

The Tragedy of the Commons Revisited

Major problems have neither technical nor political solutions; extensions in morality are not likely.

Beryl L. Crowe

There has developed in the contemporary natural sciences a recognition that there is a subset of problems, such as population, atomic war, and environmental corruption, for which there are no technical solutions (1, 2). There is also an increasing recognition among contemporary social scientists that there is a subset of problems, such as population, atomic war, environmental corruption, and the recovery of a livable urban environment, for which there are no current political solutions (3). The thesis of this article is that the common area shared by these two subsets contains most of the critical problems that threaten the very existence of contemporary man.

The importance of this area has not been raised previously because of the very structure of modern society. This society, with its emphasis on differentiation and specialization, has led to the development of two insular scientific communities—the natural and the social—between which there is very little communication and a great deal of envy, suspicion, disdain, and competition for scarce resources. Indeed, these two communities more closely resemble tribes living in close geographic proximity on university campuses than they resemble the “scientific culture” that C. P. Snow placed in contrast to and op-

position to the “humanistic culture” (4).

Perhaps the major problems of modern society have, in large part, been allowed to develop and intensify through this structure of insularity and specialization because it serves both psychological and professional functions for both scientific communities. Under such conditions, the natural sciences can recognize that some problems are not technically soluble and relegate them to the nether land of politics, while the social sciences recognize that some problems have no current political solutions and then postpone a search for solutions while they wait for new technologies with which to attack the problem. Both sciences can thus avoid responsibility and protect their respective myths of competence and relevance, while they avoid having to face the awesome and awful possibility that each has independently isolated the same subset of problems and given them different names. Thus, both never have to face the consequences of their respective findings. Meanwhile, due to the specialization and insularity of modern society, man's most critical problems lie in limbo, while the specialists in problem-solving go on to less critical problems for which they can find technical or political solutions.

In this circumstance, one psychologically brave, but professionally fool-

hardy soul, Garrett Hardin, has dared to cross the tribal boundaries in his article “The tragedy of the commons” (1). In it, he gives vivid proof of the insularity of the two scientific tribes in at least two respects: first, his “rediscovery” of the tragedy was in part wasted effort, for the knowledge of this tragedy is so common in the social sciences that it has generated some fairly sophisticated mathematical models (5); second, the recognition of the existence of a subset of problems for which science neither offers nor aspires to offer technical solutions is not likely, under the contemporary conditions of insularity, to gain wide currency in the social sciences. Like Hardin, I will attempt to avoid the psychological and professional benefits of this insularity by tracing some of the political and social implications of his proposed solution to the tragedy of the commons.

The commons is a fundamental social institution that has a history going back through our own colonial experience to a body of English common law which antedates the Roman conquest. That law recognized that in societies there are some environmental objects which have never been, and should never be, exclusively appropriated to any individual or group of individuals. In England the classic example of the commons is the pasturage set aside for public use, and the “tragedy of the commons” to which Hardin refers was a tragedy of overgrazing and lack of care and fertilization which resulted in erosion and underproduction so destructive that there developed in the late 19th century an enclosure movement. Hardin applies this social institution to other environmental objects such as water, atmosphere, and living space.

The cause of this tragedy is exposed by a very simple mathematical model, utilizing the concept of utility drawn from economics. Allowing the utilities to range between a positive value of 1 and a negative value of 1, we may ask,

The author is assistant professor of political science at Oregon State University, Corvallis 97331.

as did the individual English herdsman, what is the utility to me of adding one more animal to my herd that grazes on the commons? His answer is that the positive utility is near 1 and the negative utility is only a fraction of minus 1. Adding together the component partial utilities, the herdsman concludes that it is rational for him to add another animal to his herd; then another, and so on. The tragedy to which Hardin refers develops because the same rational conclusion is reached by each and every herdsman sharing the commons.

Assumptions Necessary To Avoid the Tragedy

In passing the technically insoluble problems over to the political and social realm for solution, Hardin has made three critical assumptions: (i) that there exists, or can be developed, a "criterion of judgment and a system of weighting . . ." that will "render the incommensurables . . . commensurable . . ." in real life; (ii) that, possessing this criterion of judgment, "coercion can be mutually agreed upon," and that the application of coercion to effect a solution to problems will be effective in modern society; and (iii) that the administrative system, supported by the criterion of judgment and access to coercion, can and will protect the commons from further desecration.

If all three of these assumptions were correct, the tragedy which Hardin has recognized would dissolve into a rather facile melodrama of setting up administrative agencies. I believe these three assumptions are so questionable in contemporary society that a tragedy remains in the full sense in which Hardin used the term. Under contemporary conditions, the subset of technically insoluble problems is also politically insoluble, and thus we witness a full-blown tragedy wherein "the essence of dramatic tragedy is not unhappiness. It resides in the remorseless working of things."

The remorseless working of things in modern society is the erosion of three social myths which form the basis for Hardin's assumptions, and this erosion is proceeding at such a swift rate that perhaps the myths can neither revitalize nor reformulate in time to prevent the "population bomb" from going off, or before an accelerating "pollution immersion," or perhaps even an "atomic fallout."

Eroding Myth of the Common Value System

Hardin is theoretically correct, from the point of view of the behavioral sciences, in his argument that "in real life incommensurables *are* commensurable." He is, moreover, on firm ground in his assertion that to fulfill this condition in real life one needs only "a criterion of judgment and a system of weighting." In real life, however, values are the criteria of judgment, and the system of weighting is dependent upon the ranking of a number of conflicting values in a hierarchy. That such a system of values exists beyond the confines of the nation-state is hardly tenable. At this point in time one is more likely to find such a system of values within the boundaries of the nation-state. Moreover, the nation-state is the only political unit of sufficient dimension to find and enforce political solutions to Hardin's subset of "technically insoluble problems." It is on this political unit that we will fix our attention.

In America there existed, until very recently, a set of conditions which perhaps made the solution to Hardin's problem subset possible: we lived with the myth that we were "one people, indivisible. . ." This myth postulated that we were the great "melting pot" of the world wherein the diverse cultural ores of Europe were poured into the crucible of the frontier experience to produce a new alloy—an American civilization. This new civilization was presumably united by a common value system that was democratic, equalitarian, and existing under universally enforceable rules contained in the Constitution and the Bill of Rights.

In the United States today, however, there is emerging a new set of behavior patterns which suggest that the myth is either dead or dying. Instead of believing and behaving in accordance with the myth, large sectors of the population are developing life-styles and value hierarchies that give contemporary Americans an appearance more closely analogous to the particularistic, primitive forms of "tribal" organizations living in geographic proximity than to that shining new alloy, the American civilization.

With respect to American politics, for example, it is increasingly evident that the 1960 election was the last election in the United States to be played out according to the rules of pluralistic politics in a two-party system. Certainly

1964 was, even in terms of voting behavior, a contest between the larger tribe that was still committed to the pluralistic model of compromise and accommodation within a winning coalition, and an emerging tribe that is best seen as a millennial revitalization movement directed against mass society—a movement so committed to the revitalization of old values that it would rather lose the election than compromise its values. Under such circumstances former real-life commensurables within the Republican Party suddenly became incommensurable.

In 1968 it was the Democratic Party's turn to suffer the degeneration of commensurables into incommensurables as both the Wallace tribe and the McCarthy tribe refused to play by the old rules of compromise, accommodation, and exchange of interests. Indeed, as one looks back on the 1968 election, there seems to be a common theme in both these camps—a theme of return to more simple and direct participation in decision-making that is only possible in the tribal setting. Yet, despite this similarity, both the Wallaceites and the McCarthyites responded with a value perspective that ruled out compromise and they both demanded a drastic change in the dimension in which politics is played. So firm were the value commitments in both of these tribes that neither (as was the case with the Goldwater forces in 1964) was willing to settle for a modicum of power that could accrue through the processes of compromise with the national party leadership.

Still another dimension of this radical change in behavior is to be seen in the black community where the main trend of the argument seems to be, not in the direction of accommodation, compromise, and integration, but rather in the direction of fragmentation from the larger community, intransigence in the areas where black values and black culture are concerned, and the structuring of a new community of like-minded and like-colored people. But to all appearances even the concept of color is not enough to sustain commensurables in their emerging community as it fragments into religious nationalism, secular nationalism, integrationists, separationists, and so forth. Thus those problems which were commensurable, both inter-racial and intraracial, in the era of integration become incommensurable in the era of Black Nationalism.

Nor can the growth of commensura-

ble views be seen in the contemporary youth movements. On most of the American campuses today there are at least ten tribes involved in "tribal wars" among themselves and against the "imperialistic" powers of those "over 30." Just to tick them off, without any attempt to be comprehensive, there are: the up-tight protectors of the status quo who are looking for middle-class union cards, the revitalization movements of the Young Americans for Freedom, the reformists of pluralism represented by the Young Democrats and the Young Republicans, those committed to New Politics, the Students for a Democratic Society, the Yippies, the Flower Children, the Black Students Union, and the Third World Liberation Front. The critical change in this instance is not the rise of new groups; this is expected within the pluralistic model of politics. What is new are value positions assumed by these groups which lead them to make demands, not as points for bargaining and compromise with the opposition, but rather as points which are "not negotiable." Hence, they consciously set the stage for either confrontation or surrender, but not for rendering incommensurables commensurable.

Moving out of formalized politics and off the campus, we see the remnants of the "hippie" movement which show clear-cut tribal overtones in their commune movements. This movement has, moreover, already fragmented into an urban tribe which can talk of guerrilla warfare against the city fathers, while another tribe finds accommodation to urban life untenable without sacrificing its values and therefore moves out to the "Hog Farm," "Morning Star," or "Big Sur." Both hippie tribes have reduced the commensurables with the dominant WASP tribe to the point at which one of the cities on the Monterey Peninsula felt sufficiently threatened to pass a city ordinance against sleeping in trees, and the city of San Francisco passed a law against sitting on sidewalks.

Even among those who still adhere to the pluralistic middle-class American image, we can observe an increasing demand for a change in the dimension of life and politics that has disrupted the elementary social processes: the demand for neighborhood (tribal?) schools, control over redevelopment projects, and autonomy in the setting and payment of rents to slumlords. All of these trends are more suggestive of tribalism than of the growth of the range of

commensurables with respect to the commons.

We are, moreover, rediscovering other kinds of tribes in some very odd ways. For example, in the educational process, we have found that one of our first and best empirical measures in terms both of validity and reproducibility—the I. Q. test—is a much better measure of the existence of different linguistic tribes than it is a measure of "native intellect" (6). In the elementary school, the different languages and different values of these diverse tribal children have even rendered the commensurables that obtained in the educational system suddenly incommensurable.

Nor are the empirical contradictions of the common value myth as new as one might suspect. For example, with respect to the urban environment, at least 7 years ago Scott Greer was arguing that the core city was sick and would remain sick until a basic sociological movement took place in our urban environment that would move all the middle classes to the suburbs and surrender the core city to the "... segregated, the insulted, and the injured" (7). This argument by Greer came at a time when most of us were still talking about compromise and accommodation of interests, and was based upon a perception that the life styles, values, and needs of these two groups were so disparate that a healthy, creative restructuring of life in the core city could not take place until pluralism had been replaced by what amounted to geographic or territorial tribalism; only when this occurred would urban incommensurables become commensurable.

Looking at a more recent analysis of the sickness of the core city, Wallace F. Smith has argued that the productive model of the city is no longer viable for the purposes of economic analysis (8). Instead, he develops a model of the city as a site for leisure consumption, and then seems to suggest that the nature of this model is such that the city cannot regain its health because it cannot make decisions, and that it cannot make decisions because the leisure demands are value-based and, hence, do not admit of compromise and accommodation; consequently there is no way of deciding among these various value-oriented demands that are being made on the core city.

In looking for the cause of the erosion of the myth of a common value system, it seems to me that so long as our perceptions and knowledge of other groups

were formed largely through the written media of communication, the American myth that we were a giant melting pot of equalitarians could be sustained. In such a perceptual field it is tenable, if not obvious, that men are motivated by interests. Interests can always be compromised and accommodated without undermining our very being by sacrificing values. Under the impact of the electronic media, however, this psychological distance has broken down and we now discover that these people with whom we could formerly compromise on interests are not, after all, really motivated by interests but by values. Their behavior in our very living room betrays a set of values, moreover, that are incompatible with our own, and consequently the compromises that we make are not those of contract but of culture. While the former are acceptable, any form of compromise on the latter is not a form of rational behavior but is rather a clear case of either apostasy or heresy. Thus, we have arrived not at an age of accommodation but one of confrontation. In such an age "incommensurables" remain "incommensurable" in real life.

Erosion of the Myth of the Monopoly of Coercive Force

In the past, those who no longer subscribed to the values of the dominant culture were held in check by the myth that the state possessed a monopoly on coercive force. This myth has undergone continual erosion since the end of World War II owing to the success of the strategy of guerrilla warfare, as first revealed to the French in Indochina, and later conclusively demonstrated in Algeria. Suffering as we do from what Senator Fulbright has called "the arrogance of power," we have been extremely slow to learn the lesson in Vietnam, although we now realize that war is political and cannot be won by military means. It is apparent that the myth of the monopoly of coercive force as it was first qualified in the civil rights conflict in the South, then in our urban ghettos, next on the streets of Chicago, and now on our college campuses has lost its hold over the minds of Americans. The technology of guerrilla warfare has made it evident that, while the state can win battles, it cannot win wars of values. Coercive force which is centered in the modern state cannot be sustained in the face of the active re-

sistance of some 10 percent of its population unless the state is willing to embark on a deliberate policy of genocide directed against the value dissident groups. The factor that sustained the myth of coercive force in the past was the acceptance of a common value system. Whether the latter exists is questionable in the modern nation-state. But, even if most members of the nation-state remain united around a common value system which makes incommensurables for the majority commensurable, that majority is incapable of enforcing its decisions upon the minority in the face of the diminished coercive power of the governing body of the nation-state.

Erosion of the Myth of Administrators of the Commons

Hardin's thesis that the administrative arm of the state is capable of legislating temperance accords with current administrative theory in political science and touches on one of the concerns of that body of theory when he suggests that the "... great challenge facing us now is to invent the corrective feedbacks that are needed to keep the custodians honest."

Our best empirical answers to the question—*Quis custodiet ipsos custodes?*—"Who shall watch the watchers themselves?"—have shown fairly conclusively (9) that the decisions, orders, hearings, and press releases of the custodians of the commons, such as the Federal Communications Commission, the Interstate Commerce Commission, the Federal Trade Commission, and even the Bureau of Internal Revenue, give the large but unorganized groups in American society symbolic satisfaction and assurances. Yet, the actual day-to-day decisions and operations of these administrative agencies contribute, foster, aid, and indeed legitimate the special claims of small but highly organized groups to differential access to tangible resources which are extracted from the commons. This has been so well documented in the social sciences that the best answer to the question of who watches over the custodians of the commons is the regulated interests that make incursions on the commons.

Indeed, the process has been so widely commented upon that one writer has postulated a common life cycle for all of the attempts to develop regulatory policies (10). This life cycle is launched

by an outcry so widespread and demanding that it generates enough political force to bring about the establishment of a regulatory agency to insure the equitable, just, and rational distribution of the advantages among all holders of interest in the commons. This phase is followed by the symbolic reassurance of the offended as the agency goes into operation, developing a period of political quiescence among the great majority of those who hold a general but unorganized interest in the commons. Once this political quiescence has developed, the highly organized and specifically interested groups who wish to make incursions into the commons bring sufficient pressure to bear through other political processes to convert the agency to the protection and furthering of their interests. In the last phase even staffing of the regulating agency is accomplished by drawing the agency administrators from the ranks of the regulated.

Thus, it would seem that, even with the existence of a common value system accompanied by a viable myth of the monopoly of coercive force, the prospects are very dim for saving the commons from differential exploitation or spoliation by the administrative devices in which Hardin places his hope. This being the case, the natural sciences may absolve themselves of responsibility for meeting the environmental challenges of the contemporary world by relegating those problems for which there are no technical solutions to the political or social realm. This action will, however, make little contribution to the solution of the problem.

Are the Critical Problems of Modern Society Insoluble?

Earlier in this article I agreed that perhaps until very recently, there existed a set of conditions which made the solution of Hardin's problem subset possible; now I suggest that the concession is questionable. There is evidence of structural as well as value problems which make comprehensive solutions impossible and these conditions have been present for some time.

For example, Aaron Wildavsky, in a comprehensive study of the budgetary process, has found that in the absence of a calculus for resolving "intrapersonal comparison of utilities," the governmental budgetary process proceeds by a calculus that is sequential and incre-

mental rather than comprehensive. This being the case "... if one looks at politics as a process by which the government mobilizes resources to meet pressing problems" (11) the budget is the focus of these problem responses and the responses to problems in contemporary America are not the sort of comprehensive responses required to bring order to a disordered environment. Another example of the operation of this type of rationality is the American involvement in Vietnam; for, what is the policy of escalation but the policy of sequential incrementalism given a new Madison Avenue euphemism? The question facing us all is the question of whether incremental rationality is sufficient to deal with 20th-century problems.

The operational requirements of modern institutions makes incremental rationality the only viable form of decision-making, but this only raises the prior question of whether there are solutions to any of the major problems raised in modern society. It may well be that the emerging forms of tribal behavior noted in this article are the last hope of reducing political and social institutions to a level where incommensurables become commensurable in terms of values and in terms of comprehensive responses to problems. After all, in the history of man on earth we might well assume that the departure from the tribal experience is a short-run deviant experiment that failed. As we stand "on the eve of destruction," it may well be that the return to the face-to-face life in the small community unmediated by the electronic media is a very functional response in terms of the perpetuation of the species.

There is, I believe, a significant sense in which the human environment is directly in conflict with the source of man's ascendancy among the other species of the earth. Man's evolutionary position hinges, not on specialization, but rather on generalized adaptability. Modern social and political institutions, however, hinge on specialized, sequential, incremental decision-making and not on generalized adaptability. This being the case, life in the nation-state will continue to require a singleness of purpose for success but in a very critical sense this singleness of purpose becomes a straightjacket that makes generalized adaptation impossible. Nowhere is this conflict more evident than in our urban centers where there has been a decline in the livability of the total environment that is almost directly proportionate to

the rise of special purpose districts. Nowhere is this conflict between institutional singleness of purpose and the human dimension of the modern environment more evident than in the recent warning of S. Goran Lofroth, chairman of a committee studying pesticides for the Swedish National Research Council, that many breast-fed children ingest from their mother's milk "more than the recommended daily intake of DDT" (12) and should perhaps be switched to cow's milk because cows secrete only 2 to 10 percent of the DDT they ingest.

How Can Science Contribute to the Saving of the Commons?

It would seem that, despite the nearly remorseless working of things, science has some interim contributions to make to the alleviation of those problems of the commons which Hardin has pointed out.

These contributions can come at two levels:

1) Science can concentrate more of its attention on the development of technological responses which at once alleviate those problems and reward those people who no longer desecrate the commons. This approach would seem more likely to be successful than the "... fundamental extension in morality ..." by administrative law; the engagement of interest seems to be a more reliable and consistent motivator of advantage-seeking groups than does administrative wrist-slapping or constituency pressure from the general public.

2) Science can perhaps, by using the widely proposed environmental monitoring systems, use them in such a way as to sustain a high level of "symbolic disassurance" among the holders of generalized interests in the commons—thus sustaining their political interest to a point where they would provide a con-

stituency for the administrator other than those bent on denuding the commons. This latter approach would seem to be a first step toward the "... invention of the corrective feedbacks that are needed to keep custodians honest." This would require a major change in the behavior of science, however, for it could no longer rest content with development of the technology of monitoring and with turning the technology over to some new agency. Past administrative experience suggests that the use of technology to sustain a high level of "dis-assurance" among the general population would also require science to take up the role and the responsibility for maintaining, controlling, and disseminating the information.

Neither of these contributions to maintaining a habitable environment will be made by science unless there is a significant break in the insularity of the two scientific tribes. For, if science must, in its own insularity, embark on the independent discovery of "the tragedy of the commons," along with the parameters that produce the tragedy, it may be too slow a process to save us from the total destruction of the planet. Just as important, however, science will, by pursuing such a course, divert its attention from the production of technical tools, information, and solutions which will contribute to the political and social solutions for the problems of the commons.

Because I remain very suspicious of the success of either demands or pleas for fundamental extensions in morality, I would suggest that such a conscious turning by both the social and the natural sciences is, at this time, in their immediate self-interest. As Michael Polanyi has pointed out, "... encircled today between the crude utilitarianism of the philistine and the ideological utilitarianism of the modern revolutionary movement, the love of pure science may falter and die" (13). The sciences, both social and natural,

can function only in a very special intellectual environment that is neither universal or unchanging, and that environment is in jeopardy. The questions of humanistic relevance raised by the students at M.I.T., Stanford Research Institute, Berkeley, and wherever the headlines may carry us tomorrow, pose serious threats to the maintenance of that intellectual environment. However ill-founded some of the questions raised by the new generation may be, it behooves us to be ready with at least some collective, tentative answers—if only to maintain an environment in which both sciences will be allowed and fostered. This will not be accomplished so long as the social sciences continue to defer the most critical problems that face mankind to future technical advances, while the natural sciences continue to defer those same problems which are about to overwhelm all mankind to false expectations in the political realm.

References and Notes

1. G. Hardin, *Science* **162**, 1243 (1968).
2. J. B. Wiesner and H. F. York, *Sci. Amer.* **211** (No. 4), 27 (1964).
3. C. Woodbury, *Amer. J. Public Health* **45**, 1 (1955); S. Marquis, *Amer. Behav. Sci.* **11**, 11 (1968); W. H. Ferry, *Center Mag.* **2**, 2 (1969).
4. C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge Univ. Press, New York, 1959).
5. M. Olson, Jr., *The Logic of Collective Action* (Harvard Univ. Press, Cambridge, Mass., 1965).
6. G. A. Harrison et al., *Human Biology* (Oxford Univ. Press, New York, 1964), p. 292; W. W. Charters, Jr. in *School Children in the Urban Slum* (Free Press, New York, 1967).
7. S. Greer, *Governing the Metropolis* (Wiley, New York, 1962), p. 148.
8. W. F. Smith, "The Class Struggle and the Disquieted City," a paper presented at the 1969 annual meeting of the Western Economic Association, Oregon State University, Corvallis.
9. M. Bernstein, *Regulating Business by Independent Commissions* (Princeton Univ. Press, Princeton, N.J., 1955); E. P. Herring, *Public Administration and the Public Interest* (McGraw-Hill, New York, 1936); E. M. Redford, *Administration of National Economic Control* (Macmillan, New York, 1952).
10. M. Edelman, *The Symbolic Uses of Politics* (Univ. of Illinois Press, Urbana, 1964).
11. A. Wildavsky, *The Politics of the Budgetary Process* (Little Brown, Boston, Mass., 1964).
12. *Corvallis Gazette-Times*, 6 May 1969, p. 6.
13. M. Polanyi, *Personal Knowledge* (Harper & Row, New York, 1964), p. 182.