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Healing an Ailing Alliance: Ethics and Science Face the Ambiguities of Water

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Water-related problems are both scientific and ethical issues. The sciences and ethics are interdependent disciplines, and both are needed in an interactive alliance for adequate policy decisions on water and other ecological concerns. Water-related problems are generally linked to excess in what people take from and return to the waters. In this essay, the author outlines four moral norms that are foundational for remedial action on the waters of New England.

Problem and Purposes

Let me come immediately to my main argument: Water-related problems are not only geological, chemical, ecological, economic, and political issues; they are simultaneously ethical ones. The choices and policies on water in New England are, as commonly recognized, scientific questions. But they are no less major moral matters—in the basic sense that they entail value judgments about what is good and bad, right and wrong, for the welfare of both humans and other creatures in our relationships. Given this dual jurisdiction, a sound association between science and ethics is a practical necessity, and a present deficiency, for facing the quandaries of water and every other ecological concern, in New England or anywhere else.

Water-related problems in New England are similar to problems in many other places, though some differences are clearly significant. For example, New Englanders are not threatened, yet, by "water wars" among competing interests, as is true in the Middle East and parts of the American West. Children's deaths in New England are rarely related to contaminated water, as is the case, directly and indirectly, for 12 or 13 million children annually in poor nations. Our local agriculture is not normally jeopardized by the severe depletion of virtually nonrenewable aquifers, as is true in many places, from China to Colorado.[1] And we usually get plentiful precipitation—an annual average of about 40 inches, more or less, across the region, though none knows what climate change might portend. Still, New England's water problems are by no means trivial.

Water problems in New England are almost always linked to excess in one form or another—too much or too many of the goods we take from the waters, and a similar profusion in the wastes and contaminants we return to its pools and flows. This should not be surprising, since American culture can be described as the ethos of excess. Contrary to a common view, the cardinal vice of this age is not sexual in nature, except insofar as our species is reproducing too many for the good of our habitat and the rest of its inhabitants. Rather, the cardinal vice—and the one most likely to be overlooked—may be prodigality—and the injustices to our communities, other creatures, and future generations that the vice of prodigality produces.

To counter excess in the use of water and related goods, what is needed is the development and implementation of a new ecologically sensitive code of conduct for individuals and societies—one that respects the limits and shares the goods of life with all peoples and all species, now and for the future. This "new" ethics will be characterized by at least four norms or virtues: social equity, sustainability, "bioresponsibility," and frugality.

The development and implementation of these norms, however, depend on an intimate alliance between the empirical and evaluative disciplines. Unfortunately, this alliance is now ailing. But neither can function effectively without the other. We, therefore, need to enhance the cooperative bonds between the sciences and ethics on questions of public policy and appropriate practice.

In the title of this essay, I refer to the "ambiguities of water." Some will see this phrasing as a bit odd, but I think it is justified by how we experience water.

Water is a phenomenon with multiple meanings, along with a confusion of values and disvalues. Water is life-giving and life-taking, our benefactor and destroyer. Both scarcity and superfluity of water can be dangers to life, yet it is the fountain of life from which "all blessings flow"—our origins and the bulk of our body and blood. Water is a means of both purification and contamination, a healing power and a conveyer of pathogens, a sacramental medium, as in baptism, and a demonic force, as in a perfect or even imperfect storm at sea. Plentiful water is a prominent feature of the Promised Land (Deut 8:7), and even of Paradise, according to the Qur'an, where running waters and gushing fountains create the eternal gardens of delight. But super-plentiful water is also the weapon an angry god uses to eliminate the wicked, while causing a lot of collateral ecological damage, in the Genesis story of the Flood. Water can be a reason for joy and thanksgiving, as well as a catalyst for theodicies—depending on one's social and ecological location. What is good for some humans and some other species in certain contexts is bad for others in the same contexts. High water, for example, is good for those plants and animals that prosper in a floodplain, but it is bad for those towns and farms built, often foolishly, on that floodplain. Water is also both the great connector and divider, the barrier that stimulates the arts and sciences of bridge building and ship building, but also the one that shapes the boundaries of states and states of mind, such as Vermont and New Hampshire.

Water is also power—not only in the sense of energy from waterwheels and hydroelectricity, but also in the sense of controlling an essential resource and potentially depriving other persons and other species of their dues. Water as power was a theme in some old cowboy movies about desert waterholes and warring ranchers. It remains a significant political problem in various contexts, from international relations to municipal allocations. It is also a central ecological issue, especially in the form of anthropocentric imperialism vis-à-vis the rest of nature.

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The recognition of these ambiguities can save theologies and ethics from some sentimental simplicities about water. They point to the complex problems and difficult dilemmas in making choices about water. They are another reason why both ethics and the sciences are important in making wise choices.

What Is Water?

What is water? Whenever I hear or see references to water, I frankly do not know the meaning of the word—unless the form and/or context is specified. We normally do not experience water as simply a chemical compound of two atoms of hydrogen and one of oxygen—the clear, colorless, odorless, tasteless liquid of the labs. Rather, we experience water usually with colors, odors, and tastes of various sorts. Water comes in a multitude of forms and places—all of which have shaped the landscapes, the weather, the cultures, the vocations, the foods, the mindsets, and lifestyles of New England and its various parts.

Water is not only the lakes, the rivers, the reservoirs (like the great Quabbin Reservoir), the falls, the bays, the open ocean, the aquifers, the kettles left behind by the glaciers, and the beaver dams—courtesy of the rodent who not only creates habitats for numerous species but also causes "property damage" for some members of our species. Water is also ski slopes, cranberry bogs, Jacuzzis, squirting fountains, canals, aqueducts, irrigation systems, pipes and pumping stations, ponds of treated and untreated wastewater, ice skating rinks, icy roads made passable with salt that contaminates our fresh waterways, as well as wooded watersheds that absorb precipitation, hinder flooding, and replenish and filter groundwater.

Each of these forms of water, moreover, has a set of moral problems associated with it. Let me, therefore, comment on several of these forms to introduce these ethical issues in New England.

Water is...

• both the gentle rain from heaven and the torrential Northeasters that erode sandy coasts, flood homes, and cause snow emergencies. Whatever the form, one result is runoff and the diverse contaminants that runoff carries—untreated sewage, oil from parking lots, leakage from tanks at gas stations, road salt, acid rain, fertilizers and pesticides, detergents and other chemicals, and metals like mercury—flowing and seeping into our streams, rivers, bogs, bays, harbors, and wells. Mercury-contaminated fish in some local ponds and rivers are unsafe for children and some adults to eat, according to the Massachusetts Department of Public Health. That includes Walden Pond of Thoreau fame.[2]

The main waterborne pollutants today are not from identifiable sources, such as factories and mills, though some still treat, or want to treat, the waterways as their private sewers. Rather, they are diffuse or "non-point" pollution from countless residential, business, and recreational sources. In an assessment of state efforts to control non-point pollution under a key provision of the Clean Water Act, the National Wildlife Federation gave Massachusetts and Maine a grade of B, Connecticut a C, Vermont and New Hampshire Ds. Rhode Island failed. No state in the U.S. received an A.[3] Non-point pollution reflects our excessive and ecologically careless lifestyles. It is the effluence of affluence.

Water is...

• vernal pools—small, temporary wetlands in the Spring, called potholes, sinks, or even puddles. Many species of wildlife are dependent on these vital habitats. They are a haven for amphibians, such as spring peepers and salamanders. But vernal pools are disappearing in New England—ditched and drained for "development" in the form of oversized homes, lawns, offices, factories, and malls. This habitat destruction is a significant factor in the decline of wood frogs, salamanders, and some birds.

Water is...

• various other wetlands—bogs, swamps, kettles, ponds, and marshes (freshwater and saltwater). They not only replenish and filter our water supplies; they are vital habitats for wildlife—indeed, some rare flora and fauna, as well as those indispensable but maddening mosquitoes who suck blood meals from us and, in turn, serve as the prime food for various birds, fish, and other animals. Like vernal pools, these habitats are the victims of our growing numbers, territorial expansion, and patterns of production and consumption. The

intrusions on wetlands are often small and subtle, but the cumulative effect over time is that our wetlands have become only a small fraction of what they were historically.

Water is...

• the small streams, originally meandering, vegetated, natural drainage systems where groundwater discharges to the surface and surface water recharges groundwater. In many urban and suburban communities, streams have been transmuted into straight and eroded drainage ditches—culverts with little ecological significance but much proneness to flooding. The expansion of impervious material—roads, parking lots, houses, businesses, etc. replacing woodlands and wetlands that used to soak up rain and snow melt—adds to flooding problems in many places.

Often, stream "improvement" has been an anthropocentric rather than an ecological concept. It has not meant, for example, preserving or restoring wild conditions for the good of a biodiverse whole. Instead, it has meant enhancing the conditions for alien, stocked species, notably rainbow and brown trout, the preferred targets of elite "sportsmen," by such management practices as adding artificial deflectors and shelters, and by eliminating such indigenous predators as kingfishers, mink, herons, and turtles.[4] Elsewhere, the spectacularly beautiful native brook trout—which makes its rainbow cousin look drab by comparison—is often deprived of healthy habitats and even replaced by alien bullheads and perch.[5]

Water is...

• the numerous dams and the reservoirs they create, from Hoover Dam on the Colorado to the "old mill stream" of romantic nostalgia. There are about 75,000 large dams in the United States,[6] and nearly 3000 in Massachusetts.[7] The Connecticut River and its tributaries alone have about 1000 dams.[8]

These great barriers have transmuted the ecological character of our rivers and streams. They are great collectors of river-borne sediments that are often filled with pollutants. They create slackwater, while indigenous species may depend on running water. They have hindered or halted the great migrations of fish that leave the ocean to spawn in freshwater, especially when the dams are "absolute" barriers without "fishways."

Most of us know something about the tragic tale of the 560 or so dams in the Columbia River basin, particularly the four major dams on the Snake River, and the near-extinction of the once-abundant Pacific salmon species. What is not equally well known, however, is the effect of dams on New England's native fish. For more than 350 years, dams in New England have reduced or destroyed the migration runs of smelt, blueback herring, alewives, shad, and, of course, the now-rare Atlantic salmon in the Northeast.[9]

Some dams can be justified for human needs—perhaps hydroelectric power or the storage of consumer water supplies—and some long-standing ecological values, but a lot of dams are unnecessary and/or ecologically harmful. The now-breached Edwards Dam on the Kennebec River in Maine is a good example of one that is both unnecessary and harmful. The organization American Rivers runs the Rivers Unplugged Campaign, for breaching those dams that no longer serve significant purposes or their ecological costs outweigh the benefits. That seems like a sensible endeavor. But making these judgments in particular cases will require substantial scientific data and creative thinking in applied ethics.

Water is...

• so-called drinking water—on tap, no less. Most of it, of course, we don't drink; it goes for flushing, washing ourselves and our cars, watering lawns, filling backyard swimming pools (of which there are an estimated 86,000 ground-encased pools in New England[10]), and keeping golf courses green. Even when used for necessary purposes, however, waste is a prominent feature of how we use water.

In some communities, the demand for water by residences and businesses far exceeds the supply, especially during dry periods. Some aquifers have been nearly exhausted and smaller rivers, like the Ipswich,

have been reduced to disconnected pools in summers, since they could not be replenished by aquifers. Thus, water scarcities have required water rationing at times, and we can anticipate more of the same in more places in the future.[11] Predictably, some of the affluent have escaped rationing by drilling private wells to ensure an exclusive and unrestricted supply of water. Of course. these wells draw from and draw down the common ground water system. This case is one of a number of social inequities in the distribution of water, reflecting the public's failure to understand that water is part of the commons to be shared fairly.

By all accounts, public drinking water in New England is usually stringently regulated and generally safe from various viruses, bacteria, and other pathogens like cryptosporidium and giardia. Municipal water treatment includes filtration and disinfection. Chlorine or a derivative is now the disinfectant of choice in most places in the U. S., because it effectively kills a variety of waterborne pathogens, including those that cause typhoid and cholera. Plus, unlike alternatives, chlorine has a residual effect; it provides enduring safety. Technically, chlorine is a pesticide.

The main waterborne pollutants today are not from identifiable sources, such as factories and mills, though some still treat, or want to treat, the waterways as their private sewers. Rather, they are diffuse or "non-point" pollution from countless residential, business, and recreational sources.

At this point, a major controversy starts. Chlorine combines with organic material in the water to create so-called disinfection byproducts (DBPs), such as trihalomethanes, some of which may cause cancer or disrupt reproductive and developmental systems in humans and other organisms. The chlorine industry argues that there is no direct or conclusive evidence for these concerns at the low concentrations of DBPs in water treatment. Opponents, however, argue that harmful effects to delicate hormonal systems in humans and other organisms can occur at astonishingly low concentrations of parts per trillion. This debate is an important scientific and ethical issue. It involves significant questions about the appropriate interpretations of scientific data and justifiable precautions. There is no easy answer, but part of the solution for now is the persistent search for ecologically-friendly alternatives to chlorine and the minimal use of chlorine to the point of necessity. Minimization is an important ethical strategy for handling many dangerous processes and products.

Water is...

• bottled water—a $4 billion industry in the U.S., where more than one-third of Americans drink it regularly.[12] The imported elite brands—from France, Italy, and Sweden, for example—cost more than milk and juice. Profit margins are high.

Bottled water, however, may not be as clean and pure as the marketers suggest. The Natural Resources Defense Council (NRDC) concluded that bottled water is not necessarily safer or cleaner than most tap water in the U.S., especially in such places as New England. Indeed, the NRDC contends that tap water is stringently regulated while bottled water is inadequately regulated in the U.S. One brand of bottled water, for example, came from a well in the parking lot of an industrial site near a hazardous waste site.[13] *Consumer Reports* claimed that the main difference in taste among some brands came from the types of plastic in the bottles.[14] At least 25 percent of bottled water in the United States is little more than tap water, sometimes but not always further treated. As much as 70 percent may come

from municipal sources. Aquafina, for example, Pepsi's water brand, does not come from the Italian or Swiss Alps, as the logo suggests. Nine of its 11 sources are municipal systems,[15] including the Ayer, Massachusetts, public water supply.[16] Glacier Valley, a brand distributed by some airlines, sports a foil label showing a snow-capped peak and a stream flowing through a conifer forest. The water comes, however, not from an icefield in Alaska, but from a bore hole in Connecticut.[17]

Nor is bottled water more environmentally responsible, considering the energy and material costs of processing, packaging, distributing, collecting, and recycling. In some places, moreover, the extraction of water for export may have adverse effects on local supplies.

The sins of excess—gluttony really—represent a failure to learn the elementary lesson of ecology: There are no infinite bounties, no inexhaustible resources, no limitless systems. We need to share fairly with all within biophysical boundaries.

My sense is that most bottled water is used not primarily because of health concerns—though that is a common argument and, in some places, a reasonable defense. Instead, the primary reason is that bottled water, especially the elite brands, is fashionable. It conforms to the values of our reference groups. It shows that we care enough to drink, and have enough money to buy, the very best, even upscale water.

Bottled water represents the privatization of hydration for the affluent. NRDC rightly fears that bottled water for the affluent "could undermine funding for tap water protection, raising serious equity questions for the poor."[18] The primary ethical challenge is to provide safe, public drinking water for everyone.

Water is...

• the ocean, which has been the primary shaper of everything from the foods and weather to the vacations and lifestyles of New England. Historically, the ocean was the foundation of the New England economy, particularly in shipping and fishing (including whaling). It remains a major factor in today's economy—not only in shipping and fishing, but also in recreation. The coasts and beaches are major magnets for vacationers—swimming, fishing, boating, driving off-the-road vehicles. In fact, some coastal fauna—such as shorebirds, both migrating and breeding species—have been declining as a consequence of human impositions on the shorelines, from both recreators and private property owners who control most of the coasts.

The ocean has been the prime sink for our carbons and contaminants, but it has also been the source of abundant foods, from seaweed to humpbacks. Some of the seafoods have been linked to New Englanders' identities, such as Maine lobsters. Yet, these links have been virtually severed in some cases, particularly in the case of the cod.

From the perspective of a New England environmentalist, the collapse of the cod fisheries is especially unnerving. The cod was central to the New England economy and its international trade from the 17th through the 19th centuries. In fact, the "sacred cod" hanging in the Massachusetts House of Representatives was the symbol of the Commonwealth. Cod were incredibly abundant on the banks off New England and the maritime provinces. In 1855, the Canadian Ministry of Agriculture, speaking of cod and related species, wrote, "Unless the order of nature is overthrown, for centuries to come our fisheries will continue to be fertile."[19]

Apparently, the order of nature was overthrown in little more than a century. The cod is close to being "commercially extinct" in

some major fishing banks in the Northwest Atlantic, though there may be signs of some recovery in some places. The major fishing banks are closed or severely restricted. Tens of thousands of fishers and processors from New Bedford, Massachusetts, to St. Anthony's, Newfoundland, were left unemployed. The remaining fishers in New England turned to the few other species that had not yet been decimated, especially the spiny dogfish, a small shark once considered "trash," but now exported to England as a major source of fish and chips. But that species too has been caught excessively, and tighter limits have been imposed. Fishers are now "wondering if there is another species out there, like the dogfish, to keep them in business."[20]

The main problem is the same as Anne Plath McGinn's description of the plight of all the world's fisheries: "Put simply, too many fishers on too many boats with too many hooks or nets are taking too many fish from the sea."[21] That's true, but as McGinn also testifies, the fishers have been responding to too many consumers making too many demands on the sea.

With the decline of wild fisheries, aquaculture is a growing business in New England. The most prominent kind is farm-raised salmon, mainly European hybrids that are raised in cages on the Maine coast. They sometimes escape and may genetically threaten the survival of the already endangered Atlantic salmon. Moreover, on the public mudflats of some coastal towns in Massachusetts, shellfishers plant beds of oysters and quahogs under grants from the towns. Complaints about nepotism and favoritism arise over the allocation of plots, but the more serious question is the effects on the mudflat ecosystems by propagating one species and protecting it from its natural predators, including birds and crabs.[22]

I could continue these lamentations at length, but the central point would remain the same: The primary moral offense on water is excess—excess in what we humans take from and do to the water, excess in the wastes and emissions we return to the water, and excess in our transformations of water systems. All of these excesses give rise to forms of injustice—to other people, other species, and future generations. Our excesses on water are really excessive regard for ourselves at the expense of others. We are grasping more than our due and thereby depriving others of their dues. In classical Jewish and Christian thought, of course, this is the essence of sin—and so it should be regarded. The overuse and abuse of water are sins—and far more serious ones than those that generally preoccupy the churches. The sins of excess—gluttony really—represent a failure to learn the elementary lesson of ecology: There are no infinite bounties, no inexhaustible resources, no limitless systems. We need to share fairly with all within biophysical boundaries.

Interdependence of Science and Ethics

To challenge these excesses on water and their resultant injustices, one of the most important resources will be an alliance between ethics and the sciences. I am not referring to an alliance simply between scientists and ethicists. Water issues, like war, are too important to be left to professional elites. Rather, I am suggesting that everyone must take the relevant sciences and ethics seriously in facing problems of water. On choices and policies about water, these sciences and ethics are interdependent disciplines.

The problem, of course, is that ethics and the sciences lean toward isolationism—hardly a unique inclination among specializations with separate sources, methods, languages, etc. Yet, we need to promote a partnership between ethics and the relevant sciences based on mutual need in support of a common cause. The relationship that I commend is not mere cooperation, though that in itself would be appealing, but also what James M. Gustafson calls "interaction," in which ethics and the sciences are reciprocally shaped through sharing.[23]

On one side, the sciences are essential resources for ethics (and theology, too). Ethics must be informed by the best available scientific data and analyses in order to make sound

evaluations and choices. It is impossible, for example, to do ecological ethics, even at a general level, without an adequate understanding of the fundamentals and some particulars of ecological dynamics. Without this understanding, ecological ethics is likely to be reduced to romantic fluff or spiritual musings, as if, for example, predation does not exist. In fact, that is precisely what has happened in some so-called eco-ethics and eco-theology in religious circles. They are not rooted empirically, and, consequently, they are largely irrelevant to such specific issues as the use and distribution of water.

But ethics also depends on the sciences in a deeper way than mere assistance in the application of independent moral norms. Those of us who are ethical naturalists find our norms in nature, in the sense that the empirical realm is the source of our standards and the place where we test their validity, and revise them as necessary. We discover and defend what we ought to be and do, in general and in particular situations, in view of the values and virtues, rights and responsibilities, principles and practices that contribute to the optimal well-being of our kind and other kinds in relationships. As a contemporary example, the "new" virtues of sustainability and bioresponsibility—that is, concern, respectively, for justice to future generations and to non-human life—have come to us not as handouts on a mountaintop; they are emerging through reflections on our experiences with a variety of environmental vices. On this assumption, ethics must be open to all cultural wisdom, especially the relevant sciences, to discover what helps and hinders social and ecological well-being. Theologically, beyond the historical sources of moral insight in scriptures and traditions, the continuing revelations of the divine moral will can be discerned in the totality of existence, including in scientific knowledge.[24]

On the other side, the sciences are equally dependent on ethics. But the recognition of this dependency is frustrated by a debilitating myth about the relationship. A common assumption, in both popular and some scientific circles, is that "real" science is morally neutral or value-free. A sharp dichotomy between facts and values is assumed. Science is considered to be objective, and ethics to be subjective—even arbitrary and relative. Science is thought to be rational and impartial, ethics to be emotional and preferential. Science is considered to be quantitative, ethics to be qualitative. Science is said to be empirical and experiential, ethics to be intuitive and existential. These frequently encountered dichotomies seriously distort both the sciences and ethics.

They distort ethics in several ways. For example, they identify ethics in general with particular ethical theories, such as emotivism or relativism, which most ethicists reject vigorously. They overlook the fact that ethics, too, is a rational enterprise, concerned with consistency, coherence, comprehensiveness of interpretation, and fruitfulness in advancing social and ecological well-being. Ethics is also empirical in orientation in naturalistic interpretations.

Equally, this myth distorts scientific enterprises in important ways, initially by missing the inherent moral character of science. The practice of the sciences is impossible without certain moral commitments and truncated without others. These include honesty in the selection and interpretation of data; trustworthiness and fairness in the community of peers; fidelity to the rules of rationality and evidence; tolerance of interpretive diversity; freedom of inquiry; corrective dissent from prevailing paradigms; and cooperation in the search for knowledge. Even the much-celebrated scientific "objectivity" is, as Langdon Gilkey, observes, a "moral and spiritual achievement."[25] Scientists are moral subjects in a moral guild, or else science itself is impossible, constricted, or corrupted.[26]

Moreover, on questions concerning social and environmental policies and projects, moral values pervade the purposes, definitions, methods, and assumptions of scientific studies. Whenever, for example, scien-

tists talk of what is an "acceptable risk" or "safe dosage" of chemical compounds in drinking water, or whenever they express alarm about the effects of dams on migrating fish, or counsel calmness about pesticides, or make any recommendations on public policy, they are no longer functioning strictly as technical authorities. They are also acting as moralists, making value judgments about what state of being is better or worse than another. They have exceeded the bounds of their formal competencies, often without a consciousness on their part or the public's of this significant shift in roles. Indeed, the pretense that science itself and science-based findings are value-free can serve as a "useful" device for scientists to disguise the promotion of their value preferences.[27]

The danger to scientific integrity in these contexts is not the expression of moral values. That is inevitable. It is, rather, the expression of (1) invisible values—ones that are not made clear and explicit, and (2) nonviable values—ones that are in some way ethically deficient or indefensible. This danger is especially evident in economic cost-benefit analysis (CBA), so dominant today in science-based public policy decisions on water and everything else. CBA aspires to the transcendence of moral values, perceiving itself as an alternative to ethics. In reality, however, it reflects a distorted set of values. Arbitrarily, CBA makes the assumptions that moral values can be reduced to market values, and that moral values are not objectively real but simply subjective preferences. CBA, for example, calculates the values of wildlife and wildlands by measuring human economic preferences (our "willingness to pay"). In so doing, it makes the moral assumption that only human interests count, and not the intrinsic value of other lifeforms. One of the indispensable service functions of ethics in an alliance with the sciences is to uncover the hidden values and norms in scientific assumptions, methods, goals, and controversies, and to help sort out the good values and norms from the bad.

Usually, my primary complaint against these disguised moral arguments in so-called scientific recommendations is that the values and norms assumed are insufficiently inclusive and comprehensive—that is, they fail to give adequate consideration to all parties with stakes in an outcome, and they fail to incorporate all relevant moral elements.[28] The sciences need ethics at this point in order to make necessary moral judgments intentionally and well, rather than unconsciously and poorly. Ethics, informed and even reshaped in interactions with the sciences, can return the favor. Ethics offers essential guidance to prevent the violation of human and biotic rights in the goals and methods of particular scientific projects, and to prevent abuses of science itself, through, for example, plagiarism, fabrication, and political or economic manipulation. Ethics and the

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sciences are interdependent; to deal with water and other problems, we need both in an intimate, interactive alliance.

Four Norms of Alliance

One question remains: What is the ethical substance that should be developed and implemented in an alliance between ethics and the relevant sciences on water problems? I shall comment briefly on four norms or virtues that are essential for remedial action on water. These virtues are standards for character formation and social transformation. Three, in fact, deal with different dimensions of distributive justice, and the fourth is an instrument for the other three. Other norms are also relevant, but these are sufficient for my purposes in this essay.

1. Social Equity

Social equity is the inter-human form of distributive justice—the ethical process of apportioning benefits and burdens, on the basis of relevant similarities and differences, in order that all parties with stakes in an outcome receive their fair share. This norm is regularly violated in water distribution in New England. The rich and powerful, both individuals and corporations, often get the most benefits and bear the fewest burdens. They have greater access to water, they waste more, and they pollute more, but they usually pay less in proportion to their use and effects. Water is not a private commodity; it is part of the commons. To combat classism, fair standards and charges need to be developed for the distribution and use of water.

2. Bioresponsibility

Bioresponsibility is the extension of the covenant of justice to include all lifeforms. It means valuing other species for their own sakes, as ends in themselves, not simply as instrumental values—"raw materials," "renewable resources"—for human needs. The violation of this norm is a central feature of the way we use and abuse water.

Bioresponsibility is recognizing that other species are entitled to a fair share of water and other planetary goods. Of course, trying to define the practical meaning of "fair share" is at best an extremely difficult task, particularly when humans in a predatorial biosphere must destroy other lifeforms in order to survive and create. Yet, a "fair share" is a concept that we must struggle to define in order to stifle the anthropocentric imperialism that is so harmful to the rest of nature. We humans have already used far more than any reasonably defined fair share of the world's goods, including water. We must henceforth seriously limit our economic production and consumption, as well as our reproduction, to allow much more room for the thriving of wildlife and wildlands along with the thriving of human communities. Water is not only a resource for us; it is also a resource and a variety of habitats for other species.

3. Sustainability

Sustainability is living within the regenerative, absorptive, and carrying capacities of our planetary places *indefinitely*. It is a covenant of justice with future generations of our kind and other kinds until the end of the age. As such, sustainability seeks a balanced distribution between present and future generations.

For example, sustainability depletes so-called renewable resources, such as fisheries, no more than the rate of their regeneration—and preferably far less—to respect the values of otherkind. Sustainability pollutes no more—and preferably far less—than can be naturally assimilated. Sustainability says that it is wrong to disregard and discount the interests of future generations in the use and abuse of water.[29]

4. Frugality

Frugality is probably the most feared and neglected norm in modern morality. Some economists consider it a "vice," because it hinders economic growth. It is the most subversive of the virtues, because it is a revolt against the most sacred values of prodigal societies. Yet, solutions to every problem associated with water in New England, and maybe every other social and environmental problem, depend on the revival of this classical virtue, and its reformation from a strictly

personal trait into a social norm. Frugality is an antidote to the gluttony that is corrupting the water and the land.

Frugality means moderation, thrift, even temperance (in a classical, not evangelical sense). It is morally disciplined production and consumption. It is a "middle way" that struggles against both profligacy and poverty. It is not a world-denying asceticism, but rather an earth-affirming and enriching norm that delights in the less-consumptive joys of the mind and flesh, especially the enhanced lives for human communities and other creatures that only constrained consumption can make possible on a finite planet. Frugality is an expression of love, and a necessary condition of social equity, bioresponsibility, and sustainability.[30]

Conclusion

In the final analysis, we need to think of all water as holy water—holy without benefit of clergy and their blessings. In all its ambiguity, all water is what the Roman Catholic bishops of the Pacific Northwest called the Columbia River watershed: "a sacred commons" to be shared and cared for by all.

Water is a sacred object and the habitat and resource for countless sacred subjects. Like all things holy, water should be treated reverently and caringly, and used only fairly and frugally. Otherwise, it should be left untouched for the good of all.

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Endnotes:

1. Postel.

2. "Fish Consumption Warnings in Northwest Communities."

3. "NWF Priority: Safeguarding America's Waterways."

4. Thompson and Stull.

5. Nickens.

6. Duncan. Large dams of "environmental consequence" are defined as those of 6 feet or higher, with 50 acre-feet of storage, or more than 25 feet, with 15 acre-feet of storage, "and those of any size that pose a significant downstream threat to human lives or property" (Graf). Smaller dams are far more abundant.

7. Contrada.

8. Meyer.

9. See Palmer, Buchsbaum, as well as the other essays in the March/April 1999 issue of *Sanctuary*, entitled "Over the Dam."

10. According to the National Spa and Pool Institute, quoted in Abraham.

11. See the excellent series, "Saving Our Water."

12. Olson, ch. 2.

13. Ibid., ch. 1.

14. "It's Only Water, Right?"

15. Kummer.

16. Preer.

17. Kummer.

18. Olson, Executive Summary and ch. 1.

19. Kurlansky, p. 33. Much of what I say about New England fisheries has been shaped by this fascinating book.

20. Daley.

21. McGinn, p. 65.

22. Keese.

23. Gustafson, pp. 68-72, 137-38.

24. For a fuller interpretation of ethical naturalism, see my "Seeking Moral Norms in Nature: Natural Law and Ecological Responsibility," *in Christianity and Ecology*, ed. by Dieter T. Hessel and Rosemary Radford Ruether (Cambridge, Mass.: Harvard University Press, 2000), 227-50.

25. Gilkey.

26. For a fuller interpretation, see Nash, "Moral Values in Risk Decisions." Scientific methods, interestingly, cannot confirm these moral preconditions of science. Any effort to do so begs the question, since even the process of validating values, such as honesty, would need to assume the validity of the values. The moral foundations of science depend on philosophical, even metaphysical, justifications.

27. Graham, p. 432. See also Toulmin; Ladd.

28. Some of the veiled—or open—moralizing among scientists is, however, very good. On some questions in ecological ethics, such as the precautionary principle, I have learned more from the rigorous criteria proposed by some scientists than I have from the ethereal principles offered by some ethicists.

29. For a fuller interpretation of sustainabiliy, see Nash, "Humility as Predisposition for Sustainability."

30. For a fuller interpretation, see Nash, "Toward the Revival and Reform of the Subversive Virtue: Frugality."

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