

USING WATER NATURALLY

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PREFACE

In 1988 the Natural Resources Law Center initiated the Western Water Policy Project with the support of a grant by the Ford Foundation. This project includes a broad-ranging review of the laws, policies, and institutions governing the allocation and use of water resources in the western United States. It is aimed at addressing the adequacy of western water policy to respond to the needs of the contemporary West.

A major objective of the Western Water Policy Project is to encourage discussion of water policy issues. To further this objective we are initiating this Discussion Paper series. The papers in this series are written in conjunction with periodic workshops primarily involving a water policy working group. The members of this group are F. Lee Brown, James E. Butcher, Michael Clinton, Harrison C. Dunning, John Echohawk, Kenneth Frederick, David H. Getches, Helen Ingram, Edwin H. Marston, Steven J. Shupe, John E. Thorson, Gilbert White, Charles F. Wilkinson, and Zach Willey.

We welcome comments and responses to these papers.

Larry MacDonnell

Using Water Naturally

Holmes Rolston, III*

USING WATER NATURALLY?

The question I wish to ask finally is about using water ethically, but the question I ask first is about using water naturally. Possibly this inquiry will not be helpful, because "natural" is a tricky word, difficult to keep under logical control. There are dozens of shades of meaning; perhaps no other word in English has the subtlety and ambiguity of "nature" and its derivatives. Even supposing that we can discover operational meanings to using water naturally, ought we to use water naturally? If we connect what naturally *is* with what *ought to be* ethically we risk committing the naturalistic fallacy. Still, lawyers, philosophers, scientists, and engineers ought to be good at keeping words under close analysis. We can clarify our thinking if we find out whether there are any connections between using water naturally and using water ethically.

Sometimes also, words that are difficult to analyze precisely nevertheless function usefully as symbols, words such as "freedom," "rights," or "equality." Both "water" and "natural" are words with layers of meanings. Would it not be politically, legally, philosophically interesting to claim that in Colorado we have a policy of "natural" water planning? And that this results in the ethical use of water? Contrariwise, no legislator would introduce a bill under the name: A Bill for the Unnatural Use of Water! or: A Bill for the Immoral Use of Water!

As a philosopher, I disclaim any detailed knowledge of water law. That involves legal questions, where others are competent and I am not. The question I am eventually asking is whether the general framework of water rights is right. That moves from a legal to a philosophical and ethical question. Laws can be revised, and routinely are; laws can be repealed, and sometimes are. We might need to alter the law or its application to use water more ethically. I also disclaim any serious knowledge of hydrology. Although I am a philosopher, I do know a little about ecosystems. We may need to consult scientists. We will also need some conceptual analysis of "natural," at which philosophers are supposed to be of some help. This could prove an interesting mix of law, morality, philosophy, logic, and science.

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You are already thinking that law does not have to be "natural." Laws have to be just, constitutional, enforceable, politically operational, economically feasible, logically consistent, and various other things, but "natural" is not a criterion of good law. Natural law in the legal tradition has taken a beating, as it has in the religious tradition. Natural law is a category that really belongs only in science. There is a pivotal distinction between civic law and natural law. Civic laws are made by humans and can be broken, revised, and reformed; traffic laws and water laws are examples. Natural laws are causal necessities or statistical regularities in the nonhuman world and cannot be broken. Civic laws are prescriptive; they tell us what we ought to do. Natural laws are descriptive; they describe the way nature works. They are "obeyed" willy-nilly. We will just get confused if we do not keep these categories straight.

Those who remember their philosophy will further protest that I am committing the naturalistic fallacy, since it is well known in philosophy since the days of David Hume and G. E. Moore that behaving naturally has no connection with right and wrong. It does not make any difference to using water justly whether we are using it naturally. Rivers and rainstorms are not moral agents; the fauna and flora that use water are not moral agents; nature is no moral agent. How then can there be any connection between humans using water ethically and using water naturally? You can see why I warned that this inquiry might not be profitable. I will have to swim upstream against both law and philosophy.

Events and actions are said to be "natural" in different senses; unless we discriminate among these everyone will get lost.

- In a law-of-nature sense, the "natural" covers all events where the laws of cause and effect operate. All organisms use water naturally, humans too when they drink it, but also when they divert and transport it, irrigate with it, or even when they use it to cool their power plants. No natural laws are broken; rather these laws are employed in our biology, engineering, agriculture, and industry. The laws of nature are obeyed, we said, willy-nilly. In this sense it is impossible for humans to do anything at all that is unnatural, much less use water unnaturally. Whether they use it justly or unjustly, economically or wastefully, they will inevitably use it naturally. Evidently, this sense of "natural" will not be useful here.
- Spontaneous events in wild nature are "natural"; in contrast, deliberate human activities and their intended or unintended results are "artificial."¹ A waterfall is natural; a dam is not. The one is there by cause and effect of natural law; the other is there by deliberate human re-doing of the natural environment. Even a beaver dam is natural in a way that Hoover Dam is not. The beaver dam results from instinctive behavior in wild animals. Hoover Dam required decades of planning. Since all actions of human agents interrupt spontaneous nature, it is

¹ We must set aside hard behaviorists who deny that there are any deliberate actions, all behavior being shaped by the natural and cultural environment.

impossible for humans to do anything at once deliberately and naturally. Certainly all water development is unnatural. Every diversion requires dams built, ditches dug, transporting the water where it did not flow by spontaneous nature, filtering and purifying, and so on. Using water at once naturally and deliberately is, in this sense, a contradiction in terms. Neither lawyers nor philosophers nor scientists want a water policy that is a contradiction in terms!

If we have only these two senses of using water naturally, such use will be either inevitable or impossible.

- There are relative senses of "natural." Some human interventions are more natural, others less natural, depending on the degree to which they fit in with spontaneous nature. Any paint on a campground water tank is unnatural, but green is more natural than chartreuse. Any manufactured product is unnatural, but those that are biodegradable, such as paper products made from wood fibers, which at the trash dump rapidly decompose, return to the soil, and are recycled through the ecosystem, are natural in ways that styrofoam and plastic, which lie inert and choke up the system for centuries, are not. Any water used for irrigation is unnatural, since the course of spontaneous nature is interrupted, but water diverted from a stream through a nearby meadow with a return flow to the stream is more natural than fossil water pumped up from several thousand feet underground to irrigate an exotic crop. We begin to see a sense in which it is relevant to ask whether we are using water naturally. How do the patterns of human water use mesh with the hydrology and ecology of the landscape?

There is a way in which human actions can violate natural law, that is, disregard the course of nature as this affects human welfare. The laws of health, for instance, operate on us inescapably. But, circumscribed by them, we have certain options, to employ them to our health, or to neglect them ("break them") to our hurt. In that sense we can break a natural law: neglect to consider its implications for our welfare. It might be more accurate to say that we get broken on a natural law. In that sense too, perhaps it will be wrong to break a natural law, if this results in harm to ourselves or to others who count morally. The laws about health, made by lawyers, will have to pay rather close attention to laws of health, discovered by physicians. Perhaps laws about water use, made by water lawyers, ought to pay attention to laws about ecosystem health, discovered by biologists. If we neglect to ask how meteorology, hydrology, and ecology operate when we use our water, we would then be using it unnaturally. We certainly do not want a water policy that "breaks" natural law, any more than we want a health policy that violates the laws of health. A difference, though is that the laws of health are innate; the laws of ecosystem health operate out on the landscape.

Air, sunshine, soil, water—these are the basic givens of life; take away any one of them and life stops. In a fuller list, we could add biological givens—photosynthesis, the citric acid cycle, the DNA code—but we can begin with the four abiotic requisites for life. We incline to say that we use the first three naturally. We

breathe the air, seek the warmth of the sunshine, grow crops in the soil, on which the sun shines and the rains fall. Water is the fourth major requisite in this vital picture, and there must be something that is, and ought to be, natural about its use too. One reason that water rights are so much fought over is that for the users, domestic or agricultural, water is "vital." They are dead without it. Bread is necessary too; so is air, sunshine, and blood, which is mostly water. No water, nothing to drink; no water, no food. Water is one of these vital givens, and in that sense we must use it naturally.

Of these four, we think that two: soil and water, are appropriate for property transfer. We do not, perhaps because we cannot, appropriate air and sunshine to property transfer. We have critical environmental legislation affecting at least three: the Clean Air Act, the Clean Water Act, and various soil conservation and land management acts. We are even beginning to worry about upsetting the sunshine regime, evidenced in threats to the ozone layer and in global climate change. Part of our concern now is that we are beginning to insist that, when soil and water are involved in property transfer, there ought to be no threat to either of these as natural givens.

The water we use comes from rain, snow, springs, rivers, wells. It arrives with weather, falls on trees, grass, soil, travels through rivulets, tributaries. It is used by fauna and flora, shuttled around in the ecosystem, runs downhill by gravity. It is recycled from the seas by air currents, arrives back again in the clouds. If so, we might worry whether western water law is unnatural. Another way of putting this is that water is used biologically, in the really prior sense; and that neither the prior appropriation doctrine nor its subsequent economic transformations pay enough attention to the biological use of water.

Water is a natural resource, and the "re" in resource makes human use of it at least partly unnatural. The central idea in a resource is that some spontaneous natural source is deliberately re-directed to an "unnatural" use, a use different from those events that would happen were nature left to take its course. So we divert water out of the stream, re-direct it to field and factory, faucet and toilet. In that sense, as we said, all use of water culturally is unnatural. Some will add now that, after we have taken care of vital needs, there is no further cause to insist that water use be natural. Humans can and ought to make whatever clever use of resources they can. We do not use petroleum naturally; we do not use iron ore naturally. Why should we use water naturally? We can use it to make plastics or to cool energy plants, or whatever we please, or can turn a profit on. Whether this use is natural is irrelevant. We even use air unnaturally, when we extract nitrogen to make fertilizer from it. We use sunshine unnaturally when we convert it to electricity via solar cells. Making flush toilets is unnatural, and whether we ought to do so has nothing to do with whether there are any toilets in wild nature. We can tamper with the flows of water all we please. Entrepreneurs exploit resources.

But then again, we do want our sewer systems to recycle. Urinating and defecating is answering the call of nature, and we do not want our sewage to choke up the riparian system (which, alas, it does). Likewise with our industrial uses and wastes, we must not only allow for the vital uses of water, but even the artificial uses of water have to fit into the natural cycling and recycling processes. Using a recyclable resource is one thing; using up or fouling up a vital resource is more serious, serious indeed if it is one of the four vital givens. We would not allow anyone to make fertilizer from air if this shut down breathing or photosynthesis. We would not allow one user of sunshine to steal it from another. Water remains in natural use, in a way that molybdenum in steel and cellulose in newsprint do not. Water works as much like blood as it does like petroleum, as much like air as like gold. Its appropriate, prior, vital use is biological and ecological; appropriate cultural uses ought to defer to this natural use. The rivers of the West are as tampered with as any in the world, and we begin to worry that this human upsetting of them is so relatively unnatural that the vital landscape processes have been thrown out of kilter.

The connection between the natural and the ethical is closer than we thought, if we are dealing with a biological and ecological necessity. It is basic to all ethics that one ought not to harm others; and, since persons are evidently helped or hurt by the condition of their environment, one ought morally to protect the use of water naturally. There is already some language in water law to this effect. The 1973 instream flow law vests in the Colorado Water Conservation Board some authority to seek "such minimum flows . . . as are required to preserve the natural environment to a reasonable degree."² Though this authority is rather late and little in law, perhaps ethically such a constraint ought to override all uses of water that degrade the environment unreasonably. Users of water, senior, junior or whoever, do not have the right unreasonably to harm others. In water disputes, we often worry about injury to junior appropriators; but perhaps nobody has the right to use property in such a way that unreasonable harms spill over to others. Using water vitally will be using water ethically because it will prevent harm to others. Positively, water use will respect life as life requires integrity in the natural environment.

USING WATER ARCHAICALLY: PRIOR APPROPRIATION

Assuming then, that using water ethically will require an intelligent mix of using water naturally and using water socially, is the doctrine of prior appropriation appropriate? Is there anything about the prior appropriation doctrine that seems likely to keep water use natural or just? A defender of prior appropriation might here prefer the phrase "using water beneficially," since the prior appropriator is required to use the water beneficially. Further, using water beneficially can

2 Instream Flow Law of 1973, Colo. Rev. Stat. § 37-92-102(3) (1990 Repl. Vol.).

include both vital biological and profitable cultural uses. But "beneficially" does not get at the essential idea, which is that rights belong proportionately to the older users who have used it beneficially. Provocatively, I call this using water "archaically".

The logic here is: if senior, then better. At least that is the logic in law. "Between competing uses of water, priority of appropriation gives the better right."³ We want to compare that with: If senior, then more natural. If senior, then more ethical. "Better" here has clear legal content; that is the law. Can "better" here have any moral content? Or any biological or ecosystemic content?

Anyone who asks this question will see at once that a senior use is not necessarily a better one, any more than a senior use is worse. How old the use is, is an independent variable from whether the use is ethical or natural. If it is senior, we cannot draw any conclusions at all about whether it is good or bad, natural or unnatural. There is no evident logical, moral, or biological implication that follows from "older" to "better," even though this is the law.

Has seniority nothing to be said for it? Sometimes a senior use may be established and tested; a junior use may be novel and untested. In that sense an old law may be better. Laws that have stood for centuries are probably good ones, like the ten commandments. A new piece of legislation may or may not be an improvement over an old law; lawyers are typically and perhaps justifiably conservative. Literature and music are like this. If it is new music it is probably bad! Many old practices are classics, new ones are ephemeral, and only a few of the novelties will test out. If senior (and tested), then better. If junior (and untested), then worse. If the water uses that were older were thought also to be tested, they might be more vital, efficient, conservative, ethical, and so on. Now we do have a plausible argument, but it is not the chronology, but the testing that is statistically correlated with the age that we are after. It is not so much the logic as the experience of seniority that counts. Senior means tested in experience. We will need some evidence that the senior uses have been winnowed for the better ones. None of that is specified here; it is just that the older is better.

Another thing to be said for seniority is: first come, first served. When people line up for a good we have no particular reason to think that the first are the most needy, or the best customers. It is simply that we have no way to judge these other criteria, or think that it is none of our business. Setting those issues aside, we simply think that it is fair to wait our turn, not push in line, and recognize the rights of those who were there before we came. There is no way to judge other users of water, whose use is better, worse, etc., and so, we set all these issues aside, assume that one beneficial use is as good as another, and say: first come, first served!

3 Vranesh, George, *Colorado Citizens' Water Law Handbook* (Denver: Colorado Endowment for the Humanities, 1989), at 12.

"First come, first served" often means that those who come second, third, fourth, do get served; they just have to wait their turn. This is the way fairness works when checking out at the supermarket. "First come, first served" sometimes means that those who come later do not get served at all, or get served more poorly; with water that is what it often means. If there is not enough water, the last do not get any at all. We are sometimes prepared to accept that, the last camper does not get a campsite at all. But then a campsite is a recreational benefit. If first come, first served meant that the last to come got nothing to eat at all, we would be less sure. Or nothing to drink. If quite senior, then most. If quite junior, then nothing. There is nothing moral or natural about that.

"First come, first served" also applies to some specific occasion—getting a campsite. But here it means once first come, forever first served. If senior, then forever first. We would elsewhere protest that. Those who are first come to a campsite do get it, but (where there is a shortage) they are only permitted to stay a week or ten days, then they must vacate and turn it over to somebody else. If those who first arrived at a campsite could preempt it forever, we would call the system unjust.

First hired, last fired. Last hired, first fired. Seniority has something to be said for it elsewhere; why not here? Since I have gray hair myself and have been on my job over two decades, I would protest if a junior were to evict me. But seniority on the job counts when other things are equal, given adequate competence, and it assumes that seniors will retire in a decade or so, that there is a constant turnover of positions in the trade (like a turnover of campsites), and that juniors can enter such vacancies, and that aging juniors will themselves in due turn become seniors. Water rights are never retired and turned over like this. Senior means senior forever.

Senior can mean tested. Do we have reason to think the first is the most competent or efficient at the job? There are some weaker reasons. Experience counts, and a seasoned employee can, on average, be expected to know things about the job that the novice does not. On the other hand youth brings a certain vigor and up-to-date training. Usually we claim only that seniority represents some probable skill and investment in the firm that counts over the novice. But we were not able to find any cause to think that senior water uses were more tested.

In simpler times, first come, first served may have been enough, because it did recognize the investments that the seniors had made, and there were ways for juniors to develop water. And there was water left in the streams naturally. But now we live in more complex times, times when the juniors may no longer have access (or may have access only if they are wealthy enough to purchase senior rights), in times when there may be no water left in the streams naturally. Though senior users have made investments, there is no reason to think that senior water use represents any added competence or contribution to the public

good, or even that senior users have invested more money in their projects than junior users.

So why does their seniority count? I gather that it comes out of an unusual American past where we perceived the continent as having a vast number of free goods, there for the taking, otherwise going to waste. We established law under these circumstances that the first to take possession of these goods had the right to them, and that others who came later had no right to take away the goods of prior appropriation. We do need stability of property ownership; property is useless if ownership is fleeting or subject to arbitrary upheaval. We typically think of land and minerals like that; the first European to arrive and claim lands, or at least to claim and use lands, had first right to them thereafter. The first miner to stake a claim had a right to it. It is as though these goods had been discovered or found and finders are keepers. That has something to be said for it when people do make discoveries or inventions.

But perhaps water as a common good and a moving resource is not something to be found and kept in this way. The natural givens—air, sunshine, water, soil—are not discoveries to be appropriated by the first European who happens to arrive. We might have learned that from the Indians who were already here; we have been learning rather tardily that we had doubtful right to appropriate their water. The question is not property, but propriety. What is really appropriate water use?

If there are goods lying unused, then the first to find them do have some right that attaches to their first finding, and water may be like this, at least after its appropriate uses as a vital common good have been protected. So deference to prior possession makes some sense ethically, but only so far as such appropriation of goods does no vital harm to others who come later, no vital harm to the ecosystems on which others in future generations will depend. There is a weak link between "older" and "better." It seems also plausible to suppose that the older uses will probably be domestic or agricultural, and not industrial, and one might expect such uses to be more vital or biological than latercoming ones. Beyond that, I can find little connection between "senior" and either "natural" or "moral."

Especially if we are hoping not only for a just interhuman ethics but for an appropriate environmental ethics, the connection fails.

Compare:

"A thing is right when it is senior."

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community."⁴

⁴ Leopold, Aldo, *A Sand County Almanac* (New York: Oxford University Press, 1968), at 224-25.

About all the prior appropriation doctrine really means is that law protects the status quo. Whether the status quo is good or bad is a question subsequently to be addressed. It assures the senior owner of quantity without any examination of the quality of his use.

USING WATER ECONOMICALLY: APPROPRIATING A COMMON GOOD

The really prior appropriators are all now dead. No one who established a water right in 1859 or even 1900 is alive today; these rights continue as held by their heirs. The logic once was: if senior, then better right. But since all the seniors are dead, the logic today is: if heir of senior, then better right. We allow persons to bequeath property to their descendants; this seems right within limits. Yet at times and places, inheritance can become a great evil, since it means that wealth no longer attaches to contemporary labor; it is just a legacy. But with water use we protect against that, since the prior appropriators have to make a continued beneficial use of their water to keep it. So the right to bequeath water rights seems right. Still, it has some strange results. Juniors who are heirs of seniors are equivalent to seniors, while juniors who had no such ancestry are inferior. I may be twenty years old, the great-grandson of an original settler, and override you, with white hair, resident here but only since 1920.

Now into the seniority system, we must add sales. Seniors can sell. So a junior with money can buy the senior right. The senior right, we recall, made only limited sense morally. Once we do get property ownership established, however, it makes perfectly good sense to be able to buy and sell water more or less like any other kind of property. So we pass from water as a right of prior appropriation to water as a marketable good. We do not try to intervene in what is bought and sold on markets; we leave it to citizens as customers to know their own preferences. Just as they will know what chewing gum is worth they will know what water is worth. Originally the water flowed preferentially to the seniors, but, after a century of buying and selling water rights, when the seniors are all dead and their heirs have sold and resold, water flows preferentially to money.

After several generations of heirs and turnovers of sales, there is no reason to think that seniority is determining current use. The seniority system got the water on the market, but for decades whoever has had the money got the water, and it does not make any difference, really, whether the right is 1859 or 1959, or even if it were 1659 or 1259, because the effects of seniority have long since been washed out. All that matters is who has money. The control drifts away from the seniors to the wealthy, regardless of age. We can forget about the prior appropriation doctrine, except as a matter of historical origins; the real outcome is that money moves water. We once passed through an era of prior appropriation, and all property law has operated via such legacies of the first to patent claims, first finders, but the forces that now control these historical entitlements are economic

ones. What we really have are economic forces passing through historic rights. We are not using water archaically; we are using water economically.

"Economically" here does not mean efficiently but that whoever has money stipulates the use of the natural resource. The seniors, or their heirs, or the heirs of their heirs, do at first sale get the purchase money, and we will have to set aside questions whether that money is justly held and where it goes in the economy. But at least, after the purchase, the control of the water passes over to the next purchaser and the next one after that. So the senior system really is an anachronism, kept on the books, with which lawyers must bother, but it is not really the determinant of use. Money is.

The question now becomes whether using water economically, making it a private good on markets, is likely to result in using water naturally or in using water ethically. If we are not so sure that senior means right, it might seem even more questionable to think that selling water to juniors with money will make for a better conservation and distribution of the values carried by water. If money, then probably right? If money, then probably a natural use? Do we have any logic or experience that supports such inference?

There is something to be said for free markets, something ethical. We are reluctant to intervene because we think it right to let people do what they please with their money. In that sense, it is ethical to leave persons free to make their own decisions as they operate in markets. So the state does not regulate use in any sense of deciding how, when, where, or for what purpose water will be put to use.⁵ There is no cause for the state, in its water law, to do any deciding how water is to be used. That is left to private decision. Persons can use their water, just as they can use their money, or time, or land, in any way they please, so long as they do not harm others in so doing. The state regulates only in the sense that it adjudicates disputes and arranges procedures for the use of water so as to minimize these disputes. The state arranges for the private use of water and after that leaves the outcome to economics. The state only polices; it has no policy.

Is it not reasonable to market natural resources? Is not water a prime natural resource? The answer to both questions is yes, indeed, but the fact that water is such a fundamental, vital natural resource forces us to ask whether we can entirely privatize it as an economic, marketable good. Ought we to allocate a commons by money?

Before answering, we have two further things to notice. The appropriators do not pay anything at all for what they put on the market. The original seniors

⁵ Though the Constitution of Colorado does say that "when the waters of any natural stream are not sufficient for the service of all those desiring the use of the same, those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using the water for agricultural purposes shall have preference over those using the same for manufacturing purposes" (Colo. Const., art. XVI, § 6.). There is an implicit sense of biological necessity overriding the artifacts of culture.

never paid anything for the water. It was a natural given, like air and sunshine. They just entered wild Colorado (unoccupied, as they thought, with their European sense of ownership), ignored the Indian peoples here, and took the water as they did parcels of real estate. The water was not even deeded to them out of the public domain. Nor have any of the appropriators since paid for water, nor do the present appropriators pay. They do, of course, pay for the ditches they build, for the delivery of the water; but the water, a common good, is appropriated for free. After the water gets into the delivery system it is paid for, as everyone knows who pays a monthly water fee. But when it is removed from the landscape, nothing is paid at all.

A second complication arises. In water development projects, the state has relied on federal assistance, and this has resulted in substantially greater amounts of water being used in irrigation than would otherwise have been the case. The federal government has subsidized water and enabled water development to occur that would not otherwise have occurred, if left to private financing. Water authorities can issue tax-exempt bonds. They are semi-public entities. So water isn't left to the market after all. Whether this is good or bad depends on who receives the subsidies; note at present only that where the water flows depends on political and social factors external to the markets. If these benefits of water development flow to special interest groups, there is no particular reason to think they will use water naturally or ethically or even efficiently and economically.

Well, it will be replied, look at it like this. Water is a free good, but we have to distribute water economically as a natural resource. We can distribute it with subsidy if we please; what we are doing is stimulating the economy, building up our Colorado culture on the landscape, and water is a vital key to innumerable other kinds of benefits. The economic use of water is an umbrella that covers indiscriminately many different kinds of beneficial uses. We see what is happening, really, only when we itemize these end uses, rather than complain of the means to this end. When persons purchase water they can put it to diverse beneficial uses: agricultural, domestic, industrial, recreational, aesthetic, ecological, even spiritual, when it is used sacramentally. Economics permits water to be used in myriads of ways, some natural, such as instream flows, some semi-natural, such as raising crops, some quite unnatural, such as making plastics.⁶ There is nothing wrong with coupling economic use with free intake and even subsidized distribution, if, after that, water is freely bought and sold to pursue these ends. Whether that use is natural or unnatural is irrelevant.

Of course, money now remains on the bottom line. In a capitalist state, most big money has to be put to work making money. In an interest driven economy, unless such money is producing at least the interest rate, it is being lost. So there

⁶ Making plastics is unnatural in the artificial and the relative senses, since plastics are deliberately made and are far removed from anything synthesized in spontaneous organic nature, quite nonbiodegradable, and misfits in ecosystemic processes. In the law-of-nature sense, of course, which we set aside earlier, no laws of nature are broken in the manufacture of plastics.

will be strong pressures to use water for vital consumptive needs or to put water to work producing income. And that will be a good thing, resulting in a balanced permission to use the water one has purchased any way one pleases, kept vital and efficient by the pressures of the market.

Liberty can intersect with the commons. The Colorado Constitution asserts, "The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied."⁷ That once seemed liberty indeed. But with changing times this could become rampant individualism, failing to see that water is a natural, common good, failing to remember that the constitution asserts, before the right to appropriate: "The water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state."⁸ The constitution does not argue that appropriation is an appropriate right ethically; it just asserts that there is such a right, and that it shall never be denied. Behind this intense assertion there probably lies the conviction that water is vital, and that humans must have access to it, which is appropriate enough. That seems to be why the constitution gives a priority to domestic over agricultural over industrial uses, in order of critical need. So it is a good thing to have the constitutional right to water.

But what if this right is asserted so intensely that it is blind to biotic community, blind to the public good? What if the right, originally asserted constitutionally as a vital one, later becomes strictly a marketable one? The constitutional stipulation that water belongs to the people becomes just rhetoric. Water belongs to the purchaser. Notice that the constitution nowhere asserts that one has the right to sell water as one pleases. Liberty ought not to be a license to harm a common good.

There are many issues, such as free speech, voting rights, abortion, or euthanasia, that we settle with little attention to economics, although we may not be uninterested in what decisions here cost and who bears those costs. Those items can figure into fairness and justice. Many things that we do put on the market, we do not leave to an unregulated market. This is illustrated at once by law, which, though it regulates markets abundantly, regulates them in the interest of fairness, equity, sustainability, spillover costs, and so on. Alas, often regulation serves more to defend vested interests and the status quo, but sometimes at least the regulation limits economic interests in order to protect noneconomic values.

Making something a property is a route to making it an artifact, to be rebuilt, remade, transformed into something else, to possession and control. We do need to provide for that kind of use of water, but not if such use pays no attention at all to the natural use of water. A main problem is that many of the values carried by

⁷ Colo. Const., art. XVI, § 6.

⁸ Colo. Const., art. XVI, § 5.

water, both to society and within natural systems, are "external" to the market; that is, they do not show up on anybody's books. Marketing water treats as externalities what are really biological vitalities. We fall into the illusion of supposing that humans, with their economics, are external to the ecologies on which their economies are superposed.

When you chop up the land into "pieces" of real estate, quarter-acre parcels, oblivious to the fauna, flora, or anything else naturally there, building fences with no regard for natural boundaries, you can hardly expect to appreciate landscapes or ecosystems in their beauty, integrity, and stability. When you divide up water into acre-feet, oblivious to the riparian ecosystem, you can hardly expect to appreciate water as the lifeblood of an ecosystem.

Compare:

"A thing is right when it is marketed freely."

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community."

USING WATER ECOSYSTEMICALLY: ECOSYSTEMS AND ECONOMICS

Ecology and economics have, as is often noted, a common root, *oikos*, house. They have to do with the logic, the law of one's home. Water is part of our home culturally; we need it domestically, agriculturally, and industrially. But prior to that water is part of our home naturally; it is given on the landscape and we need it vitally. Did we not say that water is like air, sunshine, land—one of the vital givens in the country in which we reside? We are part of a larger natural community that includes, as Leopold puts it, "soils, waters, plants, and animals, or collectively: the land."⁹

That is why we do not pay for water at the point where it is taken up into the cultural system; we do not pay for sunshine and air either, we do not pay for wildlife or photosynthesis, and water is another good that rains down on the land. So whom should we pay? But of course these other goods are not captured and appropriated either, nor bought and sold as a matter of right. If the water is going to be converted into an economic resource, then ought not some price be laid upon it, right from the point of its diversion? If the water is going to be used naturally, perhaps indeed persons ought not to pay. But then again, if the water is going to be used naturally, users will have to be constrained by natural processes, instream flows, ecosystem requirements, wildlife needs, and so on. Conceptually, we cannot have it both ways, natural and free at the uptake diversion and economic and sold at the faucet.

Only some kinds of goods can or ought to be marketable goods. We sell cars and computers. In general, we sell artifacts, over which laborers have labored, and the resources with which they can labor. We do not allow people to sell children or votes or wildlife and we doubt whether sex ought to be sold. Among the natural givens, we do not sell air or sunshine, but we do sell soil and water. It is easy to market real estate, as it remains *terra firma* stably there; you can build a fence around it, post it, develop it, reside on it, and so forth. Air and sunshine are *difficult* to contain. What about water? It is more fluid than soil but not so volatile as air. Though it flows in streams where we can catch it by bucket or check dams, water does come in the air, and it falls down like sunshine.

What you are taking on your land, or taking upstream and diverting to your land, is not something that is generated on your land, but is a good that rained down all over the land, raindrops broadcast over the landscape, and subsequently gathered into streams. The minerals beneath your land are yours, can be taken once only, and are not renewable; but water is renewable; it recycles. There will be more next year, like sunshine and air coming round again, delivered to your land. Some actually falls on your land, but not enough; that is why you are diverting the water that fell elsewhere on the landscape. Another way of saying this is that the water is really part of the ecology, and the question is: can we isolate water and make it nothing but economics?

Water may be not be the kind of good that ought to flow simply at market demand. The market serves consumers, and all are indeed consumers of water; we drink it. But water is a larger resource, such a vital resource that it is more like one of our vital sources. It is more like air, sunshine, skyline, food chains, species, or photosynthesis; it is more like cloud, wind, climate, or ocean (the sources of the water). It took Coloradans a century of water use to realize that water just flowing naturally in a stream could be a good thing. Economically it seemed to be going to waste. Ecologically it was vital, the lifeblood of the system.

The beneficial uses of water are: domestic, agricultural, municipal, industrial, and recreational, to which in 1973 we added minimum stream flows. The last "use" is a little odd. When you take water out of a stream, everyone can see that you are using it. But what is instream flow? Who is the beneficiary? The public? Wildlife? The riparian community? The environment? Whatever the answer, we have now entwined the beneficial uses of citizens and those prior in natural history. The Colorado Water Conservation Board, we noted earlier, has the exclusive power to appropriate or purchase water rights for flows required to preserve the natural environment to a reasonable degree. Such power might have been adequate if it had the seniority of natural history; it is too little too late because it makes protecting the ancient natural history junior to 1973. The Board can purchase senior rights, of course, but that means that the protection of natural history must go back on the market. In result, this is mostly paper water, not wet water.

In the most basic natural resource issues, economics is not the only, and sometimes not the principal item. Congress has said, for instance, that we want to take endangered species off the market; only under quite exceptional circumstances should we allow our economic activities to jeopardize species (Endangered Species Act). Congress has said that we want to take some wildlands off the market, designated as wilderness, where humans only visit (Wilderness Act). Congress has said that federal lands ought to be used to secure "a combination of balanced and diverse resource uses . . . without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return."¹⁰ We do not want entirely to put our forests on the market, but often to preserve nonmarket values carried there.

What about water? Should we put it entirely on the market? Perhaps, as with air, sunshine, species, landscapes, forests, there are values carried by water that do not market well because they are biologically based. We may need to be natural to be ethical with water. Congress has said, for instance, that there should be some wild and scenic rivers, which run free and are not put on markets, perhaps analogously to the way some wildlands are untrammelled by man (Wild and Scenic Rivers Act). Congress has said that the waters should be kept clean, upstream and down, even though this costs money (Water Quality Act, Clean Water Act). Congress has said that we ought to preserve our wetlands against pressures to drain and develop them (Emergency Wetlands Resources Act).

Here a deeper aspect of the matter strikes us. The natural water regime into which we must fit our cultural uses remains prior systemically because it was prior historically. For a water right, senior means 1890. If we think in terms of white settlement in Colorado, that is impressive, but if we think in terms of natural history, 1890 as senior is comedy. The wildlife in the West have been using the water beneficially for ten thousand years, a hundred thousand years; the big river fish go back two million years. In 1870, with typical European arrogance, the white settlers arrived and grabbed the water, and claimed prior appropriation. A century later, with more insight, the Fish and Wildlife Coordination Act requires that wildlife conservation receive equal consideration and coordination with water resource development. Unfortunately, as with instream flow, this is not retroactive; fortunately, it means at least rhetorically that from 1970 onward, wildlife conservation figures as heavily as human development.

In other ways, we are trying to gain more seniority for natural history. By insisting that there be water for wilderness, we are trying to figure in something of this biologically prior appropriation. Wilderness was beneficially using water, before the white or even the red man came, and if we resolve to have some such areas untrammelled, where man is only a visitor who does not remain, then we

¹⁰ Federal Land Policy and Management Act of 1976, §§ 102, 103 (codified at 43 U.S. C. §§ 1701-1702 (1986)).

must leave the water there, letting the water, and nature, take its course. In insisting that speciation continue, overriding even the most senior water rights, we are giving a kind of seniority to threatened and endangered species. In insisting on water quality, overriding senior water rights, we are giving a kind of priority to the original condition of the rivers and streams.

But we will not have a really appropriate water law until we have found how to use water culturally and economically in such ways that the natural regime of water biologically and ecosystemically remains both as our base of support and with something of its original integrity. For those who really realize where they are, on this well-watered Earth, most of the marvels of water use predate human arrival on the planet, much less the arrival of Europeans in Colorado. No virtues distinctive to the last century of development in Colorado, certainly not those of the last few decades of urban sprawl, justify the catastrophic destruction of the biological achievements of a hundred millennia.

Compare:

"Use water ecosystemically."

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community."

USING WATER UNNATURALLY

Come at this from the other side. What uses of water might be so relatively unnatural that they are undesirable? What are the injuries we want to avoid, because they degrade environments and are wrong? What are the experiences and outcomes we fear, whatever the logic? This will help make operational the connection between using water naturally and using water ethically. This will help decide whether the injunction to use water naturally is too vague to implement in water policy.

DO NOT USE WATER SO AS TO DESTROY SOIL

The four vital natural givens, again, are air, sunshine, water, soil. Consequently, water uses that destroy soils are unnatural and therefore undesirable. Avoid water development that triggers erosion and sedimentation, proportionately as it does so. Water use that destroys soil cuts down the scale during which a region can be inhabited from millennia to decades. Because it does not appropriately value the natural history of soil, a gift from the historic past, it shrinks the future of a landscape, and the human future on it, by one and even two orders of magnitude. It values fertility now at the cost of infertility forever thereafter, and that cannot be either an ethical or a natural use of water. All this signals a chronic growth problem.

AVOID WATER USE THAT IS NOT SUSTAINABLE

Water, we have said, is delivered on the landscape; it comes round and round in the meteorology and hydrology. The recycling processes are natural and must be sustained. That is what is difficult about mining groundwater. Groundwater is as natural as surface water; a well is as natural as a spring. There is nothing amiss about using rechargeable groundwater. But an economy, especially an agricultural economy that depends on mining fossil water is like one that depends on mining air to breathe or mining uranium to make artificial sunshine. We mine water, we mine petroleum, we mine coal; we are quite dependent on all three. What is the difference? The difference is vital. Water belongs in the ecosystem. Petroleum and coal do not.

In Colorado, in the Denver Basin that extends from Brighton to Colorado Springs, we have 300,000 people who rely solely on nonreplenishable groundwater for domestic supply. Colorado Senate Bill 5, passed in 1985, exacerbated the situation. I have no interest in living where I must mine my vital needs, nor do I want my children or grandchildren to live in such developments. Having squeezed all the water from a ruined countryside, we proceed to mine it from the past. There is something unecological and unhealthy about that. We are already vulnerable enough in our dependence on petroleum and coal; why should we increase our vulnerability by even more dependence on mined water? It is unnatural; it is unwise; it may be so unnatural and unwise that it is immoral.

AVOID LETTING POLITICAL BOUNDARIES IGNORE HYDROLOGY

Water does not know anything about state boundaries. Or county lines, or landowner's fences. The rain falls oblivious to the way humans divide up the landscape; and, divert water though humans may, the basic hydrology is still determined by the landscape. Climatology, meteorology, and hydrology are as important as politics, economics, or sociology in any water planning. Natural forces pay little attention to political forces, and political forces that pay little attention to natural forces do so at their peril. We must think like a river.

Colorado especially, since it has no natural boundaries at all, illustrates political ignorance of hydrology. If we want some insight into how water moves in this region, the square shape of the state is utterly irrelevant to the hydrology. A map of the state of Colorado and a map of the Colorado River Basin is a study in contrasts. Fortunately, the seven water districts do have relevant natural watersheds, and that much is wise and right.

None of our other communities pay much attention to geography (the religious or academic or industrial ones, nor even the political community in its court or legislative institutions). So why should water policy pay any attention to geography? But religion and science and education and law enforcement do not arrive by wind currents and flow by gravity down stream channels. Water does.

Natural boundaries are appropriate for natural givens, both before and after these natural givens are incorporated into a culture.

The word "rival," we might remember, comes from the same Latin root as river, *rivus*, because those who drank from the same stream often found themselves in competition with each other. Political boundaries that ignore how two political communities are really one ecological community, two jurisdictions drinking from the same stream, are bound to produce rivals, and that generates conflicts of interests, disputes, because the political boundaries are unnatural. It accentuates the self-interests of separated communities rather than combining the interests of a common culture with a common watershed. Such ignorance happens either when political boundaries are drawn with straight lines, or when political boundaries follow rivers, which blatantly fragments a drainage. There is hardly a state line west of the 100th meridian that follows a watershed (with the exception of part of the Montana-Idaho border) and there is hardly a major river that is contained within a single state (the Sacramento in California). All the big Rocky Mountain rivers cross multiple state lines.

Hydrology ought to contribute to a sense of community. People who cannot name the river basin in which they reside, or the valley they live in, do not fully know where they are. People for whom the rivers along which they live (the Mississippi, the Platte, the Arkansas, the Columbia, the Shenandoah) contribute nothing to their sense of place, nothing to their quality of life or experience of nature, are people without a country. People who never know or care whether they have crossed a divide hardly know where they have travelled. Rivers, lakes, streams, springs, beaches, bays, waterfalls—water is integral to the landscape and we are drawn to it. Being near water is almost always an asset to property, an amenity as well as a commodity. Just because politics is concerned with social and cultural identity in this comprehensive, residential sense, water policy needs to integrate with landscape geography. But most of our political boundaries are drawn so as to make this difficult.

AVOID INTERBASIN TRANSFERS

Interbasin transfers are better than living on fossil water but are often unnatural on a scale that is undesirable. All water development must move water around, out of stream onto field and into town, but by the time we move water around on regional scope in large volumes, we are no longer building our culture with enough relative attention to geography. Big interbasin transfers may destroy possibilities in one region to ship them to another; often the recipient cities are already big enough and too demanding on the basins in which they reside. There is something awkward about urban development that has to raid the water supplies of another region. We have exceeded the carrying capacity of our landscape. On regional scales, it is better to move the people where the water is than to move the water where the people are. Else the economics is too remote

from the ecology. Else we lose a sense of place; the culture is displaced, misfitted on the landscape.

There are both naturalistic and humanistic objections, problems in the donor regions that are rural and wild, and problems with the urban recipients. Big transfers big distances are unlikely to be sensitive to ecological values, unlikely to be efficient, unlikely to be humane. Consider both ends of the line.

At the intake, with major interbasin transfers, we disrupt biomes. We tamper seriously with riparian ecosystems that contain much of the richness of the fauna and flora of a region, especially in semi-arid regions. To some extent interbasin transfers might be used to restore and compensate for waters removed from local riparian ecosystems, but such considerations are seldom, if ever, the driving force behind such transfers. The transfers are for developmental profit, with only secondary considerations being given to riparian biota. The water is likely to be taken from a well-watered region, relatively in the semi-arid West, and the dewatered area is likely to contain a high proportion of the biological riches on the landscape—mammals, fishes, birds, amphibians, invertebrates, and especially the broad-leaved trees, the riparian floodplain flora, and other phreatophytes. Besides the actual transfer of the water, there are the dams and diversions, the reservoirs, riparian habitats altered to lacustrine habitats, water tables lowered, vegetation cleared, sedimentation rates increased, roads built, and exotic species introduced in disturbed areas—this too can be quite disruptive to wildlands and to rural values. Even those who care nothing for the intrinsic values of flora, fauna, and ecosystems ought to be concerned about the loss of associated hunting, fishing, recreation, aesthetics, and tourism.

What is gained at the other end of the pipeline? We have little reason to think that crowding more people into those thirsty cities is a good thing. Ever higher population density is no more desirable than escalating water use; neither is either natural or moral. A city, though increasingly cut off from its geography, might benefit if enriched in urban community proportionately. But most of our evidence is to the contrary; the increasingly crowded city is increasingly faceless and uncivil.

The scale is getting troublesome, unnatural, even arrogant. "By God, we want water right here, and we'll have it, if not by God by human ingenuity and engineering. We'll get it from however far and whomever we need to go to. If the water more naturally belongs to someone else, somewhere else, money will fix that. Never mind that somebody else, once well-watered, gets left high and dry." This captures the water of another region; it puts one's own region in capture to another. It is a kind of imperialism, of exploitation, that finds itself ever unable to say "enough," unable to envision a steady-state economy. No city can have *more* water forever, and if not forever, why not begin to face the truth now? After all, every city so far developed in a good river basin, kept to a reasonable scale, can

have *ample* water forever, and isn't that enough? Doesn't a human scale usually coincide with an ecological scale?

But it will be protested, water travels naturally, sometimes great distances. One can drink water at the mouth of the Mississippi that fell on the Yellowstone plateau; nature moves it downstream. Nature cycles water around from the Gulf back onto the interior landscapes. Sunshine and air, two other natural givens, travel even further. So there is nothing inherently unnatural, much less *immoral*, about natural givens moving around. Or about humans using water from a distance.

We move things around incessantly; most of modern culture depends on transportation. It does not matter that the orange juice I drink comes from Florida. Why should it matter if my water comes interstate? One answer is that water is among the original givens; frozen orange juice is not. A society that is outstripping its fundamental givens is in trouble. Like mining water, which fell ten thousand years ago, importing water, which fell a thousand miles away, really signals a chronic growth problem, rather than progress in transporting and distributing resources. That approaching crisis might be manageable now, if we choose an alternative form of development fitting city sizes sustainably to their landscapes. If we fail to attend to the problem now, the growth problem may later turn cancerous.

Again, it may be protested, there is no reason to think that water belongs to those near whom it happens to fall or flow. We have said as much in our argument that water is a flowing resource, a commons that rather inappropriately becomes "property." Analogously, the water of a particular region is not to be appropriated for the exclusive benefit of the human inhabitants of that region. Their water is not theirs exclusively, any more than the timber on national forests in their region. Just resource distribution pays no heed to the accidents of physical geography; ethics is not provincial.

That argument, though, models water as an economic resource only and hence ignores geography. The issue is not so much whether local resources "belong" to the natives, as whether there ought to be any attention to a "fit" between people and their landscape, whether people and the culture they form have any sense of "belonging" to their landscape. The better argument models water as a natural given and recommends a culture in satisfactory fit with its ecology. A person "belongs" to or in a watershed as well as to or in a city, a country, or state. One resides in a natural as well as in a cultural place, in North Park as much as in Jackson County, in the San Luis Valley as much as in Alamosa. Locals who have large amounts of water subtracted from their ecologies (to fuel an economic engine in a distant city) do not thereafter live in the same ecology; they no longer have the native landscape they once did.

The dewatered province may have some other future, if the provincials can purchase it with the money they have gained; and, while this will sometimes be a better one, it will seldom be so. Even if you calculate to leave enough water in the raided region for their foreseeable development, every acre foot of water transferred is so much greenery subtracted from their region and moved to yours, and greenery in an arid West is always an important asset. Selling one native green environment is usually a bad bargain, and all the more so if the purchasers are after more bluegrass lawns in their desert.

The purchasers hardly remain natives either. To put the question in extreme form to make the point: can you be a Southern California native if all your water is exotic, imported from Canada? A hydrology that is regional, even global is natural enough, but do we want a plumbing system that runs contrary to the hydrology for a thousand miles? Other things being equal, the more natural, the less artificial the plumbing, the better. Other things being equal, the shorter the plumbing lines the better. Favor hydrology over hydraulics. Where plumbing is required, it ought to increase stability, not destabilize communities. Partly this is prudential, but partly it is provincial; foreign water makes us vulnerable, it erodes our sense of place.

Big diversions are driven by realtors who want profit before they serve existing human needs, though doubtless, after the realtors have their profits, the human needs of those enticed to live where realtors have located their faucets, are thereafter served. Profit-driven water development on this scale is as likely to cause problems as to cure them. Would it not be better to be less concerned for profit where development is rampant and more concerned to integrate a people intelligently into their landscape, to entice people to live in some reasonable proximity to where the water is? Such development would be relatively more natural, relatively less artificial. It would serve human needs quite as well, indeed even better, because it would not increase vulnerability; it would not purchase one region's future at the expense of another; it would not strain carrying capacities; and it would not have optimal profits as the critical determinant, oblivious to geography. It would promote a better fit of all cultures involved to the landscapes on which they reside.

If you nevertheless decide to make interbasin transfers, then notice carefully that you need more, not less, cognizance of what the natural basin hydrology is, or was, in order to know what you are undoing with what you are doing. We need to know how to protect the integrity both of the basin of origin and the basin of receipt, so far as this remains possible.

FORGET ABOUT CLOUD SEEDING

A decade back, the Federal Weather Modification Advisory Board, established under the National Weather Modification Act of 1976, claimed that within twenty years, with proper funding, the United States could control rainfall in the

Midwest and snowfall in the Rockies, and make the science and practice of weather modification a reality all over the nation.¹¹ We are halfway into that twenty years, and perhaps able to see more arrogance than promise in weather by consent of the governed. Not that humans are unable to affect the meteorology; we are probably in fact altering the climate for the worse. But, again, is it not better to live within the hydrology of one's region than to seek the ultimate technological fix: unnaturally managed weather to improve the water supply? That is ecological hubris, not ecological harmony.

DO NOT REBUILD FORESTS TO INCREASE RUNOFF

Closer to home, in the Fraser Experimental Forest, pilot projects are testing whether water runoff can be substantially increased by managing timber harvests. With judicious cutting (often patch clearcuts or strip cuts), snowmelt and rainfall runoff can be increased up to 40 percent. Another method is to eliminate Englemann spruce, a heavy water user, in favor of lodgepole pine, an efficient water user that produces more wood with less water. These pilot projects have been done carefully and in some cases followed for nearly half a century.¹²

A decision that could lie ahead is whether to modify hundreds of thousands of acres of national forests to satisfy the demands of Denver and other Front Range cities, perhaps saving them just in the nick of time as they exhaust their underground aquifers. This seems humane and foresighted, but it might also introduce irreversible, unforeseen changes of the first magnitude, especially after the cities, hooked on the water, demand ever increasing amounts of it, their politicians and developers pressing scientists to escalate water production. Again, large-scale interventions of this kind only increase vulnerability because they force a more and more relatively unnatural culture onto the landscape. It is better for future generations, better for the integrity of natural systems, to find a way to live within the natural hydrology of the landscape.

Alternately put, you increase your vulnerability concerning a resource that is vital, because you become hooked on an artificial supply. It is neither prudent nor moral to increase risks at vital supply points. You are getting one generation hooked with considerable uncertainty about the long-range effects of what you are doing. Humanistically, you are shipping risks to future generations. Environmentally, you are radically revising ecosystems, rather than seeking an adaptive fit within them.

DO NOT DEGRADE WATER QUALITY

That water law ignored biology is revealed by the fact that early agreements specified only how much quantity and ignored the quality of the water. It was not

¹¹ Sullivan, Walter, "Federal Panel Proposes Major Effort to Modify Weather by the 80's," *New York Times*, July 13, 1978, p. A17.

¹² Alexander, Robert R., Troendle, Charles A., Kaufmann, Merrill R., Shepperd, Wayne D., Crouch, Glenn L., and Watkins, Ross K., *The Fraser Experimental Forest, Colorado: Research Program and Published Research 1937-1985*, General Technical Report RM-118 (Fort Collins, CO: USDA Rocky Mountain Forest and Range Experiment Station, 1985).

until 1976 (The Colorado River Basin Salinity Control Act) that the U.S. limited the salinity of water that passed downstream to Mexico. In general, Colorado law has not adequately addressed water quality issues; these have largely been forced on the state by federal legislation such as the Clean Water Act of 1972, the Water Quality Act of 1987, and the Endangered Species Act of 1973. But agricultural return flow or urban sewage that pollutes the streams and rivers kills the fish, shuts down the riverine and riparian ecosystems, makes the water unfit for human use downstream, and in general makes water use a misfit on the landscape. It is unnatural because it is incompatible with the role of water, in which natural systems and human culture have entwined destinies.

WATER DEVELOPMENT OUGHT NOT TO JEOPARDIZE ENDANGERED SPECIES

Roland C. Fischer, as Director of the Colorado River Water Conservation District, in testimony concerning the Colorado River, stated that "the Endangered Species Act does have within it the seeds of preventing the Western United States from properly utilizing its water resources, can seriously cripple Western agriculture, and can certainly have adverse impacts on farms, indeed on consumers, especially consumers of agricultural products and electrical energy."¹³ That is perhaps an exaggeration, but, as the Animas-LaPlata controversy reveals, further water development in Colorado, and even the continued use of previous developments, now has to take into account imperiled native species.

This is the law. We can defend it naturally and ethically with the claim that water use ought to be compatible with the continuing existence of the natural kinds that made prior use of these Western waters. We ought to take some notice of what we are undoing with what we are doing, and we ought not, without overriding justification, to shut down the speciation processes and the product species that reside with us in the Rocky Mountain West. They are the really prior inhabitants; they ought to continue by law and by biotic right. Leaving the fish there is both natural and right.

DO NOT DEGRADE WILDLIFE HABITAT

We have a start on this principle with the 1970 Fish and Wildlife Coordination Act, noted earlier, but only a start. We have legislation that asks how fish and wildlife are affected by diversions and water use and that authorizes the mitigation of fish and wildlife impacts. The instream flow provisions address wildlife habitat, but the recent nature of all such concern shows how unnaturally we thought of water when much of Colorado water law was forged.

¹³ Cited in Harrington, W., *Endangered Species Protection and Water Resources Development*, March 1980, Los Alamos Scientific Laboratory, Informal Report LA-8278-MS, at 1.

Riparian habitat has degenerated markedly in every major river system in the West,¹⁴ and this is often where the biological vitality is concentrated, as we earlier have argued. The prior appropriation doctrine never gave this matter a single thought.

INSTREAM FLOW IS THE FUNDAMENTAL WATER BENEFIT

The flow of water is really one of the vital natural benefits, one of our sources before it is one of our resources. We begin to go awry right at the start when we think that water in the stream, unappropriated, flowing naturally, is of no benefit, that is, carrying no value. By this reasoning, only water taken out of the stream, re-directed through a faucet is put to beneficial use. What's left in the stream is wasted, just as trees left uncut are wasted. But looking at a river, and lamenting that it is all going to waste, except insofar as someone is diverting it, is an unnatural way to view water. So long as instream flow is not thought a beneficial use, not seen as the original blessing of water, we are not seeing water naturally.

ECOSYSTEM INTEGRITY OVERRIDES ECONOMIC DEVELOPMENT

We perhaps could not have said this in 1890, because the cultural development of Colorado did require harnessing the resources of ecosystems, often with their significant modification, as on the Colorado plains, parks, and plateaus. But perhaps we can say this in 1990, from here forward. This in fact is what we are saying with much of our emphasis on environmental quality as a constraint on water use. From here onward, any water use that incrementally or irreversibly shuts down the ecosystem needs to be argued for. The burden of proof lies on those who wish to introduce changes to show that greater value is obtained than lost, and that such value cannot be obtained in any other way. The recent proponents of the Two Forks Dam could not satisfy this burden of proof, the result being one of the "watershed" decisions in water policy in this century.

Water is used naturally, East and West, but if water is scarce in the Western states and abundant in the Eastern states, what then? Does that mean that the West will have to use water more unnaturally? Irrigators, ditches, transmontane tunnels, bluegrass lawns in Denver—all seem to suggest that Westerners have to tamper with their water in ways that Easterners do not. Easterners just let it rain. The lawn is watered naturally. In the West you have to irrigate it. Perhaps the West will have to go further in making water marketable property, do more subsidized development, provide for more storage, build an economy mining groundwater, divert water from great distances. But I find just as much cause to think that water scarcity in the West means that we will have to pay more attention to the natural uses of water. The West will have to pay more attention than the East to fitting its cultural uses of water in with the natural regime on the landscape. It could be that the West needs more, not less naturalness in its water law.

¹⁴ See U.S. Dept. of Agriculture, Forest Service, *Importance, Preservation and Management of Riparian Habitat*, General Technical Report RM-43 (R. Roy Johnson & Dale A. Jones, eds.) 1977.

The unnatural use of water is epitomized in the aphorism that water flows uphill toward money. That suggests that such water flows unnaturally, counter to the prevailing forces on the landscape. Perhaps we can see that sooner or later economics that drives water uphill is bound to clash with an ecosystem in which water must flow downhill. We are not going to get the water law right until we recognize that hydrology and ecology are primary.

OPTIMIZING VALUES CARRIED BY WATER

Beneficial use and prior appropriation do not allow for the discovery that water carries fundamental values naturally, values that are prior to subsequent uses that resourceful humans can make of water. If we can revise the dominant model of beneficial use and prior appropriation and set this revised model in the larger context of a model that optimizes the values carried by water, then we might be able to integrate the hydrology, the fauna, the flora, the ecosystems of the state with the cultural values that we superimpose on this majestic state of Colorado.

The previous section was practical; we close with a philosophical turn. It may strike a lawyer as strange, but using water "justly" is only part of the picture. Indeed "use" may not be the final term either; some water we do not want to "use" at all but to leave in place, letting nature take its course. If we must phrase it so, we want to use water axiologically, that is, to optimize values carried by water. A portion of this optimizing involves the just distribution of water to persons, so that each gets what is due. That due will involve some biological considerations (what persons need vitally) and some economic considerations (how hard persons have worked, what investments they have made). Beyond justice, or, more accurately, prior to justice, a portion of optimizing values involves letting water take its course naturally in ecosystems. What is really appropriate is optimizing values carried by water. Justice is not the only consideration in using water ethically; ecosystemic and biological vitality is another.

Some will complain that to speak of "multiple values" that ought to be "optimized" by keeping water use relatively "natural" is to use weasel words with which you can do anything you want, so that nothing is accomplished. Perhaps. But these are also symbolic words. Consider: "water rights" versus "multiple values carried by water, natural and cultural." Is there not a beneficially orienting symbolism in "using water naturally," in "optimizing values carried by water," that could offset the archaic doctrine of "water rights" that, however well it may once have served, serves us no longer?

Recalling again the fact/value dichotomy, some may here protest that the fallacy feared at the start has been committed at the conclusion. The claim that humans should optimize the values carried by water is the most unnatural claim of all. Nature does not optimize values with water; why should we? True, nature is not a deliberate optimizer of values. By contrast, water lawyers might be. But it is

also worth remembering that water is one of the miracles of natural history. Earth is the only planet in the solar system in which there is a long history of liquid water flowing in large quantities, propelled by the energies of sunshine, recycled by currents of air. In those cycles, water is a key to the formation of soil. Carried on these water currents, life has evolved. In water life was first conceived and water has been vital in all life since. For all we know, Earth is the only planet in the universe on which there has been enough liquid water for this to happen.

George Wald, a Nobel prizewinner in biochemistry, studied the role of water in hydrology, ecosystems, and biochemistry, and concluded, "I doubt that life is possible anywhere without liquid water, the strangest molecule in all chemistry." Largely because of the presence of water here, the Earth is fit for life, just barely fit, but fit nevertheless in such way that "this universe breeds life inevitably."¹⁵ So there is scientific evidence from which we may venture the philosophical claim that water is remarkably valuable, able to carry the diverse values of life. If the rivers of water on earth are deeply entwined with the rivers of life on earth, we cannot get an appropriate legal system, the right value system until we are able to optimize the values carried by water.

In front of Eihei-ji, Dogen's mountain temple in Japan, there stands the Half-Dipper Bridge, so named because the Zen sage was accustomed to drink there; but he would take only half a dipperful and pour the rest back into the river, rejoicing in its onward flow. I do not suppose that we can derive water law in Colorado from such a gesture, but a half-dipper model, taking enough and valuing the remaining natural flow, seems more profound philosophically, ecologically, and ethically than does dewatering a river by prior appropriation for maximum exploitation.

¹⁵ Wald, George, "Fitness in the Universe: Choices and Necessities," in *Cosmochemical Evolution and the Origins of Life* (J. Oró, S. L. Miller, C. Ponnamperna, and R. S. Young, eds., Boston: D. Reidel, 1974), 7-27, citation on p. 8.