. cit. supra note 63, is devoted primarily to evaluation of positive benefits of recreational features of projects. See also Dana, Problem Analysis, Research in Forest Recreation (U.S. Dep't of Agriculture, Forest Service 1957), and Trice & Wood, Measurement of Recreation Benefits, 34 Land Econ. 195 (1958).
work best for ascribing such "foregone benefits" as a part of the costs of a private development. Panels of experts might assign unit values to various types of recreational benefits and with this as a yardstick the particular recreational opportunities in question could be rated. These are new concepts, and research into a better methodology already suggests improvements in measuring the demand, value, pricing, and financing of outdoor recreation.

It is not suggested that any of these methods supply an ultimate solution and that all people would be satisfied that a dam should be built if the values of stream fishing were established at $1,000,000 and the combined value of electric power and reservoir fishing were $1,010,000. But an economic approach to recreation would ensure that all factors were considered on some comparable basis and that neither emotional nor practical considerations are vastly over-weighted. It would provide some real justification for requiring entrepreneurs to include project features that preserve recreational benefits.

Often the decisions are made politically. Political constraints on economic choices are common in water law. Sometimes conservationists have held the upper hand. Legislatures have "zoned" particularly desirable water resources for recreational use; they have fenced off from utilitarian development such waters as the Brule River in Wisconsin, Coeur D'Alene Lake in Idaho, and several famous fishing streams and beautiful falls in Oregon. In Wisconsin, public rights to recreation are stated almost as absolutes, so that almost any injury to these rights would theoretically block the issuance of a permit to irrigate. In practice, the statute is not so stringently applied. Sometimes the hard-bitten pioneer has put across his gruff dictum: "Water is to work with, not play in." In Arizona, despite the very large and increasing demand for recreation in that parched state, the statute still reads: "When it becomes necessary for the State Land Depart-

70. Penn, Public Interest in Private Land, in Timmons & Murray, Land Problems and Policies Ch. 13 (1950) suggests the panel of experts; Green Book Supplement supra note 65, at 12, suggests the unit values.
73. A very good exposition of the process is found in Clark, Water Law Institutions and the Community, 3 New Mexico Q. 97 (1959).
ment to determine the relative value to the public of proposed uses of water, wildlife uses, including fish, shall be deemed inferior to domestic, municipal, irrigation, stock watering, power and mining uses. 76

Political constraints can take more subtle forms. Both Wisconsin and Washington have curtailed the permit-granting powers of state agencies regulating the use of water in mundane activities such as production of power and for irrigation by giving a veto of the permits to agencies concerned with the protection of fish and wildlife. 77

E. Duration of the Right

A person or firm with a need for water needs the assurance that a continuing supply will be forthcoming. Without such assurance, entrepreneurs will not risk capital and labor in business doomed to failure in case the water supply is cut off. To distinguish one interest in property from another on the basis of security involves the relativity of certainty of all human institutions. Nothing is absolutely secure in the property field. The firmest fee simple is subject to possible, though unlikely, expropriation by a revolutionary government. Confiscation may occur for failure to pay taxes. Condemnation may take away the expectations of property and substitute a presumed equivalent in money. Regulation in the name of the police power may destroy some aspects of rights to use property without compensating the owner for resulting loss of value of the property. On the other hand, a mere revocable license may be regarded by its owner as the equivalent of a grant in perpetuity if the conditions under which revocation can or will occur are highly unlikely.

The degree of certainty that the law ascribes to an interest in property depends upon many factors. One of the most important is the social desirability of the interest. If the use is clearly undesirable the law will prohibit it entirely, and the person who takes or uses water will be put in the position of a thief who acts against society and who can make the use only if he does not get caught. If the use is not clearly undesirable the law permits the user to have a non-exclusive license which permits the use but gives him no protection from others. A use obviously desirable for the time being but whose future desirability is uncertain will be given some minimum property interest,

i.e., a license protected against some persons for some purposes but subject to revocation by the state or to defeasance by others with more desirable purposes in mind. If the uncertainty of a revocable license is likely to discourage the use entirely, the interest may be granted for a term of years. If society is quite convinced of the utility of the use the interest may be granted in perpetuity.

Illustrations may be drawn from other forms of resource allocation. The manner in which the federal government has treated land brings out these distinctions. The United States was sure of the benefits to be derived from the farm use of midwestern and western land; the Northwest Ordinance and the Homestead Act provided for its patent in fee to settlers.\(^7\) Not so sure of the permanent value of cabin sites in the national forests today, it gives permits for such uses for a term of years.\(^7\) On Taylor Grazing land the government has frankly not made up its mind as to the land’s ultimate best use, and permits many uses only at will,\(^8\) subject to revocation from many causes, not the least of which is possible reclassification of the lands as more suitable for agricultural use and thus open to settlement under the Homestead Act or Desert Land Laws.\(^9\)

Illustrations may be drawn also from water law. In Wisconsin, power companies have perpetual rights to generate power at their dam sites,\(^8\) taconite miners have rights granted for the life of the enterprise (such period of time as is necessary to permit the mining and processing of their ore bodies),\(^8\) while irrigators from a trout stream live under the threat of annual review of their permits, which may be cancelled for a variety of reasons.\(^8\) These variations in the certainty of rights of water use reflect the current views of the people of Wisconsin as to the various degrees of desirability of these different uses. Yet in the West, where irrigation is everywhere regarded as desirable, irrigators are given rights in fee simple,\(^8\) while suspicion of private power operators has led some western states to grant power rights only for terms of years.\(^8\) In the field of ground water,

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10. 43 C.F.R. § 258.7 (1964).
11. 43 C.F.R. § 258.7 (1964).
Wisconsin's law historically was that the owner of the land surface had absolute rights, in fee, to do as he pleased with the underlying water. Yet in recent years the urgency of protecting future municipal supplies has led to cutting these rights down to revocable permits.\textsuperscript{87}

Other combinations are possible. Even though something less than a right fixed in time is given to the water user, he can be secured against loss of investment in facilities without a guarantee that he will be able to continue his use. A revocable privilege may be accompanied by a promise to pay for unamortized sunk costs in case of revocation. This has been done in California, where a city may apply for an appropriation of water in excess of its present needs in order to meet its estimated future requirements. The water in excess of present needs may be temporarily appropriated by any person for irrigation. These irrigation rights may be terminated at any time the water becomes needed by the city, but in such cases the city must pay for the facilities used by the temporary appropriator if they are rendered valueless when the city begins to use additional water.\textsuperscript{88}

One advantage of secure water rights over short term or cancelable rights is that the former will aid in the attainment of the major goal of maximum benefits by encouraging investment. Nearly all water uses by private individuals or firms require the investment of capital or labor in some form of plant or equipment for interrupting and capturing the water or for using the water after capture. Investment in either type of plant will ordinarily be made only if the investor can evaluate the risks of losing his capital and if he can foresee the probability that he can use the plant for a sufficient time to bring him a profit.\textsuperscript{89} If the proposed use of water is a desirable one, too cautious a policy against granting secure water rights may deter water use for the desirable purpose. Complete uncertainty may prevent any investment in facilities for water diversion or water use, and granting the right for a period of time may not remove the objection if the time is too short.

Loss of capital, in the form of "sunk costs," \textit{i.e.}, permanent investment in facilities that cannot be transferred to other uses, can be avoided by giving the water right for a sufficient length of time to permit the investor to recapture his investment through amortiza-

\textsuperscript{87} Wis. Stat. Ann. §§144.03(6), (7), (8) (1957).
\textsuperscript{88} Cal. Water Code § 1463.
\textsuperscript{89} Chryst, \textit{Some General Considerations of the Theoretical Functions of Legal-Economic Research}, Legal-Economic Research Monograph No. 1, at 15 (Iowa Agricultural Law Center 1959). Chryst describes the reluctance of the entrepreneur to invest "if his neighbor will reap where he has sown."
tion, or by a guarantee of compensation for lost investment in case of termination of the right. But the fear of loss of sunk costs is not the only deterrent to development. Time is invested as well as money, and the object of most enterprises is the founding of a going concern, and that going concern, the expectancy of the realization of opportunities, is the entrepreneur's most valuable asset.90

The giving of security of expectations of this sort requires the grant of a right that will last for the life of the enterprise. If the water is to be used in connection with an activity of limited duration such as the mining of a stock resource such as a body of taconite iron ore, the right should last as long as the expected life of the ore body. If it is to be used in connection with a flow resource such as a sustained yield cropping of timber for paper production, the water use should be in perpetuity, since the supposition is that the forest and the plant (with replacements) will last forever. If it is to be used to irrigate a farm, the water right will be the major element of value of the farm. The title to the farmer's water right ought to run as does the title to his land—"to him and his heirs forever."

F. Description of the Right

If a water right is to serve its owner and the public efficiently as a right of property, it is essential that the right be sufficiently definite to identify the property and differentiate it from the property of others. Some difficulties arise from the transient nature of water. Although physical ownership of the corpus of water is possible under certain circumstances, literal ownership of the water of a stream is not, and water rights are rights to use whatever water is present in the source at the time, or to draw from the source the water currently there. A water right is, therefore, an "intangible usufruct"; it cannot be seen or marked or fenced or otherwise taken into possession, and its existence, nature and extent must be expressed in terms of the acts that may be done in relation to the source and in relation to similar or different, but inconsistent, acts of other persons. Not only must the right be defined, it must be somehow placed on record so that it may be easily discovered by others. Since it is limited by the rights of others, all rights must be subject to determination in some ready manner.

In order to give such a definition to water rights, the law must be

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reasonably certain in its rules. The rules must be known or discoverable with some ease and stated with some certainty. They should be so phrased that they may be easily translated into action by the water user without the necessity of constant recourse to the courts for definition and redefinition.

The major advantage of a differentiating description is that it will encourage projects that "produce" water in the sense of making it available to alleviate or eliminate local or temporary shortages. Water rights that are so phrased as to lead their owners toward the same units of water will not do this. Some water laws have been based on the concept of water as a "free good," like air, that can be obtained without paying anyone for it. The rights of different persons are all expressed alike, and all refer to the same water. A "rule of capture" results and the water goes to him who physically reduces it to possession. But if the physical facts are that the water is in fact a scarce good that cannot satisfy all the demands made upon it, a law so phrased will encourage local overdevelopment and result in physical competition for the water, which is a very different thing from economic competition. Such a water right, expressed in terms of a power to take water, may operate very well in an area where there is water for all. But when even a local or seasonal shortage occurs, a power to take the free good may be transformed into a power to take from other users without liability. The right to take is similarly subjected to the liability that it may be taken, and factors such as accidents of position, better access to the source, and superior physical or financial power, will determine the allocation of the water. Under a rule of capture, the system is one of anarchy rather than law.\(^91\) No one has a "right" under a proper definition of that word.

A somewhat similar result is reached if the water law is based on concepts of reasonable sharing of a common supply. If that supply is not sufficient for all demands, legal competition, not economic competition, will be encouraged for the available "free" supply. The owners will fight for greater shares of the same water on legal, not economic, grounds, each trying to persuade a court that he should be given some of the water covered by the other right. If it is desired to encourage the increase of the supply, the rights of the claimants must be described in order to differentiate the water to which each is entitled. One or the other water user must be given a superior right, and a corresponding duty proposed. If one right is protected, the other

\(^91\) See Katz v. Walkinshaw, 141 Cal. 116, 70 Pac. 663 (1903).
user will have to spend money to develop water from an alternate source, perhaps by storage, perhaps by importation. In the West this is usually done by describing the water rights in terms of priority, quantity of diversion, and time of diversion. When senior appropriators had taken all of the dependable flow of the western streams, further development was inaugurated by junior appropriators who stored spring floods, built larger dams that stored the supply of good years against future droughts, or brought water from long distances across or through mountain ranges from other basins where the supply exceeded the demand. But a literal time priority is not essential to the operation of this principle. Under the California doctrine of correlative rights—equal rights of all overlying owners to take ground water—severe overdrafts of the ground water in the Raymond Basin took place when each user had an equal but undefined right to an insufficient supply. In the ensuing litigation, the correlative rights theory was modified by the introduction of a concept of “mutual prescription” that led to firm rights for all to a reduced amount. Each overlying landowner was restricted to a percentage of his former pumping that reduced total withdrawals to within the limits of recharge in the basin.\(^9\) After this rationing of the available supply by introducing certain water rights, development did not cease, but persons with new water requirements have been forced to turn to imported surface water.\(^9\)

Even though there may be no present shortage of water or immediate prospect of conflicts between users, there are advantages to a system of water law that clearly describes and identifies a private right in terms of quantity and purpose. A future benefit can be reaped, since as each new right is added to the list potential conflicts can be avoided, and as more and more uses are made, an agency charged with the duty of permitting the initiation of uses is furnished valuable data which it can use as the basis of action, and potential water users can employ the same data in making their plans.\(^9\)

Many western water adjudications were made in water-rich or underdeveloped areas, and permits were issued as new development took place, until the limit of the supply was eventually reached. Accidental and

\(^9\) See the marvelous exposition of the proposed state control system by Mr. Burritt to Mr. Hay in the debates on the Wyoming Constitution, quoted in Wyoming Hereford Ranch v. Hammond Packing Co., 33 Wyo. 14, 236 Pac. 764 (1925).
ECONOMIC FORCES

A. Changes in Use

Economic forces can operate on water much as they do on other resources. Ordinarily, the economic mechanism is the market. If all water were brought from suppliers, in a perfectly competitive economy, the problem of optimum use could be settled by the market: water would flow to those uses in which it had the highest value. A single water user or firm, supplying itself with "free" water for various uses, can use the "derived value" resulting from the market for various products of different water use. A power company often can time its releases through the turbines to produce peaking power. An irrigator can vary his field crops from year to year to bring in what he believes will be the best price. But most uses of water are quite inflexible. They require permanent and often costly installations. The demand is usually continuous, for the same or similar use year after year. What is needed, then, is not a market for water as a commodity, but for water rights that will bring in the continuous or recurring supply.

A modern water law should provide sufficient flexibility of rights to insure the continuing production of maximum benefits as needs and demands change. It must operate in a growing society. For all practical purposes, we must accept the resource as limited. Yet we know that the demands upon it are continually growing as population and industrialization expand. Expanding demands will not all increase at the same rate. Some demands may decrease or even disappear into limbo along with the grist mill and the log drive. As the disparity between demands grows, and as total demands increase, a shift from existing uses to new uses must take place. In the West, where irrigation has claimed most of the water, the transition is

95. Wollman, supra note 8, at 568.
96. Heady & Timmons, supra note 14.
97. In extreme cases weather modification and desalinization processes offer some hope for increasing the supply side of the picture. See Lof, Potential Applications of New Water Technology in the West, in Resources Development, Frontiers for Research 39 (Western Resources Conference 1959).
likely to be from agriculture to municipal and industrial uses. In
the East, perhaps, the pressures of population will require such an
increase of recreational uses of water that industry will be forced
out of some locations, or will be required to adopt water recircula-
tion practices that will reduce the quantity needed for those uses.
Perhaps demands for food will require more supplemental irrigation
in the Midwest, or municipal needs for water supply and the dilution
of sewage will necessitate less irrigation.

No system of water rights should result in a rigidity that will
hamper future generations, nor impose upon those generations a
water use pattern suitable only for a bygone age. A water use law
should be flexible enough so that today's lack of omniscience or
prescience will not prevent the correction of mistakes. It must grow
with the times. The water rights it creates must be flexible enough to
enable shifts from use to use. While it may be permissible to assume
that the use to which water is first put is the most desirable and
economic at the time, it is fallacious to presume that such a use
would be the best for all time. While we may wish to encourage
water resource development today for its immediate benefits, get-
ting the best use possible under present conditions, in years to come
we may find that new or different uses promise greater benefits.

One method of obtaining flexibility of water rights is to build
into the right a degree of plasticity. This is the antithesis of security.
It has already been noted that rights may be revocable at will, or
may be limited in term, or subject to future adjustment or to ter-
minalion in favor of preferred uses.

A second method of obtaining flexibility in water use rights is not
to deny certainty to the rights, but paradoxically to guarantee their
security. The security of water rights that protects and encourages
development and investment does not necessarily entail rigidity of
use. A water right with the aspects of security and transferability is
a property right that can move in response to economic forces.

A variation of the market method of obtaining flexibility of firm
property rights involves involuntary transfers with compensation.
Public condemnation or the exercise of eminent domain powers by
private firms impressed with a public interest insure that water will
move to the preferable use. Eminent domain eliminates the pos-
sibility that the transfer might be blocked or impeded by imperfec-

98. Fox, supra note 28, at 19.
(1959) ; Ciriacy-Wantrup, op. cit. supra note 62.
tion in the market such as monopoly or oligopoly, or by extra-market motives that make the owner unwilling to sell at a fair price.

If the law makers can choose the degree of security and the corresponding flexibility to be assigned to water rights, the question arises as to which of the methods, flexible rights or secure but transferable rights, is most conducive to the maximization of benefits. If water is presently being used for irrigation but a manufacturing company can create greater wealth with the water, the maximization principle requires that the water should go to the manufacturer. But a law that would allow the manufacturer to simply take away the farmer’s water seems shocking; the unjust enrichment involved in such an expropriation is obvious. As between private persons a transfer of use should only be made with compensation. The law could conceivably give the manufacturer an absolute preference and give the farmer an insecure right subject to termination by the manufacturer in case the latter should need the water. The law could do the same thing indirectly and give the irrigator a temporary right for a term of a few years, and reassign the water at the end of the term. But although either form of this transfer from irrigation use to manufacturing will produce greater dollar benefits for the whole economy in the future, neither will result in maximum social benefits, since the “compensation principle,” one of the keystones of welfare economics, has been violated. This principle is most often stated in the form of the “Pareto criterion” of welfare economics—a change that makes at least one individual better off and leaves no individual worse off represents an increase of welfare.100 That half of the principle requiring that no person's position be worsened is usually satisfied by some method of assuring that he is compensated for a change which deprives him of a benefit. In the water use field the benefit is in the future, the expectation of being able to put the water to beneficial use. Transfers of water between uses and users should allow this principle. In the above illustration, the manufacturer can afford to and should pay the farmer for the water. Admittedly the quality of expectation is dependent on the security of the legal right. But no tautology is intended. The question is not what security the law does grant, but what security it ought to grant.

The argument is that in order to realize the welfare principle as well as maximum dollar values the law should grant a firm right, a security of expectation. Another example may help to clarify this

100. Ciriacy-Wantrup, op. cit. supra note 62.
thought. As between commercial uses of water for private benefit, the use for irrigation may produce some wealth by enabling the owner to grow crops, while the use for hydroelectric power may produce a different amount of wealth. It is assumed that the public interest will be furthered by assigning the water to the use which will produce the greatest wealth. But if this allocation requires the change of the water from one use to the other, the Pareto criterion is not satisfied if either the farmer must return his field to grazing land without compensation or if the power company will lose valuable peaking capacity and receive nothing in return. Even though the non-compensated transfer may have been made legally, because the water rights for the older use were evidenced by cancellable permits, or were subject to new reasonable uses by others, a loss has occurred. To say that the farmer or the company has lost nothing because he or it never had a right to expect a continuation of the use is to ignore the fact that the land or the plant is now less productive; the owner is worse off in fact. The law should recognize that fact. It can do so by giving the water user a firm property right. Then the new user who desires the water must buy it from the old user. He can offer the present user less than the value of the new use to him, which still leaves him a margin of profit, but more than the value of the present use to its owner, which gives the latter a profit. As in the case of the sale of farm land to an industrialist, the property will move to its most productive use. The maximization principle is served, and the welfare principle is satisfied. The person who desires the new use is better off, the person who sold the old use is no worse off and is actually better off to the extent of his profit on the sale.

The granting of secure but transferable property rights in water has other advantages. One is that such a grant can to a large extent eliminate the hazards of physical insecurity for the most valuable rights. As the development of water resources proceeds and as scarcity of water increases in relation to demand, seasonal variations or long-term droughts will make satisfaction of some demands impossible. The right to change water uses from the original place or purpose will enable those with the most desirable uses to buy out the less valuable, or at least to shift the claims to the firmest portion of the supply to the more valuable uses.

If water use is to be flexible and transferable the water right must be mobile. There should be no artificial restrictions on who is eligible to purchase the water right or where the new use is to be made. Transfers of water rights should not be incumbered with "tie in"
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arrangements that require the transfer of unwanted land in order to acquire the wanted water right.\textsuperscript{101} Rigid appurtenancy of the right to specific land is undesirable.\textsuperscript{102}

In much the same way, it is undesirable to restrict the right to the purpose for which it was originally used or acquired. Admittedly there are complications if it is proposed to use a right initiated for a consumptive use for a nonconsumptive use or vice versa. These may limit the \textit{ad hoc} practicalities of particular transfers, but they should not result in general rules against the shift of water to other uses. This brings up the problem of how to define the right so that it is transferable. One economist has criticized the typical definition of a water right in western appropriation law on this basis. He points out that if an irrigator sells a water right to a steam power plant, the depletion of the irrigator is much greater than that of the plant, and the first needs a seasonal supply while the latter desires a continuous flow, and that an irrigator increases the saline content of the unconsumed water (at least on most western soils) while the power plant will increase its temperature.\textsuperscript{103} He offers a different solution:

\textit{I}t would seem desirable to try to get away from a definition in terms of quantity diverted, point of diversion, time of diversion, and type of use. Instead it would seem preferable to move toward a definition in terms of the effect upon either minimum flows, water yield, or a combination thereof and the effect upon water quality including chemical content, organic content and temperature. Unless such a definition is practicable it will be difficult for market forces to function effectively.\textsuperscript{104}

But such a definition would be difficult to translate into action terms relating to just what the water right holder might do in the exercise of his right and what others must forebear to do in violation of the right. Since a translation must occur in one direction or the other, it should be asked which is the least inconvenient. For purposes of legal protection, the appropriation definition is the more

\textsuperscript{101} Haar & Gordon, \textit{Massachusetts Water Law}, in Haber & Bergen, \textit{op. cit. supra} note 8, at 40, state that “in the riparian system, the one representing the highest beneficial use of the water resource will bid highest for riparian land. . . .” But if the land is unwanted its cost adds to the costs without increasing the benefits, and many uses of water cannot be moved to the river bank.


\textsuperscript{103} Fox, \textit{Water—Supply, Demand and the Law} (Resources for the Future, Inc. 1960).

\textsuperscript{104} \textit{Id.} at 23.
usable and the easiest to apply by the water user. If a transfer becomes imminent, the effects of the action can be determined and evaluated as a measure of the desirability of making the purchase. Essentially, this is the western system that has evolved in practice. Administrators, supervising transfers under the general rule that a change in water right must not operate to the detriment of other appropriators, in each case determine the effect of the change on depletion, time of withdrawal, and purity, and allow the change only to the extent that these effects have no adverse repercussions on other water users.105

B. Changes From Private to Public Use

Placing transfers of water between two commercial private users on the basis of property, and letting the market provide the change through a sale of the right from one user to the other in consideration of a cash payment, may be more acceptable to many people than the application of the same idea to a situation in which the change in allocation is from a private commercial use to a public use. If an irrigator is permitted to initiate a consumptive use, but it is later found that a growing city needs the water, so that the irrigation must cease, none will deny that the public use should prevail, but many will disagree as to whether the irrigator should be paid for the discontinuation of his use.

If the future public use is foreseeable, and is foreseen, it may be unwise to permit an interim use of the water at all. If the benefits of an interim use make its encouragement desirable, some incentive for initiating it must be given, at least some minimum of certainty that will secure to the user the return of his invested and sunk costs. This may be done, as pointed out above, by permitting the water right to run for such term of years as will secure the return of the investment through amortization, or by a promise of compensation for unamortized costs if the right is sooner terminated.

But if the future more beneficial public use is only speculative, or appears only in the distant future, it may be desirable, in the interest of obtaining the greatest benefits over time, to encourage investment and good resource use practices by giving a permanent right.

One advantage of adjusting rights so as to permit free recapture by the public is the obvious one that the public is put to no expense when the decision is made that the public interests have reached the point

105. Trelease, supra note 102, at 28-35.
where they can be determined to be superior and more important than
the private. Yet the loss of investment or expectation by the water
user is a cost of making the change from private to public use, and
poses the question of whether such private subsidy of public benefits
is a desirable method of achieving the benefits. But only the extra-
legal machinery of public opinion and group pressures is available to
bring such a question up for discussion; the recapture process itself
does not force a benefit-cost analysis.

The imposition of a public servitude on private rights that will al-
low such uncompensated cancellation of the rights may eliminate a
desirable flexibility in adjusting private rights in favor of public rights
in the light of changed conditions. Exercising a servitude of this na-
ture puts the adjustment on an all-or-nothing basis. Obviously per-
petual and indestructible private rights would prevent adjustments
demanded by changing times and new pressures, but just as obviously
adjustments by the method of uncompensated expropriation may be
unduly harsh. The middle ground, of procuring changes in water use,
or eliminating uses once desirable but now undesirable, by compensat-
ing the owner, gives the state a third alternative. The harshness of
taking or destroying rights when such action will mean substantial
loss of investment may actually deter the state authorities from mak-
ing some very desirable adjustments. The naked legal power has to be
exercised by men with human sympathies, who may hesitate to act in
the public interest if such action means ruin to the water users.

Since absolute security of property rights is unthinkable, and since
there is such a wide choice in the degree of the security that may be
given, it may be asked if there is any principle or set of principles that
governs the degree of security that a state ought to give, and, con-
versely, the amount of compensation, if any, that ought to be paid
upon the termination of a private use in favor of some public interest.
One such principle seems to be implicit in the distinction between
eminent domain with compensation and the exercise of police power
without compensation: if an established use of property is curtailed
in order to prevent the user from harming the public, no compensa-
tion need be paid, but if the use is curtailed in order to enable the
public to use the property, compensation must be paid. Thus, orna-
mental red cedar trees on one man’s land may be destroyed without
compensation where they harbor a disease that destroys fruit trees

106. Dunham, A Legal and Economic Basis for City Planning, 58 Colum. L. Rev. 650,
666 (1958).
which form the basis of an important segment of the local economy, or pollution may be enjoined where it poses a threat to the health and well-being of the many downstream people. But if a farmer is prevented from using a strip of his land so that the public may use it as a road, due process will require that compensation be paid to the owner. Although this distinction is traditionally put on due process grounds, it has been pointed out that in British Commonwealth countries, unhampered by due process restrictions, the moral and political problem posed by the question of whether compensation should be paid for public infringements upon the use of property is handled by the same considerations. This then has relevance for the moral and political problem in America: in creating rights of different degrees of stability that may eventually be terminated for the public benefit, ought the government create one that will be protected by due process in the event of termination? The distinction between stopping a use to prevent harm and taking over a use should provide a guide.

It is true that there will be borderline cases. Mistakes might be made, a withdrawal of water might be initiated on the basis that there would be no injury to an important fishing stream, then actual experience might show that the injury occurs and that the withdrawals will have to cease. Is this a taking by the public or the stopping of harm to the public? In such cases the justice of allocating the risk of such loss to the individual or to the state might be determined on the basis of who made the mistake. The risk might be allocated to the water user if he misjudged, or to the state if the user had been granted a permit in effect certifying that no harm to public interests would occur. Often the matter might be solved on the basis of timing. The owner of a dam whose retention of three-quarters of the flow of the river caused no harm when initiated might be compensated if later city growth required the discharge of a greater flow to dilute the effluent of a sewage treatment plant. True, the continuation of the withholding would now injure those downstream, but the case seems different from one in which a dam from the beginning blocked enough water to raise the percentage of effluent to pollutive proportions. Perhaps foreseeability should be a factor in these cases. If at the time of initiating a private use an increased public demand could be foreseen in the rather immediate future, its inception could be said to be a cause of harm to the public despite its priority.

108. Dunham, supra note 106, at 665.
A second principle involves the distinction often made between preventing a potential use from being exercised and stopping an existing exercise of the right—the familiar distinction between zoning against future uses and permitting the continuance of nonconforming uses. If a water right is given for use, and in fact is used, it is arguable that a future order stopping the use in favor of the public should be accompanied by the payment of compensation.

One important limitation must be placed on the compensation principle to terminations of private rights in favor of the public. If the loss to the individual that renders him "worse off" is merely shifting back to him costs which he had originally shifted to others or to the community, he deserves no compensation for a corrective measure that deprives him of the expectation of continuing his use. This is no more than the withdrawal of a subsidy. For example, if a dam in Wisconsin originally destroyed the migration of fish to their spawning beds, the saving to the dam builder of the costs of fishways was made at the expense of the recreation-seeking public. If the Public Service Commission were to order a fish ladder installed the dam owner would have no valid claim that the order deprives him of property by requiring him to spend money for the public benefit.

IV
PUBLIC REGULATION

A. Private Uses in the Public Interest

To the extent that water law allocates any rights or privileges to private users, the state recognizes that private development of water resources is a desirable form of human activity from the standpoint of the public. The water is used to produce wealth. The increase in the wealth of the citizens of the state, and the secondary effects of the increase in purchasing power, spending in the community, employment, tax revenues, and in goods made available for use by others, can all be said to be within the concept of the public interest. Hence water uses that contribute to such increases in individual, local and national wealth are prima facie in the public interest.

It follows that polarity of thinking should be avoided when speaking of the regulation of private rights in order to protect the public interest. The private water user is not always arrayed against the

public, appropriating public property to his individual profit. A private purpose may also be a public purpose, and activities of individuals may be of value to the rest of the people. In addition, many private developments of water resources may provide direct public benefits. That portion of the public seeking outdoor recreation may reap benefits from water control projects initiated for private purposes. Impoundments of water may make better wildlife habitat; provide hunting, fishing, and recreational areas; and result in stream stabilization. Some private rights to water may provide recreation for a substantial number of people, such as members of a club, or patrons of a resort; and even though a club or resort use cannot be said to be public in the usual sense of the term, it may to a degree satisfy both an economic and an esthetic urge and take some of the pressure off public recreation areas.

B. The Place of Public Regulation

It has been urged that the economic forces of self-interest that lead man to get the most out of his environment, and of the market where relative values can be compared, should be the primary mechanisms of water allocation, and that public regulation should be secondary, to fill in the gaps, so to speak. The twin forces of self-interest and regulation in the public interest are the usual methods of allocating and controlling other resources—land, timber, and minerals—whenever they have a scarcity value. This, in essence, is the American tradition. We have become a great nation on the basis of "regulated laissez-faire." Incongruous as the combination of noun and adjective may be, it aptly describes the strong emphasis our society places on the institution of private property and individual freedom, overlaid with state regulation. The most important problem relates to the respective areas of action for the public agency and the private water user, i.e., to identifying the decisions that can and should be made by the individual, and those that should be made by official action. A wise water policy will take advantage of the human trait of self-interest and leave to individuals as much decision-making as possible, rather than eliminating choice and substituting government mandates

111. Penn, supra note 70, at 223: "An individual should not be condemned for acting to maximize his profits. Where his interests coincide reasonably well with the public interest no problem exists. In fact, government action in this area has no place."
supposedly directed to the same end of the best interest of the individual.\textsuperscript{112} Decisions on the questions of whether a man should use water, or to what use it should be put, where the answers do not have deleterious side effects on others, are best based on an individual’s personal ideas on what is good for him, not on an administrator’s thoughts on what should be good for that individual. The administrator is needed only when the question relates to what is good for others who are not in a position to affect the individual’s decision, because they are not parties to the transaction. Such a question is obviously one that the individual should not decide, and that the others are not in a position to decide. Then and only then is there excuse for a governmental decision.

In a perfect, idealized, economic setting, the principle of individual freedom of choice among resource users, owners and buyers should lead to water being put to its most productive and desirable uses.\textsuperscript{113} But in part due to the physical properties of water, its transient nature,\textsuperscript{114} and the interdependence of its use in common by a number of users,\textsuperscript{115} and in part by acknowledged imperfections in the market for water and water rights,\textsuperscript{116} the market cannot be relied upon to always produce optimum results.

One defect exists in situations in which there is literally no market to exert control. The most important of these is in the very inception of water rights and uses, since the initial rights are traditionally granted or created by the state without cost to the recipient. Issued free of charge, they have value in terms of the use proposed to each person who seeks them. But the grantor-state is not a seller, and puts no price on the rights granted.\textsuperscript{117} Furthermore, the needs for new uses do not all arise at the same time. Where the times of the different uses do not coincide, there may be an indirect economic factor present in the market for capital, rather than for water. It may be that those projects most worthwhile will first justify the expenditure of funds necessary for water control works. But for the most part no economic

\textsuperscript{112} Milliman, \textit{supra} note 99, at 41.
\textsuperscript{113} Milliman, \textit{supra} note 99, at 45.
\textsuperscript{115} \textit{Ibid.}; Milliman, \textit{supra} note 99, at 42, 58.
\textsuperscript{116} Wollman, \textit{supra} note 8, at 569; Bagley, \textit{supra} note 112, at 502.
\textsuperscript{117} It has been suggested that the state might use the price mechanism by assuming control over all waters and selling their use to the highest bidder. Wollman, \textit{Economic Factors in the Study of Water Use}, in Haber & Bergen, The Law of Water Allocation in the Eastern United States 565 (1958).
controls operate to allocate the water to a particular initial use. In
general, any promised increase in the individual’s productivity that
will justify his expenditure will also justify his seeking the right, with-
out regard to the relativity of that value to anyone else’s.

A second major gap in the market procedure is that many demands
for water use have no dollar value, for they are not sold. While in-
tangibles such as the saving of human life, the protection of health,
the general well-being of the people, and the esthetic pleasures of
scenic enjoyment and recreation may be translated into money terms
for comparative purposes in justifying public expenditures or permit-
ting private uses, this is a fiction employed for a particular purpose
and such “values” are not actual prices.

A third reason why the market may fail is that even if monetary
values can be placed on certain interests, they are so widely held and
so dispersed throughout society that no effective means exist for them
to compete on the market.\textsuperscript{118} For instance, individuals may have so
small a stake in preserving a particular recreation opportunity that
there is little incentive to take legal steps to protect their interests, or
even to join hands into an effective group to represent themselves
economically. However, some collectivization of diffused individual
interests is possible, so that the use of the market in the allocative
processes is not entirely eliminated. For example, sportsmen may
organize into an association and supply it with funds to be used for
furthering its purposes, and state agencies may use general public
funds or special funds derived from license fees to the same ends.
Both types of organization are actively engaged in many states in
purchasing, on the market, land for public hunting and fishing, or ac-
cess on private lands for these purposes. The idea behind these
market allocations of land rights to the public purpose could be
applied to the purchase of water and water rights to insure water
for fish and wildlife habitat. But for the most part it must be recog-
nized that such techniques are impractical and that public regulation
is necessary to see that such interests are not neglected.

A fourth market imperfection is the absence of bidding for future
uses. Even where the possible future user and the possible present
user are the same person or firm, there is a marked time preference
in favor of present uses, a tendency to attribute a greater value to
present enjoyment than to the same enjoyment in the future.\textsuperscript{119} If

\begin{footnotes}
\item[119] Bagley, Some Economic Considerations in Water Use Policy, 5 Kan. L. Rev. 499, 504 (1957).
\end{footnotes}
future enjoyment is uncertain, the preference is magnified. The generations who will receive future benefits are generally not represented at the market place. If there is a felt need on the part of most of the public to preserve water resources as a part of their children's heritage, it can generally be protected from exploitation by persons who do not share these sentiments only by public intervention and regulation of the dissentient minority.

Many illustrations of short-sighted over-use have occurred, where stock resources have been subject to exploitation by a number of different people. Disastrous races for the quick, short-term profit have destroyed untold values that could have been realized by orderly, managed development. While for the most part water is a flow resource of the type whose source is unaffected by man's activities, there are some examples of possible waste of this type in the water field. Pumping ground water from aquifers, in excess of the local recharge, with a resulting drop in the water level, is a form of "mining" of the water resource. When levels decline to the point of making it economically infeasible for some water users to continue pumping, the water between the original and new levels has been used up. Some consideration of the rate of depletion should be made, and the law should allow for a choice to hold the water in storage for use at a later time if the future promises benefits that when discounted to today's values are greater than those of today's uses.¹²⁰ In some locales, pumping has been so excessive that saline intrusion has occurred.

Even though the flow of water may be unaffected by most of man's activities, the use of future flows may be affected by uses of present flows. Many "irreversible decisions" can be made with relation to water uses, at least decisions with effects so lasting that several generations may be affected. Some effects are physical in the sense that it might take nature many generations to heal the wounds of a destructive use, and some are economic where the investment of capital for a particular use is so great that its scrapping for a new use would involve costs that make the new use infeasible.¹²¹

A fifth reason for public intervention may occur even though there is a market and values exist upon which the exercise of choice can be

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based. Because of the physical location or some preferential position in law of the owner of the water right, the market for water may be so dominated by the holders of the rights that competition breaks down. Monopoly and oligopoly conditions and a relatively inflexible demand (not sensitive to price variations) could lead to unhealthy conditions. A riparian entitled to the natural flow, or a power company entitled to full low flows, could extort "holdup" prices from persons who wished to initiate upstream diversions, either discouraging new development or imposing unnecessarily high costs upon the new user.  

Lastly, the market is based on a theory of rational behavior, and it is a despairing fact that very often people do not act rationally. Often they cannot, because of insufficient information, funds, or intelligence; often they simply prefer not to act rationally and to respond instead to motives of sentiment, frivolity, or even spite. Often the public must be protected against such irrational action. Today it is not uncommon for society to step in to protect people from the consequences of their own folly.

C. Prevention of Cost-Shifting

All of these reasons for not trusting entirely to economics and instead calling upon public regulation have a single factor in common. In each case, unregulated private activity will permit the water user to shift or impose some of the costs of his water use to other persons or to the public. To discover this principle we need only to accept the economist's concepts of foregone benefits as "opportunity costs," and

122. In California, the natural flow doctrine for a time gave every riparian a monopoly as against nonriparian appropriators. Appropriators seeking to purchase releases of the riparian's right to an injunction were charged exorbitant prices, a process described as a "racket" in Bingham, Some Suggestions Concerning the California Law of Riparian Rights, 22 Calif. L. Rev. 251, 263-65 (1934).

123. Compare Huber v. Merkel, 117 Wis. 335, 94 N.W. 354 (1903) with Anaheim Union Water Co. v. Fuller, 150 Cal. 327, 88 Pac. 978 (1907) (injunction issued against use which would leave plaintiff 2000 "inches" of water, where plaintiff's need was for only 400 inches). See Gaffney, Diseconomies Inherent in Western Water Laws: a California Case Study, Proceedings, Water and Range Section, Western Agricultural Economics Research Council (1961), discussing the "Heirloom attitude" of western water users leading to irrational practices and prices.

124. One means of affording such protection is by providing for condemnation of rights from holders not amenable to ordinary market pressures. See Trelease, Preferences to the Use of Water, 27 Rocky Mt. L. Rev. 133, 137-38 (1955).

125. See also Dunham, Flood Control Via the Police Power, 107 U. Pa. L. Rev. 1098, 1112-16 (1959).
of induced adverse effects as "social costs." A poorly located use that will prevent an otherwise compatible multiple use deprives the other users and the public of the economic benefits of the second use. A use that destroys recreational values costs the public in the intangible values of the recreation. A hasty use today that deprives future generations of greater benefits is made at their expense. A monopolistic or irrational price imposes costs upon the buyer (and society) but does not increase gains, and it may deprive society of the opportunity offered by a blocked use.

This then is the defect in the market—it does not prevent a person engaged in private enterprise from shifting part of his costs to third persons or to the community. And this is the area into which government must step to protect the public interest. The activities of private persons should be so regulated by the state as to prevent or minimize the shifting of costs by the water user to other users, or to the public, or to future users or the future public. Such "spillover effects" or "externalities," as they are called by economists, should be curbed.

Laissez-faire economics can be relied upon to channel private development into those areas and projects promising the greater benefit for the individual, and these should be permitted to continue to fruition unless such cost-shifting is present and renders the proposed use anti-social. But laissez-faire cannot be relied upon to prevent the shifting of costs to others. The actual pressure is much in the opposite direction. The profit motive does not ordinarily encourage the entrepreneur to add costs that do not increase productivity but simply prevent a cost to others. Free enterprise is an uncertain force for the preservation of future values from destruction for the quick realization of present profits. Distant future returns are generally undervalued in the market place. Thus viewed, the role of law is to provide for as close an association of costs and returns as possible.126

It must be recognized that public uses have their externalities too. Care must be taken that when one public use is preferred at the expense of another a proper balance is struck. Even when the conflict is between public use and private use, a public use made at the cost of individual sacrifice of value and socially desirable labor and investment results in a shifting of costs to those who do not obtain the benefits.

126. "[I]t would seem that the function of law in the solution of economic problems is to prescribe a range of human behavior to bring about a closer association of costs and returns." Chryst, supra note 89, at 15.
D. Devices For Protecting Public Interests

Protection of the public interests in these cases where the market does not insure their effective representation requires a machinery that will permit the state to step in at various points in the economic process. Perhaps the greatest need for regulation of water use is at the inception of use. Defining the property right in a use of water at its inception is a most effective way of preventing harm to other users, public or private. In allocating rights to use, public regulation may take the form of restricting the uses for which rights will be granted, restricting the persons who may acquire rights, and restricting the rights granted both in scope and duration. Undesirable uses should be prevented from ever arising, not stopped after the harm is done. Uses prima facie beneficial which entail substantial possibilities of unfavorable effects may be conditioned to permit the good and eliminate the bad.\textsuperscript{127} If the permission to initiate the use is issued in specific terms and is reasonably free from collateral attack, attributes of certainty and security are imparted to the right, and the person receiving the permission may be saved the waste of investment that might attend a later declaration of invalidity.

The power to control water uses by denying permission to start them would enable state officials to prevent overdevelopment and physical and legal competition for water in sources insufficient for existing demands and the new demands,\textsuperscript{128} and thus require new users to seek new supplies. Underdevelopment as well as overdevelopment can be prevented by a state choice of the better use when pending applications for water use relate to the same supply and the available water is not sufficient for both. Another form of underdevelopment can be prevented: if a large project for development of an area is foreseeable, and smaller piecemeal parts of it are sought to be developed by competitors, so that the larger project is rendered infeasible by having the heart cut out of it, the smaller projects can be denied in favor of the greater benefits promised by the later larger one.\textsuperscript{129}

One of the most important aspects of controlling the initiation of uses is this power to deny uses, \textit{i.e.}, to reserve the water for other pur-

\textsuperscript{127} See action of state engineer recited in Big Horn Power Co. v. State, 23 Wyo. 271, 148 Pac. 1110, 1113 (1915).


\textsuperscript{129} Young & Norton v. Hinderlider, 15 N.M. 666, 110 Pac. 1045 (1910); Tanner v. Bacon, 103 Utah 494, 136 P.2d 957 (1943).
poses. The principle of reserving water from present use may be exercised on grounds not specifically directed to the undesirability of a proposed use but to its lack of flexibility. If a foreseeable future use will be forever foreclosed by the physical facilities of a present use, the present value of the lost benefits must be counted against the project. If a desirable future use is foreseen with certainty, and an interim use can be made until the need for change arises, the present use may be a desirable step toward maximization. But if the change to the future use would involve substantial costs of scrapping or removing facilities for the interim use, these costs must be counted in determining its desirability.109

The power to deny permits for uses that involve diversion from or interruption of the stream is also the *sine qua non* of the power to reserve water for use in place, usually by the public. In this fashion the most effective protection can be given to site values, recreational values, and fish and wildlife habitats. Similarly, minimum flows can be provided for dilution of wastes where full purification is impossible or too costly and the most efficient and desirable method of treatment of the wastes is to use the natural ability of the living stream to purify itself.131

The most important reason for the existence of the power to permit or deny water uses is that it gives to the state and the public an effective method of directing developments along planned lines. Since the hydrologic cycle passes the water from one user down to the next, water resources are more than any other subject to multiple claims, and in their development the use by one person will affect the use by another. Inevitably water resources are due to be more and more intensively used, and intensive use means multiple use. Multiple use in turn means foresight and planning, involving whole states and basins. A single prospective water user cannot make a plan, but he can be fitted into one or excluded as inconsistent with it, if his use would wreck it.132

109. See note 121 *supra* and accompanying text.
132. Oregon's laws provide for broad planning and the review of individual projects in the light of the plan, Ore. Rev. Stat. §§ 536.210 to -560, 537.170 (1963). California's plans are similarly protected from inconsistent private action. Cal. Water Code §§ 10500, 10504, 10504.1. *Cf.* Tanner v. Bacon, 103 Utah 494, 136 P.2d 957 (1943), in which the usual permit granting authority was held to allow this result. On the interstate level, the Delaware River Basin Compact (which the United States signed as a party) creates a commission with planning powers and authority to approve all proposals, public and private, for developing water resources. 75 Stat. 688 (1961).
The second point in the economic process into which public regulation must be injected is in the transfer of a water right from place to place or from use to use or even from season to season. Again the reason for regulation is the prevention of spillover costs. Some of these that are most likely to occur are really attributable to a lack of definition or understanding of what is being or what can be transferred, and have already been alluded to. A nonconsumptive use cannot ordinarily be changed to a consumptive one without affecting other parties, nor are uses freely transferable in space or to a different time of year without consideration of external effects on third parties. To a very large extent these transfers can be made without these unwanted side effects. But even where these policing difficulties are not involved, the same considerations of the public interest in the use to which the rights are transferred arise as in the case of the initiation of a completely new use, and the social effects of the changed use must be scrutinized.

If one user has two possible uses the determination of the "most productive" can be made by his judgment as to which will bring him the greater value. If one user has a water right and another person who needs water does not, economic forces can be in general relied upon to see that the water is used in the most productive use. The use will shift if the non-owner offers the owner more money than he can expect to gain from his use. It will not shift if the owner values his use more than the money. This is exactly the way that farms, homes, corporate stocks and loaves of bread are allocated. However, changes and transfers of water rights have peculiar possibilities of undesirable effects on persons not parties to the transactions, and the state should oversee new uses of old rights to the same extent as it controls new rights, to prevent injuries and costs to others and the public.

The third area of governmental intervention in a system of private property is in the general one of the police power. This includes simple policing, the enforcing of the duty of one water right holder in order to give meaning to the right of another, and the prevention of a water user from overstepping his rights to the detriment of the public. It also includes the imposition of regulatory measures such as requirements for installation of regulatory and measuring devices and the furnishing of reports. Finally, it encompasses the entire field of prevention and abatement of nuisance and the restriction of prop-

133. See note 102 supra and accompanying text.
134. Trelease, supra note 102, at 28-33.
135. Id. at 34.
CONCLUSION

These policies are suggested as guides to legislative, judicial, and administrative bodies for use in formulating, administering, and applying water law. Policies and principles are merely the starting points of legal reasoning, and do not automatically generate specific rules and decisions. Those here suggested do not necessarily lead to the conclusion that any one form of water law is the ultimate of perfection. Most of them can be met by a wide variety of combinations of laws, institutions, organizations, and agencies. They leave room for the full play of forces arising from local conditions and physical and political climates. For example, there is no magic in "prior appropriation" such that incantation of those words automatically creates complete fulfillment of all of the objectives here stated. That system has been freely and repeatedly criticized for its shortcomings, on the basis of much the same criteria. Many aspects of western water law seem to violate these maxims. Maximum development may be impeded by western as well as eastern laws restricting the place of use of water. The principle of certainty is violated by the existence of many forms of paper rights that represent unused appropriations which may spring into life and destroy valuable existing uses. Some western water laws tie the water to the land and prevent its movement on the market to higher uses. On the other hand, eastern riparianism may give some certainty of water rights simply because of the overwhelming abundance of water, or by prescription or condemnation. In combination with other techniques, such as licensing riparian uses to insure their consistency with the public interest and the use of semi-public organizations for solving local water supply problems, riparian law may achieve many of the objectives here set forth. Where public agencies can control a sufficient number of rights,

139. Trelease, supra note 102, at 11, 26-27.
whether riparian, appropriative or correlative, and can make water available to water users by contracts, water rights may become not so much property rights as contract rights. Such rights, initiated by sale and regulated by the terms of the agreement, may be as suitable for meeting many of these criteria as any form of real property rights.¹⁴⁰ They may also be as acceptable to the water user, who is likely to be unconcerned with laws and institutional arrangements as long as water appears when he turns the tap.

There is no perfect water code that meets all of these requirements. Perhaps an idealized law of prior appropriation that is not the law of any one state would come closest to filing the bill.¹⁴¹ It is not suggested that every state, or any state, should start anew. It is not suggested that the law of every state should be alike.¹⁴² Many states would choose to preserve and build on cherished institutions, local practices, and comfortable old phrases.

Yet it is believed that these policies should have almost universal appeal. While the general approach has been economic, and the policies lean heavily on economic factors, economic formulae are not offered as a substitute for judgment. It is assumed that men can, by applying economic principles and studying economic consequences, make wise choices to guide both public and private action. Difficult decisions must be made by people, and at best the benefit-cost formula can insure that in the exercise of judgment, some factors are not overlooked and others are not vastly overweighed. If legislators, administrators, and judges ask whether their statutes, rules, or decisions will aid people to take steps toward obtaining maximum benefits from water resources, and whether these steps can best be taken as the exercise of private rights pursuant to economic forces or by means of public regulation, then, surely, whatever form their actions take, they cannot stray far from the ultimate goals of the law.

¹⁴¹ I once tried, with help, to write such a code. Trelease, A Water Code for Alaska (1962). What its defects were I do not know. Despite support from experts and administrative officers, the legislature has not adopted it.
¹⁴² Even the proponents of the Model Water Use Act, Handbook of the National Conference of Commissioners on Uniform State Laws (1958), do not proclaim its universality. Nor would I agree that it would in all respects further the policies here advocated.