

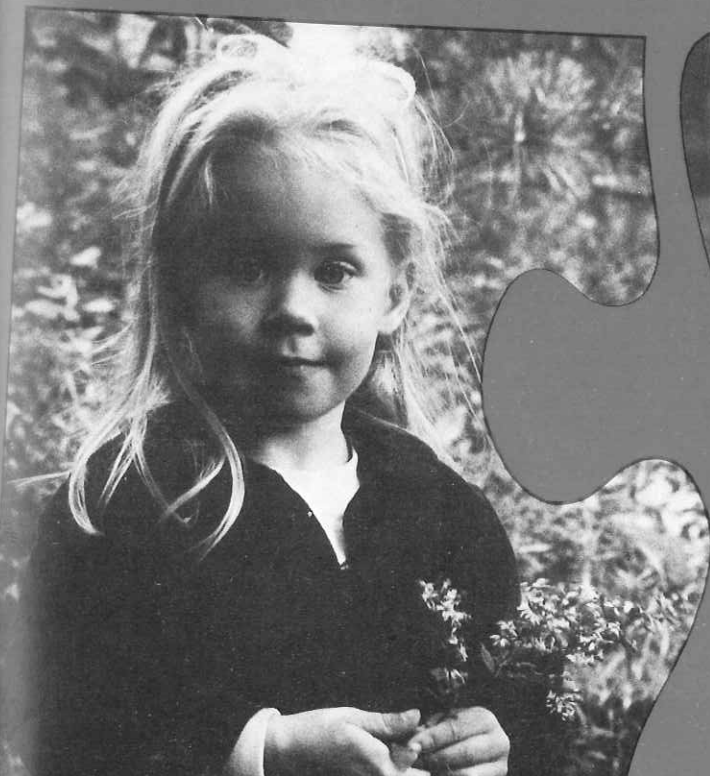
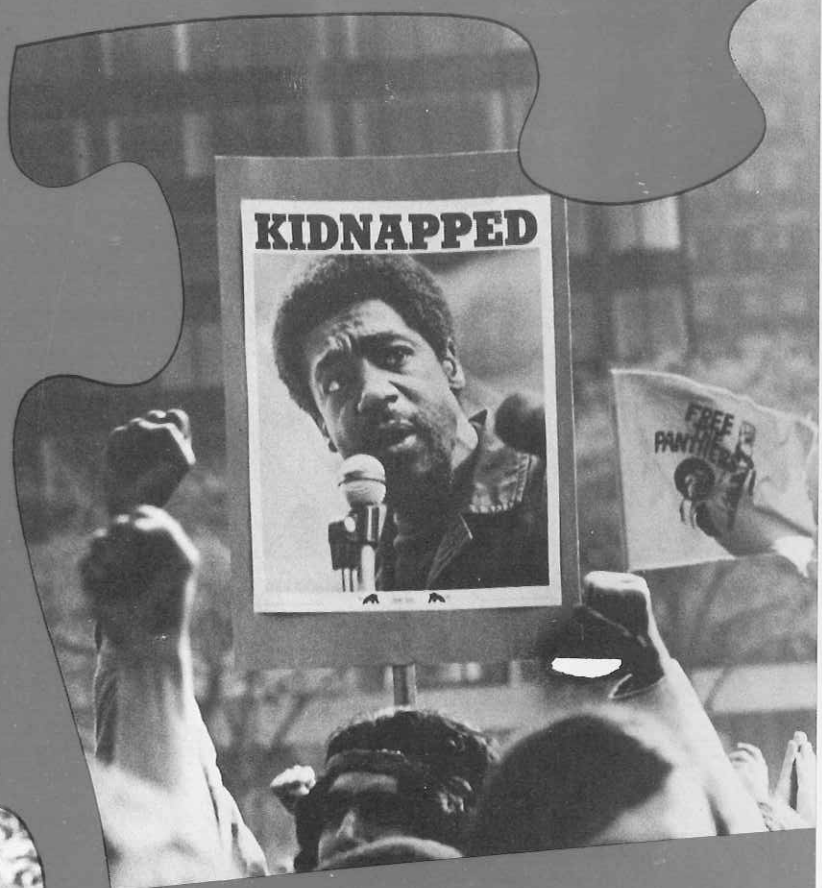
Yale

Alumni Magazine
May 1970

**Special
Issue:**

**The Quality
of Life**

**May Day
at Yale**



SIXTH ANNUAL TOUR PROGRAM—1970

This unique program of tours is offered to alumni of Harvard, Yale, Princeton, M.I.T., Cornell, Columbia, Dartmouth, and the Univ. of Pennsylvania and their families. The tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. The tour to India, for example, is based on a special fare, available only to groups and only in conjunction with a tour, which is almost \$400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines.

The tour program covers four areas where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and saving of group travel. There is an avoidance of regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

THE ORIENT

30 DAYS \$1649

1970 will mark the sixth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. As a special attraction, spring and summer departures will include a visit to the "EXPO 70" World's Fair in Osaka. Twelve days will be spent in JAPAN, divided between TOKYO, the FUJI-HAKONE NATIONAL PARK, and the ancient "classical" city of KYOTO, with excursions to NARA and NIKKO. A further highlight will be a comprehensive visit to the famous ruins of ANGKOR WAT in Cambodia, together with visits of 4 to 5 days in BANGKOK and HONG KONG and a shorter visit to SINGAPORE. Optional pre and post tour stops may be made in HONOLULU and the WEST COAST at no additional air fare. A complete program of sightseeing will include all major points of interest. Features range from a tour of the canals and floating markets of Bangkok and an authentic Javanese "Rijsttafel" dinner in Singapore to a launch tour of Hong Kong Harbor at sunset and a trip on the ultra-modern 125 mph express trains of Japan. Most tour dates include outstanding seasonal attractions in Japan, such as the spring cherry blossoms and beautiful autumn leaves and some of the greatest annual festivals in the Far East. Total cost is \$1649 from California, \$1828 from Chicago, \$1899 from New York. Special rates from other cities. Departures in March, April, June, July, September and October, 1970.



MOGHUL ADVENTURE

29 DAYS \$1649

An unusual opportunity to view the outstanding attractions of India and the splendors of ancient Persia, together with the once-forbidden mountain kingdom of Nepal. Here is truly an exciting adventure: India's ancient monuments in DELHI; the fabled beauty of KASHMIR amid the snow-clad Himalayas; the holy city of BANARAS on the sacred River Ganges; the exotic temples of KHAJURAHO; renowned AGRA, with the Taj Mahal and other celebrated monuments of the Moghul period such as the Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of JAIPUR, with an elephant ride at the Amber Fort; the unique and beautiful "lake city" of UDAIPUR; a thrilling flight into the Himalayas to KATHMANDU, capital of NEPAL, where ancient palaces and temples abound in a land still relatively untouched by modern civilization. In PERSIA (Iran), the visit will include the great 5th century B.C. capital of Darius and Xerxes at PERSEPOLIS; the fabled Persian Renaissance city of ISFAHAN, with its palaces, gardens, bazaar and famous tiled mosques; and the modern capital of TEHERAN. Outstanding accommodations include hotels that once were palaces of Maharajas. Total cost is \$1649 from New York. Departures in August and October, 1970.

AEGEAN ADVENTURE

21 DAYS \$1299

This original itinerary explores in depth the magnificent scenic, cultural and historic attractions of Greece, the Aegean, and Asia Minor—not only the major cities but also the less accessible sites of ancient cities which have figured so prominently in the history of western civilization, complemented by a luxurious cruise to the beautiful islands of the Aegean Sea. Rarely has such an exciting collection of names and places been assembled in a single itinerary—the classical city of ATHENS; the Byzantine and Ottoman splendor of ISTANBUL; the site of the oracle at DELPHI; the sanctuary and stadium at OLYMPIA, where the Olympic Games were first begun; the palace of Agamemnon at MYCENAE; the ruins of ancient TROY; the citadel of PERGAMUM; the marble city of EPHEBUS; the ruins of SARDIS in Lydia, where the royal

mint of the wealthy Croesus has recently been unearthed; as well as CORINTH, EPIDAUROS, IZMIR (Smyrna) the BOSPORUS and DARDENELLES. The cruise through the beautiful waters of the Aegean will visit such famous islands as CRETE with the Palace of Knossos; RHODES, noted for its great Crusader castles; the windmills of picturesque MYKONOS; the sacred island of DELOS; and the charming islands of PATMOS and HYDRA. Total cost is \$1299 from New York. Departures in April, May, July, August, September and October, 1970.

EAST AFRICA

21 DAYS \$1649

A luxury "safari" to the great national parks and game reserves of Uganda, Kenya and Tanzania. These offer a unique combination of magnificent wildlife and breathtaking natural scenery: a launch trip on the White Nile through hippo and crocodile to the base of the thundering Murchison Falls and great herds of elephant in MURCHISON FALLS NATIONAL PARK; multitudes of lion and other plains game in the famous SERENGETI PLAINS and the MASAI-MARA RESERVE; the spectacular concentration of animal life in the NGORONGORO CRATER; tree-climbing lions around the shores of LAKE MANYARA; and the AMBOSELI RESERVE, where all types of big game can be photographed against the towering backdrop of snow-clad Mt. Kilimanjaro. Air travel is used where possible, enabling longer stays within the parks. Also seen are the fascinating capital cities of NAIROBI and KAMPALA, the exotic "spice island" of ZANZIBAR, and the historic MOMBASA, a beach resort on the Indian Ocean, with its colorful Arab quarter and great 16th century Portuguese fort. Tour dates have been chosen for dry seasons, when game viewing is at its best. The altitude of most areas provides an unusually stimulating climate, with bright days and crisp evenings (frequently around a campfire). Accommodations range from luxury hotels in modern cities to surprisingly comfortable lodges in the national parks (some equipped even with swimming pools). Total cost from New York is \$1649. Departures in July, August, September and December, 1970.

Rates include Jet Air, Deluxe Hotels, Meals, Sightseeing, Transfers, Tips and Taxes. Individual brochures on each tour are available.

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Cover:

The quality of life—for the world, for the country, and for the University—seemed this turbulent April and May especially to be a tension between legitimate expectations and broken promises.

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conomic Association. Recently E.J. Mishan, Tibor Scitovsky, and Staffan Linder have made penetrating anti-growth arguments. There is also much in Galbraith that is anti-growth—at least against growth of commodities whose desirability must be manufactured along with the product.

In spite of these beginnings, most economists are still governed by the assumption of infinite wants, or the postulate of non-satiety as the mathematical economists call it. Any single want can be satisfied, but all wants in the aggregate cannot be. Wants are infinite in number if not in intensity, and the satisfaction of some wants stimulates others. If wants are infinite, growth is always justified—or so it would seem.

Even while accepting the above hypothesis, one could still object to growthmania on the grounds that given the completely inadequate definition of GNP, "growth" simply means the satisfaction of ever more trivial wants, while simultaneously creating ever more powerful externalities that destroy ever more basic environmental amenities. To defend ourselves against these externalities, we produce even more, and instead of subtracting the purely defensive expenditures, we add them. For example, the medical bills paid for treatment of cigarette-induced cancer and pollution-induced emphysema are added to GNP, when in a welfare sense they clearly should be subtracted. This should be labeled swelling, not growth. The satisfaction of wants created by brainwashing and "hogwashing" the public over the mass media also represents mostly swelling.

A policy of maximizing GNP is practically equivalent to a policy of maximizing depletion and pollution. This results from the fact that GNP measures the flow of a physical aggregate. Since matter and energy cannot be created, production is simply the transformation of raw material inputs extracted from the environment; consequently, maximizing the physical flow of production implies maximizing depletion. Since matter and energy cannot be destroyed, consumption is merely the transformation into waste of GNP, resulting in environmental pollution. One may hesitate to say "maximal" pollution on the grounds that the production inflow into the stock can be greater than the consumption outflow as long as the stock increases as it does in a growing economy.

To the extent that wealth becomes more durable, the production of waste can be kept low by expanding the stock. But is this in fact what happens? If one wants to maximize production, one must have a market. Increasing the durability of goods reduces the replacement demand. The fas-

ter things wear out, the greater can be the flow of production. To the extent that consumer reaction and weakening competition permit, there is every incentive to minimize durability. Planned obsolescence, programmed self-destruction, and other waste-making practices so well discussed by Vance Packard are the logical result of maximizing a marketed physical flow. If we must maximize something it should be the stock of wealth, not the flow—but with full awareness of the ecological limits that constrain this maximization.

But why this perverse emphasis on flows, this flow fetishism of standard economic theory? Again the underlying issue is distribution. There is no theoretical explanation, much less justification, for the distribution of the stock of wealth. It is a historical datum. But the distribution of the flow of income is at least partly explained by marginal productivity theory, which at times is even misinterpreted as a justification. Everyone gets a part of the flow—call it wages, interest, rent, or profit—and it all looks rather fair. But not everyone owns a piece of the stock, and that does not seem quite so fair. Looking only at the flow helps to avoid disturbing thoughts.

But even if wants were infinite, and even if we redefine GNP to eliminate swelling, infinite wants cannot be satisfied by maximizing physical production. As people grow richer they will want more leisure. Physical growth cannot produce leisure. As physical productivity increases, leisure can be produced by working fewer hours to produce the same physical output.

Even the common-sense argument for infinite wants—that the rich seem to enjoy their high consumption—cannot be generalized without committing the fallacy of composition. If all earned the same high income, a consumption limit occurs sooner than if only a minority had high incomes. The reason is that a large part of the consumption by plutocrats is consumption of personal and maintenance services rendered by the poor, which would not be available if everyone were rich. By hiring the poor to maintain and even purchase commodities for them, the rich devote their limited consumption time only to the most pleasurable aspects of consumption. The rich only ride their horses—they do not clean, comb, saddle, and feed them, nor do they clean the stables. If all did their own maintenance work, consumption would perforce be less. Time sets a limit.

The big difficulty with the infinite wants assumption, however, is pointed out by Keynes, who in spite of the use made of his theories in support of growth, was certainly no advocate of unlimited growth,

as seen in the following quotation:

"Now it is true that the needs of human beings seem to be insatiable. But they fall into two classes—those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relative in the sense that we feel them only if their satisfaction lifts us above, makes us feel superior to, our fellows. Needs of the second class, those which satisfy the desire for superiority, may indeed be insatiable; for the higher the general level, the higher still they are. But this is not so true of the absolute needs—a point may soon be reached, much sooner perhaps than we are all of us aware of, when those needs are satisfied in the sense that we prefer to devote our further energies to non-economic purposes."

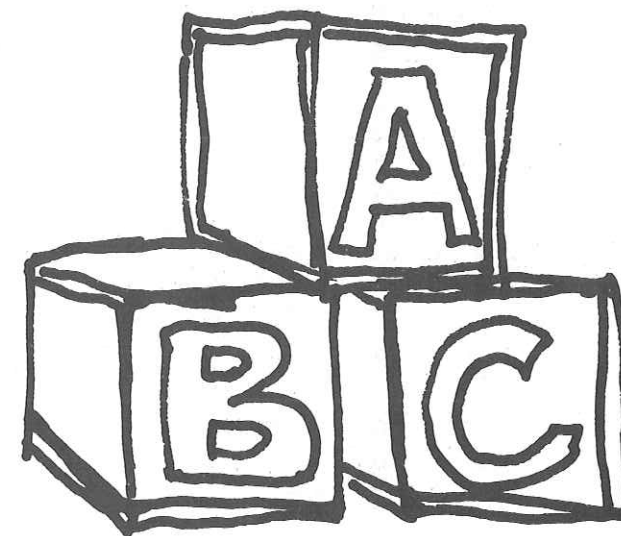
Lumping these two categories together and speaking of infinite wants in general can only muddy the waters. The same distinction is implicit in Mill, who spoke disparagingly of "consuming things which give little or no pleasure except as representative of wealth. . . ."

The source of growth lies in the use made of surplus. The controllers of surplus may be a priesthood that controls physical idols made from the surplus and used to extract more surplus in the form of offerings and tribute. Or they may be feudal lords, who through the power given by possession of the land extract a surplus in the form of rent and the corvée. Or they may be capitalists (state or private) who use the surplus in the form of capital to gain more surplus in the form of interest and quasi-rents.

If growth must cease, the surplus becomes less important and so do those who control it. If the surplus is not to lead to growth, then it must be consumed, and ethical demands for equal participation in the consumption of the surplus could not be countered by productivity arguments for inequality as necessary for accumulation. The surplus would eventually enter into the customary standard of living and cease to be recognized as a surplus. Accumulation in excess of depreciation, and the privileges attached thereto, would not exist.

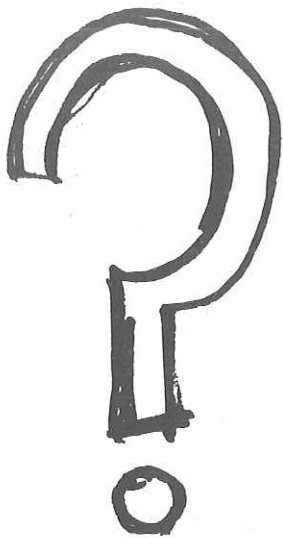
We no longer speak of worshipping idols. Instead of idols we have an abomination called GNP, large parts of which, however, bear such revealing names as Apollo, Poseidon, and Zeus. Instead of worshipping the idol, we maximize it. The idol has become rather more abstract and conceptual and rather less concrete and material, while the mode of adoration has become technical rather than personal. But fundamentally, idolatry remains idolatry.

Positions and Projections: Views from the Yale Community on Issues in Ecology



We are in the midst of a period of discovery that there are limits to how much we can abuse nature before she fights back. There are two levels at which we can respond to this new knowledge. At one level, we can occupy ourselves with the mess we have made and the task of cleaning it up. At another level, we can try to identify and then to inhibit the values and habits which could have allowed us to make such a mess in the first place.

The rhetoric of the politicians is at the first level, equating environmental quality with cleaning up pollution. The job to be done is relatively straightforward, and the end result will be that electric power, gasoline, food, and perhaps water will be somewhat more expensive than they are now. The costs are likely to be distributed regressively; not surprisingly, the poor are hostile. There is no suggestion by the politicians that the scale of human activities on this globe is in any way limited.



The Earth is viewed as of infinite extent; it might as well be flat.

The photographs of Earth taken by the Apollo astronauts, showing the earth to be round and colorful and very small, have played a major role in spreading a second level of understanding of our environmental predicament. We now see our planet as a spaceship, and ourselves as voyagers who have no choice but to treat our vessel with care and with great restraint. From this second point of view, it is obvious that unlimited economic growth is unattainable, and an aura of recklessness adheres to the proponents of new technologies, like the supersonic transport and the flood-lit ski slope, which are addressed not to man's necessities but to his whims. Equally, an aura of irresponsibility adheres to those who would stifle all technology, disregarding the large number of places, among them transportation, power, and population control, where technological innovation must play a major role in any accommodation to our fragile environment.

Those who view the environmental crisis at this second level are bound to win more converts. Fairly soon our society will begin to make new forceful judgments about what constitutes acceptable individual behavior. These judgments will inhibit driving alone in an automobile and wearing a leopard coat, while promoting the bicycle, the canoe, and the one-child family. Corresponding judgments will be made about the behavior of nations, in such a way that all of the modern technologies of war will be stigmatized. The export of scarce raw materials from poor to rich countries is going to be more harshly criticized; the United States is going to become even more conspicuous and even more vulnerable than it is today.

By focusing on new restraints, rather

than on new expenditures, this second approach to environmental quality makes greater demands on the prosperous than on the poor. Posed in these terms, the problem of adjusting to life on a round earth is not at all straightforward. It may be the most difficult task that man has ever faced. And we may not have more than one or two generations in which to solve it.

Robert H. Socolow,
Assistant professor of physics

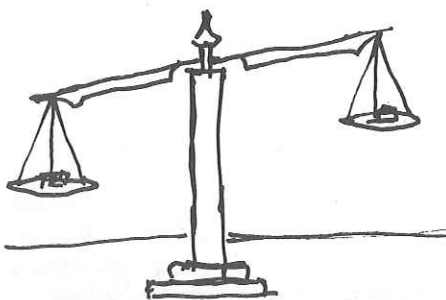
My "view of the future" assumes that eventually it is inevitable that growth in the population and in many areas of the economy will have to stop. This is true because there are limits beyond which further growth leads to absurd situations.

It is obvious, for example, that at some point before there is one American per square yard, population growth has to stop. But it also makes plain sense that at some point growth must be stopped in those forms of economic activity which produce and consume material goods or energy. The United States is expected to consume in the 1970's as much petroleum as it consumed in the history of the oil industry up to 1970. If you consider the possibility of growth like that continuing for the next century or so, you soon reach unthinkable levels of resource use and waste production.

"Zero net population growth" and "zero growth in the gross national product" are often urged as twin goals. The latter, at least, is quite misleading. There are all sorts of economic activity—college teaching leaps to my mind—which add little to the production and consumption of goods or energy. But at some point the growth of other kinds of economic activity will have to stop. Remedial measures such as the use of returnable containers and electric cars may set back the time at which that point is reached, but it will inevitably come.

As a political scientist, what interests me most is that this will create important new problems for American society. Two such problems are:

1) It will take a conscious effort to



keep creativity, innovation, and imagination vigorous in a reined-in economy, in which many kinds of technological and economic innovations must be discouraged. In the past most of our creative energy has been motivated by the desire for more material goods and has gone into entrepreneurial and technological activity. This energy will have to be rechanneled.

2) Achieving social justice will become more difficult, and demands for social justice will occasion more conflict, as it becomes clear that it is no longer possible to satisfy new demands out of net growth. Social justice will become more clearly a matter of taking from one man to nourish another.

These are problems, of course, but they may also point the way to a healthy new society. The very success of industrialism, in reaching the limits of reasonable growth, may eventually force a reorientation of our values. Perhaps if the production of material goods becomes a more static factor in the economy, those goods will become the secondary items in our lives that air used to be.

W. Phillips Shively,
Assistant professor of political science

Our industrialized societies are chiefly the result of European thought and action and generally paid for by the enslaved labor of non-Europeans.

The European imbued with Judeo-Christian philosophy considered himself as having dominion over the fishes of the sea, fowl of the air, and animals of the earth. He had to contest with and subdue nature for his food and livelihood. This was a continual battle. Consequently, he felt apart from rather than a part of nature.

In contrast, many of the non-European, non-white peoples considered themselves as part of nature and "kin" to the birds and animals of forests and fields. Many of their gods took animal forms.

The European's concept of private property contrasted with the non-white's concept of community land. Private property was inconceivable to African and American Indians. Land belonged to the tribes—it was the peoples' patrimony and no one was forced out of it. European farmers and ranchers fenced their lands to keep the resources and treasures of the land for their own personal development and enrichment. Most of the United States came under European ownership through conquest. Indians were more accustomed to viewing land as a tribal heritage and not as a private commodity. Consequently, they

were an easy mark for swindlers.

The early European settlers generally considered our natural resources to be inexhaustible. In just 200 years, greed and short-ranged views of immediate profits have squandered the resource base of the richest continent in the world.

The concept of inexhaustible natural resources came to an end when Gifford Pinchot and Theodore Roosevelt created the U.S. Forest Service. Roosevelt set aside many areas from the public domain as National Forests, parks, and wildlife refuges. The Forest Service policy assigns each generation a limited equity in resource property and thereby creates a people's patrimony to be passed on undamaged from generation to generation—a concept not unlike that of the American Indian and Africans.

It's the large industrial societies of the world which, except for Japan, are largely European that provide the greatest threat to resources and life on earth aside from the potential nuclear holocausts or biological warfare.

The Europeans are reputed to be approximately 20 per cent of the world's population and consume an estimated 80 per cent of the world's resources. Americans alone (5.7 per cent of the world's population) consume 40 per cent of the world's production of natural resources. Americans also produce 50 per cent of the world's industrial pollution. American automobiles cause 60 per cent of the air pollution in the cities.

The socio-economic and political systems developed in the U.S. have rewarded the industrial gains and technological progress that have led to a mass-consumption economy. Population increases were desirable as *markets* and *consumers* and were not even considered as *competitors* and *burdens* on the planet's dwindling resource base. Many countries have looked at our economic development with envy and emulation. In time, men may curse it.

The mass-consumption economy today has become an artificially inflated demand for goods which involves catering to created wants rather than to human needs. Obviously, it is extremely wasteful of limited resources in a world of poverty. It results in a seriously imbalanced distribution of goods in our country—thus creating poverty in the midst of plenty; and it has already created destructive environmental pollution. Economic growth *per se* does not necessarily service human welfare.

The demographic results of some federal work projects to increase the resource base—like arid land reclamation—are not always readily apparent. For example, the

building of large dams and subsequent storage of water in the water-scarce Southwest has placed an enormous population pressure on a fragile resource base. Every new acre irrigated and made habitable resulted in population growth and thereby increasing demands were made on all resources.

Adverse ecological results with naturally demographic ramifications are being seen with the newly built Aswan High Dam. *Time* magazine reports the lake shoreland behind the dam is infested with waterweeds and it speculated that they may speed up the water evaporation to the point where the lake lacks enough water to drive the gigantic generators.

The dam has also stopped the flow of silt down the Nile, which used to replenish the productivity of the Nile delta. Now, downstream, erosion may wash away as much farm land as is opened up by new irrigation. Irrigation projects on the delta plain have favored a moisture-loving snail, a carrier of schistosomiasis, a liver and intestinal disease which is increasing among the delta people.

Pointing to other, better possibilities, Vine Deloria Jr., a Standing Rock Sioux and author of the recently published *Custer Died for Your Sins*, reported in the December 17, 1969 edition of *The New York Times Magazine*: "American Society has much to learn from Indian tribes. The black community is desperately seeking capital funds. Indian tribes already have capital in land and resources and have demonstrated how well it can be used."

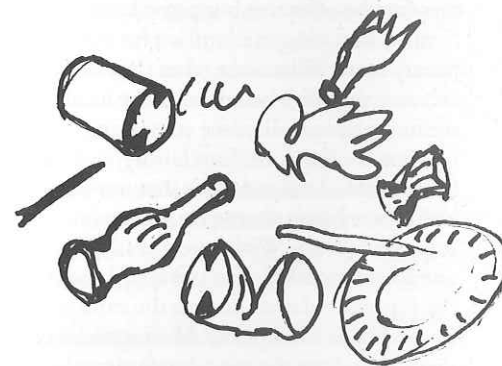
"Blacks and Mexicans are developing rural cooperatives in an effort to solve the poverty of their people in the rural areas. Indian tribes have already proven that rural corporations and cooperatives can and do work when undertaken by a united community. Indians are showing the way to conserve the natural state of their resources while using them. Unemployment declines as tribal programs are committed to creating jobs, not simply making profits. Land is being renewed, beaches and rivers are being cleared, and the reservations are becoming models of proper land use."

African countries have recognized the values of their heritage, and conservation of their immense big game herds and wild-life species is occurring. However, poachers enticed by American and European fashion industries remain a problem. Attempts are being made in natural resource management to learn from European mistakes (the Aswan Dam notwithstanding). It's time we learned from each other.

Carroll B. Williams Jr.,
Lecturer in forest entomology

One of the current diagnostic tests for schizophrenia consists in observing how the subject groups or fails to group miscellaneous objects. The failure to group them in standard patterns is taken to be evidence of a thought disorder. Useful though this test is, it is significant for the assumption it makes about the nature of thought, namely that it consists in the classification and manipulation of objects. The disorder is interpreted not simply as a breakdown in prevailing intellectual procedures but in the thinking process itself.

Many of the tests we employ to determine intellectual ability measure skill in carrying out pointless operations. Yet thought which operates without concern for what it is doing is hard to distinguish from idiocy. Nothing has been more extensively studied in the present century than the learning process; and nothing has been more taken for granted than learning itself. Confident that knowledge is power, we have come increasingly to believe that power is freedom. It is not in the least surprising that we should now interpret the mind after the model of that most elegant of machines, the computer. The emerging concern about the environment and man's relation to nature calls into question a conception of knowledge, thought, mind, and freedom which has dominated Western culture since at least the seventeenth century.



Ostensibly, the concern about the environment is motivated by immediate practical considerations for health and well-being. The threat posed by the pollution of the air, the land, and the sea are quite real and evident and the response altogether appropriate. There is, however, a note of moral passion voiced with the protests against pollution which suggests that there may be even more fundamental issues at stake. In addition to concern about the spoliation of the natural environment there is the further concern about the *artificial* environment which has at least partially replaced it. The parking area of a

drive-in hot dog stand that is littered with used napkins, cups, plates, etc., not only obscures that particular bit of natural landscape but replaces it with a humanly created landscape of a distinctive and yet familiar kind. Indeed, we find ourselves increasingly required to take our pleasures in such distasteful settings and, while eating, trying not to see.

One response to this predicament would be simply to change our aesthetics. If we could school ourselves to enjoy the visual disarray of the parking area, we would not then have cause to bemoan either the asphalt which covers over the earth or the refuse strewn upon the asphalt. With a new aesthetics and, perhaps, a new sensibility urban man might resolve the problem by substituting styrofoam cups, interestingly flecked with bits of catsup and mustard, for the imagery of leaves lifted up by a momentary breeze. Breeze? Or the slipstream of a passing truck? This is, I believe, precisely the issue. Can we so transform our aesthetics and with it our sensibility? The environmental crisis is due in large part to the amazing and seemingly limitless *adaptability* of human beings. The question is whether it is in fact a *limitless* capacity.

Is it really possible for man so to transform his sensibility that he can find complete aesthetic satisfaction in litter-strewn parking lots? Can our perception be so transformed that the parking lot not only ceases to be offensive but provides the most familiar and congenial milieu for contemporary man? When one takes note of the fact that nightly visitations to the local discount house have become something of a pastime for the American family, it is difficult to avoid the sad truth that our sensibilities are being altered on an increasingly wide scale. With a new aesthetics and a new morality man can adapt; he is the supreme adapter among the earthly animals. But at what price? Must man forget, deny, repudiate the most fundamental natural roots of his own humanity in order to be so infinitely adaptable? Has adaptation completely lost its way when it accommodates without discrimination?

George A. Schrader,
Professor of philosophy

A spokesman for the Automobile Manufacturers Association recently asserted that additional automotive pollution controls beyond those incorporated in 1970 models are unwarranted. In my opinion, this attitude is unconscionable. He indicated that present measures will result in a lowering of the total automotive emissions of car-

bon monoxide and hydrocarbons over the next 20 years. This does not justify a moratorium in the fight to eliminate carbon monoxide and hydrocarbon emissions or to control other pollutants. The control of nitrogen oxides emissions is far from satisfactory and few efforts have been made to eliminate lead.

A further lowering of CO and hydrocarbon emissions will necessitate installation of catalytic converters. Unlike thermal or electric converters, catalytic converters require neither additional heat nor power. What they will require if they are to keep emission levels below proposed 1975 standards for the lifetime of the vehicle is lead-free gasoline. In addition to the beneficial effects on other gaseous pollutant controls, the use of lead-free gasoline would nearly eliminate particulate emissions.

The case against lead as a pollutant *per se* can also be made. The fact that lead aerosols at present levels have not been unequivocally demonstrated as hazardous to health is not very comforting. Quite apart from the danger of air-borne lead, the concentration of lead in some food chains resulting ultimately in toxic doses for man or other organisms is a real possibility. It has already been noted that lead in the rainfall over two major cities is greater than permitted by the U.S. Public Health Service standards for drinking water by about a factor of two.

One car manufacturer has announced that all of its 1971 models will be able to operate on low-octane unleaded fuels. Limited quantities of unleaded gasoline have been available in Eastern and Southern states for some time and have recently come onto the West Coast market. One may expect that public opinion, if not legislation, will force all the car manufacturers and petroleum producers to conform. If this does happen, there will still remain the problem of the over 100 million vehicles now on the road that were designed to run on high-octane (leaded) gasoline.

It is possible to produce high-octane unleaded fuels by replacing the lead antiknock compounds with organic substitutes such as aromatics. This approach has two drawbacks. It is expensive (average increase of refinery costs are estimated to be about two cents per gallon), and the petroleum industry doesn't have the necessary refinery capacity to meet the demand if lead were outlawed now. Moreover, the organic additive used to maintain the high-octane would produce oxidation products of unknown toxicity. But, the unburned or partially oxidized organic additives can be handled by the same catalytic converters that oxidize CO and hydrocarbons to CO₂ and

water. Thus, it would appear to me that a reasoned approach would call for an orderly but rapid changeover to unleaded fuels (a portion of which would have to be octane upgraded to meet the needs of older cars) and at the same time require installation of catalytic converters on cars manufactured before 1971.

Gary L. Haller,
Assistant professor of engineering and applied science

By and large, the atmosphere can be considered to be a gigantic heat engine which redistributes heat energy from the sun, primarily by means of winds and air currents. In the process, water vapor is carried up from the earth's surface into the atmosphere and distributed and deposited as precipitation. Other materials such as smoke, combustion products, dust particles, and so forth are also carried about by the winds.

Many of the atmospheric constituents that we consider to be pollutants are necessary for the proper functioning of the atmosphere. In particular, the precipitation process requires the presence of so-called hygroscopic particles, such as smoke, dust and salt particles, for its initiation. Recent research has indicated that precipitation increases have occurred down-wind of major sources of these particles, as in Gary, Indiana and Buffalo, New York. Since water droplets form on the particles, they are carried down and out of the atmosphere in precipitation, completing the cycle. Thus there is a continuous stream of material carried into the atmosphere, transported horizontally, and subsequently redeposited on the earth's surface by precipitation. To a certain extent, therefore, "pollutants" are necessary for the cycling of water from land to atmosphere and back to land.

It would seem possible and even necessary for man to use this cycling process of the atmosphere in order to carry off unwanted contaminants which would later be returned to the surface, perhaps in the sea, where they would cause no harm.

Although it seems necessary that we continue to use the atmosphere as a carefully controlled disperser of unwanted pollutants, there remains the legal and ethical

questions of who has the right to so use the atmosphere. We all agree that we do not have the right to dump garbage on our neighbor's lawn. However, we do not seem to have quite such a clear idea as to why someone should or should not have a right to force noxious gases down our lungs.

Although it is easy to make a commitment to reduce pollution to an acceptable level, and we most certainly will do so, many problems remain. The technology of pollution control at the source is complex and expensive. The costs will have to be borne by someone—in the last analysis by each one of us. It seems preferable, however, that the polluter be the one who bears the cost. Control at the source is certainly less expensive than control at the receptor: a major emission control device on a few industrial stacks is still less expensive than a system of filters on each house.

Because of the important role of the atmosphere in controlling the dispersal process, and because we will always use the atmosphere to some extent as a cycling mechanism for pollutants, we must use our knowledge of atmospheric conditions in regulating emissions of pollutants to the atmosphere. Although this is done currently in a number of places, the future will see much more use made of this aspect of the regulatory process.

William E. Reifsnyder,
Professor of forest meteorology and public health

Expanding environmental consciousness has generated a demand for legal services the traditional private law firm inadequately fills. Historically, law firms have viewed civil practice services primarily as a market commodity; an "environmental department" could not justify itself financially in the way that tax, trust, and corporate departments can. Consequently, since environmental advocates rarely can compete effectively in the market for legal services, their interests go under-represented.

Some firms have established devices purportedly designed to compensate the imbalances of representation. One is the official encouragement of "civic involvement" by member lawyers, on their own time. This is the piecemeal device by which many citizens' groups have received counsel in the past. A slightly more energized approach is the donation of "firm time" for "pro bono publico" work. One hears of large firms donating 200 hours per year of attorney time for "socially relevant" projects. That this commitment represents about one-tenth of 1 per cent of the legal

services resources of many firms bespeaks the relative insignificance of the donation. A third device, instituted by a Washington firm and planned in variation by several others, involves the assignment of a senior partner to full-time public service work and the opportunity for other lawyers in the firm to participate up to prescribed time limits.

The inflexibility of established law firms produces a disparity in legal representation that environmental law groups and other public interest organizations are attempting to correct. As advocates for ecological values, environmental law organizations have taken various forms: single attorneys and small firms who accept their clients on the basis of ideological compatibility; loose amalgams of lawyers who commit substantial independent time to assist environmental litigants (e.g., the Natural Resources Defense Council); associations of lawyers, scientists, and citizens that act both as client and counsel (e.g., the Environmental Defense Fund). While their activities range from attempts to establish local flood plain zoning to the \$30 billion anti-trust treble damage suit brought by the flamboyant Victor Yannacone against the manufacturers of DDT, they share a belief that governmental decisions have shown distorted emphasis on commercially exploitive values.

In attempting to insure balanced decision-making, the public interest firms suffer from a financial disadvantage as against commercial firms. Because environmental firms are funded by public contributions, foundation grants, and fees from occasional wealthy clients, they do not enjoy the security that enables commercial firms to embark on long and complex litigation and to expand as demand for their services expands.

Balancing interests in an adversarial setting requires adequate representation of competing interests. This need suggests substantial changes in the process of allocating legal services availability. The questions of who should get legal services and who should provide them cannot be answered by resort to a private market system unless purchasing power is fairly evenly distributed among potential contestants. Since that is not the case, the response takes the form of modifying the market system as an allocation device. Environmental law firms represent one experiment in modification. More forms are needed, however, if the legal process is to be a legitimate vehicle for resolving conflicts of public policy.

David W. Tundermann,
Yale Law School, '71

Why don't "they" do something about the environmental crisis and other societal problems?

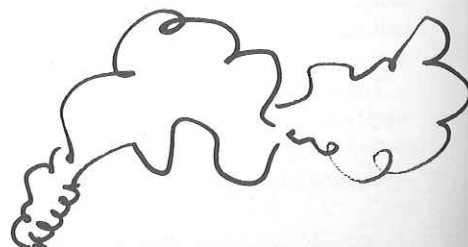
The some 28,000 federal executives listed in the *Executive Inventory*, who are at this moment helping to make social choices, are one segment of "they." Outmoded and shopworn images of a world that no longer exists seriously constrain the possibilities inherent in this critical mass of decisions makers. Almost half of all federal executives in the senior grades GS-15 through GS-18 and their equivalents have been in the federal service since 1945—a figure that increases to 67 per cent for those entering before 1950. A full 81 per cent of the executives are at least 45 years old. Theirs was a world scarred by Depression, World and Cold Wars. More than half have worked for the same agency for their entire careers. And one in five is eligible to retire to contemplate cherished images and experiences of older and simpler times.

A businessman "they" operates with a clock that ticks four times a year. If minutes exceed pluses, however labeled, on successive quarterly reports, what might happen next year let alone what might happen five or 10 years from now is of no great consequence.

Political "theys" may have one-, two-, four-, or for a select few, six-year clocks. In any case, the focus of political attention is contracted to the point where intralite games preoccupy disproportionate amounts of time and consume intellectual and emotional energies better spent on less diversionary and trivial pastimes. Political parties, wholesale apathy, the role of courts and law, the legislative committee and seniority systems, and incredibly weak local executives all contribute to a fundamental conservatism with respect to change.

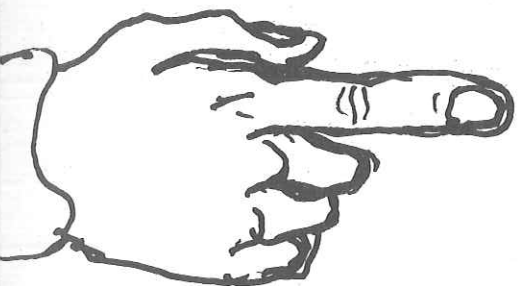
Should one really expect many decisions to be made in the interests of a constituency whose only distinctive characteristic is that it must somehow exist in the world beyond next year's election or report to the shareholders? What is in the near term hard-headed, rational, and responsive for the political and commercial "they" increasingly proves to be incomplete, expensive, impractical, and immoral for the collective "us."

For a society that has supposedly dedicated itself to maximization of individual dignity, capability, and responsible choice, our society has failed to measure and monitor indicators of that individual human choice. As clear as the burden is, we have largely failed to provide for the assembly



of information pertinent to individual dimensions of dignity, potential, well-being, or opportunity. As Senator Mondale has flatly stated, "The Nation presently lacks a comprehensive and consistent information base upon which major decisions in social affairs may be made."

Information collection and analysis procedures more thorough than the 1970 Cen-



sus are being proposed with sufficient frequency and clarity that eventual progress may be in the offing.

One comprehensive and potentially beneficial innovation is [Ford Foundation professor of law and the social sciences] Harold Lasswell's proposal to develop institutions called "decision seminars." A central function of the seminar is to monitor the course of social and political events as they unfold and to relate these data quickly and systematically to current verbal and formal models of systemic processes and operational procedures. The agenda of this innovative institution includes not only the use of sophisticated models and trend data to project the future course of events and evaluate policy alternatives; it also includes the revision and expansion of normative judgments and empirical formulations emphasized by researchers in their models and acted upon by political participants in their routine experiences.

Why don't "they" do something? Largely because "they" have had neither reason nor means to do much more than respond in marginal, parochial fashion. At issue is the difficult question of whether these innovative initiatives are too few in number, too remote from real centers of authority and control, and too late on the scene to alter significantly the unfortunate course of unfolding social events. One hopes not.

Garry D. Brewer,
Graduate student in political science

My greatest pessimism about the future of our environment is that we may have neither enough scientific and technical professional personnel nor all the money and resources we need to cope with this fu-

ture. For more than a decade the world has been visibly running out of steam and slackening its pace in science, and quite importantly this slackening has been felt most strongly in the two most developed countries, the U.S.A. and the U.S.S.R., so that we begin to have a problem of "over-developed countries."

Science is, after all, the only way we have for making an investment in future technologies. If we become so preoccupied with present and relevant technologies and forget about the future, it will certainly not forget about us. Political action and idealism are only hot air if we do not have the technologies to conquer technological evils. However much we were to play down unpopular physics and play up biology there will probably not be enough high-level manpower in the biological sciences. Though we need all the most ardent political and popular support we can get for the problems of the environment, I doubt if the presently big nations have the intellectual muscle left to transform the promises into actuality. I see little sign yet in this country or in the U.S.S.R. of a rational science manpower and funding policy designed toward any such end.

Derek J. de Solla Price,
Avalon professor of the history of science

Experienced physicians realize that predictions about the course of a disease and the health of their patients are hazardous, and often fallacious. I hesitate, then, to attempt to predict with any certainty what will befall American children in the next decade. But I am willing to make some assumptions and some guesses.

From my experiences in the past, I assume that there will not soon be changes in those circumstances which affect so adversely the lives of people of minority groups. I expect that the poor will continue to suffer inequities of many kinds, which will prevent them from attaining the full measure of good health and well-being which they deserve. I believe that hunger, even malnutrition, will continue to exist in those places where we now are surprised to find it in great measure, that is, among the children living in the city ghettos and in the South.

Another assumption which I hold is that pollution of the air will not diminish greatly, so that we may expect an unabated high incidence of respiratory infection, emphysema, and allergies among children of all economic groups.

I also believe that the population will remain at a high level of density, with crowding in cities, with the use of more

automobiles and other machines, so that the noise level to which all people are exposed, will continue to be high. There is good evidence that continued exposure to loud sounds produces deafness. I hazard the guess that deafness among all American people will appear earlier and be of a more severe variety than we have experienced in the past.

It is my feeling that we are not yet aware, and in the next decade, will not be conscious enough of the potential dangers of many food additives and contaminants which we today assume are safe and not injurious to health or development. The number of children born with defects, because of genetic damage to pregnant women and to embryos, will increase. The psychological stresses of life will increase so that adults, adolescents, and even younger children will depend increasingly on medications and drugs to help them meet the strains of attempting to cope with life. There will be new forms of drug habituation and addiction, and possibly genetic change from such medications.



Another result of the stressful living which children will continue to be exposed to is already reflected in the frequency of suicide among children. The first peak in the rate of juvenile suicides now is around the age of 10 years. Younger children will consider suicide, as now they are turning to drugs. Not all disturbed children attempt suicide. Many others, failing to compete satisfactorily and to cope successfully with the demands made upon them in our society, will show emotional illness in other forms.

I see no diminution in the feelings of hostility and aggression of adults toward each other. That being so, it is my belief that there will continue to be international wars, as well as local outbreaks of violence of various forms which will affect the health and lives of our children. Whereas in the past, there were outlets for one's feelings of anger, despair, hostility, and

aggression in recreation, even these will diminish. American business interests, aided and abetted by greedy politicians, will continue to try to convert to industrial use those resources which could serve as recreation areas.

As a diagnostician and prognosticator about the condition of the lives of American children, especially their health and well-being, I continue to be pessimistic. I hope I am proved wrong on every count. The only hope lies in the will and sustained efforts for change of our young people themselves.

Milton J.E. Senn, M.D.,
Sterling professor of pediatrics and psychiatry

Almost 800 million pounds of insecticides, fungicides, and herbicides, costing about \$2 billion, were sold in the United States last year. The use of such chemicals has been growing at about 16 per cent per year recently; at that rate the usage of these chemicals will, on a dollar basis, overtake the use of fertilizers by the mid-1970's. In 1950, farmers spent 25 cents per acre for pesticides (0.5 per cent of farm production); last year it was \$3.65 per acre (4.6 per cent of the value of farm production). This prodigious increase is designed to blunt the effects of the 50,000 kinds of fungi, 30,000 kinds of weeds, 15,000 species of nematodes, 10,000 species of insects, and several species of rodents that together cause crop losses estimated at about \$13 billion per year.

Nobody can deny that pesticides have been a boon to mankind. They have resulted in greater food production on fewer acres of land with the expenditure of fewer hours of human labor. They have permitted the rationalization of agriculture and the opening up of new areas for cultivation.

Despite these undoubted large benefits, many thoughtful students of the environment are worried about the growing intrusion of these toxic chemicals into the environment. For one thing, many chemicals previously considered innocuous to man and animals, such as the herbicides 2,4-D and 2,4,5-T, have recently given evidence of producing birth deformities in laboratory mice and rats. Others, like the chlorinated hydrocarbon insecticides of the DDT type are so persistent that they are now global contaminants, present in all creatures from the Antarctic penguin (thousands of miles from the nearest site of application of DDT) to a nursing mother in New Haven. In many birds, accumulated DDT residues have caused an upset in sex

hormone metabolism. This leads to deficient calcium mobilization, thin-shelled eggs, frequently aborted embryos, and catastrophic population declines.

The extent of the local danger is best understood by the estimate that there are more than 30 pounds of undegraded DDT in every acre of soil around Long Island Sound. What this will ultimately do to man and his ecology is anybody's guess, but prudence would dictate that we begin immediately a reassessment of our large scale commitment to organic pesticides. Any that we use should be nontoxic, easily biodegradable, and without danger of spreading throughout the ecosystem. Much more effective federal machinery will be required to police a new, strict policy.

In Vietnam, herbicides have been used massively as military weapons; since 1962, more than 100 million pounds have been sprayed over an area larger than the state of Massachusetts, mainly to defoliate the jungle and prevent infiltration and enemy buildups, but also to kill food crops. American lives have undoubtedly been saved; on the other hand, serious and possibly permanent ecological scars have been left in Vietnam. Some consider that such willful destruction of the ecology is in violation of the Geneva Gas Protocol of 1925 and the analogous United Nations Resolution of 1966.

It has been suggested that a new international agreement outlawing *ecocide* as well as genocide would now be appropriate.

Arthur W. Galston,
Professor of biology

It is not surprising that many economists consider themselves qualified to supervise the solution of the world's environmental problems. After all, pollution appears in the earliest economic writings as a perfect example of an "external technological diseconomy," a situation in which the private costs to an individual (or corporation) of engaging in a particular activity underestimates the full social costs of that activity because the activity involves certain effects which spill over to other parties.

Yet despite these unimpeachable qualifications, I suppose it is more than a simple lack of humility (a characteristic of the profession) that has earned for economists the less-than-subtle animosity of ecologists and others involved in the recent show of concern for environmental problems; we may well be guilty of turning our analytical tools loose on a few selected trees while ignoring a large part of the forest (al-

though not all economists have neglected the larger aspects of environmental problems). A few examples cannot be counted as a full confession, but may provide a notion of what I mean.

The pollution field, as suggested above, is the area in which we have contributed most of our environmental expertise and for the most part the analysis has been log-



ically sound. The problem, I think, is that we have looked only at the short-run, easily quantified costs (a factory's smoke dirties the neighborhood and causes property values to fall) while ignoring the long-run costs that the ecologists warn us are infinitely more serious.

Waste disposal is another form of externality, one which most economists have ignored entirely. The simple truth is that unless we foresee some vast technological development that will eliminate the problem, society (which has a life transcending the current generation) is very likely not making the best use of its resources by continuing to treat waste disposal as a free good until the full capacity of the earth to absorb our trash is exhausted. One appropriate remedy may lie in the direction of a tax on commodities in inverse proportion to the ease with which they are recyclable. We must wake up to the idea that non-returnable bottles, including the price society must pay for their disposal, makes them a luxury item.

A third area in which we have been negligent is in the conservation of natural resources. Economists can show that, when a few reasonable assumptions are fulfilled, the bidding for resources in a free, competitive market insures that the resource winds up in the use that has the highest social as well as private value. One of these assumptions is that all parties who may have an interest in acquiring title to a given resource be permitted to bid. In the case of depletable natural resources, a fairly substantial population—namely all future

generations—is left out of the bidding process. The fact that a particular corporation at a given point in time may have outbid all other parties for the rights to strip mine the mountains of Kentucky is simply no guarantee that, from society's point of view, that is the appropriate use of the resource. While I am not advocating the use of a clairvoyant medium in future auctions of digging or drilling rights, it would be appropriate for the Federal Government to speak more effectively for the posterity than has occurred to date—the U.S. Department of Interior notwithstanding. Furthermore, this is not Thoreauism—it's simply good economic sense.

An additional interest group has been effectively excluded from bidding in many cases even though it consists of people who are quite alive—people who think that mountains should be looked at and walked on rather than mined, that seas should be swum in and fished rather than drilled, and that preservation of wildlife is more important than a jetport. These demands are every bit as legitimate as those of Bethlehem Steel, Union Oil, and Eastern Airlines; and if the dollar votes of the millions of individuals who share those feelings were added up, they would in many cases far exceed the price at which these properties were sold or leased to industrial interests. However, there is no effective private means of harnessing those dollar votes, and we have no choice but to entrust the government to vote our proxies. Unfortunately, they seem to be botching the job.

The problem is not, as ecologists charge, that economists' single-minded emphasis on progress for progress's sake is incompatible with quiet, beauty, and the quality of life. Progress, properly defined, is simply getting more satisfaction for everyone with less input and is unassailable as a goal. The problem is that cheaper electricity at the cost of thermal pollution of our waters is not necessarily progress, cheaper oil at the cost of oil spills that threaten estuarial ecology is not necessarily progress, and two-car families at the cost of a poisoned atmosphere is not necessarily progress when all costs, private and social, are counted. Economists, recognizing their inability to measure many of these social costs, have often chosen to ignore them, not merely in individual benefit-cost analyses of various proposed projects, but even more seriously, in calculating GNP—the number we have peddled as an indicator of social progress. The analytical tools are available; we must learn to use them properly.

George A. Hay,

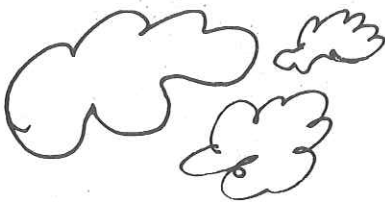
Assistant professor of economics

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The earth is continually undergoing climatic variations on many scales in time and space. On one end of the spectrum are the long period "ice age" oscillations involving awesome global changes in the environment. On the other end of the spectrum are the more visible local changes, such as the droughts of "dust bowl" dimensions.

In addition to the natural physical processes at work in producing these variations, it is now believed that man himself is capable of causing climatic changes, either inadvertently by such side-effects as the pollution of the atmosphere, or purposefully by the direct applications of his growing technology. Indeed, proposals abound for altering climate by direct intervention in nature.

However, *no quantitative theory now exists by which one can confidently predict the future consequences of these current human activities or proposals* (or, for that matter, account adequately for any of the past climatic changes). Yet, in principle, these future consequences could very well be of the catastrophic variety.



The difficulty in constructing a theory of climate lies in the inherent complexity of the atmosphere as a dynamic fluid system, as illustrated by the all too familiar difficulties of *weather* forecasting. In the case of *climatic* forecasting, these difficulties are compounded by the need to simultaneously consider the large-scale interactions of the atmosphere with oceans, ice fields, and land surfaces, including in the latter both physical and biological factors.

As global air and ocean pollution grow, population pressures mount, and technological capabilities and energy sources increase, the need for predicting and managing climatic change is bound to become more insistent. In the long run, the ultimate success of man on earth may well depend upon his success as a climatic "engineer."

Barry Saltzman,

Professor of geophysics

Underlying our concern about the environment is a general agreement that the earth's inhabitants are rapidly moving toward an upper limit of population, pollution, and consumption of natural resources. A solu-

tion to this dilemma will probably take the form of a carefully planned balance between the social and material needs of the human race and the available resources. In such a world the economy would move along at a fairly even pace, population growth would not exceed zero, and the natural resources would be reasonably managed.

An essential element, however, might be uncontrollable: the ability of mankind to live together in relative harmony. The expertise of the behavioral scientist can be called upon to help bring about and maintain the level of harmony necessary to develop a balanced and humane society.

Aside from the question of the scientist's ability to comply with the request, the reality that a behavioral scientist might be mistaken in believing his advice is valid and efficacious illustrates one of the roles in which he is cast. He is a member of one of many competing social institutions. In the past, the behavioral sciences have embodied in their conclusions numerous silent assumptions taken from their cultural milieu. The assumptions have often been overlooked because at the time they seemed obvious to the institution's practitioners. To take one example, psychiatric advice in the nineteenth century was closely entwined with what we would now describe as a quaint morality. Pronouncements backed by institutional authority were assumed to express valid scientific judgment. A curious feed-back mechanism can develop in these institutional relationships. An institution may be vested with an aura of objectivity and political impartiality and then approached for advice on the correct ordering of society. In the past these experts have resembled the appellant in so many ways that the appeals have been unwittingly self-serving.

The position, then, of those who would ask of science advice on social engineering is as difficult as that of the scientists to whom the request is made. Both sides, however, have evolved ways of handling their uneasy roles. Usually, the scientist has assumed that a request made through proper institutional channels is morally sound, and society has assumed that statements made by the authorized spokesmen of science are correct. I can't calculate the amount of good or harm accomplished in the past by these premises, but in a bureaucratic and impersonally technological society that obscures personal responsibility such unexamined assumptions can be disastrous.

David F. Musto, M.D.,

Assistant professor of history and psychiatry