ETHOS, EQUITY AND THE WATER RESOURCE

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It was 431 B.C., the end of the first year of the Peloponnesian war, a conflict that lasted 27 years. The Athenian general and respected leader, Pericles, spoke to the assembled citizens concerning their strength, weakness, and prospects against the better prepared, military-minded Lacedaemonians. He pointed out that the inherent advantage of democratic Athens over the oligarchy of Sparta lay in the character of its citizens accustomed to freedom enjoyed in their government and in their ordinary life. He described this inherent character as follows: "... (the) ease in our private relations does not make us lawless as citizens." The chief safeguard, he noted, is that citizens obey the customs and the laws, "whether they are actually on the statute book, or belong to that code which, though unwritten, yet can not be broken without acknowledged disgrace" (Thucydides, Book II, Chapter 6, 37).

Pericles was a member of the government, a post filled by annual election. He was also a general. In this speech he was speaking for the government. He described, if you will, an ethos or guiding belief of both government and citizen. That ethos defined the character of Athens--character of both government and governed. But this changed. As Finley pointed out in his introduction to the writings of Thucydides, "democratic government, always less decisive and certain of its direction than are more authoritarian controls, is seen at its most unstable and precarious in Athens" (1951, p. xvi). Having disavowed Pericles' view of a defensive war and accepted Cleon's urging a war of conquest, Athens no longer represented the "hopeful and creative force whose humanity, though imperfect, far surpasses the repressiveness of Sparta. She herself becomes the repressor." In her arrogance and conceit, Athens attempted to conquer Syracuse and subdue all of Sicily. She failed. The ethos of her earlier history was eroded and finally obliterated.

The unwritten assumptions of fairness, equity, and the common good gave way to domination by a narrow class and special interests. Athens lost her strength and hope at Syracuse, lost the war despite her overwhelming advantages, and deteriorated to a second class power. Alexander, when he was only 18 years of age, took Athens by persuasion, without a fight.

This ancient history is far removed in time. What is its relevance to the field of water in the modern age? Two concepts stand out. Democratic governance at the will of the people was effective and responsive as long as there existed an ethos in administration, guiding beliefs even though unwritten into law. Second, democratic guidance was effective when equity--fairness to all--was not submerged to private or narrow interests.

It may sound to some that by citing simplified contrast with the distant past I wish to draw sharp analogy between ancient and modern circumstance. My objective is much more mundane. I wish merely to use two concepts, well known to the ancients but later forgotten, in an analysis of some aspects of resource use.

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The first concept concerns an ethos in administration. This Greek word, ethos, means character or tone. In the present context the best definition is guiding beliefs. In the resource agencies of our government, it seems strangely absent.

It can hardly be doubted in the growing realization of interdependence among biologic forms and the physical environment that even renewable resources are suffering the impact of degradation in quality and limitations on renewability. Water can be so characterized. Not only in countries of high population density, water in the United States is increasingly degraded by soil erosion, chemical wastes, irrigation salts, organic overloads, and increased temperature. Of course, the technology of water treatment still allows American cities to have the best water supply in the world, but the hydrologic system is under stress. In the available technology lies the rub. To water supply engineers the hydrologic system as a whole is outside their domain and they are not immediately concerned with its problems.

To the farmers who are plowing up and downhill (and despite 50 years of "soil conservation", many are doing just that) their interest is in the productivity of their fields. That their soil is changing conditions downstream is not their problem. Indeed the county agent who advises them is similarly concerned with the fields, not the river basin.

Examples abound of individuals each of whom has a personal interest in the water needed for their operation, livelihood, or home use, but has no larger responsibility except to be prudent in water use. If they think about the water at all, citizens feel they can rely on those persons they elect or on the organizations whom they support to take the broader view. Among these are the federal and state agencies and individuals who have no direct monetary interest in the water they administer, but whose attitudes, policies, and clientele determine in great part where, how, and how much the water resource is utilized.

The proliferation of public agencies dealing with water has led to a disassociation of their policies, their procedures, and their outlook from the operational health of the hydrologic system. Everything one entity does affects many other entities, yet each entity operates as if it alone is the flower facing the sun. There is no guiding belief, no ethos involving the natural world. There is no concern for the common--as Garrett Hardin expressed it--no overriding responsibility for the whole.

The individuals and agencies that manage the water resource are, after all, the product of the public that supports them, and that public has several ways of expressing itself. One is through the Congress it elects, but more directly, if not more effectively, is the expression of the public conscience. Note the explanation of the character of Athens. It is the character of the citizenry that was expressed in the ethos of both government and governed. If the citizenry becomes divorced from concern for the common good, then government itself follows in the same path.

The citizenry can become so divorced if they are not informed, if they do not see the consequences of neglect of the general welfare, and if they are given no insight into the operational details of how their own interests are being handled.

The ethos of which I speak is the unwritten gut feeling that the resources of the planet, and of the nation, are worthy of husbandry--indeed are essential to our long-term well being.

The second concept is equity--a dedication to fairness, a desire to consider various interests and treat all with some measure of equality. We see all around us a shocking lack

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of even-handedness, the pressure of special interests and the bending under that pressure. Equity was part of the Athenian code. As Thucydides expressed it, "... praise is due to all who ... respect justice more than their position compels them to do" (Book 1, Chapter 3, 75).

Agencies and individuals that manage resources have functions that are described by law, but not necessarily specified by law. There is a wide range of administrative discretion not only permitted by allocated by legislative bodies. Indeed, this is as it should be, but often lacking is a guiding precept that public service means service to the whole with a sense of balance and equity. These units and individuals are often under pressure from self-seeking forces. As a result, we see dedicated public servants captured by the history of the organization in which they work, subjected to conflicting demands, and receiving no assurance from the public or any overseeing body. The result is that ethos and equity are not part of the system.

The immediate answer to this observation swells to a clamor in my ears--the agencies are doing just what the legislature ordered them to do. But anyone who has been in government service knows that administrative discretion is as wide as a barn door. This very discretion itself permits the possibility of buckling under pressure of outside interests.

I wish to examine here the nature of the ethos and equity that I feel are needed to sustain the public interest in resource use. Then it is desirable to discuss the perceived loss of these qualities and the results of such loss. Then I will turn to some possible means of promoting progress, slow and halting as that progress may be, in bringing to the system an operational sense of the common good.

What might be the form and content of a guiding direction of water agencies and individuals who work in those agencies? In phrasing this guiding direction a distinction is made between ethos and policy. Policy can be written in explicit terms and can be in the form of an order. Ethos is less explicit and includes view point--a guiding value understood but not necessarily written out.

The first component of such a guiding direction might include the following idea: Decisions in the field of water development and management should aim toward the preservation of the integrity of the hydrologic continuum.

It will be noted that the phrase hydrologic continuum is different from the term hydrologic cycle. The latter continues for good or ill. But the idea of a continuum implies a maintenance of balance--an operational quasi-equilibrium in the processes within the hydrologic cycle.

Hydrologic continuum might alternatively be called the hydrocycle, involving air, water, soil, biosphere, and humans.

By hydrologic continuum I mean the effective operation of forces in the drainage basin that maintain a balance among processes of rock weathering, soil formation, water and sediment delivery to stream channels, and the exit of water and sediment from the basin. These forces are both biologic and physical. Vegetation promotes weathering, soil formation, and infiltration, but mediates and modifies erosion and surface runoff.

Each part of the system modifies other parts. The flood plain reduces flood peaks. River curves maintain hydraulic resistance and thus help moderate velocity. Thus both form and presence interact to assure no part of the system accelerates beyond the limits of flexibility. This is what is meant by quasi-equilibrium.

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This integrity of the hydrologic continuum is implied in the explicit term "sustainability" used recently by G. W. Barrett (1989), by Charles Wilkinson (1989), and again by William Ruckelshaus (1989). But in choosing to use the phrase I mean more than ability to exist through time. I mean the dynamic flexibility to adjust constantly through changing circumstances. Integrity of the hydrologic continuum must include adjustment to a changing climate by gradual, non-catastrophic alterations. Climate has changed radically during the Holocene, indeed, within our own lifetime. As we are becoming alarmingly aware, we can expect more change in the next century.

Let us remind ourselves that much closer than the altithermal period 3000 to 5000 years ago, when the climate was much warmer than present, there was a drought lasting about 200 years, ending about 1500 A.D. After the discovery of America there was a long period of storm and cold that in the United States ended in the last part of the 19th century, just 100 years ago.

The hydrologic continuum has absorbed these marked but gradual changes in climate, but its integrity has been violently disrupted in some places by overpumped aquifers, by deprivation of the throughflow of sediment due to water withdrawal, as examples.

Water withdrawal, storage, and pollution by sediment and wastes will have effects, often adverse, to this continuum, and some are unavoidable. But preservation of the integrity of the continuum ought to be one of the objectives of resource use.

As we dry up mountain streams to provide subsidized irrigation water to grow surplus crops, the sediment continues to reach these streams and will clog the channels. The exceptional floods will still occur and the channels, all but destroyed, will flood over land heretofore above the reach of floodwaters.

Undermining the integrity of the hydrologic continuum may not be obvious in the four and six year election cycles, but the civil servants in the more permanent agencies supported by the public might have a longer and larger perspective. It would be salutary if there were developed a guiding principle, sufficiently persuasive that it would be an unwritten but well understood direction--in other words, a public ethos.

A second component of guiding direction involves another form of balance--what is here called equity.

In the administration of water programs, one might hope that decisions would reflect a balance among the various claimants, even if the laws or rules do not specify such a need.

Though a sense of need for balance may be present, agency personnel are often under great pressure, not only from outside groups having special interests, but from superiors in their own agency. And these superiors are usually pressured by officials in the administration who derive their authority not from experience in resources management but from one or another political decision.

We see a lop-sided allocation of tangible resources such as water or timber, and a less tangible allocation of preference or advantage. This results in a striking disregard for the public interest and a net loss of national wealth, monetary, and intellectual.

Allocation of advantage to the few at the expense of the many persists in spite of the growing alarm at the dangers of shortages, of pollution, of irreversible degradation of quantity and quality of the water resource, the soil resource, and the biotic resource.

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A major problem as I see it is the need to muster support for the majority of devoted public servants who perceive the need for a guiding direction, who know that there exists an accumulated lack of fairness, but who are powerless to combat it. Here is where science and the professions can help.

Before discussing some details of what steps can be taken to enhance an ethos and of fairness, let us examine briefly some results of such lack. In these examples it must be kept in mind that in most instances Congress itself has set the stage for excesses, not only by writing legislation favoring one or another special interest, but by giving no counteractive instructions to protect the whole public.

And the public, lacking information and insight, fails to react. But even when reaction begins, it is often after considerable damage has been done to the environment.

The public has begun to perceive that clean air, clean water, decrease in acid rain, maintenance of the ozone shield, and control of carbon dioxide are commonalities that sooner or later are going to be of importance to all the people of the earth. Note also that it is the public that is forcing the Congress in this direction.

A comparable perception regarding the management of natural resources in our own country has not yet grown to effective levels. Most of the Congress, with the exception of a few such as Senator Gore and Congressman George Miller, have not yet seen the problem. Let us look at a few examples of the results of the absence of ethos and equity.

The Corps of Engineers of the U.S. Army designs and builds works for flood control and navigation, but it also issues permits for alterations in water bodies, marsh lands, and estuaries. The Soil Conservation Service, originally a land-management agency, after World War II became another engineering organization. Where earlier policy had been in the hands of agronomists, soil technicians, and range managers, after the war engineers filled most of the policymaking posts.

One aspect of these engineering programs is the practice of "channel improvement" carried out both by the Corps of Engineers and the Soil Conservation Service. This program of channel straightening has involved 5,000 miles of "improvement" by the Corps and 3,200 miles by the Soil Conservation Service. These activities lead to channel instability, readjustment of channel form, downstream effects including bank erosion and bed alteration, aesthetic degradation, and changes in stream biota. These adverse effects have been documented but not to the extent demanded by their seriousness (Dunne and Leopold, 1978, pp. 706).

No studies, research, or practical investigations, have been pursued by either the Corps or the Soil Conservation Service to examine the downstream effects, the on-site, longterm results, or the ways in which the river channel has reacted to these alterations. Government interest in the long-term future of the landscape is not part of the plan. If the computed but often unrealistic benefit-cost ratio is unity, the bulldozers can rev up.

Despite any theoretical calculation of a benefit-cost ratio, the design of such channel destruction does not include off-site, downstream and indirect costs. Nor does it include consideration of the non-monetary yet real effects on the biologic and aesthetic systems, values belonging to the public or the common. Degradation of the channel system is degradation of the hydrologic continuum.

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The Corps of Engineers must issue a permit for a development that destroys wetland or marshland. In California, more than 90 percent of the original wetlands have been lost to drainage, urbanization, and levee-building. Even in the face of this history, permits to destroy wetlands continue to be issued, usually with some requirement for mitigation--not replacement. In fact we do not know how to reclaim areas that once were marshlands. And no federal research on how to reclaim lost wetlands is in progress. So, the excuse can be used, we will mitigate this permitted additional loss of wetland. Mitigation does not create wetland. Mitigation is a euphemistic way to assuage the conscience.

Water development obviously has contributed greatly to the economic and social growth of the country. In the western states this development has been aimed primarily to promote irrigated agriculture. Most people do not realize that only a small part of the water used in the United States is used in cities and towns. Irrigation uses the overwhelming share. For example, irrigation withdrawals range from 80 percent of the total use in Utah to 90 percent in New Mexico (Reisner, 1989, p. 36). Furthermore, the water use for irrigation is very inefficient. The U.S. Geological Survey showed that the loss of water by seepage from canals was one third of the amount actually delivered to irrigated farms (Leopold, 1947, p. 137).

The excesses, shady deals and blatant fraud associated with some of the early water development schemes in the western states have been detailed by Reisner in "Cadillac Desert" and more recently by Doris Dawdy (1989). What is increasingly inexcusable is the persistence of prodevelopment bias of the Bureau of Reclamation, an attitude that continues into recent decades of obvious strain on both quantity and quality of water resources. It is deplorable that the government agency most responsible for management of water in water-short regions continues to be so insensitive to the hydrologic continuum and to equity among claimants.

In the legal battle concerning the water of Mono Lake, the Bureau of Reclamation intervened on behalf of the Los Angeles Department of Water and Power, the suit brought to prevent that Department from further lowering the lake by diverting stream flow in Mono Basin to Los Angeles. This is an example of active and unnecessary intervention toward further debasement of the hydrologic continuum. The intervention by the Bureau was directed against the Public Trust Doctrine which has been the basis for some recent court decisions including the Mono Lake suit, a doctrine leading toward wise management of natural resources.

The Bureau of Reclamation provides water irrigators at heavily subsided rates. In addition, from 33 to 45 percent of the acreage irrigated by water provided by the Bureau was devoted to production of surplus corps. In hearings on HR 1443, a bill to eliminate this double subsidy, Congressman George Miller stated that a "a farmer with a 960 acre farm receiving water from the Columbia Basin project in the state of Washington will receive a total subsidy in the neighborhood of \$4.4 million ... for a single farm. A single 960 acre farm receiving water from the Central Valley project in my home state of California will receive a total subsidy of \$1.8 million" (U.S. Congress, 1987).

Another serious inequity is the manner in which the 160 acre limitation has been thwarted. Reclamation Law was aimed at supporting the family farm, but by dividing paper ownership among many individuals, large agribusiness companies can skirt the law; the Bureau of Reclamation looks the other way. Dawdy (1989, p. 83) notes that "when the San Luis Act was passed in June 1960, anticipation of a bright future for small-scale farming ran high. The selling of excess lands, it was said, would create 6,100 farms from the 1,400 ownerships then of record, and provide employment to 26,100 persons on farms

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and 43,500 "in collateral industries by 1990". In 1978, 67 percent of the farms were 320 acres, and ... 99 percent of the land was tied up in these large farms."

"Despite the alleged economic benefits of subsidized water ... unemployment in these areas has reached persistent, catastrophic levels" (Leveen and King, 1978). For the same area, the Department of Interior reports annual applications of approximately 500,000 pounds of herbicides and 1,400,000 pounds of pesticides" (Dawdy, p. 81).

The San Luis Drain carried selenium-laden drain water from conduits on 8,000 acres to Kesterson Reservoir. The poisoning that killed or deformed thousands of waterfowl and aquatic organisms in and around Kesterson Wildlife Refuge is now widely known. But the Bureau of Reclamation had plenty of advance warning that was conveniently disregarded. As early as 1949 the famous geologist J. D. Love warned that surface seleniferous rocks, actively or potentially poisonous, cover 20 to 30 percent of the area of Montana, Wyoming, Colorado, Utah, Northern Arizona, and Northern New Mexico (1949).

There is not let-up in the demand for more water. The Denver Water community wants more diversion and storage to be subtracted from instream flows and more transmountain diversion. Never is there serious consideration given to the idea of decreasing irrigation use to supply urban needs. This is true despite the fact that most agricultural water grows low value crops. In California, for example, "nearly one million acres of irrigated pasture require about 4.6 million acre-feet of water per year ... as much as an urban population of 23 million. Pasture, though it is the single largest water use in California, is an extremely low-value crop, with a gross value of just \$94 million (in 1986) in a state economy of \$480 billion (Reisner, 1989, p. 38).

As another example, Glen Canyon Dam on the Colorado River is built upstream of a national Park. Grand Canyon National Park was established not merely for public enjoyment of the canyon landscape, but to preserve the living river. Granted that the generation of hydroelectric power by releases from the reservoir is one of the purposes of the dam, the resulting rapid changes in river discharge as the gates are opened and closed are gradually destroying the riparian ecology of the Colorado River within the national park. One might suppose that the Bureau of Reclamation that operates the power plant would have some consideration for the purpose and public interest in the park. These include not only the immense recreational demand on the river for float trips, but also the fish, wildlife, and riparian habitat of the channel within the park.

Recently the Bureau of Reclamation has started a program of rewiring the electrical generators so that they will produce more power, but this will be associated with even greater rapid changes in river discharge. The amount and rapidity of discharge is known to be a major element in the erosion of sandbars in the canyon and the destruction of the riparian zone. These changes in discharge cause the river level to rise or fall many feet in an hour.

This increase in water level fluctuation has caused great concern in the National Park Service and of course to the recreational users of the river. The response of the Bureau has been to initiate some studies, but there is no indication that they intend to alter any operational program to help a sister agency.

The special interest bias and short-term outlook is not limited to the government agencies developing and selling water, changing the flow of rivers, and altering stream channels. It can also be seen in some of the other resource agencies.

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The U.S. Forest Service wishes fervently to be considered the protector of the public interest in the administration of national forest lands. It should be no surprise to its administrators that the general public unconnected with forest product industries, pictures the Forest Service as overseeing the elimination of ancient forest, selling publicly-owned timber resources at a loss, constructing roads in presently roadless areas so they can not be considered for wilderness designation, and promoting oil and gas development in the face of environmental degradation. "The conifer forests of the pacific northwest contain the largest stands of temperate, old-growth rain forest south of Alaska. These stands are being liquidated faster than the tropical rain forest of South America. At least 85 percent of the Pacific Northwest's old-growth forests have been eliminated, compared to 40 percent of the world's tropical rain forests and 15 percent of the Amazon's." (Sigel, 1989).

While the United States continues to import a significant portion of the wood products we use, an important part of the annual cut from national forests has been shipped to other countries. U.S. District Judge William Dwyer in a 1989 decision said, "Statistics show that in the last ten years more than 30 billion board feet of raw logs ... have been exported from Washington and Oregon to foreign markets, primarily Japan" (1989). Compare this figure with the 2.6 billion board feet that comprise the total cut in the year 1949 from the entire national forest system, coast to coast.

Declining lumber mill employment is a result of the fact that "... one in every four logs cut in the northwest is shipped overseas. Most are purchased in Japan, Korea, and other Asian nations that are willing to spend twice what domestic mills will pay for unprocessed logs. Consequently, the largest United States timber companies are posting record profits by exporting raw logs--and thousands of mill jobs ..." (Sigel, 1989, p. 19).

There are officers within the Forest Service who cry out for an ecological long-term policy. Hal Salwasser, a Deputy Director of Wildlife and Fisheries of the Forest Service, put it this way: "Because it will not be possible to protect much of the variety of life in the strictest nature reserves, the multiple-use of public lands and semi-natural areas ... will be crucial. That means stewardship, sustainability, and recovery ..." (1989). Notice the word sustainability is used again, this time by a government officer.

Jeff DeBonis, a national forest timber sale planner, wrote to the chief of the Forest Service as follows: "[We in the Forest Service must] ... have the courage to aggressively move our agency away from the political expediency of the past in our alignment with the resource extraction industries. [We must] ... forge a new resource ethic by publicly endorsing our alignment with the world-wide environmental community, aggressively endorse the search for a sustainable future, and demand an attitude change to move our agency away from its current perception that the environmental community is the "enemy" in "getting our job done" (1989).

The Forest Service advertises its dedication to multiple use. But its research gives no assurance that its policy of clear cutting followed by monoculture will result in sustainability.

Present practice throughout all the national forests is to clear cut the timber, then plant a single species of tree or depend on regeneration of a dominant species. In the forests I know personally in Wyoming, clear cut is followed by hand planting seedlings of Lodgepole pine. We are told that in 120 years these seedlings will develop into merchantable trees 9 inches in diameter.

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The monoculture of planted spruce in Germany resulted in an ecological desert, devoid of birds and insects, and no soil development. According to biologist Chris Maser, no forests in the world can survive logging more than three generations. "In western Europe and Scandinavia," he said, "where the tree plantations are over 200 years old, trees have almost stopped growing. Normally replenished by rotting logs, the soil has simply worn out" (1989).

To my knowledge no Forest Service research is aimed at evaluating over the longterm the effect of changing a multi-storied, mixed species stand to an even-aged, single species forest.

Let the people 120 years from now worry about the results of this present ubiquitous policy of forest management. There is a bland assumption that present policies are sufficient to maintain the integrity of the ecological and hydrological system. But the extensive and competent research establishment of the Forest Service is so separated from the operational needs of the organization that important questions concerning the longterm effect of present policies are not being addressed.

Thus in the Forest Service, one of the key resource agencies of the federal government, the current policies appear to be importantly driven by demands of the extractive industries with no part of the program devoted to assessing the long-term results of these policies.

The Forest Service is required by law to have a monitoring program to make just such assessments. The required monitoring is given short shrift. It is the stated policy in one forest headquarter's I know that they can clear cut 50 percent of the forested area of a basin with no adverse effects on the water quality or the stream channels. There has been no attempt to make measurements to test the validity of this assumption.

The resource establishment, especially in the field of water, is stuck on the shoals of special interests, a lack of long-term perspective, and shortage of public-minded leadership. The resource base of the nation is washing downhill, sold for less than its real value, exported to foreign countries, and needlessly degraded in aesthetic quality. This is occurring while there is a world wide awakening and concern for nature. The leading spokesmen for the environmental cause are heard not here, but in Montreal, Stockholm, Paris, Geneva, Ottawa, and interestingly, in Moscow. These voices are asking for what Congressman Ronald Dellums calls an ethical pragmatism, as yet unheeded by most of our leadership.

There are some encouraging signs that perhaps a new outlook can be developed. Some senior officials in the Washington office of the Forest Service are trying to develop a program dedicated to the preservation of ecologic balance and continuum. Some forest supervisors are leading the way to new concepts of forest management; the Carson Forest in New Mexico and the Nez Perce Forest in Idaho are examples.

There are environmental technical officers in the Corps of Engineers who are gradually influencing the thinking in that agency.

The Bureau of Reclamation is attempting to find a new purpose including water quality, environmental restoration, and enhancement (1987). Unfortunately, this is not being received with enthusiasm in the field offices. A description of the attitude of some of the Bureau personnel regarding this restructuring as detailed by Dawdy (1989, p. 185) does not give any basis for optimism.

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Specific suggestions for alterations in legal definitions and administrative procedures have been detailed by several scholars, particularly Charles Wilkinson and Marc Reisner. These include reforming the classic doctrine of appropriation, the need for comprehensive watershed resource planning, the enunciation of substantive policy objectives, and legislation reform (Wilkinson, 1989). Water transfers represent one of the most important useful and practical ways to improve efficiency and equity. Some details of this have been outlined by Reisner (1989).

Recognition in some court cases of the public trust doctrine in water law is the single strongest statement that historic uses must accommodate modern needs.

To carry out such reforms, William Ruckelshaus said "In creating the consciousness of advanced sustainability, we shall have to redefine our concepts of political and economic feasibility. The concepts are, after all, simply human constructs" (1989, p. 174).

It is this very idea on which I wish to concentrate attention. In practical terms, how do we begin to "redefine our concepts of political and economic feasibility"?

By far the most efficient way to begin would be to have leadership coming from the White House. But action and inaction on environmental matters at the top levels have been mixed. With the exception of leadership posts in the Environmental Protection Agency and the Fish and Wildlife Service, the appointments made or proposed by the present administration are not ones that are going to provide leadership in the environmental field. The administration is certainly not oriented toward the environment. Whether some leaders in the Congress can move us in that direction depends on whether public interest and concern can be mobilized. Even without such high level help a very large step can be taken by a reorientation within the resource agencies. A new direction should be guided by an expressed ethos involving the long-term health of the ecosystem and a new pledge for equity. Such a change does not need new legislation, does not depend on legislative reform, nor does it need new money.

Such a change is actually possible. Even though the extractive industries denounce the new environmentalism, concern for the health of the planet is beginning to reach the public mind. A subtle and no doubt difficult metamorphosis is necessary to bring these alterations to reality. This more elementary part of the job might well begin with science and the professions, which apparently must provide the key elements needed--the scientific underpinnings supporting the need for action and the need for a better informed public. The global warming debate shows that a role in mobilizing public opinion can be played by science effectively.

In a recent speech the President of the American Society of Civil Engineers said he had selected four areas of emphasis for the Society, one of which was "participation in public policy development; i.e., engineering involvement in societal issues" (Chi Epsilon, 1989).

The field of resource management is in need of that concern. The professional societies have in many instances provided much needed technical overviews that influence policy. An example in the water resources field is the compilation of a handbook on sedimentation. This required work by a committee of distinguished engineers and many subgroups that lasted over a period of years. Besides the elucidation of technical details, the work brought into public view the importance of sedimentology to a variety of engineering projects.

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Apart from purely technical aspects of engineering, the water management field is ripe for a wide-ranging discussion of engineering practices in the water field. There are concerns regarding the narrow scope of graduate education, ethics in professional practice, especially in regard to litigation, and the matters referred to earlier concerning intellectual freedom in agencies of government. In such matters it may be useful to expand the Society's Committee on Ethics initiated by Daniel W. Mead in the 1930s.

As a Fellow and Life Member of the American Society of Civil Engineers, I feel I can call on the President of the Society to explore how his pledge to be involved in public policy development can be applied to water management.

The technical aspects of resource policy need discussion both by the professional groups and by the scientific organizations such as the American Geophysical Union (AGU) and the Water Resources Association (WRA). It would be useful to organize a series of technical sessions dealing with the processes, physical effects, and probably future results of present policies of water related agencies. I have already mentioned the program of river improvement by dragline and bulldozer about which but little scientific analysis has been done. The ecologic and pedologic effects of continued monoculture is a technical subject having policy implications. A discussion of management policy is within the compass of scientists of AGU and WRA not dissimilar to the recent successful series on the history of hydrology.

What is the role of science in facing problems of ethos and equity? What might be the role for the National Academy of Sciences, the National Research Council, and its committees such as the Water Science and Technology Board? A principal function of the Academy is to provide advice to the government. Most studies conducted and reports prepared by committees under the Research Council are of a technical nature. But many committees and boards are specifically authorized or instructed to discuss and analyze issues of public policy. Often such policy issues relate directly or indirectly to available scientific knowledge and the need for further facts and understanding, but in many cases the items of importance are the policies and management practices themselves.

Policy and management decisions made by resource agencies have direct effect on various groups of people, logging and mining interests, agricultural groups using water, contractors and suppliers of machinery and fertilizers, and recreationists, to name a few. Therefore the details of policy and management are often contentious.

Agencies that manage natural resources desperately need objective analysis and advice from independent organizations such as the National Research Council (NRC). But experience has shown that many committees under the NRC are not comfortable with contentious issues. As a result the effectiveness of the NRC is diluted by committees that do not want to expend the effort needed to delve into tough issues.

Even when advice is requested of the Academy and is given, one can ask what do government agencies do with such advice? There are instances where it appears that an agency requests advice from the Academy in order to increase credibility but without any serious intention of acting on the advice received. In such a case the Academy appears to be used as a mere tool.

The National Research Council might well consider how it can help its committees manage the discussion of contentious issues. Some suggestions are worthy of consideration.

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It is often stated with pride that under the Research Council there are well over a thousand committees, boards, study groups, and panels. In the few fields in which I have some knowledge it appears that many of these entities are studying issues of minor importance or ones that might well be done by consulting firms. An argument might be made that there should be fewer such committees working on more carefully screened topics. That some agency is willing to finance a study does not guarantee it is worthy of NRC attention.

The majority of committees or units set up under the Research Council are financed by agencies or bodies not related to the Academy. As a result, however, some subjects of vital importance to the sustainability of the national well-being get no attention. I strongly commend the President and the Council of the Academy for their effort to increase the endowment of the Academy. I hope the greater flexibility that the endowment will permit means that the Academy, on its own volition, will take up matters of importance that heretofore have not been financed.

Further, there is a need, in my opinion, for units under the Research Council to insist on a broader scope of inquiry than might be originally suggested by an agency request. Let me give some examples within the water resource field.

The Water Science and Technology Board has a "Committee on Irrigation-Induced Water Quality Problems". The selenium in Kesterson Marsh is central to that problem. But the committee has struggled to maintain within its purview any inquiry into the policies or management decisions that led up to the serious situation that now exists. The committee has been valued for its technical advice but the jury is still out on whether it has been able to have influence on broader policy issues at the root of the problem.

Under the same Board is a "Committee on Glen Canyon Environmental Studies Review". This very useful committee has assisted in setting priorities with respect to work plans for study of the effects of reservoir operation on the ecology and physical health of the Grand Canyon channel. Although, the committee does not have within its scope any inquiry into the reservoir operation that is causing the degradation downstream, it has constantly pressed the Glen Canyon Environmental Studies research team and the Bureau of Reclamation to consider changes in reservoir operations to minimize the degradation.

Under the Board there was recently organized a "Committee on Restoration of Aquatic Systems". At the time this came under consideration I argued that such a committee should include in its deliberations discussion of the policies and practices of government agencies whose actions have led to the destruction of aquatic systems and thus, the necessity for restoration.

In the choice of subjects for study and in the instructions for carrying out the tasks, the Academy oversight must be intensified, improved, and made more incisive.

The professional societies can certainly plan a greater role in bringing to the public information and analyses regarding the policy issues involving resource management.

The professional societies and the Academy can support and can increase the stature and professional status of civil servants in the resource agencies by encouragement and by putting in their hands good information.

The natural resources of the United States are a key aspect in the growing world competition. Their management is not guided by any ethos of long-term sustainability.

Management is stressed by a plague of special interests, a disdain for equity, and as a result, the public is the continual loser.

It is not far fetched to look back in history. When I do I have the deeply disturbing thought that absent a basic metamorphosis, we are presently rigging our ships for the voyage to Syracuse.

REFERENCES

Barrett, Gary W. 1989. A sustainable society. Bioscience, v. 39, no. 11, p. 754.

Chi Epsilon Newsletter. Fall 1989. No. 15, p. 2.

Dawdy, Doris O. 1989. Congress in Its Wisdom. Westview Press, Boulder, Colorado, 236 pp.

DeBonis, Jeff. 1989. By letter, The Inner Voice. Vida, Oregon, v. 1, no. 1, p. 5.

Dunne, T. and L. B. Leopold. 1978. Water in Environmental Planning. W. H. Freeman Co, San Francisco, p. 706.

Dwyer, William. 1989. The Forest Voice. Eugene, Oregon, September, p. 9.

Leopold, L. B. 1974. Water, A Primer. W. H. Freeman Co., San Francisco, 172 pp.

- Leopold, L. B. and T. Maddock. 1954. The Flood Control Controversy. Ronald Press, New York, pp. 242-244.
- Leveen, E. P. and L. B. King. 1985. Turning off the tap on Federal water subsidies, v. 1, The Central Valley Project, the 3.5 billion giveaway. Natural Resources Defense Council, San Francisco. Quoted by Dawdy. 1989, p. 83.
- Love, J. D. 1949. Memo to Chief Geologist, U.S. Geological Survey, February 25, 1949. Cited by Dawdy. 1989, p. 100.

Maser, Chris. 1989. Quoted by Bryan Welch, High Country News. Paonia, Colorado, September 11, 1989, p. 3.

Reisner, Marc. 1989. Overtapped Oasis: Reform or Resolution for Western Water. Viking, New York, in press.

Reisner, Marc. 1986. Cadillac Desert. Viking, New York, 580 pp.

- Ruckelshaus, W. D. 1989. Toward a sustainable world. Scientific American. September 1989, pp. 166-174.
- Salwasser, H. 1989. By letter. Issues, National Academy of Sciences, U.S.A., v. VI, no. 1, p. 11.
- Sigel, Mark. 1989. The destruction of America's rain forests. The Christian Science Monitor, September 27, 1989, p. 19.

Thucydides, the Complete Writings of, the Crawley translation, introduction by John H. Finley, Jr. The Modern Library. New York, Random House, 1951.

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- U. S. Bureau of Reclamation. 1987. Assessment 1987, A new direction for the Bureau of Reclamation, U.S. Department of the Interior, Washington, D.C.
- U. S. Congress, House of Representatives Committee on Interior and Insular Affairs, Hearings on HR 1442, Serial No. 100-40, May 12, 1987, p. 4.
- Wilkinson, Charles F. 1987. Colorado water and the lords of yesterday, Trail and Timberline, no. 822, p. 244-251.
- Wilkinson, Charles F. 1989. Aldo Leopold and western water law: Thinking perpendicular to the prior appropriation doctrine, Land and Water Law Review, University of Wyoming, College of Law, v. XXIV, no. 1, pp. 1-38.