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WATER RIGHTS TRANSFERS AND THIRD-PARTY EFFECTS

George A. Gould*

INTRODUCTION

The application of economic principles to water rights is currently receiving much attention. "Water marketing," "water brokering," "water banking," and similar concepts are offered as solutions to western water law problems. The premise of water marketing is a relatively simple one: water is an economic good, no different than any other, and should be treated as such. As there is little that government can do to improve on the efficiency of free markets, it should move out of the way and let the market determine water uses. Toward this end, private water rights should be capable of being bought and sold like any other commodity.

Markets are the usual method of allocating scarce resources in our society, so the interest in applying market principles to water rights is not surprising. However, the current enthusiasm for water marketing has more complex origins. Water supplies are under new strains, resulting primarily from industrialization and urbanization. The response of the

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1. Almost every conference on water law has at least one paper devoted to water marketing or similar concepts, and some conferences are devoted entirely to such topics. Illustrating this trend, the University of Denver College of Law held its "Second Annual Conference on the Marketing and Transfer of Western Water Rights" in 1987. Another illustration is the recent appearance of a monthly newsletter on water marketing, The Water Market Update, published by the Western Network, Santa Fe, N.M.

2. Indeed, one writer suggests that an economist "might be defined as someone who doesn't see anything special about water." Tregarthen, Water in Colorado, Fear and Loathing of the Marketplace, in WATER RIGHTS 119 (T. Anderson ed. 1983).

West to new demands for water has usually been to develop additional supplies. However, practical, financial, environmental, and political factors are making development of new supplies increasingly difficult.

Practically, little water remains available for development in certain parts of the West. Financially, developing new supplies is approaching prohibitively expensive levels. What water is available for development typically consists of snowmelt and floodwater, which is only present for short periods of time, or of water which must be imported from river basins where there is a surplus. Such water is expensive. Effective utilization requires the construction of extensive facilities, including dams for collection and storage, aqueducts for transportation, and tunnels and pumping stations to surmount geographic barriers. In the past the federal government subsidized much of the water development. In this day of massive federal deficits, the West is finding the federal pocketbook increasingly difficult to pick.

Environmentally, there is great resistance to new water projects. Instream flow laws, the Wild and Scenic Rivers Act, the Endangered Species Act, NEPA, "public interest" criteria and other environmental

4. 1 U.S. WATER RESOURCES COUNCIL, THE NATION'S WATER RESOURCES 1975-2000 3 (1978) (17 of the 106 water resource subregions in the United States "have or will have a serious problem of inadequate surface water supply by the year 2000."). All 17 are located in the western United States. See 2 id. at 4, fig. 11-I. One writer concludes that in 24 of the 53 western subregions total water use (which includes offstream consumption and instream needs) actually exceeds average-year streamflows. Frederick, OVERVIEW in SCARCE WATER AND INSTITUTIONAL CHANGE 7 (K. Frederick ed. 1986).
5. See Frederick, supra note 4, at 23.
6. The water users on some federal irrigation projects repay no more than 10% of the construction costs. NATIONAL WATER COMMISSION, WATER POLICIES FOR THE FUTURE 128 (1973). Federal subsidies are typically created by charging parts of projects to nonreimbursable costs (flood control, recreation, etc.) and by collecting no interest or interest at below market rates for reimbursable costs of the project. One 1978 study of the Central Arizona Project concluded that the cumulative subsidy for that project would amount to $5.4 billion. The present value of this subsidy was calculated at $1.7 billion, which was equal to the estimated capital cost of the project at the time of the study. THOMPSON, AN ECONOMIC ANALYSIS OF THE CENTRAL ARIZONA PROJECT (1978) cited in F. WELCH, HOW TO CREATE A WATER CRISIS 81-82 (1985). In fact, as Thompson predicted, the actual capital costs of the Central Arizona Project were much higher than estimated in 1977, and are currently calculated at $3.5 to $3.75 billion. WELCH, Id. at 208.
7. The Carter administration's 1977 "hit list," which withheld funding for a number of proposed and partially built water projects, provided the first hard evidence of a new federal attitude toward western water projects. The most recent evidence of this new reality is the announcement that the primary mission of the Bureau of Reclamation, the preeminent promoter and builder of western irrigation projects, is being changed from water development to conservation, environmental protection, and water management. Los Angeles Times, Oct. 2, 1987, § 1, at 22. According to the Times story, a report accompanying this announcement noted that Congress has not authorized any new water projects for the Bureau since 1968. Reflecting the theme noted here, the report states: "Major agricultural water and power projects are becoming increasingly difficult to justify from an economic, bureaucratic and environmental prospective." Id.
8. Most western states have enacted laws of some form to preserve flows for "instream uses," such as fish and wildlife habitat and recreation. These laws are discussed in Tarlock, The Recognition of Instream Flow Rights: 'New' Public Western Water Rights, 25 ROCKY MTN. MIN. L. INST. 24-31 (1979).
lacks frequently inhibit or prevent new water projects. The environmental movement earned its spurs opposing water projects. Armed with a phalanx of environmental laws, environmental groups mount fierce and effective resistance to many new projects. Politically, there is also great resistance to water transport proposals. Economists may assert that water is a resource like any other, but the public does not see it that way. Parochial claims on water are strong; anyone familiar with attitudes in northern California or western Colorado, both regions in which water is exported to support faster growing parts of those states, can attest to this fact.

In sum, there is a growing realization that the West can no longer look entirely to water development to meet new demands. Instead, westerners must more effectively utilize existing supplies through reallocation and conservation. The free market, with its alleged advantages in facilitating the movement of resources from low value uses to high value uses and in encouraging conservation, is frequently advanced as the best

12. Every western state with the exception of Colorado requires some sort of “public interest” or “public welfare” review before permits to appropriate water are issued. See, e.g., WYOMING STAT. § 41-4-503 (1977); UTAH CODE ANN. § 73-3-8 (Supp. 1987) and ALASKA STAT. § 46.15.080 (1987). The most recent state to add such a requirement is Montana. See, MONT. CODE ANN. § 85-2-311(2) (1987).

13. One of the early great battles of the environmental movement was the unsuccessful attempt by the great environmentalist and founder of the Sierra Club, John Muir, to prevent the construction of a reservoir by the city of San Francisco in Hetch Hetchy, a magnificent valley in Yosemite National Park. Although unsuccessful, Hetch Hetchy was the first prolonged environmental fight against an apparent excess in technological progress and demonstrated the power of the radical amateur. See S. FOX, JOHN MUIR AND HIS LEGACY 139-47 (1981); W. BEAN, CALIFORNIA, AN INTERPRETIVE HISTORY 346-48 (1968). The Hetch Hetchy controversy, which raged for nearly 20 years before being resolved by congressional action in 1913, was reignited on August 7, 1987 when United States Secretary of the Interior Donald Hodel suggested that Hetch Hetchy might be drained and the valley restored. Hodel’s announcement that he had directed his staff to study the feasibility of such an undertaking drew praise from the Sierra Club and sharp criticism from the city of San Francisco. In addition to a generous supply of high quality drinking water, Hetch Hetchy also provides San Francisco with substantial revenues from electric power sales. See Los Angeles Times, August 7, 1987, at 2 col. 5.

14. The “Owens Valley” syndrome, resulting from the “rape” of the Owens Valley by Los Angeles in the early part of this century, remains strong in California. One manifestation is “area of origin” legislation to preserve water for slower growing parts of the state. CAL. WATER CODE §§ 10505, 11460-11463 (West 1971) and §§ 1215-1222 (West Supp. 1987). Apparently worried that this legislation might be repealed if it proved troublesome to the more populous parts of the state, attempts have recently been made to make it a part of the California Constitution. See Assembly Constitutional Amendments No. 13 and 26 and Senate Constitutional Amendment No. 24 (1987-88 Regular Session). In another manifestation, California voters refused in 1982 to approve the Peripheral Canal (Proposition 9, June 8, 1982 ballot), a project which would have allowed more water to be sent to the southern part of the state through the State Water Project. Examples of a similar attitude elsewhere are provided by Colorado legislation requiring conservancy districts to build compensatory storage on the west slope of the continental divide when diverting water to the east slope. COLO. REV. STAT. §§ 27-45-118(1)(b)(IV) (1973). Regional jealousy also led Senator Scoop Jackson of Washington to require a 10 year moratorium (later extended for another 10 years) on federal studies to import water into the Colorado River Basin as part of the Central Arizona Project Act. See 43 U.S.C.A. § 1511 (West 1988). Most recently, the Great Lakes states and Canadian provinces, currently awash in water, have adopted the Great Lakes Charter, which seeks to prevent the export of Great Lakes water to other regions. See J. SAX & R. ABRAMS, LEGAL CONTROL OF WATER RESOURCES 464 (1986).
means to this end.15 Cities and industries, confronted with the full cost of water development, see market purchases as a superior means of meeting their needs.16 Environmental groups and regional interests in potential export areas hope water marketing will eliminate the need for new, environmentally disruptive projects.17 Agricultural interests, which use eighty to ninety per cent of the water in the West and which are currently experiencing difficult economic times, are beginning to look upon water as a "cash crop."18

Finally, the "law and economics" movement is a factor. This movement, which has gained considerable strength in the last 20 years, has focused much attention on applying market solutions to legal problems. The movement has found a sympathetic audience in recent years. Contemporary opinions which view government regulation as anathema and which advance the marketplace as the solution to all problems are familiar.19 Because of the importance of water, much of the energy of this movement in the West has been directed toward water markets.

Despite the current enthusiasm and interest, water markets have failed to develop, except in limited circumstances. Economists typically give two reasons for this failure: legal restrictions and third-party effects.20 Contrary to common perception, legal restrictions to the transfer of water rights are not numerous21 and, except for restrictions on the transfer of
water supplied by the Bureau of Reclamation and irrigation districts, are not a significant factor in the failure of water markets. In any case, the theoretical solution to this problem is simple—the restrictions can be repealed by legislation.

Third-party effects, on the other hand, represent a significant impediment to the development of water markets. A number of economists have suggested that third-party effects are largely the result of deficiencies in the definition of water rights. That is, water rights are not defined in a manner that internalizes third-party effects; consequently, these effects must be determined and mitigated on a case-by-case basis, thereby inhibiting the development of water markets. The solution usually advanced by those making this argument is to redefine water rights by "consumptive entitlement" rather than "diversionary entitlement" as is currently done. If consumptive entitlements are adopted, so the argument goes, third-party effects will be internalized, private parties will be able to transfer water rights with little or no government involvement, and water rights markets will develop.

This article examines third-party effects and their impact on water rights transfers and water marketing. First, it considers the relationship between the nature of surface streams and the manner in which water rights are defined under the appropriation doctrine. The article attempts to demonstrate that the present definition is not an irrational mistake which can only be explained by pioneer ignorance but is instead a logical consequence of the complex nature of the water resource. Second, the article examines the impact of third-party effects on water rights transfers and shows that they do, indeed, present a formidable impediment to the development of water markets. Third, the article discusses the redefinition of water rights in terms of consumptive entitlements as a possible solution to the problem of third-party effects. The article will argue that redefinition is impractical and would, at best, provide only marginal relief for the problem. Finally, the article suggests approaches to minimize the difficulties which third-party effects create for water rights transfers.

Surface Streams and the Definition of Water Rights

An appropriation gives the appropriator the right to divert a specified quantity (e.g., 2 cubic feet per second) of the flow of a stream, at a particular point on the stream, for use for a particular purpose, at a particular place, provided the water is not needed to satisfy appropriations acquired at an earlier date. Thus, the parameters defining an appropriative right are its (1) diversionary entitlement, (2) point of diversion, (3) purpose of use, (4) place of use, and (5) priority date. As the following discussion

indicates, parts of the definition have historical roots. For the most part, however, the definition is a practical response to the complex nature of surface streams, and, apart from problems associated with water rights transfers, the definition provides a simple and effective mechanism for the allocation of surface streams.

Surface streams are a complex resource. Although it is common to talk of the "average" flow of a stream, "[a]ccording to nature, water does not flow in any stream by averages, but flows by extremes."25 There is great variation in stream flow from year to year, from season to season, and even from day to day.26 Because of variations, the annual yield of a stream is not known until the year is over. Further, without storage the annual yield, even if known, is not even particularly relevant to water use. The relevant question is whether the "flow" of the stream is adequate to satisfy the demands being made on it at a particular point in time. To put it somewhat differently, the problem the law attempts to solve is how to allocate the "flow" when it is inadequate to meet demands at a particular point in time. In other words, the resource consists of an instantaneous "flow," not gross "quantity" or an annual yield.

In addition, the flow varies depending on location. Streams are classified as "gaining" streams or "losing" streams depending on whether or not the stream gains water from or loses water to the surrounding groundwater table. On a gaining stream a larger flow will be available downstream than upstream; on a losing stream the opposite is true.

The existence of storage might have allowed the law to focus on annual yield instead of instantaneous flow, although there are some difficult problems which would have to be solved to make such a system work.27 In any case, storage was not available in appreciable amounts during the formative years of the appropriation doctrine. Although extensive storage now exists on many streams (such streams are typically referred to as "regulated" streams), the focus of the law remains on the allocation of instantaneous flow, not annual yield. Water is typically held in storage pursuant to particular water rights. As such, water may be stored only when flows are sufficient to satisfy the claims of those with earlier priorities. Once stored, water effectively becomes the property of the person or entity storing it, thereby removing it, at least temporarily, from the laws relating to water allocation.

The use of water increases the complexity of surface streams. Most uses of water are not entirely consumptive; rather, some of the water diverted returns to the stream. "Return flows" of 50% from irrigation are not uncommon, and most other uses produce return flows of varying

26. See infra note 29.
27. Storage sufficient to capture all or most of the annual yield of a stream would permit water to be allocated by a specified number of acre-feet per year. To make such a system work, the storage on a given stream would have to be under the control of a single entity (probably the state) so that an appropriator could call on his allotted quantity at any time during the year.
degrees.\textsuperscript{28} Return flows affect the availability of water downstream; one user’s return flows are another user’s source of supply. Similarly, the place and time at which return flows enter a stream affect stream flow patterns. The flow at a point along a heavily appropriated stream consists of an indistinguishable mix of natural flows and return flows.

In addition, needs are not typically constant. For example, irrigators need water only during the summer months, making flows available to others during the rest of the year. Irrigation is not constant even during the summer months. Rain may eliminate the need for irrigation at various times during the summer, again making water available to others. In losing streams, diversion of a particular flow at a higher elevation will leave more water for other appropriators than diversion of an equal flow at a lower elevation. In gaining streams the opposite is true.

The eastern United States has had few difficulties dealing with these conditions. Variations in stream flows are not so extreme as in the West.\textsuperscript{29} Furthermore, eastern streams are typically gaining streams, so the effect of upstream diversions is diminished. More importantly, the humid climate reduces the demand on water resources. Irrigated agriculture, the big consumer of water,\textsuperscript{30} is unnecessary and is not practiced on an extensive scale.\textsuperscript{31}

Demand is further moderated under the riparian doctrine by limiting use to those lands bordering a water course.\textsuperscript{32} With these limitations, conflicts are infrequent and usually occur when an unusual demand is made on a water resource or during an occasional drought. These conflicts are resolved on a case-by-case basis by limiting each riparian to a “reasonable” use and by requiring that water be shared in times of drought.\textsuperscript{33}

The West is not so fortunate. Irrigation is essential for agriculture and requires enormous quantities of water.\textsuperscript{34} Furthermore, irrigation demands are concentrated in only a part of the year. As the West developed, demand quickly exceeded supply during critical parts of the irrigation season, and a more sophisticated doctrine than riparian rights was needed if order was to be maintained and progress facilitated.

\begin{itemize}
\item \textsuperscript{28} See, e.g., Water Policies for the Future, supra note 6, at 7 (indicating that consumption from irrigation is 56% of withdrawals and total national water consumption is 24% of withdrawals).
\item \textsuperscript{29} Flows in an eastern stream may vary by a factor of 2 between the wettest and driest months; on a western stream this factor can be 40. The average annual flow of western streams varies by a factor of 85 between the wettest and driest years: on eastern streams this factor is 24. New Challenge, New Direction, The Water Policy Report of the Western Governors’ Association 7-9 (undated). See also Water Policies for the Future, supra note 6, at 5.
\item \textsuperscript{30} Nationally, irrigation accounts for 83% of water consumption. 1 The Nation’s Water Resources 1975-2000, supra note 4, at 30-31.
\item \textsuperscript{31} See id. (for a comparison of withdrawals for irrigation in the various regions of the country).
\item \textsuperscript{32} See 7 Water and Water Rights § 614.1 (Clark ed. 1976).
\item \textsuperscript{33} See Restatement (Second) of Torts § 850 (1979).
\item \textsuperscript{34} The origins of the appropriation doctrine are usually traced to the mining camps of California. See infra note 35. However, irrigation has been the major use of water in the West. Reflecting this, the appropriation doctrine has historically been “irrigation law.”
\end{itemize}
The Appropriation Doctrine

The appropriation doctrine was the western response. Drawing on the experience of the mining camps, the courts adopted the rule of priority—first in time, first in right. Those who first put water to use would receive water when the flow was inadequate to satisfy all demands.35 The rule of priority is not just a historical accident. It is first and foremost a rule of possession, grounded in accepted principles of the common law.36 Just as the first person to take possession of a wild animal acquires “property,” western courts ruled that the first person to take possession of water by diverting it and applying it to beneficial use acquires “property.”37 Furthermore, the rule of “first in time, first in right” is an accepted principle of equity and fairness. The late Frank J. Trelease, relying on a broad survey of nearly sixty countries, noted that priority is “the verbal identification of a very widespread human trait.”38 Numerous examples of the principle are found elsewhere in the law, including the “queue,” which is perhaps the oldest and most commonly used method of allocating scarce resources.

Most importantly, particularly in pioneer times, the rule of priority encourages economic investment.39 Economic investment is essentially a matter of risk assessment. If the prospective enterprise requires water from a stream, the investor must assess the risk that the stream may not provide sufficient water to meet the needs of the enterprise. This risk involves two components, supply and demand; i.e., how much water will nature supply and with whom must this water be shared? The priority rule deals with the demand component; it eliminates any requirement to share water needed in the enterprise with future users.

In the East, with its abundant supply and low demand, the risk that new demands for water will overwhelm the supply of a particular stream is generally small and can perhaps be ignored. In the arid West, this risk is substantial, rising almost to the level of a certainty in many cases. The rule of priority eliminates future demand as a risk factor by giving the investor a guarantee that his appropriation will be fully satisfied before subsequent appropriators can divert water. Anything which eliminates risks encourages investment.

In accordance with the nature of the resource, priority under the appropriation doctrine is priority as to “flow,” not volume. Emphasizing this, Wells Hutchins said:

This right of prior appropriation attaches to the flow of the stream in its natural condition at the time the appropriation is made.

36. See 1 S. WIEL, WATER RIGHTS IN THE WESTERN STATES § 275 (3d ed. 1911).
37. Has any lawyer forgotten the fox in Pierson v. Post, 3 Cal. R. 175 (N.Y. Sup. Ct. 1805)?
Junior appropriators have no right so to interfere with the flow of water, by detaining and releasing it at irregular intervals and thus causing fluctuations of flow within wide limits, as to interfere seriously with use of water by downstream prior appropriators and thus cause them substantial damage, even though the total quantity flowing to the headgates of the latter over a 24-hour period is not diminished.\footnote{W. Hutchins, Selected Problems in the Law of Water Rights in the West 330 (1942).}

Priority alone was not adequate if full development of water resources was to be encouraged. Just as the first user needed assurance that the second user would not steal his water, the second user needed assurance that the first would not take water on which the second depended. As Elwood Mead put it:

As scarcity of water led to the adoption of the doctrine of priority, the two led to the necessity of defining the quantity of water to which an appropriator should be entitled. While the early appropriators were entitled to protection in their use of water, the later comers had an equal claim to protection from enlargement of those uses. The first appropriator had the first right, but he had not the right to take all the water he might want at any future time. His right must, in justice to others, be defined as to quantity as well as to time. In theory, beneficial use has been made the measure of a right. That is, each appropriator has a right as against a subsequent appropriator to a continued use of whatever quantity of water had been put to a beneficial use at the time of the acquirement of the subsequent right.\footnote{E. Mead, Irrigation Institutions 66, 67 (1903).}

Mead uses the term "quantity" loosely. The junior appropriator, like the senior appropriator, is concerned with flow, not quantity. To paraphrase Mead, "the later comers had an equal claim to protection from the enlargement of prior uses which reduced the flow available to satisfy their appropriations." He might more accurately have said that the senior right "must, in justice to others, be defined as to its effects on flow." Consequently, a rate of diversion, commonly stated in cubic feet per second (cfs), limits the "flow" to which each appropriator may claim a priority as against subsequent appropriators.\footnote{"The cubic foot per second has come into general use as the unit of volume for gauging and dividing rivers." Id. at 107 (emphasis added). In the early years, the capacity of the ditch served as the measure of the flow to which an appropriator was entitled. Later, actual "beneficial use" became an additional limitation. See, e.g., W. Hutchins, Water Rights Laws in the Nineteen Western States, 491-522 (1971); S. Wiel, supra note 36, at §§ 473-482. Some states, in an effort to provide uniformity and give some objectivity to the standard of beneficial use, enacted "duty of water" statutes limiting the flow which irrigators can claim. See, e.g., Wyo. Stat. § 41-4-317 (1977) (limiting an irrigator to 1 cfs for every 70 acres irrigated).} Some states later added a volume ("quantity") limitation. For example, a Nebraska statute limits an irrigator...
to 3 acre-feet per acre per year.43 Such volume limitations merely place a "cap" on water use to promote efficiency and prevent waste and are not very important in the day-to-day adjustment of water rights. Thus, the right to divert a specified flow (a diversionary entitlement) remains the primary limit on water rights.

However, the effect of an appropriator's use on stream flows is not simply a matter of the rate of diversion. In addition to the rate of diversion, the effect is a complex product of the point of diversion, the amount of water diverted, the times of diversion, the return flows produced, the place and time at which the return flows enter the stream, and other factors. A change in any of these factors may interfere with junior uses. For example, a senior appropriator might reduce return flows without increasing the rate of diversion, thereby depriving downstream junior appropriators of water.

In a perfect world where information is both complete and costless, an appropriator's right might be further defined by directly specifying these effects on stream flows. Of course, stream hydrology was only crudely understood in the last century. The information or data necessary to apply principles of stream hydrology was frequently unavailable and could only be obtained at great cost. Thus, it was not feasible to define water rights by directly specifying the effects on stream flows. Rather, note was taken of the fact that these variables are largely determined by the point of diversion, the place of use, and purpose of the use, and these parameters were used to further define the right.

Unlike the priority date and the diversionary limitation, which cannot be changed, the point of diversion, the place of use, and the purpose of use can be changed. It could be argued that these are not defining criteria at all. However, a change in these criteria is permitted only if it can be shown that the change will not produce a detrimental alteration in the flow regime. These criteria do, in fact, define (limit) the water right. As Mead states in the preceding quotation, an appropriator's "beneficial use" is the measure of his right.

Defining a water right by its point of diversion and place and purpose of use is responsible for many of the third-party effects which result from water rights transfers,44 and, for this reason, the practice is sometimes criticized. The adoption of these criteria was not, however, an irrational or ill-considered attempt to frustrate transfers. As the foregoing discussion indicates, these criteria were adopted as an effective, practical means of protecting junior appropriators and, thereby, encouraging full development of water resources. The use of these criteria may also have been motivated by an additional practical consideration. Any attempt to define rights more precisely with regard to the effect on stream flows

43. NEB. REV. STAT. § 46-231 (1984). For a recent case discussing whether a volume limitation can be imposed on a right previously subject only to a flow limitation, see Mac-Donald v. Montana, 722 P.2d 598 (Mont. 1986).
44. See the next section of this article.
might have locked appropriators into an undesirable straight-jacket. Consider, for example, an appropriation for irrigation. Good husbandry and economic conditions may dictate that a variety of crops be grown over time. Different crops have different water needs. Similarly, climatic conditions vary from year to year, producing different water needs. Defining the water right by the purpose of use—“irrigation” in this case—gives the appropriator flexibility to respond to these sorts of variations within the limits of his diversionary entitlement. To be sure, the flexibility given a senior appropriator increases the uncertainty for junior appropriators, but the range of change which the senior can produce is greatly proscribed. The increase in uncertainty is therefore generally insubstantial, particularly when compared with the uncertainties which junior appropriators face as a result of natural variations in stream flow.

As just defined, appropriative rights provide a means of allocation which is suited to the resource being allocated. Each appropriator is granted the right to a specified flow (a diversionary entitlement). Variation in flow is accounted for by the rule of priority. At a particular point in time, an appropriator may take his diversionary entitlement unless the flow is needed to fill the diversionary entitlements of prior appropriators. As the flow increases, persons holding entitlements with progressively more recent priorities are allowed to divert water; as the flow decreases this process is reversed. In this manner, demand is matched to flow.

Appropriative rights are also simple to administer. In the absence of changes in use, the law need only do two things: it must see that diversionary entitlements are not exceeded and it must regulate these entitlements in order of priority. Diversionary entitlements are easy to enforce. All that is required is that each headgate be designed so that diversions can be measured and regulated. The enforcement of priorities is similarly uncomplicated. An appropriator may divert water at any time it is not needed to satisfy the rights of downstream senior appropriators. If an appropriator is not receiving a sufficient flow at his point of diversion to fulfill his diversionary entitlement, the diversions of upstream junior appropriators are regulated (shut down) in order of priority. Here, all that is required is a compilation of priority dates so that the appropriators to be regulated can be easily identified. On heavily used streams with large numbers of appropriators, government intervention in the form of a “water master” may be required to insure that these tasks are performed expeditiously and efficiently. Nevertheless, the process is not a complicated one.

The italicized qualification in the prior paragraph might seem a substantial one. Historically, it has not been. In the initial stages of development of the appropriation doctrine, when the focus was on encouraging and protecting the initial use of water, transfers were of little concern. Furthermore, at a time when irrigation was practically the only use for water, transferring water from an existing irrigation project to a new one seldom made economic sense. To begin with, the first irrigators usually selected the best sites, making it unlikely that a subsequent irrigation
project would be superior. In addition, the diversion and use of water typically requires large capital expenditures for dams, headgates, canals, and other facilities. Once made, these expenditures are sunk costs and are essentially irrelevant in determining future economic returns. Similar capital expenditures, not yet sunk, are relevant in determining the economic return from a project yet to be built. Seldom is a new irrigation project sufficiently better than an earlier one to offset the advantage which this gives the earlier project.

Water rights created by the appropriation doctrine might be analogized to a jigsaw puzzle in which each piece represents a water right. The area of a piece represents the diversionary entitlement, and the shape represents other variables which affect stream flows. These variables include the amount and timing of return flows, the place at which they enter the stream, the frequency and the seasonal patterns of diversion, and the point of diversion. The first appropriator is free to carve out a piece of any size and shape. Each subsequent appropriator is also free to determine the size and shape of his piece, except that it cannot encroach on the pieces carved out by prior appropriators. As this process progresses, the pieces or rights become a tightly interlocking pastiche.

The task of the appropriation doctrine is to prevent one piece from encroaching on another. The priority principle performs this task for senior appropriators. Any time the use of water by a junior appropriator interferes with a senior appropriator's use, the junior is required to modify or terminate his use to eliminate the interference.

The principal mechanism for protecting juniors is the diversionary entitlement. A senior appropriator cannot increase his diversionary entitlement to the detriment of junior appropriators. In the context of the jigsaw puzzle, the senior cannot change the size of his piece. But what about changes in the shape of the piece? What prevents a senior appropriator from reducing return flows or altering some other variable so that his piece encroaches on that of junior appropriators? For the most part, this is not a problem. Return flows and the other variables represented by the shape of the piece are largely determined by place and purpose of use. As long as there are no changes in use, the regulation of the diversionary entitlements of senior appropriators protects junior appropriators.

In summary, whatever its shortcomings where transfers are concerned, the appropriation doctrine has great virtues. It allocates surface streams in a manner that is suited to their complex physical nature, that is generally perceived as fair, that encourages water development, and that is simple to administer. These virtues should be kept in mind when criticizing the doctrine. Further, when considering changes to the doctrine to make it more responsive to water marketing, gains made with regard to marketability must be weighed against losses with regard to these virtues.

45. Of course, the cost of the facilities is not irrelevant to the individual incurring them. This is particularly true if funds will have been borrowed to finance the facilities. The burden of servicing the borrowed funds may result in financial failure.
Transfers and Third-Party Effects

As used in this article, and as typically used in discussions of water rights, a "transfer" indicates a change in purpose of use and/or a change in place of use, which often incidentally requires a change in point of diversion. The place and purpose of use and the point of diversion are defining parameters of an appropriative right, a transfer is not, then, a simple change in ownership; rather it is an alteration of the water right itself. If one were to draw an analogy to land, a water rights transfer is more like a zoning change than a sale of land. Because of this, it is not surprising that transfers create some problems for third parties. This section examines these difficulties.

Although not of principal concern in the early years of the appropriation doctrine, transfers were permitted almost from the beginning, subject to the limitation that a transfer could cause no injury to junior appropriators. Stating this rule from the perspective of junior appropriators, some courts have said that an appropriator has a vested right in the continuation of the stream conditions which existed when his use was initiated. Although the "no injury rule" may sometimes completely block a transfer, more often it results in the imposition of conditions to mitigate the injury.

The following discussion examines the more common forms of injury resulting from the transfer of water rights and the conditions typically imposed to mitigate injury. The purpose of this examination is not to provide an exhaustive treatment of this complex topic. Rather it is to illustrate the impediment which the rule imposes to the development of water markets and to provide a perspective for the consideration of solutions discussed in subsequent sections.

Reduced Return Flows

The most common injury is a reduction in return flows or, stated conversely, an increase in consumption. If an irrigation right with a return flow of 50% is transferred to a new place of use in another river basin, its return flows are no longer available to other appropriators in the basin of origin. A similar loss in return flows will occur if the same irrigation right is transferred to an industrial use which is 100% consumptive. Obviously, the new use need not be 100% consumptive to cause injury. Any increase in consumption may cause injury if no adjustments are made.

47. See Farmer's Highline Canal & Reservoir Co. v. City of Golden, 129 Colo. 575, 272 P.2d 629, 631 (1954). Of course, the "no injury" rule is merely a corollary of the holding that a junior appropriator is protected against enlargement of a senior appropriator's uses. See supra text at note 41.
48. Indeed, several states have decisions indicating that a proposed transfer can be denied only when it is impossible to condition the right to mitigate the injury. See Colorado Springs v. Yust, 126 Colo. 289, 249 P.2d 151 (1952); Tanner v. Humphreys, 87 Utah 164, 48 P.2d 494 (1935).
The obvious mitigation measure is to restrict diversions under the new use. For example, if an irrigation right which is 50% consumptive and which has a diversionary entitlement of 10 cfs is transferred to a use which is 75% consumptive, the diversionary entitlement would be reduced to 6.67 cfs to compensate for the decrease in return flows. The net effect of the old use was to reduce stream flows by 5 cfs. Restricting the new use to a diversion of 6.67 cfs produces the same net effect on stream flows.

In addition to requiring an adjustment in the diversionary entitlement, it is also typical to impose a limit on the total quantity which can be diverted in these situations. For example, if it was determined that the irrigation right in the preceding paragraph consumed a total of 210 acre-feet of water each year, a similar limit would be placed on the new use. Because the new use is 75% consumptive, diversion of 280 acre-feet will produce 210 acre-feet of consumption. Thus, after transfer, water could be diverted at a rate of 6.67 cfs until 280 acre-feet had been diverted.

Transfers of Seasonal Water Rights

Transfers of seasonal water rights, such as irrigation appropriations, present special problems. The most obvious injury from the transfer of a seasonal right is an increase in diversion and consumption resulting from an extension of the period of use. However, a mere shift in the dates of diversion can cause injury. For example, a water right with a very junior priority often provides a secure water supply because diversions are made during periods of the year when demand is low. If, as the result of a transfer, diversions under a senior seasonal right are shifted to these periods of low demand, the junior right could be injured. If the nature of the use permits (as in the case of a reservoir right), it may be possible for the holder of the junior right to make up any shortfall by shifting diversions to other periods of the year. However, its relatively inferior priority makes it unlikely that any water will be available to the junior right at times of high demand. Even water which may have been freed during periods of high demand because diversions under the transferred right have been shifted to periods of low demand is likely to be claimed by holders of rights senior to the displaced junior right. Thus, it is critical to the holder of the junior right that its claim on flow during the period of low demand be preserved, illustrating again that it is the protection of flows, not volume, that is central to the appropriation doctrine.

49. See, e.g., Basin Elec. Power Coop. v. State Bd. of Control, 578 P.2d 557 (Wyo. 1978). In Broughton v. Stricklin, 146 Or. 259, 28 P.2d 219 (1939), a change from hydroelectric generation, a nonconsumptive use, to irrigation was prohibited. Id.
51. If diversions under the old use were constant, the restriction on quantity would be unnecessary. The restriction on quantity adjusts for the seasonal or intermittent nature of diversions.
52. Many reservoir rights fall into this category. Although junior in priority, reservoir rights frequently provide a more secure supply than more senior direct flow rights because the reservoir is filled during times of low demand or extremely high flow.
To prevent these injuries, a transferred seasonal use may be restricted to diverting water during its traditional season.\textsuperscript{64} Thus, in the preceding example, the new use might be restricted to diverting 6.67 cfs of water from May 15 to September 15, until a total of 280 acre-feet have been diverted. If the new use requires water on a year-round basis, this limitation may make it necessary to construct a reservoir so that water may be stored during the summer for use during the rest of the year.

\textit{Stream Conveyance Losses}

Stream conveyance losses constitute a third form of possible injury. Consider the situation in the following diagram:

\begin{figure}
\centering
\begin{tikzpicture}
\node [circle, draw] (J) at (0,0) {J};
\node [circle, draw] (S) at (2,0) {S};
\node [circle, draw] (Proposed S) at (4,0) {Proposed S};
\draw [->] (J) -- (S) node [midway, above] {10 cfs Diversion};
\draw [->] (J) -- (Proposed S) node [midway, above] {5 cfs Diversion};
\draw [->] (J) -- (0,2) node [midway, left] {5 cfs Diversion};
\draw [->] (S) -- (0,-2) node [midway, left] {0 cfs Return Flow};
\draw [->] (Proposed S) -- (0,-2) node [midway, left] {0 cfs Return Flow};
\end{tikzpicture}
\end{figure}

For simplicity, assume that both J's use and S's use are 100\% consumptive. Also assume that the stream is a losing stream and that there is a stream conveyance loss of 0.5 cfs between J's point of diversion and S's point of diversion. The conveyance loss between J's point of diversion and S's proposed point of diversion is 1.5 cfs. As things currently stand, J can take his entire appropriation (5 cfs) whenever there is 15.5 cfs in the stream at his place of diversion. If S moves his point of diversion to the proposed location and no other adjustments are made J will only be able to divert 4 cfs when the stream flow is 15.5 cfs (11.5 cfs must be released downstream to deliver 10 cfs to S). The obvious mitigation measure is to reduce S's diversion to 9 cfs.\textsuperscript{64} The unavailability of actual data on stream conveyance losses has sometimes resulted in denial of a proposed transfer or in the use of high loss estimates.\textsuperscript{65}

\textit{Changes in Point of Diversion}

A fourth form of injury, which results from changes in the pattern or order of rights on a stream, is illustrated by the following diagram:\textsuperscript{66}

\begin{figure}
\centering
\begin{tikzpicture}
\node [circle, draw] (2) at (0,0) {#2};
\node [circle, draw] (1) at (2,0) {#1};
\node [circle, draw] (3) at (4,0) {#3};
\node [circle, draw] (Proposed 1) at (6,0) {#1 (proposed)};
\draw [->] (2) -- (1) node [midway, above] {10 cfs Diversion};
\draw [->] (2) -- (3) node [midway, above] {5 cfs Diversion};
\draw [->] (2) -- (Proposed 1) node [midway, above] {20 cfs Diversion};
\draw [->] (1) -- (0,-2) node [midway, left] {10 cfs Return Flow};
\draw [->] (1) -- (2,-2) node [midway, left] {5 cfs Return Flow};
\draw [->] (1) -- (3,-2) node [midway, left] {0 cfs Return Flow};
\end{tikzpicture}
\end{figure}

53. See, e.g., City of Westminster v. Church, 167 Colo. 1, 445 P.2d 52 (1968); Basin Elec., 578 P.2d at 557.
55. See Gould, supra note 21, at 1833, 1834.
56. See also Ellis, Water Transfer Problems: Law, in WATER RESEARCH 233 (1966) for an excellent discussion of these problems.
The numbers over each diversion indicate the order of priority. As things now stand, all parties can divert when the flow in the stream is 20 cfs or more. Assume appropriator #1 proposes a transfer which would move his point of diversion downstream of #3. If appropriator #1's right is not adjusted, appropriator #3 will be able to divert nothing when the flow is 20 cfs because the entire 10 cfs flow remaining after #2's use will be required to satisfy #1's right.

A possible mitigation measure is to limit diversions at the new point to #1's consumptive use, 5 cfs. However, this measure does not fully protect #3 when stream flows are less than 20 cfs. At present, #3 receives his entire appropriation when stream flows are between 20 cfs and 10 cfs because of his position below #1. When flows are between 10 cfs and 0 cfs, #3 received roughly half the stream flows in the form of return flows from #1's use. Under the proposed measure, #3 could take nothing at stream flows of 10 cfs and below and would receive his full appropriation only when stream flows were above 20 cfs. It is possible to solve this problem, but the solution is quite complicated and adds to the administrative difficulties associated with the enforcement of water rights.57

The proposed solution has also been criticized for over-compensating in some cases.58 If #1's use continues to be 50% consumptive after the transfer, a diversion of 5 cfs at the new point will produce return flows of 2.5 cfs which previously did not exist, thereby providing a windfall to downstream junior appropriators. The study for the National Water Commission suggested that a person in this situation ought to be treated as owner of these newly created return flows, with the right to sell them or use them as he saw fit.59

If #1 proposes a move of his point of diversion upstream of #2, the problem becomes almost intractable. No limit on #1's diversion will fully protect #2. For example, any diversion and consumption by #1 when stream flows are at 20 cfs will reduce the flows available at #2's point of diversion below the 20 cfs needed to satisfy his right. Number one's right might be subordinated to #2, but that is hardly a solution that #1 would find palatable; the retention of priority is a major aim of transfers.

Three economists, Gisser, Johnson, and Werner, have labeled the preceding difficulties "flow constraint" problems.60 They define flow constraint as a situation in which one or more appropriators do not have sufficient flows at their place of diversion, even though the total consumption does not exceed the available supply. In the preceding example there is no flow constraint if the order of diversion, upstream to downstream, is #2, #1, #3. However, a flow constraint exists at a stream flow of 20 cfs

57. The solution requires placement of a gauging device at #1's old point of diversion and the regulation of diversions by #1 and #2 to permit #3 to divert water whenever stream conditions are such that #3 would have been able to divert water prior to the transfer. This solution is discussed in Gould, supra note 21, at 1836-40.
58. See Meyers & Posner, supra note 18, at 36, 47.
59. Id.
60. Johnson, Gisser & Werner, supra note 15, at 277.
if the order of diversion is #2, #3, #1. The total consumption from all three uses remains 20 cfs, exactly equal to the stream flow. However, if appropriators #2 and #3 exercise their rights fully, only 5 cfs will arrive at #1's point of diversion, enough to satisfy his consumptive needs but not enough to meet his diversionary entitlement. A flow constraint also exists at a stream flow of 20 cfs if the order of diversion is #1, #2, #3. Now it is #2 who will be shorted if #1 exercises his right fully.

Where flow constraints do not exist, Gisser, Johnson, and Werner observed that, if there is no increase in consumption, rights can be moved freely up and down a stream without causing the problems discussed above. For example, in the preceding illustrations, assume that 80 cfs of stream flows is legally committed to downstream use because of compact obligations or because of the rights of users who are senior to appropriators #1, #2, and #3. Quick calculations will show that the rights of appropriators #1, #2 and #3 are not affected by the order of diversion. In such a situation, none of the three can divert when the flow of the stream is 80 cfs or less. All three can exercise their rights fully at stream flows of 100 cfs or more. At flows between 80 cfs and 100 cfs, their rights will be regulated (diversions reduced or terminated) in order of priority, but the degree of regulation of each at any particular flow is independent of the order of diversion.

The Gisser-Johnson-Werner observation suggests that injuries resulting from the change in diversion patterns may not be as prevalent as assumed. In addition, it suggests that courts and officials should not simply assume that the alteration of diversion patterns will cause injury. Of course, this is not a panacea for diversion pattern problems. It is valid only where there is a senior obligation to deliver large flows downstream. In addition, care must be taken to assure that the downstream commitment coincides with the rights being transferred.

For example, the North Platte decree requires Wyoming to deliver 75% of the flow of the North Platte River to Nebraska. At first glance, it might appear that this commitment makes flow constraints on the North Platte and its tributaries in Wyoming unlikely. The commitment exists only during the irrigation season, specifically from May 1 to September 30 each year. Flow constraints could still be a problem if a transfer involved a water right which is exercised at other times of the year. In addition, many of the small tributaries of the North Platte are exempt from the decree. Again, the decree commitment would provide no protection from flow constraints in transfers of rights on these tributaries. Nevertheless, there may be numerous situations where downstream commitments do eliminate flow constraints.

61. Id. at 280-83.
63. Id.
64. Id. at 623-24, 665-66.
Temporary Storage Problems

A fifth form of potential injury is associated with the "temporary storage" sometimes provided by return flows. It often takes days or weeks for return flows to reach the stream. This delay often provides a benefit to downstream appropriators by adding to stream flows in the late summer when water to mature crops is particularly critical. Consider the irrigator who diverts 2 cfs, producing return flows of 50%. Earlier it was suggested that reduction of the diversionary entitlement to 1 cfs would mitigate the harm to downstream juniors if this right was transferred to a use which is 100% consumptive. This solution leaves 1 cfs in the stream to replace the irrigator's return flows. However, the water left in the stream will reach the downstream appropriators almost immediately. On the other hand, the return flows which the water left in the stream replaces may have appeared in the stream in late summer. Although there does not appear to be much law on this subject, at least one trial court has required that releases be made to replace these flows. Replacement will usually require the construction of storage facilities so that stream flows can be held and released to reach the downstream appropriators at about the same time as the return flows previously did.

Other Problems

It is well settled that the appropriation doctrine protects quality as well as quantity. Consequently, a transfer cannot produce changes in quality which cause material injury to other appropriators. Mitigation here will require steps to eliminate the reduction in quality.

The types of injury against which junior appropriators will receive protection seems to be growing. For example, recent decisions by the Wyoming Board of Control have indicated that adjustments must be made in transfer proceedings to account for natural subirrigation that will continue after lands are taken out of production and to account for the loss of soil moisture during years of nonirrigation in an intermittent transfer from irrigation to power production. Thus, the preceding discussion of injuries to other appropriators should not be considered exhaustive.

65. Application of the City of Aurora, No. W-7932-75 (D. Ct., Colo. Water Div. No. 1, June 21, 1979). The regulations of the Wyoming Board of Control state that a transfer applicant may be required to prepare studies on "return flow lag time," suggesting that the board would consider changes in the timing of return flow in determining injury. Regulations and Instructions of the State Board of Control, Part IV, § 50 (F) (1982).
66. Hill v. King, 6 Cal. 336 (1887); 1 Hutchins, supra note 42, at 448.
67. 1 W. Hutchins, supra note 42, at 448. See A-B Cattle Co. v. United States, 196 Colo. 539, 589 P.2d 57 (Colo. 1978) (concluded that an appropriator had no right to "dirty" water).
69. See Petition of Basin Elec. & Power Coop., Wyom. Bd. of Control Docket Nos. I-U-79-3-2 & I-U-79-4-1, Finding of Fact No. 28 (1980). The Board indicated that there would be above normal requirement for water in the years following use of water in the power plant because of the loss of soil moisture. Id.
Injuries to Non-Appropriators

The foregoing discussion involved injuries to other appropriators resulting from the transfer of water rights. But transfers may cause injuries to the environment or to persons who are not appropriators. For example, the transfer of a point of diversion a substantial distance upstream could have a serious effect on the aquatic environment between the old and new places of diversion. Large scale transfers of agricultural rights from a rural community to a distant city could reduce the tax base of local schools, undermine the economy of the rural community, and cause businesses and banks to fail. Historically, injuries of these sorts have been ignored by the law. The statutes and judicial decisions generally indicate that only other appropriators are protected from injury.

The law, however, seems to be changing. A Wyoming statute enacted in 1973 directs the Board of Control to consider the economic effects of a proposed transfer, and other language of the statute is broad enough to be construed as giving the Board authority to consider environmental effects. A California statute added in 1980 relating to trial transfers directs the Water Resources Control Board to approve a transfer only when it concludes that the transfer will not "unreasonably affect fish, wildlife, or other instream beneficial uses." Recently, New Mexico, Idaho, and Montana have added public interest considerations to their transfer criteria. Nevada and Texas have required consideration of the public interest in transfer proceedings for some time, but these requirements seem to have little actual application. The Public Trust Doctrine, as articulated by the California Supreme Court in National Audubon Society v. Superior Court, may also require the consideration of environmental effects in transfer proceedings.

Impact of Third-Party Effects on the Transfer Process

The determination and mitigation of third-party effects has a substantial impact on the transfer of water rights. To begin with, all western states

70. See, e.g., In re Robinson, 61 Idaho 462, 103 P.2d 693 (1940) (overruled an objection to a transfer based on the loss in tax base).
71. See, e.g., Ariz. Rev. Stat. Ann. § 45-172 (Supp. 1986); Utah Code Ann. § 73-3-3 (Supp. 1987). This is in marked contrast to the law relating to the initial appropriation of water, where, in most states, water officials are given broad powers to consider the "public interest" in granting permits for the appropriation of water. See supra note 12.
72. See Wyo. Stat. § 41-3-104(a) (1977). The Wyoming Board of Control has denied transfer petitions because the applicant did not supply data on the economic effect of the transfer. See Petition of Pacific Power and Light, supra note 68, at Finding of Fact # 13.
require administrative or judicial approval before a right is transferred.\textsuperscript{77} The prevention of third-party effects is the primary purpose of the administrative or judicial process. In most states, the burden of proof is on the proponent of the transfer. That is, the proponent must, at least, make a prima facie case that the transfer will not result in injury to third parties.\textsuperscript{78} In addition, other appropriators may participate in the proceeding and assert that the transfer, despite proposed mitigation measures, will cause them injury.\textsuperscript{79} If the state recognizes indirect third-party effects, environmental organizations, state agencies, like the fish and game department, and local booster groups, such as the chamber of commerce, may also intervene.

Determining third-party effects is a complex process, frequently requiring the assistance of various experts and the accumulation of extensive data. For example, the prevention of an increase in consumption is a major concern in most transfer proceedings. In the earlier examples used in this paper, consumption is treated as given. Similarly, much of the writing on transfers and water marketing reads as if there were two metered pipes, one for diversions and one for return flows, leading from the stream to the place of use. Of course, such is not the case. Actual data concerning the quantity of water diverted is frequently not available. Return flows may sometimes enter streams as discrete, identifiable, sources, but even so, these flows are seldom measured. More often return flows seep back over a broad stretch of the stream or percolate into groundwater which is tributary to the stream, making direct measurement impossible. Consequently, it is usually necessary to estimate consumption indirectly.

Techniques such as the Blaney-Criddle method use temperature, sunshine, climatological data, and consumptive use coefficients for various crops to estimate consumption.\textsuperscript{80} This approach requires the collection of data about the area irrigated and the crops grown. It also requires the assistance of agronomists, agricultural engineers, and other experts. It leads to an inevitable battle of experts concerning factual information and technical issues. Furthermore, this method assumes that only water used in the growing process is "consumed." Because the purpose of the transfer process is to preserve stream flow conditions, however, consumption properly includes all water lost to the stream, not just that used in the growing process. Thus, irrigation water which seeps into deep aquifers not tributary to the stream or which collects on the surface and evaporates


\textsuperscript{78} See Gould, supra note 21, at 1844-45.


\textsuperscript{80} See Blaney & Criddle, Determining Water Requirements for Settling Water Disputes, 4 Nat. Resources J. 29 (1964). See also Gould, supra note 21, at 1824-33.
is also "consumed" and should be included in the amount available for transfer.81 Disputes involving the extent of such losses further complicates the transfer process.

Although the effect on consumption is typically the central focus of transfer proceedings, other matters must also be evaluated. Like consumption and return flows, information concerning stream conveyance losses, the timing of return flows, the effects of alterations in diversion patterns, water quality changes resulting from a change in use, and other factors which must be evaluated to determine the effects of a proposed transfer, is sketchy or nonexistent and subject to varying interpretations. Gathering this information, evaluating it, and presenting it entail the same delays, expenses, and uncertainties as information concerning consumption.

Difficulties and uncertainties associated with the determination of third-party effects is further compounded by the "historic use" rule, applied in some western states. The historic use rule holds that the actual use of water by an appropriator, not the "paper" right described in the permit, certificate, or license, determines the amount of water which can be transferred.82 Stated conversely, in determining third-party effects, the historic use of the appropriation, not the "paper" right, is controlling. Application of the rule can substantially reduce the water which can be transferred. For example, in one Wyoming case, the diversionary entitlement was cut from 98.73 cfs to 46.77 cfs and similar reductions were made in consumptive use figures because the appropriator had irrigated only about one-half of the land for which water had been appropriated.83

The historic use rule is a logical corollary of the no injury rule. The historic use rule may also be a product of early quantification procedures which often awarded excessive amounts of water to appropriators.84 Finally, the rule reflects the same policies that underlie western forfeiture and abandonment laws - the use it or lose it philosophy. Although criticized by economists,85 these laws are a universal part of the water law of western states.86

Whatever the reasons for the rule, it greatly complicates water rights transfers. The rule throws into doubt much of the data contained in water rights certificates and decrees, thereby eroding the usefulness of cer-

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81. See Green v. Chaffee Ditch Co., 150 Colo. 91, 371 P.2d 775 (1962) (added ditch losses to the water used in the growing process in computing consumption); Basin Electric, 578 P.2d at 557 (limited the transfer to the quantity of water used in the growing process and refused to allow the transfer of waste water which collected in a closed basin and evaporated). The Wyoming decision is based on an extremely technical reading of the Wyoming transfer statute, WYO. STAT. § 41-3-104 (1977), and has been widely criticized. See Trelease, The Changing Water Market for Energy Production, 5 J. CONTEMP. L. 83, 89 (1970); Gould, supra note 21, at 1829-31.
85. See, e.g., Milliman, supra note 15, at 49.
86. See 5 WATER AND WATER RIGHTS § 413 (R. Clark ed. 1972).
tificates and decrees as a basis for informed decision making. The rule also adds additional factual and legal issues which may be disputed and must be resolved in the transfer process. For example, how long a period of time is historic? What period controls if an appropriator's use has varied from time to time? How is historic use calculated if use has varied within the historic period?  

It should be emphasized that the transfer procedure is a comparative one. The effects on stream conditions of the present and the proposed use of the right must be determined and compared. In some cases, such as interbasin transfers, the effects of the proposed use are quite simple to determine. On the other hand, if the transfer involves a change to a new use or a new place of use within the same basin, there may be as much uncertainty and debate about the effects of the new use as there are about the present one.

In theory, the focus of transfer proceedings is on third-party effects. As streams become heavily appropriated, almost any change in stream conditions is likely to produce injury to someone. Consequently, there is a tendency on the part of water officials and judges to focus on the preservation of stream conditions in approving transfers. If an applicant for a transfer can show that existing conditions will be preserved, the transfer will be approved. If he cannot, the transfer may be denied despite the lack of any direct showing that others will be injured.

**Third-Party Effects and Water Marketing**

Third-party effects greatly impede the development of markets in appropriative rights. Markets perform best when dealing with homogeneous products, but appropriative rights are far from homogeneous. Because the priority date and the point of diversion, place of use, and purpose of use which define appropriative rights differ for each appropriation, each right is unique. This means that each right must be dealt with on an individualized basis, giving rise to the problems discussed below.

Using the earlier jigsaw analogy, the problem results from the description of the pieces. To describe a piece accurately, both its size and shape must be known. Unfortunately, only the size of the piece (the diversionary entitlement) is clear. A vague outline of the shape may be gleaned from the size and from the point of diversion, the place of use, and the manner

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87. For a discussion of these issues see Gould, supra note 21, at 1843-44.
88. See, e.g., Farmers Highline Canal & Reservoir Co. v. City of Golden, 129 Colo. 575, 272 P.2d 629 (1954), in which the Colorado Supreme Court reversed a trial court decision which had approved a transfer despite a showing of increased consumption because the injury could not be shown to affect any junior appropriator specifically. In reversing, the supreme court held, in effect, that the increase in consumption was certain to affect some appropriator. Id.
89. See Howe, Schurmeier & Shaw, Innovations in Water Management: Lessons from the Colorado-Big Thompson Project and Northern Colorado Water Conservancy District, in SCARCE WATER AND INSTITUTIONAL CHANGE, supra note 15, at 171, 184. A homogeneous product is one of the requirements of a perfectly competitive market. C. Ferguson, MICROECONOMIC THEORY § 8.2b (1972).
of use. However, this vague outline is not sufficient. The purpose of the transfer procedure is essentially twofold: (1) to determine the shape of the piece and, (2) to make certain that the new use will not change its shape.

The effort and expense required to effectuate a transfer—the "transaction costs" in the jargon of economists—is perhaps the greatest impediment to markets resulting from third-party effects. Transaction costs reduce the net gains resulting from transfers and make some otherwise profitable transfers unprofitable.90 Collecting data, hiring experts such as agronomists, engineers, and lawyers, and the protracted and dispute-prone procedures associated with the identification, quantification, and mitigation of third-party effects makes for high transaction costs.91

A related difficulty for the development of markets is the uncertainty created by third-party effects. The yield which a transfer will produce in terms of usable water is uncertain until the transfer process is complete. The unpredictability of outcome, when coupled with high transaction costs, tends to discourage transfers. Buyers and sellers are reluctant to incur high transaction costs for results that are uncertain.

Because of their impact on transfers, it has sometimes been suggested that third-party effects should be ignored. Professor Joseph Sax articulated such a view:

It is interesting to note that the problems created by the absolutist attitude toward protecting junior appropriators are absent in the parallel situation in real property law. The reason is that a landowner has never been thought to have a property right in the maintenance of neighboring uses. For example, a theatre may exist when I open a restaurant down the block, and the theatre patrons may be a valuable source of business for me. Nonetheless, I cannot prevent the theatre from converting into a warehouse, though the change is economically disastrous to me. . . . Why should a junior on a stream be in a better position than landowners like the restaurateur?92

Dean Frank Trelease disagreed, stating that the analogy is not apt because no property right of the restaurateur is interfered with when the theatre owner converts his property to a warehouse, whereas a transfer which deprives an appropriator of water interferes with a basic element of his property right. Trelease notes that the restaurateur loses an expectation, and expectancies are seldom given legal protection.93 Sax might reply that the junior appropriator has a property right, rather than an expectancy, only because the law gives him one. He would have a mere

91. The uniqueness of each appropriation right also contributes to high transaction costs. When rights are homogeneous, transaction costs are low because buyers and sellers can easily determine what is being bought and sold. As rights become more heterogeneous, the need to investigate and evaluate each right individually increases the transaction costs.
93. Trelease, supra note 77, at 511.
expectancy if the law provided no legal protection. If in any case, Sax's view would certainly expedite transfers and facilitate the development of water rights markets. An appropriator would in effect own his diversionary entitlement, which he could transfer without regard to the effect on third parties.

Despite this advantage, there is generally widespread agreement that third-party effects should be taken into account in water rights transfers. In part, this attitude undoubtedly reflects the view that a senior appropriator, who has no further use for the water, should not be able to play the "dog in the manger" and deny others its use. However, two economic reasons are also given. First, the protection of third parties promotes more complete utilization of water resources by providing security to water development by junior appropriators. If return flows were clearly identified and quantified, this reasoning would be doubtful because equal security could be provided a junior appropriator by the purchase of a senior's return flows. However, the flow of a stream is generally an indistinguishable mix of return flows and natural flows. This makes it difficult for a junior appropriator to determine how much and who to pay. By giving junior appropriators vested rights to return flows, the law makes it unnecessary to determine these matters. Like the modern expression, the law says to a junior appropriator, "What you see is what you get."

Second, the protection of third parties promotes economic efficiency. Third-party effects are, by definition, economic "externalities." Economic efficiency requires that externalities be "internalized;" that is, that market participants be forced to confront the full social cost of a market transaction. Internalization is accomplished by requiring senior appropriators to mitigate third-party effects, thereby insuring that only those transfers occur whose benefits outweigh their costs (to society as a whole).

The fault of the current system does not then lie in its protection of third parties but in the definition of water rights. Well-defined rights are one of the essentials for an efficient market. The present definition clearly

94. "If the court grants the protection, it has created a species of property, ... If it refuses the remedy then no property can be said to exist because 'take away laws and property ceases.' " J. CRIBBET, PRINCIPLES OF THE LAW OF PROPERTY 5 (1962).
95. The Northern Colorado Water Conservancy District is frequently cited as an example of a successful water market. One of the major reasons for its success is the fact that the district owns its return flows. This permits the transfer of water entitlements within the district without regard to the effect on return flows. See Howe, Schumeler & Shaw in SCARCE WATER AND INSTITUTIONAL CHANGE, supra note 15, at 185-89. For other examples of situations in which it may be legally possible to ignore third-party effects in transfers see, Gould, supra note 21, at 1846-51.
97. "An externality exists whenever an activity by one or more parties affects, for good or bad, another one or more parties who are not part of, or are external to, the activity." ENCYCLOPEDIA OF ECONOMICS 357 (D. Greenwald ed., 1982).
98. See id.; Demetz, Some Aspects of Property Rights, 9 J. L. & ECON. 61, 62 (1966). In his seminal article, Coase pointed out that externalities are a product of transaction costs; if there were no transaction costs there would be no externalities. Coase, supra note 90, at 15, 16.
fails in this regard. The parameters which define the right - the diversionary entitlement, the point of diversions, the place of use, and the purpose of use - provide only indirect information as to the property which can be transferred. If the market is to function, so the argument goes, water rights must be redefined to clearly describe the property which can be transferred. At the same time, third-party effects must not be ignored. Defining the right in terms of its diversionary entitlement and allowing this entitlement to be transferred without alteration, as Sax suggested, would meet the first requirement but not the second.

Consumption is most often suggested as the definitional parameter that will accomplish these ends. It is frequently argued that if each appropriative right was assigned a consumptive entitlement, rather than a diversionary entitlement, the consumptive entitlement could be transferred with a minimum of expense and effort. Some who urge this approach acknowledge that consumption does not internalize all third-party effects. They recognize a need for a procedure to determine and mitigate these effects. Nevertheless, advocates say these effects would be minimal and their determination and mitigation would not be a major impediment to the development of water markets.

**CRITIQUE OF THE CONSUMPTIVE DEFINITION**

At least three general criticisms can be leveled against redefinition of water rights in terms of consumptive entitlement. First, determining the consumptive entitlement for existing rights would be difficult, expensive, and largely a waste of resources. Second, the enforcement of rights defined by consumption would be an administrative nightmare. Third, consumption fails to internalize many third-party effects. Each of these criticisms is discussed below.

First, it should be noted that simply redefining new rights as they are created would do little good. New rights, with late priorities, are unlikely to be the target of a transfer. Early rights, with early priorities and commensurate dependability, are the usual targets for transfer. Thus, to be effective existing rights would need to be redefined.

There is no simple way to determine the consumption of existing water rights. As noted earlier, appropriations do not consist of one metered pipe for diversions and another for return flows so that consumption can be calculated simply by subtracting return flows from diversions. If junior rights are to be respected and protected, redefinition would require the same complex, expensive, dispute-prone procedure now associated with the transfer process. The prospect of conducting these procedures on a
comprehensive scale is mind-boggling. Comprehensive redefinition of rights would, presumably, resemble general adjudication proceedings. Anyone familiar with general adjudication proceedings, in which claimants can number in the thousands, can appreciate the complications. Perhaps not surprisingly, none of the writers recommending redefinition address this problem. Furthermore, redefinition would involve tremendous waste. Most water rights will never be the target of a transfer. Redefining all water rights in order to create a market for a few simply does not make sense.

Perhaps some of the proponents of redefinition have in mind redefinition by *ipse dixit*, that is, by a simple declaration by some public official or body. For example, irrigation rights might be redefined as having a consumptive entitlement equal to 50% of their diversionary entitlements. This possibility has some merit as a presumption to narrow the issues and expedite the transfer process, but not as a flat rule of law. This possibility is explored in greater detail in the next section.

The second criticism has to do with enforcement. The cost of policing rights is also an element of economic efficiency. As an earlier section of this paper demonstrates, ease of administration is one of the virtues of defining rights by their diversionary entitlement. Enforcing consumptive entitlements would be another matter indeed. At the risk of being repetitious, most appropriations do not involve metered pipes. The difficulties of determining consumption are a major source of complication in transfer proceedings. Imagine this effort on a day-to-day basis!

One proponent of redefining water rights by consumption quite correctly noted that an irrigator may increase the quantity of water that can be transferred simply by changing to more consumptive crops prior to proposing a transfer. Finding this absurd, he suggested that irrigation rights should be defined by consumption. But how would such rights be enforced? If the farmer rotates crops for reasons of good husbandry his consumption varies with the crops grown. If his right is defined by consumption, it seems he must adjust the acreage irrigated to keep consumption constant. But who will determine what adjustment is required and who will see that the adjustment is actually made? The administrative problems are obvious.

A related problem has to do with determining consumption associated with the new use. Preventing an increase in consumption is a comparative process. The consumption of both the present use and the proposed use must be determined. In an earlier section, an example involving the


104. Some economists who favor redefinition of water rights in terms of consumptive use acknowledge this difficulty, but give it little actual attention. See, e.g., Johnson, Gisser & Werner, *supra* note 15, at 283, n.21 ("In a world where measurement costs are positive, it does not automatically follow that water rights should be based on consumptive use. Where the value of water is low relative to measurement costs, diversion may well be the optimal method.").

transfer of an appropriation of 10 cfs for a use which was 50% consumptive to a use which was 75% consumptive was discussed. It was suggested that the new diversion might be limited to 6.67 cfs to prevent third-party effects. In reality, of course, there might be as much uncertainty and disagreement about the rate of consumption for the proposed use as there is for the existing use. Other appropriators might be understandably unwilling to accept the proponent's calculation. Thus, the usual factual and technical disputes are likely to be present, yet this problem never receives discussion by those urging the consumptive use definition.

The third criticism of redefinition stems from its failure to internalize all third-party effects, as some of its advocates acknowledge. The quantity consumed by a senior appropriator is only one of the concerns which a junior appropriator has. The timing of the senior's consumption is also very important.\textsuperscript{106} It makes a great deal of difference to junior appropriators whether a senior appropriator takes a large quantity of water for a short period or a small quantity over a long period. A senior appropriator who takes his full consumptive entitlement in August, rather than spreading it over the entire irrigation season as was done prior to a transfer, could cause immense injury to junior appropriators even though his total consumption remains the same. Similarly, a junior appropriator who has adjusted to a senior's seasonal diversions by making his own diversions during the off-season may suffer injury if diversions by the senior are spread over the entire year after a transfer.

Also, problems resulting from changes in diversion patterns are not internalized by consumption. As discussed earlier, these patterns may not be as pervasive as once thought because they do not exist where there are no flow constraints.\textsuperscript{107} Nevertheless, flow constraints do exist, particularly on smaller streams on which water rights are most likely to be closely regulated. It cannot be left to private parties to determine if flow constraints exist in a particular case. Similarly, problems resulting from the elimination of temporary storage and changes in water quality are not internalized by redefining rights by consumption and must also be determined on a case-by-case basis.

Finally, defining rights by consumption does not eliminate environmental effects or indirect third-party effects. Unlike the effects on other appropriators, many advocates of market transfers would ignore these effects. Noting that resource shifts are common in our dynamic economy and are the source of much of our economic growth, one economist has argued that there is little that the government can or should do about the indirect economic injuries which result from water transfers, beyond existing wealth redistribution programs such as unemployment compensation and welfare.\textsuperscript{108} Another writer has objected to the use of public interest criteria on the grounds that, by increasing the risk of disap-

\textsuperscript{106} See supra text at note 52.
\textsuperscript{107} See supra text at note 60.
\textsuperscript{108} Gardner, supra note 100, at 167.
proval, such criteria make the expectation of revenues from a sale more uncertain, which, in turn, dulls market incentives. 109

On the other hand, the question is not simply one of individual economic losses. Fierce regional attitudes and strong policy questions are the heart of this issue. Running through the fabric of western water law is a clear thread that all geographic regions should enjoy the benefits of water. This thread is evident in the adoption of interstate compacts and “area of origin” statutes 110 which preserve water for more slowly developing regions. In spite of what the economists say, water is viewed by many as a “different” resource, having a special importance to society:

Water is a social good and for that reason a public trust; private ownership of it is not desirable. “Public interest” must be protected by government, especially if water becomes part of a market exchange. But to treat water as a commodity is a mistake in our view. In addition, the use of “efficiency” alone is a poor rule for evaluation of water projects and for water allocation. 111

Some economists simply do not see environmental effects as significant. One economists has said: “There may be circumstances where public goods are significant, but in most cases in water allocation my sense is that they are not very important.” 112 This view is hard to accept. It is difficult to think of a resource which produces more public goods than water. Water produces public goods in the form of recreational activities, such as fishing, boating, swimming, and rafting, in the form of fish and wildlife habitat, and in the form of general aesthetic enjoyment. All of these may be affected by water allocation. To dismiss them as unimportant seems myopic at the very least.

In any case, the trend towards considering the indirect effects of water rights transfers is a trend which is clearly growing. 113 In those jurisdictions where such effects must legally be considered, redefinition will do nothing to facilitate their resolution. In summary, defining water rights in terms of consumption is not the solution to the problem of third-party effects. The definition would be difficult to implement, would substantially complicate the administration of water rights, and would not eliminate the need for individual proceedings to determine the effects of water rights transfers. Redefinition will produce few benefits, will solve few problems, and is simply not worth the effort.

SUGGESTIONS FOR IMPROVEMENT

It is incumbent upon those rejecting common suggestions for improving water rights transfers to propose their own solutions. As a beginning proposition, there are no quick fixes or easy solutions. It is simply not

110. See supra note 14.
111. Ingram, Scaff & Silko, supra note 3, at 195.
112. Gardner, supra note 100, at 167.
113. See supra text at note 72.
possible to define appropriative rights in nice, discrete bundles which can be transferred without affecting other parties. The complexities of surface streams and water use inevitably lead to highly interdependent rights. The following suggestions and observations are offered with this reality firmly in mind.

**Use of Non-adjudicatory Procedures**

Consideration should be given to greater use of non-adjudicatory procedures in transfer decisions. Judge Henry J. Friendly, a recognized authority on administrative law, has written of the need to develop new models for some types of administrative processes. He has suggested that the use of an "inquisitorial" or "investigatory" model, along the lines of the continental system, may sometimes produce results superior to those of a trial-type model. In an investigatory model the decision maker ("judge") is not simply an "umpire," as is the case in an adjudicatory system, but instead assumes a more active role. Friendly notes that such a model permits much greater informality, including the use of a conference-type setting in which the evidence is discussed. Judge Friendly was suggesting abandonment of the adjudicatory model in areas of mass justice, such as the welfare system. Others have criticized the use of trial-type procedures in situations raising complex economic, scientific, and policy issues, involving a vast range of alternative solutions and a variety of competing interests. Water rights transfers frequently present just such a situation.

Along similar lines, another expert on administrative law, Professor Roger C. Crampton, has noted that the civil or criminal case in which the defendant is charged with violating pre-existing legal standards is the paradigm of trial-type decision making. Professor Crampton lists the characteristics of such cases as (1) a controversy which is two-sided in nature, (2) facts which are generally within the control or knowledge of the parties and arise out of non-recurring events, (3) issues which are bipolar in that they call for a "yes" or "no" answer, and (4) the court is impartial and is called upon to decide a limited number of questions that are usually within the common understanding of the average judge. 

A water rights transfer possesses some of these characteristics in some cases. For example, where the proposed transfer is opposed by another appropriator alleging injury, the dispute is similar to a boundary dispute between landowners. Likewise, the question of whether a proposed transfer will cause injury to other appropriators usually presents "yes" or "no" questions. Often, however, the proceeding is not merely two-sided but is multi-sided, encompassing a number of competing interests. This will be

115. Id. at 1290.
116. See Crampton, A Comment on Trial-Type Hearings in Nuclear Power Plant Siting, 58 Vir. L. Rev. 585, 590-91 (1972).
117. Id. at 588.
118. Id.
particularly true if the decision maker is required to consider "public interest" matters, such as social, economic, or environmental effects. In other cases, the proceeding may be one-side because no other appropria-
tors or parties have protested the transfer. Nevertheless, in most states
the decision maker may not automatically approve the transfer, but is
carged with the responsibility of preventing injuries to third parties\(^\text{119}\)
and, in some states with protecting the "public interest."\(^\text{120}\) Similarly, the
issues are often not bipolar; they frequently involve questions of compet-
ing policy not subject to simple "yes" or "no" choices. Rather than being
concerned with past, non-recurring events, water rights transfers usually
involve prediction of future consequences.\(^\text{121}\)

These and other differences reinforce the perception that the adjudica-
tory process may not be the most appropriate model for an agency charged
with making water transfer decisions. As Judge Friendly noted, too often
the courts (and thus administrative agencies) have yielded to the notion
that the adversary system is the only appropriate model.\(^\text{122}\) Experimenta-
tion and empirical study should be encouraged. The best procedure will
probably be a mix of adversarial and non-adversarial processes. While I
will not attempt to define that mix, it seems that transfer procedures
should provide for a high level of informal exchange of information and
views between the transfer applicant, the agency, and protestants. In
addition, they should provide for maximum utilization of the records and
information of the water rights agency and the expertise of its staff. In
some regards, the preceding recommendation is directed as much at atti-
tude as at procedure. The water agency should see its role not as an unin-
volved judge but as an involved participant, charged to use its expertise
and its information to facilitate efficient decision making with regard to
water rights transfers.

**Greater Use of Rulemaking**

Rulemaking could be used in many ways to increase predictability and
reduce or narrow the issues associated with a water rights transfer.\(^\text{123}\)
Rulemaking could be used to set standards and uniform procedures for
deciding technical issues. An example might be the adoption of consump-
tive irrigation requirements or return flow coefficients for various streams
or regions of a state. Another example might be the setting of convey-
ance loss coefficients for streams and rivers in a state. If a state has adopt-
ed the "historic use" rule, rulemaking could be used to set the number of
years that constitute the historic period and define how the rule will
be applied when there has been a variation in crops grown during the
historic period.

\(^{120}\) See supra text at note 72.
\(^{121}\) The question of whether the transfer will injure third parties obviously involves
a prediction of future consequences.
\(^{122}\) Friendly, supra note 114, at 1316.
\(^{123}\) Rulemaking refers essentially to "legislation" by an administrative body. Like legis-
lration, it prescribes future patterns of conduct having general application to members of
a broadly identifiable class. See B. Schwartz, Administrative Law 146-47 (2d. ed. 1984).
A recent case from New Mexico illustrates the use of rulemaking to produce efficient resolution of complex technical issues. In approving new permits for appropriation or in adjudicating water rights, the New Mexico state engineer is required to set limits on agricultural appropriations based on "good agricultural practices." To implement this responsibility to set a "water duty" for each appropriation the state engineer uses a "nationally recognized and proven formula" to produce duty requirements on a stream-wide basis. The numbers used in the formula are based on the average needs of users along each stream and not on the needs of a particular user. In response to a challenge by an appropriator that he was entitled to a water duty based on his particular needs, the New Mexico Supreme Court said:

After reviewing the formula, the methodology used, and after receiving evidence concerning climate and soil variations, both special masters found that the averaging of water duties of users along a particular source stream was an appropriate and reasonable procedure for determining Niccum's water duty. (emphasis in original)

Rulemaking can even be used to give more content and direction to broad policy mandates such as the "public interest." The Federal Communications Commission has promulgated a number of regulations elaborating on its statutory mandate to pursue "public convenience, interest, or necessity." Similarly, rulemaking might be used to delineate the various factors that the water rights agency will consider in determining whether a proposed transfer is in the public interest. Perhaps rulemaking could even be used to provide an indication of how competing policy considerations will be balanced when in conflict.

Adoption of a Legislative Policy Encouraging Transfers

States should consider adopting a legislative policy favoring water rights transfers with appropriate protection of third parties. While a degree of skepticism about the effectiveness of general policy declarations is not unreasonable, case law in Utah and Wyoming lends support to the suspicion that attitudes play a substantial role in the degree of transfer activity which exists in those states. Utah judicial decisions have long exhibited a favorable attitude toward transfers as a means of promoting full use of its water resources. Although the decisions of the Utah Supreme Court do not speak the language of the economist, the court has grasped the role which voluntary transfers play in maximizing the benefits to be derived from water use. Toward that end, the court has attempted to

126. Reynolds, 695 P.2d at 481.
127. Id.
128. See Schwartz, supra note 123, at 151-52.
strike a reasonable balance between encouraging transfers and protecting third parties.\textsuperscript{130}

The Wyoming Supreme Court, particularly in its more recent decisions, has shown little recognition of the need for and role of transfers. Furthermore, its decisions have interpreted Wyoming transfer statutes in an unnecessarily rigid manner, exhibiting indifference to water rights transfers.\textsuperscript{131} It does not seem unreasonable to assume that the apparent difference in the judicial attitudes of these two states has affected the attitudes of the respective administrative agencies and accounts for some of the difference in transfer activity between the two states.

Another illustration can be drawn from Colorado. In 1969, the Colorado legislature adopted a policy of "maximum utilization" of the state's water resources.\textsuperscript{132} The Colorado Supreme Court has referred to this policy repeatedly and seems to have been greatly influenced by it. In particular, the policy statement has been used by the court to require some accommodation by the holders of "vested rights" in order to permit full utilization. For example, in \textit{Alamosa-La Jara Water Users Protective Association v. Gould},\textsuperscript{133} pumping by junior appropriators from groundwaters "tributary" to the Rio Grande and its tributaries had reduced the surface flow of the Rio Grande, requiring the curtailment of diversions to meet Colorado's obligation to New Mexico under the Rio Grande Compact. Apparently curtailment would be unnecessary or its degree reduced if the senior surface appropriators replaced their surface diversions with wells. Overruling contrary precedent and citing the policy of "maximum utilization," the court held that senior surface appropriators could not always insist on maintaining surface diversions and might lawfully be required to use wells to satisfy their appropriation. More directly on point, the court has also referred to the policy in approving imaginative water rights transfers over technical or minor objections of alleged injury to other appropriators.\textsuperscript{134}

"Public Interest" Determinations

The interjection of broad public interest criteria into the transfer calculus raises questions regarding the appropriate government body and mechanisms for resolving the issues raised by such criteria. These questions are particularly acute when social or economic issues, as opposed

\textsuperscript{130} Bagley, Kimball & Kapaloski, \textit{supra} note 129, at 20.

\textsuperscript{131} See Green River Dev. Co. v. FMC Corp., 660 P.2d 339 (Wyo. 1983); Town of Pine Bluffs v. State Bd. of Control, 649 P.2d 657 (Wyo. 1982); Town of Pine Bluffs v. State Bd. of Control, 647 P.2d 1365 (Wyo. 1982); \textit{Basin Élec.}, 578 P.2d at 557. In none of the cited cases does the court discuss or seem to appreciate the importance of water rights transfers. Not surprisingly, the transfer was denied in all. The last case is particularly insensitive to underlying policies and has been strongly criticized. See Trelease, \textit{supra} note 81; Gould, \textit{supra} note 21, at 1829-31.


\textsuperscript{133} 674 P.2d 914 (Colo. 1983).

to environmental issues, are at stake. A recent New Mexico decision illustrates the problem. In the Matter of Howard Sleeper involved an application to transfer water from irrigation to ski area use. On appeal, the district court denied the transfer application, finding that it was not in the public interest. The court gave two reasons. First, it found that the ski area would mostly produce menial jobs for local residents. Second, the court found that the economic benefits were insufficient to overcome the effects of the transfer on the traditions and culture of the region. The following is illustrative of the court's attitude:

[I]t is simply assumed by the Applicants that greater economic benefits are more desirable than the preservation of a cultural identity. This is clearly not so. Northern New Mexicans possess a fierce pride over their history, traditions and culture. This region of northern New Mexico and its living culture are recognized at the state and federal levels as possessing significant cultural value, not measurable in dollars and cents. The deep-felt and tradition-bound ties of northern New Mexico families to the land and water are central to maintenance of that culture.

I am persuaded that to transfer water rights, devoted for more than a century to agricultural purposes, in order to construct a playground for those who can pay is a poor trade, indeed.

The decision prompts two observations. First, the farmer selling the water right obviously made the decision that the money he would receive was more desirable than preservation of his "cultural identity." Second, perhaps many of the area's residents might prefer a menial job to no job. These observations are not meant to suggest that the court's decision was wrong. Rather, they are intended to point out that the decision is not really a water rights decision at all. It involves the inevitable trade-offs between economic development and preservation of existing "lifestyles." Ultimately, it is a decision about the future of New Mexico society.

Water rights agencies were given initial jurisdiction over water rights transfers because of their expertise in engineering and technical matters. This was appropriate at a time when the criteria for approving or rejecting a proposed transfer involved only technical issues regarding the affect of the proposed transfer on other appropriators. However, such bodies do not possess special expertise in deciding questions of social and economic policy. This seems particularly true where the decision maker is a single official, such as the state engineer, chosen primarily because

136. At the time of the decision the New Mexico statutes did not expressly require the state engineer to consider the "public interest" in transfer proceedings. The court, nevertheless, found that he had a duty to do so. Id. Since that decision, the legislature has made this an express requirement. N.M. STAT. ANN. §§ 72-5-23 (1985 Replacement) and 72-12-7 (Supp. 1986).
of engineering expertise. It is only incrementally less so where the decision maker consists of a board chosen primarily on the basis of technical expertise. In those states where the decision making board is required to have more general representation, its competency in deciding social and economic policy questions may be increased. Nevertheless, it does not seem unreasonable to question whether water rights agencies should be charged with the responsibility to set social and economic policy, particularly without any guidance.

If such broad social decisions are to be made, they should be made by a representative body with a relatively broad-based constituency, perhaps even the state legislature. This does not mean that each water transfer decision must be reviewed and approved by some broadly representative body. It does mean that such a body should establish general criteria or plans to guide water officials in such decision making.

At the very least, water rights agencies should be provided with statutory direction regarding the matters to be addressed and the interests to be considered in deciding whether a proposed transfer is in the public interest. For example, such a statute might specify whether the water agency is to consider the effect on the tax base or the economy of the community where the water is presently used, the effect on cultural values or lifestyles, the effect on fish and wildlife, and the extent to which any of these effects may be offset by positive benefits provided by the transfer.\textsuperscript{138} Listing the various factors to be considered does not resolve all difficulties because the agency will often have to make hard choices between competing factors. However, it does provide prospective applicants information regarding the concerns their transfer application will have to address and the matters about which information must be gathered. In addition, it reduces the inevitable judicial appeals about whether certain effects can or must be considered by the water rights agency.

Ideally, decisions regarding the social and economic effects of water transfers ought to be made as part of a broad planning process. As noted above, these decisions are not water rights decisions; in effect, they are usually land use decisions. As a consequence it makes little sense for an agency whose sole responsibility is for water matters to make these decisions. Such a fragmented approach is likely to be counterproductive and confusing. George Christopolus, the former Wyoming State Engineer, when asked about water planning used to comment, "Tell me what kind of state you want and I will do the water planning."\textsuperscript{139} This comment hits the nail on the head. Only if the water agency has some notion of the broader social and economic goals and policies it is expected to promote can it make intelligent decisions on the sort of issues raised by Howard Sleeper.

\textsuperscript{138} The Alaska statute listing the factors which the water rights commissioner is to consider in determining whether a proposed appropriation is in the public interest provides one model of this technique. \textit{Alaska Stat.} § 46.15.080 (1987).

\textsuperscript{139} The author heard Mr. Christopolus make this remark on several occasions when addressing various groups regarding Wyoming water law.
Requiring that environmental effects be considered is not as problematic as requiring the consideration of social and economic effects, because it is easier to develop workable standards to guide the water rights agency. For example, a California statute governing trial transfers directs the Board of Control to approve the transfer if it does not “unreasonably affect fish, wildlife, or other in-stream beneficial uses.” While a standard of “unreasonableness” is not precise, it is workable. Beyond the standard itself, issues concerning the effect of the proposed transfer on fish, wildlife, and in-stream uses are technical ones and are within the competency of water rights agencies.

More precise standards could be adopted if desired. For example, a Washington statute requires the Department of Ecology to establishing minimum stream flows for the protection of “fish, game, birds or other wildlife resources, or recreational or aesthetic values.” By administrative rulemaking or by statute, a policy prohibiting any transfer which would result in a violation of established minimum stream standards might be adopted.

Proof Problems

As any trial lawyer knows, the assignment of the burden of proof is often determinative of the outcome in areas which involve complex technical issues. Thus, the assignment of the burden of proof could have a great effect on the frequency of water rights transfers. The burden of proof with regard to injury is on the proponent of the transfer in most western states. Recognizing the difficulty of proving a negative (“no injury”), the Utah Supreme Court held that a petitioner need only make a general showing of no injury and then rebut specific claims of injury. The Colorado Supreme Court went even further, holding that the petitioner is only required to rebut claims of injury asserted by protestors. Other decisions have tempered the proof problems by holding that an injury must be substantial and not merely “fanciful” or by holding that remote possibilities of injury should not interfere with beneficial transfers.

In general, these cases reflect an appropriate resolution of the proof problem. However, some states are not so reasonable. The Wyoming Board of Control, apparently without any direct statutory or judicial authority, has sometimes required the transfer proponent to prove lack of injury by “clear and convincing” evidence. The imposition of this higher level of

142. See Gould, supra note 21, at 1844.
143. Tanner, 48 P.2d at 488, 489.
144. Yust, 249 P.2d at 151.
146. See American Fork Irrigation, 239 P.2d at 188.
147. See Petition of Basin Elec. & Power Coop., supra note 69, at Conclusion of Law No.4. Montana recently adopted the clear and convincing standard for transfers which will result in consumption of more than 4,000 acre-feet per year of 5.5 cfs. See Mont. Code Ann. § 85-2-402 (4) (1987).
proof seems unnecessarily harsh, and, in fact, the Wyoming Board of Control has rejected transfer applications because the proponent failed to meet its burden of proof, although there was no showing that others would be injured.\(^{148}\)

Trial transfers and presumptions are two mechanism which can alleviate proof problems. Trial transfer provisions allow the water agency to approve the transfer without a complete showing that it will not produce injury, but subject it to future modification or revocation after its actual effects are observed. California provides for trial transfers by statute,\(^{149}\) the judicial decisions of several other states approve of the technique.\(^{150}\)

The California statute on trial transfers limits its use to situations in which the Board of Control concludes that "substantial injury . . . is unlikely to occur . . . but . . . the precise effect of the transfer . . . is difficult to determine in advance of the transfer."\(^{151}\) Both limitations seem sound as a matter of policy. As a practical matter, both are probably inherent limitations anyway. As noted earlier, a trial transfer presupposes future modification or revocation if the transfer produces actual injuries. If substantial injuries are likely, the possibility of revocation, of modifications which significantly reduce the yield of water, or of conditions which are very costly to comply with is great. Few transfer applicants would be willing to assume such risks. Thus, transfer applicants are likely to request trial transfers only when substantial injury is unlikely. Similarly, if the effect of the modification can be determined without difficulty most applicants would prefer to have it determined before incurring the capital expenditures which are usually required to effectuate a transfer. It is always preferable to buy a pig in view rather than one in a poke.

The trial transfer process could be further improved by legislation requiring injured parties to accept money damages in some cases. The requirement to accept money damages should be recognized for what it is - a private power of condemnation. If an injured party is required to accept damages in lieu of protection, his water right has been partially condemned. While private parties should not be given the power of condemnation lightly, it does not seem inappropriate to confer it where the injury is slight but the cost of preventing it would be disproportionately large.\(^{152}\)

There is already precedent for the use of presumptions in water rights transfers. The Wyoming statutes relating to temporary transfers specify

\(^{148}\) See Petition of Basin Elec. & Power Coop., supra note 69, at Conclusion of Law No. 4. See also Petition of Pacific Power & Light, supra note 68, at Conclusion of Law No. 5.


\(^{150}\) In Colorado, transfer proceedings are apparently conducted on this basis by stipulation of the parties. Meyers & Posner, supra note 15, at 33. American Fork Irrigation, 239 P.2d at 188, also seems to adopt this approach.

\(^{151}\) CAL. WATER CODE § 1735 (West Supp. 1987).

\(^{152}\) See Demetz, supra note 98, at 64-65 (1986). Demetz suggests that, from the standpoint of economic efficiency, the greater the uncertainty of the effect, the less inclined the law should be to require prior compensation. Id.
a presumption that return flows from irrigation are 50%.\textsuperscript{153} Presumptions are a device for shifting the burden of proof. However, where complex technical questions are at issue, presumptions may have an even more important effect: a presumption eliminates the need to produce evidence on the presumed fact, unless, of course, the presumption is challenged. In the case of the Wyoming statute, the presumption frees the transfer applicant from the duty to produce evidence on return flows. The transfer applicant or parties protesting the transfer could, of course, attempt to rebut the presumption if they felt it advantageous to do so.

A presumption is preferable to a rule of law because, in terms of fairness, it can be rebutted in cases where its application would be inappropriate. Its usefulness as an efficiency device is dependent on the accuracy of the presumption. Ideally, a presumption should represent a close approximation of the actual results in a high percentage of cases. Otherwise there will be frequent attempts to rebut it, and it will produce few gains in efficiency.

Because of varying conditions, it may be impossible to produce a single, workable presumption for some of the factual criteria, such as return flows. In such a case, however, presumptions might be developed on more limited geographic bases. Just as the New Mexico State Engineer set "water duties" on a stream-wide basis in Reynolds v. Niccum,\textsuperscript{154} presumptions for consumption, return flows, stream conveyance losses, and other factors could be formulated for streams or regions of a state. Because presumptions should be grounded in reality, administrative rulemaking, rather than legislation, would be the most appropriate means for their establishment.

\textit{Temporary Transfers}

Because some needs are temporary or intermittent, temporary transfers can greatly improve the efficiency of water use. Several states have statutes providing for temporary transfers.\textsuperscript{155} In general, these statutes provide for an expedited decision making process and permit the resumption of the permanent use at the end of the temporary need without additional procedures.

Third-party effects are a serious problem for temporary transfers. Because the need is temporary, expensive and time-consuming procedures must be avoided. Some statutes attempt to reduce delays associated with determination of third-party effects by giving water officials authority to approve transfers without notice to potentially affected parties and without a hearing if it appears there will be no third-party effects.\textsuperscript{156} Wyo-

\textsuperscript{154} Reynolds, 695 P.2d at 480.
ming attempts to expedite temporary transfer through the adoption of a presumption that return flows from irrigation are 50%.¹⁵⁷ The use of these techniques or others suggested above may be particularly appropriate where temporary transfers are involved because mistakes, if any, will have only a short-term effect.

Water rights transfers are a particularly appropriate means to satisfy intermittent needs. A city, for example, having adequate supplies for normal years, may wish to acquire agricultural water rights for drought years. A mechanism which permits a quick transfer of water from a nearby farm as the need arises is an ideal solution to the city's problem. In normal years the water can remain in agricultural use, thereby reducing the cost to the city and aiding society by permitting continued farming except in drought years.

Most of the temporary transfer statutes seem to contemplate only a one-time transfer and are not designed to meet intermittent needs. It may be possible to use permanent transfer procedures for this purpose.¹⁵⁸ The water rights agency determines the effects of the intermittent transfers on third parties and imposes appropriate terms and conditions to mitigate those effects. When the need for transfers arises from time to time, the transfer can be effectuated with little or no fanfare because the conditions of transfer have already been determined. This seems like a workable approach to the problem, although it might be desirable to enact authorizing legislation to eliminate any doubts concerning its legality.

Transfer Information.

Most of the difficulty in determining third-party effects results from deficiencies in information. Any steps which assist transfer applicants in the generation of required information or which reduce the need to produce information on an individual basis will expedite water rights transfers. Although not stated as such, many of the recommendations set forth above are such steps. For example, it has been suggested above that administrative rulemaking might be used to set standards or presumptions for return flows and other parameters. Ideally, standards or presumptions will not be pulled out of thin air but will be based on information which is gathered and analyzed to produce presumptions or standards that approximate reality. By setting such standards or presumptions, a water rights agency is generating information which transfer applicants might otherwise be required to generate and is relieving transfer applicants of the need to produce that information.

There are a variety of other steps which might be taken to reduce the void in information. The collection and publication by a state agency of various data necessary to assess the effects of water rights transfers is an obvious possibility. A more ambitious approach would be the creation

¹⁵⁸. See, e.g., Petition of Basin Elec. & Power Coop., supra note 69.
of a state water transfer agency. This agency might provide a brokerage service to match willing buyers and seller and might provide legal and technical assistance in assessing proposed water rights transfers and in developing the information which will be needed in the transfer process.

California has taken limited steps in this direction. In 1986 legislation the California Department of Water Resources was directed to create and maintain a list of entities seeking to enter into water transfers, leases, exchanges, or similar arrangements.159 It was also directed to maintain a list of physical facilities (canals) which might be available to transport transferred water160 and to develop a "water transfer guide." The guide is to contain (1) a review of state and federal laws pertaining to water transfers and markets, (2) a list of persons or agencies who could be helpful to those transferring water, (3) information and resources to identify third-party effects and mitigation alternatives, and (4) a description of services available from the department.161 The water transfer guide has not yet been completed, and it is difficult to tell whether it will be able to provide much effective assistance to prospective transferees. Nevertheless, the legislation represents an interesting experiment.

Private alternatives to a state water marketing agency may develop. A recent publication of the Water Market Update, describes a private publication, Water Exchange Information Service, which lists Colorado water rights which are being offered for sale. The publication appears to be primarily a brokerage service, designed to match potential buyers and sellers. The publication apparently provides some information about the water rights being offered for sale, but it is unclear how extensive that information is.162 While a simple brokerage service is a step in the right direction, technical assistance to buyers and sellers in assessing water rights is essential if real progress in producing more efficient transfers is to be made.

An earlier issue of the Water Market Newsletter reports on a corporation, Western Water Rights Management, Inc., which was recently organized for the purpose of speculation in Colorado water rights.163 The corporation, which has a capitalization of $35 million, intends to buy water rights for later resale at a profit. Because its profits depend on the wisdom of its purchases, one assumes that the corporation will have done extensive legal and technical assessments of the water rights it acquires, thereby satisfying one of the essentials to efficient water rights transfers.

An excellent study of the feasibility of water marketing in Utah makes several salient points regarding the development of water marketing

160. Id. Another innovative statute enacted in 1986 seeks to facilitate transfers by making publicly owned water conveyance facilities available to transferors of water if there is unused capacity in such facilities. See Cal. Water Code §§ 1810-1814 (West Supp. 1987).
organizations. The study notes that the principal advantage of such an organization results from the reduction of information costs to individuals through the accumulation of specialized information and the counsel of an expert staff. This observation can be generalized beyond the development of water marketing organizations. All of the steps suggested above are premised on efficiencies which come from specialization and expertise. The development of standards or presumptions, and the collection and publication of data by a state water rights agency, is predicated on the assumption that the agency can produce this information more cheaply than can individuals.

The Utah study also considered the use of a publicly financed state marketing organization, the use of a purely private organization, or some mix of the two. It noted that using a publicly financed organization assumes that many of the benefits of efficient water transfers are public in nature such that the public might properly subsidize buyers and sellers in order to generate these benefits. Whether or not efficient water rights transfers in fact produce sufficient public benefits to justify public financing, it seems unlikely that there is sufficient perception of such benefits to produce the political support necessary to establish a publicly financed water marketing organization. However, there may well be political support for more limited approaches, some of which have been suggested above, to reduce the information costs to individuals.

The "chicken and egg" syndrome is a problem for the development of water marketing organizations. The present level of transfer activity may not be sufficient to justify the costs of such an organization, yet without such an organization the level of activity will remain low. This problem may justify the expenditure of public funds, at least to a limited extent. For example, a state might fund a marketing organization for a limited geographic area to determine if such an approach can really increase transfers. If successful, private enterprise might be much more willing to attempt such activities elsewhere.

Additional Empirical Research

Many of the preceding suggestions are directed at improvements in administrative procedures. In closing, it should be noted that this is a subject in need of in-depth empirical research. A comparison of transfer activity in Wyoming and Utah in the years 1978 through 1980 is instructive. During this period there were seven applications for transfers in Wyoming, of which three were denied. During the same period Utah received 1,596 applications, virtually all of which were approved. The

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164. Bagley, Kimball & Kapaloski, supra note 129. This study is excellent, in part, because it acknowledges the problems of third-party effects and attempts to develop institutions for dealing with them, rather than ignoring them or suggesting simplistic solutions. Id.
165. Id. at 25.
166. Id. at 26-27.
167. Letter from Francis A. Carr, Adjudication Officer, Wyoming Bd. of Control (Sept. 9, 1983).
168. Letter from Dee C. Hansen, Utah State Engineer (Sept. 1, 1983).
magnitude of the disparity in transfer activity in these two states suggests that a thorough examination of transfers in Wyoming, Utah and other western states would produce useful information.

Such an examination should focus on what agencies actually do, not on what the statutes say they do. For example, how much informal contact and consultation is there between the agency and those proposing a transfer? Does the agency provide assistance or basic technical data that may be required in evaluating and mitigating third party effects? Are there opportunities for “mid-course” changes in the transfer application to reflect new information about third-party effects? How does the agency view its role in the transfer process? As facilitator? As an uninvolved decision maker? As an adversary? Is the agency giving adequate protection to third-parties? The answer to these and numerous other questions would provide invaluable insight for those attempting to develop better transfer procedures.

CONCLUSION

An increased level of water rights transfers could produce great benefits. However, efforts to induce more transfers must be based on reality. This article has attempted to demonstrate that the way in which water rights are defined under the appropriation doctrine is not purely a matter of historical accident but is a practical response to the complex nature of water resources. Whether out of ignorance or obstinacy, too much of the writing on the subject of water rights transfers ignores reality. Third-party effects cannot be eliminated by simple changes in the appropriation doctrine. Rather, they must be met head-on, and better mechanisms for dealing with them must be developed.

History also cannot be ignored. Perhaps it might be possible, if starting anew, to develop a system of water rights which more easily facilitates the movement of water to new uses. But rights have vested and expectations have been based on the current system. To have any prospect of adoption, suggestions for improvement must take the current system as a given. It can be improved, but it will not be replaced. This, too, is a reality which must guide the search for better use of water resources.