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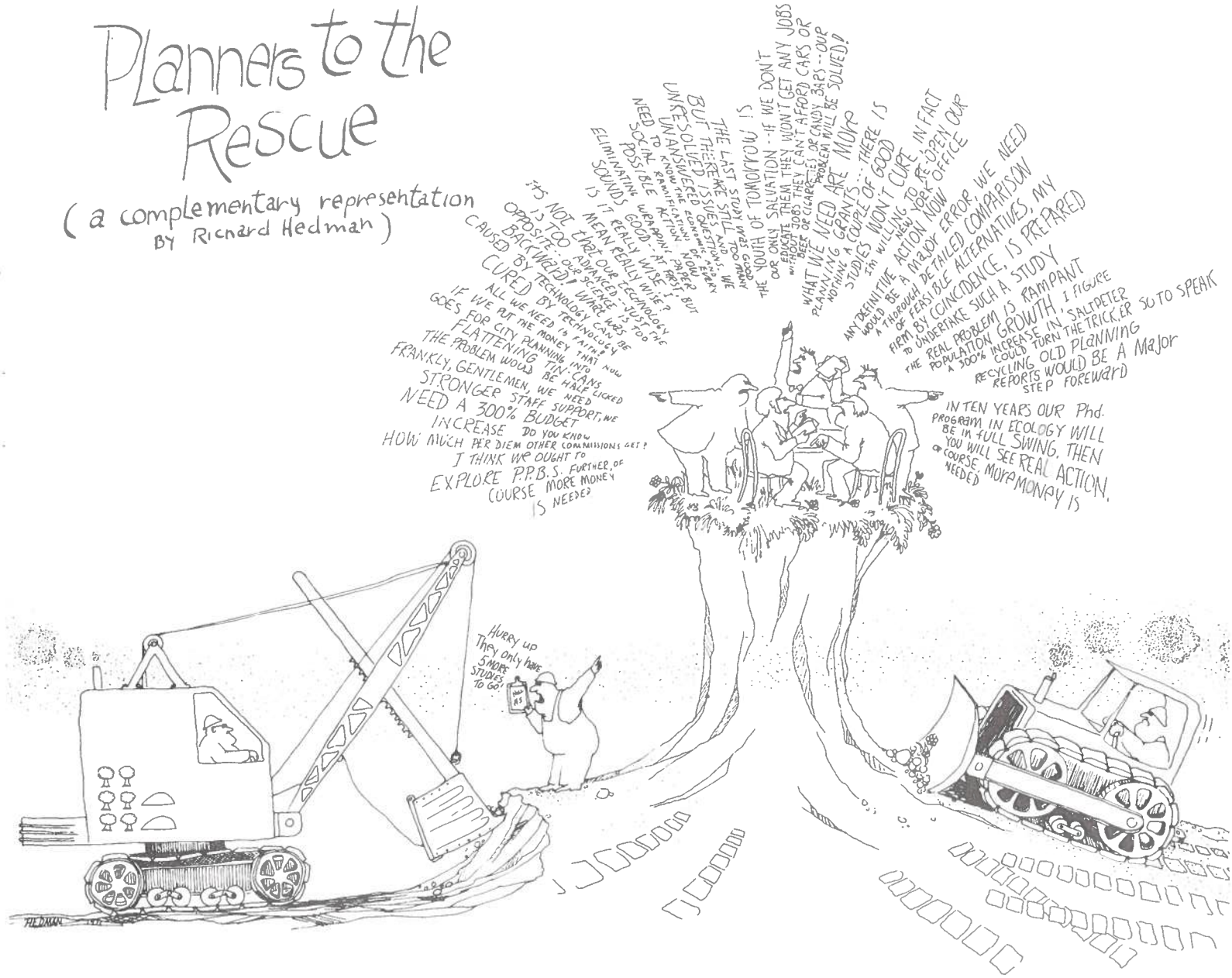

Interpretation

INSIGHTS INTO POLLUTION

Richard L. Meier

Tracing the conceptual origins of pollution illustrates how it springs from the violation of taboos. This basis has shaped both the public health and esthetic order approaches to environmental management. In its extreme forms, the present environmental stewardship approaches a religion. The apparently innocuous worship of Nature may have damaging consequences for the rest of society, through restricting freedom of choice and delaying the construction of needed public facilities. Planners and policymakers must be aware of the consequences of current conflicts over environmental values and seek strategies to postpone destructive confrontations.

There are those who revere the ecosystem and wish to maintain its unity. This dedicated minority finds itself fighting threats that are given three different labels. The destruction of a resource in connection with use is *depletion*. It applies most often to minerals, but it is also a term used for such diverse resources as forests and fish. The proper response is the development of substitutes from resources in greater supply. Negligent, unconcerned, improvident use results in *waste*. Slothfulness in obtaining and using recent information is usually found around the responsible

decisionmakers. The answer lies in the improvement of management. Finally, the corruption and contamination of resources is called *pollution,* a less than neutral term. These are not mutually exclusive categories, so it is quite possible for a single act to deplete, waste, and pollute at the same time. The three words actually imply different degrees of condemnation instead of different policies of exploitation.

Pollution causes scientists and planners great anguish, because the definitions are not anchored but keep drifting. Pollution is a cultural concept and implies a commonly held belief system. Inevitably, the operational meaning is elusive. About the time engineers are able to concur on a technical standard for assessing the quality of a resource, thereby establishing whether it is being degraded by men, the elites in the society shift emphasis and claim they wish to be even more discriminating than before, or they extend demands for prohibition in some new direction, It is now virtually impossible to find a more controversial domain for the application of science.[1]

The Semantics of Pollution

Pollution implies the violation of a taboo; thus, the idea of pollution is much older than the concept of a city. Primitive man was already making distinctions between the natural and supernatural, and taboos ordinarily reflected natural situations or conditions to be avoided. Sometimes, taboos extended into the ambiguous zone between the natural and supernatural, where pollution and desecration could not be differentiated. The Greek word for "pollute" literally translates "profane, contaminate"; the noun is *miasma,* one meaning of which has been continued to the present time. In Hebrew, associations with scum are indicated in addition to those incorporated by the Greek. These are all values which, when violated, stir up strong denunciations and retributions.

The etymology of the present English term is straightforward since it stems from the Latin noun *pollutionem*—defilement. A man, a place, or a piece of property can be made unclean through physical befouling or through some immoral act. It is a term used by the educated classes for formal breaches in conduct, while the masses developed their own language around one of the famous four-letter Anglo-Saxon words—*dirt.* Mary Douglas, in her book on *Purity and Danger* (1966), demonstrates that for dirt to exist there must be an idea of system that applies to the perceived environment. When a thing is dirty, it is offensive and should not be touched. Tools or instruments are to be used in cleaning or tidying up. Small children are taught these rules of dirt avoidance, beginning with toilet training. The rules may later be extended to contact with other races or sexes so that color bars and caste barriers are maintained by pollution rules.

Taboos involving elimination were greatly strengthened by displacement of the garderobe, the two-hole privy, and chamber pots by the modern bathroom which caused elimination to be carried out increasingly behind locked doors, thus building up a taboo on the sight, sound, smell, and taint of human excretion (Rosebury, 1969). This taboo has even been extended to the reuse of water after sewage treatment regardless of its chemical analysis. Virtually all American communities that have had opportunities to recycle their wastewater find their projects halted by guardians of propriety. The veto groups are made up of either vociferous local citizens or bureaucrats who understand the risks generated by sensitivities frequently found in the politically organized population.

Critical tests that determine what is polluted depend increasingly on chemical and microbiological analysis, but they must also fit within rules of purity and conduct designated by an educated class. Civilized taboos are more systematic and less arbitrary than the primitive, but they remain taboos.

The arbitrary character of the taboos presently maintained by an urban society is perhaps best exposed by an application of the semantic dichotomy *dirty:clean.* When well-informed residents are asked to assign one or the other to a wide range of perceptions in the cityscape, surprising degrees of consensus can be obtained regarding many urban contexts and locations. A number of opinions are virtually unanimous among people of the same social class and ethnic origin. Convictions about pollution are maintained over the long run because institutions bring pressure to bear on deviant individuals. The punishments applied to acts of pollution are used to enforce conformity; indeed, the earliest memories of children are very frequently recollections of being scolded for willfully dirtying either the environment or the food the family was expecting to eat. Each punishment more specifically defines the meaning of dirt for the child, and he passes this information on to siblings and playmates. They use it for acts of rebellion or conscious punishment of their elders. Even in a rational society concepts of dirt are transmitted at a pre-rational stage and so are maintained in the culture more strictly than intended.

The Health Factor

Some taboos may have sufficient foundation in fact to promote the survival of the group that holds to such rules. They are the superstitions that contain grains of truth. Thus, a "survival of the fittest" process should come into being for taboos, with good taboos eventually driving out bad ones. The pollution taboos of interest to the health sciences are the best examples, because they may prevent epidemics that weed out the population (Sigerist, 1944). Taboos affecting health are particularly important to cities because, until the nineteenth century, urban environments had excessively high death rates due to disease. Those who survived the endemic diseases, such as malaria and dysentery, succumbed to periodic outbreaks of "the plagues." Wherever people were tightly packed in their living arrangements, tuberculosis was particularly deadly. When cities warred against each other, health as often determined the winner as did the quality of the weapons used. The right mix of rules provided a strong defensive capability at the time of seige, but even the healthiest urban societies

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retained practices that were later discovered to be wasteful, harmful, and pernicious. A selection process based on the "survival of the fittest" criterion cannot select out from a list of hundreds of specific taboos all those that are disadvantageous, nor are new associations with dirt likely to result in new health-producing prohibitions. A capability for identifying unhealthy dirt came onto the scene only after adoption of the scientific method; it yielded conclusions that could eventually be applied to changing public behavior regarding health.

An important collection of taboos associated with cleanliness was accorded much more respect as a result of the propagation of the "germ theory of disease." Here was a body of biological principles which at the beginning of this century had already yielded some spectacular results and promised many more. They introduced a series of operations for discovering what should be considered unclean; with the aid of microscope and some agar plates one could trace direct connections between contaminated food, water, air, and artifacts and the specific disease contracted. The conclusion that all illness was caused by germs was a natural simplification, while a program for the control of the environment for purposes of health was a natural corollary. Hygiene was taught in the schools and teachers took on the task of proscribing what was dirty instead of depending upon the folklore transmitted among households. The results, as measured by numbers of human survivors, have been spectacular, and a very high proportion of the incidence of illnesses and deaths attributed to pathological organisms has been eliminated from urban populations, even in the poorest parts of the world.

Threats to health in an urban society are as serious as the threat to use violence is to personal safety. Therefore, public health officers have been granted police powers to intervene at the source of the threat or to operate on its vector; they are allowed to use coercion in the public interest. However, in order to remain legitimate, public health officers must have presumptive evidence of a true threat. They need symptoms, signals, indicators, criteria, and justifications, preferably in some readily comprehended, systematic framework—not a manual of prohibitions. For such a system they look to science to determine the threshold of environmental impurity at which humans are harmed, and to technology for instruments sensitive enough to detect environmental changes that cross that threshold.

Unfortunately, the science of man is woefully incomplete. It has been evident for some time that the "average," or standard, man so often invoked in arguments about man-environment interactions should not be used in designating thresholds for intervention. Some people are far more sensitive than others to specific pollutants. Should we set the indicator for action when 5 percent are noticeably affected? 1 percent? one per thousand? Note that as the proportion is reduced the cost of collecting data pertinent to risk increases, often exponentially, so that finding out could absorb all the professional talent and funds available for intervention. There will always be a significant fraction who *may* be affected by a given level of pollution, but no one will ever know for sure who these people are or where they may live, because their cases lie beyond our ability to detect.

Deciding where to set the threshold, or minimum tolerable level, becomes a joint technical-political decision that depends as much on the level of publicity as on the objective facts. That interaction was shown most clearly by Chauncey Starr (1969) in a remarkable analysis of American behavior when balancing risk of life or injury against the benefits to be obtained from an activity. He notes that people tend to seek out those situations where they perceive that the risk to life and limb is roughly the same degree that is inevitable. The vehicles they choose, the dwellings they live in, and the foods they eat are strongly determined by such considerations of safety. Thus, as a population average, this exposure to situational risk tends to approximate the risk of death from disease, which serves as a norm, although some riskier activities will be undertaken if they promise sufficient reward. More precisely, Starr was able to show, by isolating specific activities within American society as a whole, that extra risk undertaken voluntarily is proportional to the cube of the benefits. Stated in the way people make decisions, an increase in risk by 50 percent would not be worthwhile unless accompanied by a three to fourfold increase in benefits.

However, involuntary risks in America are treated in a strikingly different fashion. Such risks are incurred when the decision is out of the range of individual or face-to-face group choice and placed with a public body, a panel of experts, or a corporation board, or depends on the effectiveness of a lobby. The risk in this instance could be exposure to some toxic factor introduced in the environment or to accidents. Under involuntary circumstances people tend to tolerate risk levels of the order of a thousand times less than those instances consciously undertaken. In this category also, more risk is allowed if substantially increased social benefits result. However, decisionmakers and the professional experts who set the levels of public safety must remain alert to social justice considerations. Do the segments of the population exposed to the greater-than-normal risk receive proportional rewards? Only with such principles at hand is it possible to determine: "How safe is safe enough?"

The Esthetic Factor

Much of what is called pollution merely offends the senses, or violates an idealized concept of environmental order. The general concern for renewing the esthetic features of the urban environment suggests a fundamental insight: *a concept of proper order underlies all statements about pollution.* Even the assessment of conditions for cleanliness to reduce the threat from germs is forced to rely on arguments regarding bodily order—the basic concept of health. Though health remains a vague term, some consensus has been achieved regarding the kind of order than can be applied to the external environment. Disruptions of order in personal grooming, the household, the neighborhood, the central business district, the park, or the wilderness are all claimed to be polluting. But what are the determinants of proper order?

A question like this is grist for the philosopher's mill. Kuntz (1968) recently published a twenty-sided reassessment entitled *The Concept of Order,* so it has become easier to find well-digested viewpoints. Environmental order for Aristotle meant tilled fields outside the city walls, clear sparkling spring water, freedom from the miasma of nearby swamps and cesspools, cobbled streets with prospects opening toward temples and monuments, and control over the delinquent resident, whether his intent was to rob, add to the graffiti, or merely to drop debris. For Thomas Aquinas, order was hierarchical; a proper life-style existed for each level in the hierarchy, and each life-style made complementary demands on the environment. For nineteenth century Europe, it meant formal gardens, gridded street patterns, and allusions to the classics by all forms of imposed imagery, particularly architecture, grand scale art, and uniforms. The antithesis of order was provided by factories, railroads, slums, deforestation, and frontiers. Since then change has come rapidly, with many of the institutional sources of disorder and turmoil becoming pillars of the new order and those pillars overturned in favor of more abstract concepts.

The most comprehensive theory of environmental order treats the environment as a message that people interpret sequentially on the basis of what they recall from past experiences. (This much of Marshall McLuhan most investigators can accept.) Thus, contacts with the environment are similar to reading a body of prose or listening to a musical composition. If the message is full of cliches and repetitions, it could have order, though at a low level, but it would be dull. Soon it would fail to gain the attention of the population. If the message has too many surprises and unfamiliar patterns, it induces fatigue, and again is given little attention. When messages contain overwhelming complexity, they induce confusion. The condition of optimal environmental order—the golden mean—lies somewhere inbetween, where people can be continually learning about the imposed order.

Education and experience determine what transmission rate from the environment is deemed to be proper. Those with low levels of education tend to embrace conventional standards; people with high levels of education can often infer order even in a wilderness, tending to consider anything that disturbs the wilderness a pollutant. In the city this modern intellectual elite will demand a wide repertory of synthetic images-in-context, as well as attention to detail or "finish," so that the edges make well-defined patterns (Milgram, 1970). There is also demand for "disciplined ambiguity" and controlled complexity to stimulate interest (Rapoport and Kantor, 1967). The rate of information transmitted by the environment should be proportional to that of other media—books, television, and interpersonal transactions. The mass of the population has acquired a broad distribution of values reflecting propriety in environment. Families seeking homes in the suburbs spend a great deal of effort in matching their own taste for order with the environments presented, because they know what to expect of people who maintain familiar fronts.

In an affluent society it is often feasible for a person or group to construct a private environment. This private synthesis may revolve around a common avocation, such as gardening, sports, or yachting. Thereafter, certain specific pollutants, usually created by the wastes of the other people around them, are raised to the level of a threat to that style of life. Such threats are fought vigorously and tirelessly. The subdivision of the metropolis into communities containing citizens who have made strong commitments to the site or to special neighborhoods and households, creates enclaves of environmental values and sets the stage for bitter conflict.

Belief Systems

What happens when a taboo is broken? Any public occasion draws group disapproval and the withdrawal of cooperation with the violator. Private violations are to be punished by the individual's conscience—the built-in discriminator that differentiates proper acts from improper ones. However, Riesman's (1960) "autonomous personality"—the one that calculates costs and benefits associated with alternative behaviors and then chooses the best of the set, one who is not selfish or property-regarding but who believes that the welfare of everyman and the orderliness of the physical environment is a part of his own well-being—occurs far too infrequently to be seriously considered an effective preserver of a stable man-environment relationship.

Civilized man has evolved his taboos into systems of beliefs. One such system exists at the informal level of folk-culture myths. Another belief system exists in the formal teachings propagated by schools and mass media that allow those who hold to the system to participate freely in the popular culture. One important environmental belief system arises from "outdoorsmanship," a personal involvement in and experience with the natural environment. Using these codes, a person is expected to be able to grade the seriousness of a violation, whether it is his own or whether it was committed by someone else.

Environmental belief systems appear to be acquiring strong religious overtones. This drift toward sanctifying the natural environment shows up in terms chosen by prominent spokesmen when decrying violations of their taboos—no longer are these acts singled out as unthinking, uninformed, destructive behavior or willful misdemeanors; they have become serious crimes and even sins against Nature that must be expiated. Popular versions of ecology have become the dogma of the religion, and the wilderness is its cathedral. Membership runs into the millions and is concentrated in the best metropolitan suburbs and university towns, but still amounts to a tiny minority in the population as a whole. The phenomenon thus far follows the classical path for effective social movements (Blumer, 1969).

A neo-Calvinist stewardship for the environment constitutes ethical behavior for the organized faithful. In their catechism, tidiness is Godliness and preservation is an act of dedication. True believers exhibit a compulsion to isolate primitive areas and wildernesses, protecting them from insult and desecration by humans who wish to exploit them. A typical act of devotion is to write a

letter expressing outrage to the *New York Times, Time, Science,* or the local newspaper. A more repetitive ritual, analogous to prayer, is writing to one's Congressman. One's vacations are spent making pilgrimages to the holy places. The Sierra Club dramatically increased its membership when it resorted to the organizing techniques of the early Christians, but this "high church" was subjected to one's Congressman. One's vacations are spent making pilgrimages to the holy places. The Sierra Club dracompromising Friends of the Earth society split off. They and others with them will go to court to stop the power plants, jetports, harbor facilities, and freeways that fracture the environment.

Members of the Nature worship establishment find their religion a bit inconvenient when good deeds are required. For example, they will clean up meticulously after themselves but rarely after others not yet indoctrinated. They find it inconvenient to get rid of the second car in the household even though they know it is the extra cars that brought smog levels close to the alarm stage. The recycling of glass containers gets to be tedious after a few months. Although DDT and lindane are conscientiously boycotted, parathion is used to save the garden and the roses from being consumed by larvae. A fair degree of laxity in the observance of the new faith has already set in.

Unattached younger people, seeing the disparity between professed beliefs and actual behavior, are ready to label this group as hypocrites. Quite a few of the young in their enthusiasm embrace brown rice and macrobiotic vegetables; they live with little more property than a few records and books—even their clothes are shared. They bicycle, hitchhike, or buy the car model believed to consume the least amount of fuel per mile. They backpack into the wildernesses and contemplate the grandeur of the scene. Many join social movements founded by various prophets and evangelists who draw on elements of Buddhism and Christianity; their teachings often attribute supernatural features to natural phenomena; their communion centers around wine or marijuana rather than the cocktail. Nevertheless, many backsliders can also be found among the youth, along with a fair-sized number of drifting "seekers" looking for more exciting experiences.

The Earth Day celebrations on many North American campuses in 1970 built a quick, strong, revitalized consensus in the new generation. It was reinforced in the mass media by dark, evil caricatures of the despoilers and polluters who were to be the target of the new crusades. A handbook had been prepared in advance which maintained a high degree of unity in the movement by defining the articles of faith. An interest in back-to-nature communes was generated, but most such communes lacked a cohesive ideology and dissolved within months after they were formed. Nevertheless, participation grew in organizations run by "true believers," and the variety of organized activity vastly increased.

As a religion the new Nature worship is one of the mildest and most innocuous yet to appear on the scene. Its devils are of this world—litterbugs, pesticide sprayers, oil spillers—whose behavior can be curbed by appeals to authority (where science is co-equal with government), by litigation, and by public education. Its heretics are neither burned at the stake, incarcerated, or banished. Even today the other kinds of new religions may resort to assassination when threatened with dangerous schisms (as when Malcolm X, who deviated from the true path as a Black Muslim, was shot to death), while the established ideology in the Soviet Union erases recorded history, creating another "non-person" who may at the same time be put away in a mental institution. In America such schismatics are merely subjected to character assassination—they stand accused of ethical misjudgments, advocating crimes against Nature, and even scientific error. Therefore, if a person is predisposed to seek a faith, glorification of the unity of the ecosystem along with a commitment to strive personally to promote such ends seems to be the least harmful religion to appear in recent years.

Religions cause harm by restricting freedom of choice in the society at large. They do this because they concentrate on the propriety of present behavior and close out many future options, but Nature worship reverses this bias by consciously preserving options for the collective future at the expense of immediate gratifications. Because they regard themselves as stewards of the Earth, Nature worshippers feel justified when intervening to impose their morality on the behavior of nonbelievers, an attitude directly analogous to that formerly held by prelates of the Roman Catholic Church on the issues of family planning and abortion. Many otherwise utilitarian behaviors are specified as sins: "thou shalt not construct a highway or transport electric power through a wilderness." The difference between religious dogma and taboos is that dogma is presumably fixed and unyielding, uncompromisable and nonnegotiable, while taboos can be elaborated, modified, transferred, and even extinguished.

Very likely the price to be paid by the public for heeding this dogma will appear in the form of major public service delays. In 1970, it was noted by engineers that every large public utility facility programmed for metropolitan New York was held up by litigation, federal investigation, or demonstrations by activists. The list included power plants, housing programs, jetports, harbor development, and freeway construction, all of them requiring two to five years to complete. This means increasing delays in air and ground travel, continuing scarcity of housing, and shortages of power. It could also mean a reduced ability of the metropolis to compete, an accelerated moving away of productive jobs, leading to the beginnings of a "depressed area" syndrome. Generally it is the poor who suffer the increased insecurity of employment in return for the benefits of better air, less noise, and more natural scenery that they did not ask for in the first place, or put far down on their priority list if they did. The intellectuals and the professional classes are in a position where they can usually evade the new inconveniences pollution control imposes upon them.

Consequences for Policy

The cultural prohibitions and nonmaterial values attached to pollution are especially significant for public policy where physical conditions, ob-

jective circumstances, and hard facts are less influential over the short to middle run than sentiments and attitudes. Beliefs held tenaciously by educated people present the greatest hurdles to be overcome before major programs for the conservation of water and energy resources can be put into operation. The technologies for striking improvements in efficiency are at hand, but it is now clear that the beliefs of one splinter or another of the educated classes will be violated by taking such action. These tiny minorities do not have the power to promote alternative changes, but they often succeed in confusing the choice-making processes in a democratic society so as to effect a practical veto.

Why should people of good will, with the interests of humanity in mind, take such strong stands against progress, or at least progress as it has been previously defined? One major source of this frustration lies in reforms acomplished a generation ago: soil conservation, forest management, flood control, the preservation of threatened species, and national park development. The values advanced by those national programs were gradually elaborated into state and local political platforms, then into law, and simultaneously into bureaucratic principles. The recommendations have at many points been accepted much too blindly so that an increasing number of policy paradoxes bedevil us.

One example, an almost trivial one, illuminates the persistent influence of these values. Many deer hunters exposed to simplistic lessons remain convinced that it is highly improper to shoot does. Naturalists point out that the abandonment of marginal farms has increased the range of the deer at the same time it reduced the number of truly effective hunters, while natural predators, such as lynx and wolves, have been bountied to virtual extinction, so now 10 to 40 percent of the deer regularly die of starvation in late winter. Their plight is expected to move the hunters, but the well-ingrained taboo against shooting does postpones a change in the regulations by as much as a decade or two. Forestry, land use, pest control, park development, and shoreline management are similarly constrained by the preconceptions of the past generation.

A more serious error in the positions taken by aggressive advocates of "the environment as it should be" is their insensitivity to social justice, an oversight that will do their cause great harm over the long run. A pertinent example may be drawn from the recent Save-the-Bay crusade, organized among top professionals and businessmen in the communities surrounding San Francisco Bay. The major threats were pollution of water and air and the loss of the marshes and tidal flats to apartments, factories, docks, and airports after receiving solid waste from the cities. A temporary Bay Conservation and Development Commission was formed to study the problem and recommend action (Schoop and Hirten, 1971). It was found that much of the pollution would be under control as soon as treatment plants in various stages of construction came into operation, but that encroachment on the Bay Shore would rise to unprecedented dimensions. It could be stopped, however, if suitable legislation were enacted. This was deemed to be a good and worthy objective, with no further analysis required. That legislation blocked all development, including, inadvertently, the improvement of the San Francisco waterfront contracted for by the city.

However, the urban ecology of North American cities leads to the settlement of ghettos in low-lying areas. Thus, seven of the eight Negro communities and two of the three Latin settlements immediately adjoin the Bay. They exhibit high concentrations of unemployment. The principal entry into high-paying jobs for young men happens to be through the construction industry and its suppliers, but if all construction on the edge of the Bay is halted, growth is deflected to the periphery, which has poor commuter transportation connections to the ghettos. So, programs for saving the Bay, as conceived by the purists, will benefit those with "view" lots, yachts, and interests in estuarine wildlife, at the expense of those least able to pay for and to defend their interests.

A fair resolution of the issue would be to tax the people whose esthetic values, beliefs, and taboos would be offended. The rate should be enough to transport the blacks and the browns to jobs in the suburbs. However, that operation would encounter bitter resistance from the suburbanites themselves since a large proportion have recently fled to these communities to avoid racial integration in the central city. One suspects also that the privileged group would regard the size of such a special tax as intolerably high; they would vastly prefer to have it undertaken by the public at large, even if a majority of the public does not share the benefits.

An alternative, of course, is to compromise—develop a plan that would serve as many different lifestyles and specialized publics as possible, including the construction of perhaps 20,000 units of waterfront apartments and moorings for thousands of houseboats in designated areas to match the office space that is aggressively promoted. The plan should be kept open enough to take advantage of new opportunities when they arise. Services to any specialized group should never be subsidized unless tradeoffs have been worked out with many other groups. If at all possible, arrangements should be made so that individuals who benefit extraordinarily from public development of the shorelands should pay at least a full share of the cost to the operating administration; if the resource is scarce it should go to the highest bidder, public or private, who would not degrade the values of others. Plentiful resources, regarded as cheap, should be allowed to be used opportunistically with a minimum of regulation. Leases on land should be kept relatively short during the period of rapid development. These are a few of the relevant principles that are well-known to planners, in theory at least, but are not easy to apply. A primary reason for planners' current difficulties is that compromise for the true believer is akin to the crime of heresy.

This analysis of the social dilemmas springing from ideology has been marshalled to follow contemporary political theory as summed up by Sartori (1969). He considers the conflict between the belief systems held by elite publics and welfare oriented planners when these two groups differ on public policies. Says Sartori,

> The two mentalities simply do not fit: their very logic, their *Gestalten,* are different. Each belief group is inevitably prompted to project its own *forma mentis* on the opposing group. A blind game results, in which misinterpretation, misperception, frustration, and a spiral of distrust play the major roles.

Much to the bewilderment of the external observer, the logic of self-interest no longer suffices to explain political actions. This is a troublesome prospect a wise man wishes to avoid.

The best hope, it seems now, is that the newly evolved ideologies will progress as social movements. A number of the major tenets of the belief system may then be expected to lose their centrality and move to the periphery of collective attention. Believers may then only "satisfice" with respect to these principles; they would be ready to consider compromises. Moreover, the identification and publication of the contradictions between these principles and other social values could help in introducing rationality, based on verifiable facts and calculations, that would postpone confrontation and avoid destructive conflict.

After a substantial erosion of the faith has occurred, economical, resource-conserving reform can be proposed. The earliest formulations will most likely be adopted in resource-poor developing countries due to conditions of scarcity. It should then be possible to elaborate more sophisticated versions of resource-conserving cities for life-styles prevalent in Europe and North America. But it will take *organization* to recycle water and raw materials efficiently through the metropolis, and the discipline of that organization is likely to cause many free spirits to renounce urbanity, move out of the congested regions, and live less comfortably in the empty spaces. The extremes of pollution and waste could be conquered but life in the cities might then be too demanding and stressful for many contemporary objectors.

H. G. Wells (1902) foresaw that cities in the twenty-first century would present "a new and entirely different phase of human distribution (over space)," and M. M. Webber (1963) recognized that the substitution of messages for trips would allow a large proportion of educated people to reside outside the normal commuting distance. In general, life with Nature would then be lived in the back country by refugees from the stresses and the pollution of the metropolis in a pseudo-simple fashion. However, economists will object that the overall capital cost is greater than for suburban living because economies of scale are not available, and major line maintenance costs must be added, while the demand for high quality services such as medicine is not likely to be diminished. The technologist will be quick to point out that this orderliness at the interface between man and Nature is bought at the expense of the environment around *extra* chemical plants, spinning and weaving mills, power stations, refineries, mines, and telephone exchanges.

Thus, it does not seem likely that a strong commitment to the simple life with Nature will do anything more than redistribute the disorders in the ecosystem, preserving some places from pollution at the expense of others, unless it is associated with some more fundamental considerations of social organization. It is to these larger issues that the concerns of the environmental movement must be addressed.

NOTES

[1] One of the most patient and informed views of the problem, including the extent to which a technological or remedial solution exists, was provided by a Subcommittee on Environmental Improvement of the Committee on Chemistry and Public Affairs of the American Chemical Society (1969). The chemists systematically divide the problem by the medium threatened—air, water, land and ecosystem. They take responsibility for the full range of facts, chemical and otherwise, and emphasize the need for data primarily about long-lived substances. Their recommendations concern means to efficiently acquire information that would provide the basis for action, whether it be standards-setting, purchase of equipment, legal injunction, or statutory control. They try for public safety by objective measures regardless of the excitement, much of it among academics and other professionals.

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