

The Implications of Improved Water Allocation Policy

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My introduction to water policy—baptism, I am almost tempted to say—took place a little over twenty years ago when I was on a commission of the state of California to investigate the social and economic consequences of the California Water Plan. In the course of these deliberations I came up with some verses. It is alleged that these had something to do with the fact that the legislature abolished the commission as soon as it found out what it was going to say and before it could report. I cannot refrain from quoting one of the verses now:

Water is far from a simple commodity,
Water's a sociological oddity,
Water's a pasture for science to forage in,
Water's a mark of our dubious origin,
Water's a link with a distant futurity,
Water's a symbol of ritual purity,
Water is politics, water's religion,
Water is just about anyone's pigeon,
Water is frightening, water's endearing,
Water's a lot more than mere engineering,
Water is tragical, water is comical,
Water is far from the pure'economical,
So studies of water, though free from aridity
Are apt to produce a good deal of **turbidity**.¹

On rereading these verses, they sound depressingly up-to-date after twenty-one years, though this may be just my ignorance of what has taken place in the meantime. Water is still a very

peculiar commodity in that it is so affected with romantic and poetic interests that it is extremely hard to deal with rationally. I must confess that I have some doubts as to whether water allocation policy can be much improved; we may have to learn to put up with what we have and hope that the costs are not too great. However, hope springs eternal in the human breast. Perhaps a more rational attitude toward this peculiar substance is more likely to develop in an age of increasing scarcity of energy and materials. Water may well be the earliest serious limitation that we reach in many projects for human development and improvement. In some parts of the world right now water is a more severe limiting factor on development than energy or other materials.

We cannot talk about water allocation policy without putting water into the scheme of human values. The earth is a vast, structured ecosystem, consisting of populations of materials and energy, physical and biological species, and human beings and their artifacts. Every time a human being does something, the ecosystem immediately around is altered, and the whole ecosystem of the earth may be altered in a small degree. The impact of human beings on the ecosystem of the earth has been quite marked even from the early days of the human race. We almost certainly produced the extinctions of the larger mammalian species; we profoundly altered the biosphere with agriculture and forestry; we diverted rivers, made huge lakes, irrigated deserts and created them. We now seem to be in the process of changing quite drastically the composition of the atmosphere and the oceans. While it is still easy to exaggerate the human impact, there is little doubt that it gets larger all the time. It may be approaching some sort of cliff beyond which there are drastic, irreversible changes in the whole ecosystem of the globe, which are highly likely to be adverse to the niche of the human race.

In this world ecosystem, water can almost be described as the dominant "species," perhaps after the human race. It is the physical basis of all life, at least on this planet. The kind of complexity of structure that life involves seems to be able to develop out of a liquid environment in a narrow range of temperatures. Within this range water seems to be the only convenient

liquid available, and we can certainly say that on earth at least no life exists in the absence of water. The amount of water has a very strong impact on determining the nature of the ecosystem, ranging from deserts to forests, grasslands, swamps, rivers, lakes, and the oceans. The variability over time of the quantity of water is also very important, as it is in intermittent streams and in the intertidal strip. The quality of water, likewise, matters—whether it is fresh or salt, polluted or clean.

The significance of water in the biological ecosystem carries over into human artifacts. It is hard to think of any human artifact or commodity that is produced in the total absence of water. Some require very large amounts, agriculture is impossible without it, so indeed are most manufacturing processes. The driest lecturer will have a glass of water on the rostrum and could not lecture without an intermittent stream of water passing through the body. I have never seen any attempt to classify commodities by the amount of water their production entailed as there have been for energy. It could certainly be done, and it might even be moderately interesting.

Once the human race has appeared on the scene, the quantity, quality, and variability of water in different ecosystems and habitats becomes in part a function of human valuations. Water is diverted from rivers for irrigation, it is transported hundreds of miles through pipes to cities, it is brought down from the air by cloud seeding, purified by distillation, salinated by irrigation. These changes are the result of human valuations. If water is redistributed or transformed by human action, it is because somebody believes that it is being transported or transformed from places, times, and conditions where it is less humanly valuable to those where it is more humanly valuable.

Who makes these valuations is a tricky question. I have argued that the impact of human valuations on the ecosystems of the world is organized through three major mechanisms, though there may be considerable overlap among them and mixtures of the three. I call these the "three P's"—prices, policemen, and preachments. Prices, of course, represent the market mechanism operating through exchange and a relative price structure. In a primitive form this is a water carrier selling water through the streets at the price that presumably pays him to do

it. A vestigial private water market remains in our society in water from particular springs and spas.

From very early days, however, water has been a strong concern of the political system, and it has been organized by "policemen"—legitimated threat. Indeed, as Wittfogel argues, water may even have created Oriental despotisms or at least created a social ecological niche in which despotisms could thrive and survive. Irrigation, for instance, often begins privately, and there still is a private sector in it. In very early times, it tends to become a socialized enterprise, whether in Egypt, the Orient, the Roman Empire, or the modern world. Even in a capitalist society we never really trusted private property and the market to supply us with water, as we did, for the most part, with oil. In my California experience, I asked, Why not give water back to private enterprise and tax the daylights out of it? Water is a liquid, it is found in the ground, it runs through pipes just like oil, so why treat them differently? This suggestion was always received with amusement or horror. Why what is good for water is not good for oil and vice versa still puzzles me a bit. The almost universal socialization of the water industry certainly has some rational justification in the economies of monopoly. Two water systems in a city would be as silly as two telephone systems. But there is more to it than that, and the sacredness of water as a symbol of ritual purity exempts it in some degree from the dirty rationality of the market.

This is not to say, of course, that prices may not and should not be an extremely important element in human decisions in regard to water. There is a principle beloved of economists that states if people can pay for something, they should, and that if something, through state power, is made artificially cheap or artificially dear beyond some "natural" price that reflects the alternative costs, something goes wrong with the invisible hand and it slaps us in the face. We will fail to conserve things that are too cheap; we will use poorer substitutes for things that are too dear. In the case of water, the danger is always that it is too cheap. This seems to be the case with all sacred objects. To some people, charging for water seems almost as indecent as charging to go into church. But it always remains true that somebody has to pay for it.

My second "P," which also stands for political order and is perhaps the dominant system in the water industry, interacts strongly with "prices" because the market always rests on some kind of definition and protection of property, which is a function of the political system. We cannot have exchange unless there is property in the things exchanged. The definition of property, particularly in the case of water, is a highly tricky business, as the competing water laws of different times, different countries, and in this country different states amply testify. We now find ourselves engaged in defining on a world scale the property rights in regard to the ocean, which had previously, beyond a small segment off the coast, been common property. Now it is clear that the "tragedy of the commons" applies to the oceans, as the declining yield of fish testifies, and we have to face either property, such as the 200-mile limit or beyond, or some sort of community exploitation, which is often very difficult to do. Property in water presents many of the same problems as property in land. Without property, we get tragedies of the commons; with property, we get tragedies of absentee ownership, excessive concentrations of wealth, and divorce of ownership from control, which is both sometimes deplorable and nearly always necessary and, indeed, is what the financial system is all about. The definition of property is one of these areas where the cost-benefit analysis of institutions themselves is extremely difficult, so that it becomes a major source of world conflict, insecurity, and perhaps even catastrophe.

While the problems of the interaction between the polity and the economy sometimes seem particularly dramatic in the case of water, it remains true that the relative price structure—no matter how determined, whether by competitive markets or by government fiat—affects not only the allocation of resources among different uses or employments but also the distribution of income among persons. So intimately related, indeed, are allocation and distribution that we cannot affect one without affecting the other. In classical economics (which is still pretty good), the "natural" or "normal" relative price structure is precisely that which so distributes income among the owners of resources in different occupations that there is no incentive to move from one occupation to another. If the relative price

structure diverges from this, some prices will be perceived as "high" and the occupations that produce these commodities will be perceived as unusually well rewarded, while others will be perceived as "low" and ill rewarded. If, then, there is freedom to choose the occupation and the use of the resources that one owns, including one's own body, water rights, land, buildings, machinery, or what have you, then there will tend to be a shift of resources from the ill-rewarded occupations to the better-rewarded ones. This shift in itself, however, will move the structure of relative prices back towards the "normal." This is the great mechanism of the invisible hand, and no matter how we intervene in it and distort it, it still works, however clumsily.

On the other hand, the distribution of personal well-being, which is an intermediary in the process of change of relative outputs and relative prices, may be unacceptable from a political point of view. Agricultural policy in almost all countries is a remarkable example of the power of this proposition. Because of the low income elasticity for agricultural products, for the most part technical improvement in agriculture almost always requires a shift in population and, to a lesser extent, other resources, out of agriculture into other occupations. The way the market does this is to make agricultural prices "low"; therefore, agricultural income is low relative to others, and this will drive people out of agriculture and into other occupations. If the agricultural interest is politically powerful, however, it will try to prevent this, and we get such phenomena as price supports and agricultural subsidies, corn laws, and the like.

As in many other cases of public intervention, however, the results may be very different from the objective of the policy. U.S. agriculture is a striking case in point. The diminution in uncertainty consequent upon the introduction of price supports increased the willingness of farmers to invest, to practice technical change, and to increase productivity. As a result, agricultural income, especially of poor farmers, remained depressed, and we had an enormous migration out of agriculture—some **30 million** people in one generation—after 1945.

The tendency has been to try to push agricultural prices up; with water, the tendency has been to try to push the price down. Up to now, at any rate, over large parts of the temperate

zone, water has almost had the status in people's minds of being a free good, like air. We should say, perhaps, a cheap good rather than a free good. It has been scarce enough to appropriate. It has had a price. It has an alternative cost in the sense that it takes resources to produce it that might be producing other things, so it has entered into the price system more than air has. Now, with increased pollution, air perhaps also is becoming a scarce good with a price. There is, however, an association of water with the feeling of its being almost a free good, so there has been a strong tendency to keep the price, even where there is one, very low. The result of this, of course, is that there has been no incentive to conserve water, and it has been used with magnificent wastefulness.

Again, to go back to my California experience, the one thing I learned in that study was the great importance of pricing in a time perspective. I argued then, and I would argue now, that if we have something that is plentiful now that is going to be more scarce later on, perhaps in a few decades, the sensible social policy is to make it expensive now. The principle here is that the social policies should try to anticipate the normal relative price structure of a generation or so ahead on the grounds that otherwise we will not be prepared to meet the scarcities that seem to be coming up. When they are actually upon us, it may be too late to do much about them. In any case, to go back to the California case, I proposed at least a 400 percent tax on water. It seemed like an admirable subject for taxation. The tax would be reasonably progressive, as the rich undoubtedly use much more than the poor, but would not be unreasonably burdensome to anyone because water purchase takes a very small proportion of income. Any sharp rise in price, however, would start a long-term movement for conservation. It is a very fundamental principle that nobody will ever conserve anything that is dirt cheap, for they would be fools to do so. The same principle applies to energy, perhaps even in a greater degree. The policy of keeping oil cheap may turn out to be far more disastrous than that of keeping water cheap. If we want people to conserve energy, just as if we want them to conserve water, it must be made expensive. Yet this is politically very difficult.

The political dilemma arises because income distribution

changes may be much more in the political consciousness than allocational changes. If we make something expensive, something that is as universally used as water, everybody perceives themselves as being made worse off by this. It is extremely hard to get elected on a political platform that involves making everybody perceive themselves as being worse off. Policies, therefore, that are extremely desirable from the point of view of allocation, especially long-run allocation, may turn out to be quite politically unacceptable in the short run. After all, politics is strongly dominated by the short run. We can hardly blame it for that, for it is in the short run that people get elected or not elected, as the case may be. It is a common criticism of the market that it overstresses the short run and that the horizons of a market system rarely go beyond the year or two of forward contracts and futures markets. Even corporate executives rarely have a longer active life than politicians, at least in the positions of power that they tend to reach in their sixties, and the principle of "après moi le déluge" is noticeable in corporations, though perhaps not as much as it is with kings and presidents.

A very important question in social policy, which certainly applies to water policy as much as it does to any other, is whether the distributional impacts from the price structures that are desirable from the point of view of allocation can be modified sufficiently to make them politically acceptable without destroying the necessary motivation for allocational change. If everybody is completely protected against all distributional impact, there is no motivation to do anything but what they are doing now, and we have to guard against this. The slowdown in technical change that we seem to be encountering in the 1970s may be partly attributable to the distributional impact of the "industrial welfare state" when it is applied, for instance, to the Chrysler Corporation, Lockheed, and other big corporations in trouble. If bankruptcy becomes a privilege of the poor, one of the main sources of legitimacy of the market and of capitalism will be eroded. Similarly in the labor market we may be developing a "new feudalism" in that labor leaders deploy their members almost like feudal serfs in the interest possibly of their own power but also in the search for protection against the income effects of allocational change.

Up to now, I must confess that the misallocation of water resources is a problem that has given me a very few sleepless nights. I have no doubt at all that there is misallocation, largely as a result of an absurd pricing system. I am sure that there is also unnecessary waste, again as a result of the pricing system. I discovered, for instance, in my California experience, that in the Los Angeles Basin water was expensive enough, even in the fifties, to develop a whole profession of water savers who went around to the farms and taught farmers how to conserve irrigation water. In the Central Valley water was absurdly cheap, thanks to the U.S. taxpayer, so no such profession existed and I have no doubt that the waste of water was enormous. A dramatic example of the power of high prices to inspire conservation was the recent drought in the Bay Area, especially in Marin County, where high price structures produced quite spectacular conservation. Even though at low prices the demand for water is inelastic, beyond a certain point the demand for water becomes extremely elastic, and, with high enough prices, we will consume a twentieth or perhaps a hundredth of what we do now. Up to now, however, water has really been such a small part of the economy that we have been able to afford mistakes and wastefulness, and it is doubtful whether these mistakes have drastically affected the health and welfare of the total society.

We may now, however, be moving into a very different era. There is some critical point as scarcity increases when it becomes cheaper in terms of real resources to conserve a gallon than it does to produce it. In some cases, we may have reached this point some time ago without realizing it. What becomes increasingly clear, both in the energy and in the materials fields, is that we are moving into an era where it is cheaper to conserve than to produce. It is probable that we have reached this position with regard to oil, though we are very slow to act on it. We will reach this position with regard to water irregularly—at different times in different places and in different circumstances—but that we will reach it (if we have not reached it already) in many instances seems highly likely. Unfortunately, our economic indicators reflect a state of mind that assumes it is always easier to produce something than to conserve it. Conservation does not get into the GNP and other indicators, and we may easily

be reaching a position now where our economic indicators become very dangerously misleading.

Under these circumstances, the heterogeneity of the system also becomes much more important than it was before. It is a dangerous tendency to think of energy in terms of BTU's and water in terms of gallons. What is significant is human valuations. What humans are concerned about in the case of both energy and materials—including water—is not the aggregate but to have them when and where and in the form that we want them. An assumption of much water policy has been that a gallon is a gallon is a gallon, or maybe an acre-foot. As we begin to approach water as an important limiting factor, however, the heterogeneity of water used becomes increasingly important. When water is virtually a free good, there is no harm in flushing the toilet with drinking water. As water becomes increasingly scarce, the desirability of dual systems or even multiple systems for different uses becomes of great importance. It may be that another hundred years from now the idea of flushing a toilet with drinking water or even flushing a toilet at all may seem the height of absurdity. Like energy, water is not valuable in itself but only in the right time at the right place in the appropriate quality and use. We can see the beginning of this recognition in industrial recycling, in ever more stringent effluent restrictions or even taxes, and in using various grades of water for irrigation. However, as far as I know, the principle is very rarely applied to domestic use. There is a whole field of study here that needs much more support and further work.

The third mode of coordination of human values, "preachments," is the moral order, an extraordinarily subtle and complex process in society whereby human valuations are learned and changed. Economists have rarely been willing to go beyond the level of abstraction at which human valuations are simply assumed. A realistic examination, however, of the dynamics of society has to face the fact that human values change. They may have a genetic base in part, but this is relatively small and consists of certain very general prejudices and directions. Almost the whole structure of human valuations is learned from birth on, if not before. The processes by which valuations are learned are very mysterious. Part of the process is one of

association (the old-fashioned psychological term in which learned valuations are associated with genetic ones). This is perhaps why the culture of the parents is so easily transmitted to the children, though perhaps less easily today than it used to be. There are also very complex processes of feedback from valuations into experience and back again. There are two opposing principles at work here. One I have called the "sour grapes principle"^M—if you can't get what you want, you decide not to want it, that it is not valuable after all. The other is the "perseverance principle"^V—that if at first you do not succeed, you try, try again. The balance between these two principles opens up a possibility of occasional, very dramatic reversals of valuations (for instance, in conversion experiences—religious or political—or even in falling in love).

It might be thought that water is so commonplace and plentiful as to be exempt from these kinds of considerations, which would be a very dangerous assumption. The value a thirsty person puts on water undoubtedly has a genetic origin, but after that water becomes the object of a very complex structure of evaluations, rituals, superstitions, and attitudes. It has been the subject of sacred observances from very early times in human history. It is no doubt too Freudian to suggest that the curious difference in our attitude between water and oil rests on the fact that we get baptized with water at the beginning of our lives in Christian societies, and we only receive Extreme Unction with oil at death, but these symbols do affect our value judgments.

There is a more commonplace level at which political reactions to water policy are by no means unconnected to the peculiar place that water holds in our symbolic system. It is so holy and valuable to us as a symbol that we are apt to carry the production of it and the transportation of it far beyond the point of rational economic returns. Having to conserve it is perceived almost as an insult to the personality. As noticed earlier, there is still a strong feeling that water, like air, should be a free good. The faucet in the household is a perpetual spring of blessing, and it seems almost indecent to charge for it. There are some things where the legitimacy of the market wears thin, particularly where sacredness is involved. Water is curiously

close to this boundary. This means that we almost certainly go past the point at which it is cheaper to save a gallon than to produce it. We are always in danger of over-investment in the provision of water and under-investment in its conservation.

A very interesting question is whether the general development of a conservation ethic would lead to change in these valuations. The environmental movement so far has devoted most of its energies in this regard to cleaning up pollution and expressing a demand for clean water in rivers, lakes, and oceans. There is a great legitimacy in this demand. It certainly does not derive merely from a symbol of ritual purity. Nevertheless, there is a lurking danger behind environmentalism that it can become a subtle attempt to preserve the privileges of the rich at the expense of the poor. Its distributional impacts always have to be carefully scrutinized. One way of avoiding this danger would be a shift from a more preservationist ethic to a more conservationist ethic. How this can be done in a way that will command widespread acceptance and will also have significant effects on human behavior is a tough problem.

These considerations may seem somewhat remote from the issues of water policy, but in the long pull they may be extremely significant. It is ultimately the moral order that dominates the other two, for neither politics nor exchange can survive and flourish in the absence of a legitimating moral order. Politics, indeed, tends to follow the changes in the moral order with perhaps a ten- or twenty-year lag. Prohibition, income-redistribution, civil rights, antidiscrimination, and so on all show the political order following changes in the moral order, although this does not preclude what may be very important feedback from the political order to the moral order. Legislation passed by a very few may eventually become accepted by the many. Even the economic order depends much more on legitimation than economists usually think. In fact, they usually take the legitimacy of exchange for granted. But it took a very long time to establish the legitimacy of exchange, and in many areas its legitimacy has been destroyed and is still threatened, as, for instance, in the Marxist denial of legitimacy to the capital market. Similarly, Proposition 13 represents a certain denial of legitimacy to aspects of the tax system.

In thinking about the future of water policy, therefore, especially the long-run future, the changing structure of legitimacy with regard to conservation, to price structures, to property, to regulation or to particular political structures, there is something that we cannot simply take for granted. The dynamics of legitimacy, however, even though they may eventually dominate the social system, are extremely mysterious and so far remain in the area of the highly unpredictable. My advice, therefore, is to keep a watchful lookout for changes in legitimacy and not take too many things for granted. Sometimes the things that seem to be taken for granted are quite suddenly not granted and we find ourselves in a very different, unfamiliar, and often frightening world.

Notes

1. Stanza III of Kenneth E. Boulding's "The Feather River Anthology," *Industrial Water Engineering*, 3, 12 (December 1966):32-33.