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Concern for the quality of the environment has been expressed in terms of conservation, natural resources, ecology and the impending extinction of mankind. Each of these terms has varying meanings and it is not unusual for two "conservationists" to be fighting against each other for different realizations of environmental quality. Yet there is a set of shared values among them, probably exemplified about a concern for nature and the limitations of the natural environment. The complex interconnections of the various components of the "biosphere" are the realities of our day.

I think, however, that debate over environmental policy issues ought to take place in a larger arena than that admitted by most environmental quality enthusiasts. The world of politics and public policy is vitally concerned about problems related to equity and poverty. Since resources for change, whether in the natural or "unnatural" environment, are limited, problems related to environmental quality must be compared to problems related to poverty. We need ways of suggesting relative priorities for spending on problems of the environment and problems of the poor. Where is there a greater gain for a dollar spent--in pollution abatement or poverty abatement? By observing the interaction of environmental quality programs with poor people, we might come to the conclusion that pollution is good and environmental quality programs are bad. The unexpected side-costs (externalities) of environmental improvement are substantial.

The issue of environmental quality may be viewed as a conservative response to the urban revolution and a "rich man's issue." Policies related to the improvement of the quality of the environment may result in a greater mal-distribution of the quality of life for the people of this country. In this article, I want to look into the interfacing of environmental policy with considerations of equity.

I shall take a conventional view of the environment and concentrate on the physical and aesthetic aspects of the world around us. For the purpose of this paper more inclusive definitions of "environment" (for example, one's home or social milieu) will not be used.* The societal and social aspects of the environment, including the relationships of individuals to each other, have not been strongly pressed by those who have been concerned about the environment. Also, the extended concepts of the environment may be used to hide equity issues.

Underlying much of the concern about the quality of the environment is a perception that the environment has become poorer and that there exist incipient, if not present, problems which may cause drastic and undesirable alterations of the environment. As a result, people have been advocating new varieties of policy, involving laws and administrative schemes, as well as a new ethic about the nature of the environment. The communications media, especially television, have been trying to dramatize how our country has been "raped" and how we are likely to drown in our own pollutants. This development of public opinion towards the environment is also part of the policy for the environment since, to a very large extent, the kinds of policy articulated are reflections of the public's degree of interest in and information on these issues.

* See H. Perloff, The Quality of the Urban Environment, Resources for the Future, 1969, for a more extensive discussion of the "new" environments.

It is often the case that contradictions between two highly desired goals, such as good environmental quality and the elimination of poverty, are not pointed up in the same political arena. It might not serve the interests of either issue to do so. There may be a fairly large bad guy, "the defense budget," to attack. Yet such an "outside enemy" does not let us avoid the trade-offs and side-effects of policies.

It is an illusion to believe that environmental quality is a separable issue from problems related to equity. Problems related to environmental quality, in many cases, are very much the issues for the non-poor in our society and are acceptable for that reason.* Thus, dangerous situations in our environment, which need immediate consideration, are easily brought to the attention of the policy maker. But there exist many ameliorative plans whose necessity is not at all clear and whose beneficiaries may well be more wealthy than they are numerous.

Problems of Equity and Distribution

In asking questions about the incidence of poor environmental quality and the distribution of its betterment, we can see a connection between environmental problems and equity concerns. In this section I want to define what I mean by equity and then look at several kinds of poor environmental quality and the incidence of their disbenefits.

Let us define an equitable distribution of goods as an equal opportunity for each individual to gain access to and utilize his desired kinds of services and environment. Much of the environment and its quality are provided for by the public sector and I think a strong definition of equitable distribution

* See C.P. Benson and P.B. Lund, Neighborhood Distribution of Local Public Services, Institute for Governmental Studies, U. of Calif., Berkeley, 1969. They show that the users of services can be divided into two groups, dependent on the services used. The service groups are poverty related services and developmental services. Many of the aspects of environmental quality as narrowly conceived fit into the second category.

of the environment is justified. In emphasizing the consumer's desired level and kind of environment, we take into account the changing expectations for environment that seem likely in a rich and growing society.

I shall not deal with the question of who is to pay for public sector environmental improvements. Taxation questions are better left to others;* whether admissions to National Parks should be free is a red herring--as I suggest below; and deeper questions--such as who should pay for clean air--would require another article.

I want to look at some specific aspects of environmental quality and how their benefits are distributed. The aspects that I am concerned about are not the owned parts of the environment for which property rights exist. These would include timberland, private lakes, or development rights. The beneficiaries of these environments are more easily accounted for and controlled, though often the side-effects of their activities are neither.

On the other hand there are parts of our environment which are not owned by anyone and ostensibly are equally available to all. Such collective or public goods include the air, the water, and the sound spectrum. Some of these may be appropriated by a government, but which government (federal or local) is a matter of legislation and is not a given. Frequently, there is no price for these goods. More significantly we, as a political entity, may decide that it is good for people to have these aspects of the environment (such as clean water) and decide that people should have these "merit goods."

* See, for example, J. Pechman, "The Rich, the Poor, and the Taxes They Pay," The Public Interest, Fall, 1969.

We should note that our ability to use some of these "unowned" attributes of the environment may depend on our ability to own "ownable" parts of the environment. For example, a car enables one to get to a national park. In being able to use the environment more, it is also likely that one is capable of creating more bad environment. Those who own bigger cars with larger engines and travel more, are likely to pollute more also. The production side of pollution and bad environment is not discussed further here, but remarks similar to those that shall be made for consumption can also be made on the other side of the ledger.

Consider the case of air pollution in an urban environment. Let us say, for the moment, that the pollution level is constant throughout the city. The incidence will turn out not to be so. The "rich" have air conditioners. Also, they can get away from the city for the weekend or when the pollution gets very bad. One envisions their having a plane ticket ready to be used when the CO level reaches a certain point. The well-to-do have alternative means of reducing their pollution intake substantially.

It is not true, however, that the distribution of pollutants is constant throughout the city. There are fixed sources of pollution. Pollution is probably greater close to factories and power plants. Disamenity created by these sources, partially due to the pollutants they emit, tends to reduce the rent in these areas.* Poor people live here. That the better half frequently lives in a less polluted suburb, yet uses the resources of the city to make its living, makes these inequities even greater. Finally, considering the reduced income of the poor people,

* See R. W. Ayres, "Air Pollution in Cities," Natural Resources Journal, Vol. 9, p. 1. There is still some controversy on this question, though.

the cost of pollution, such as extra medical services and dirtier clothing, affects them more deeply than it does the well-to-do. Also, the probability that pollution will cause disease, for a fixed level of pollutant, will be greater for those in poorer health (such as poor people) than for those in good health.

It is true that the well-to-do sometimes choose to live in places with large amounts of pollution. They live in the center of the city--though they often have air conditioners and second homes. The well-to-do can afford to express their needs in terms of effective demand; one would expect that there are benefits that outweigh the costs of living in the polluted environment. But the poor cannot so effectively participate in the amenity market.

A similar case can be made for the problem of noise. Noisy areas are also likely to have lower rents. It is true that the well-to-do may have apartments in the central city very close to sources of noise, yet they can afford to have other homes, better sound insulation, air conditioning so that they may keep their windows closed, and money for vacations. Presumably they also have chosen the city environment for its other positive discretionary benefits. The poor's choice of a noisy area in which to live is for necessary benefits of lower rents and good access to work. Even convenient access to transit may not make up for the fact that the trains go by outside one's window regularly.

It is very difficult to stop breathing or to plug up our ears, but we do have options as to kinds of recreational facilities we wish to have. The density of cities and their frequent lack of open spaces makes access by the poor to open space facilities difficult. It is sometimes argued that mountain lakes and hiking trails may not be desired by poor people --their culture requires a more dense style of life. It is funny that

when people stop being poor they suddenly are able to appreciate the beauties of nature. The extra cost of transportation, the lack of availability of time, and the extra costs of recreation at distant facilities such as a lake outside the city, make it reasonable to suggest that those who use a facility are those who can afford to. We have a case here of poor environmental quality not because the environment is not available, but because it is quite inaccessible.*

An argument can be made that the poor can afford the wait for the use of facilities. They can take a "slow" bus to the park. But, although their ability to "demand" time saving methods of access to facilities is weak, their "need" is substantial. Also, the costing of the time of the poor ignores important social costs. If a child is not taken care of while his mother goes to a clinic far away, for example, then the social cost may be quite substantial in the long run.

The solid waste disposal problem looms large in our society. Yet it looms even larger in certain sub-sections where solid waste, commonly called garbage, attracts nuisances such as rats, but insufficient helpers such as sanitation workers. It is true that better garbage disposal may not be what is needed or desired by ghetto residents. Perhaps more garbage cans would do the job. But it is a fact that garbage is not as well picked up in the ghettos as it needs to be. In this case, the services have not

* This is discussed in part in M. Clawson and J. Knetsch, Economics of Outdoor Recreation, 1966, Johns Hopkins. They point out some of the fallacies concerning the benefits to the poor from outside recreation (pp. 271 and 305)--the poor cannot afford to get to the national parks. They also point out that the amount spent for outdoor recreation is a (approximately) constant 5-6% of income (p. 106). Finally, they discuss the lack of outdoor recreation facilities for the poor in the central cities (passim). Ruth P. Mack and Sumner Meyers suggest how we might take these into account in R. Dorfman, Measuring Benefits of Government Investment, Brookings Institution, 1965.

been geared to the needs of a community. The provision for environmental quality has not been geared toward each man's need, i.e., toward each man's receiving equal environmental quality.

Even the water we drink can be subject to problems of inequitable distribution and costs. Substantial amounts of money are needed to dig wells, provide water purification machines in the home, and to provide hot water. It is interesting to note that some of the greatest advances in environmental quality improvement has taken place in this field. Could this be so because we are all much more equally affected by bad water than most of the other bad parts of our environment?

To summarize, it appears that the distribution of environmental pollutants and disamenities is inequitable and that people who are financially poor suffer disproportionately from a poverty of environment.

Improving the Environment

It would seem to be worthwhile that we improve the quality of our environment. For problems such as air pollution, the imperative to improve the environment seems quite real and seems to have justification independently of who immediately benefits. Yet it may turn out that long run benefits to the society from improving the environment, as it is narrowly conceived, will make life worse for some members of the society now. Urban change rarely hurts no one, but it seems unfair that we ask those people who are least able to cause changes in their environment to pay for improving the environment of others. Let us consider an example with respect to housing policy.

Assume that we have a housing market which consists of two kinds of housing, good and poor. Let us say there is a latent demand for better

housing; people are crowded up in the better housing. Rents are set by the market with no direct intervention by the government.

Let us try to decrease the amount of air pollution released into the environment. There are some localized sources due to power plants, for example. Property values are depressed near the sources of pollution and it is quite likely the rents are lower there. The poor live near the worst air. We apply a pollution abatement mechanism near the power plants. Aha, you say, the poor benefit somewhat more than the rich since the pollution source is much closer to where they live. There may be problems with diffusion and winds and so forth, but it is still quite likely that the poor do have better air than they used to, and probably, proportionally, are doing somewhat better than the rest of the city.

However, the property values and rents for housing in the power plant area, which were depressed due to the pollution, have no reason to be depressed anymore. The owners could now charge substantially higher rents and meet the demands of the better quality housing market. Over time, the stock of low-rent poor housing decreases, and the stock of higher-rent housing increases. It is likely that the poor will have to crowd up, while the well-to-do will have more space available to them. And, of course, the better air that the poor had begun to breathe is not necessarily better anymore since they have moved.

Our attempts to improve the general welfare have succeeded by decreasing the amounts of pollutants in the air. Our disappointment lies in the fact that our efforts to improve the lot of a special group have been foiled. The clean air might have been more effective in improving the lot of poor people than that of the rich; this does not influence systemic behavior though.*

* J. Margolis discusses this point more generally in "The Demand for Urban Public Services," in H. Perloff and L. Wingo, Issues in Urban Economics, Johns Hopkins, 1968, p. 546.

This new pattern need not have to occur since there could be a housing policy coordinated with the air pollution abatement policy. The point of my argument has been to suggest that environmental quality policy which is not coordinated with housing policy leads to undesirable results from the point of view of equity considerations.

Though the above argument may be interesting, it would be good to know that it applies to real situations. The housing market is quite complex. The low vacancy rate for good housing that seems to be necessary for the above argument to apply may not exist. In many cities with bad environmental quality, there is a high vacancy rate--people are abandoning the city. On the other hand it can be argued that an improvement in environmental quality would encourage an influx back into the city and consequently the poor would not benefit from the improvement. More data and some study is needed to ascertain the true situation.

One completed study points up some other problems of air pollution abatement procedures based on automobile effluents.* This study points out how the poor and disadvantaged "...may value pollution reduction, but they are likely to value more reduction of the disadvantages and poverty that set them apart." Also the costs of pollution reduction mechanisms bear more heavily on people with limited incomes than on the non-poor.

We might have a similar situation for noise abatement as we have for air pollution. The removal of the Third Avenue El in New York City, for example,

* Ed Blum, Approaches to Dealing With Motor Vehicle Air Pollution: Report of the Subpanel on Transportation System Requirements of the Panel on Electrically Powered Vehicles* Rand Corp., Santa Monica, California, December, 1967, P-3776.

occasioned the building of luxury housing (admittedly during the boom for luxury housing).

However, there is an interesting twist to noise abatement. It turns out that a large number of poor people regulate their day and obtain their sense of time from the noises that exist around them. Would Italians prefer to live without the benefit of their church bells? There is some evidence for cultural norms for noise levels.⁺ Noise may be a benefit for some and as Todd La Porte has suggested, "A quiet street is cultural imperialism." The lonely and the elderly find in noise a substitute for people around them. They gain comfort from their thin walls. Silence may well be a norm of the rich. It is true that psychologically harmful noise is not considered desirable, although frequently chosen. This issue may seem facetious and trivial. But we do not know the cost of the readjustment required by people when the environment that gives them the cues for regulating their lives is altered dramatically. Could there be an increased incidence of mental illness?

For both of the cases given so far, I am not arguing against improving the environment. It is true that poor people are especially harmed by the bad environment. It is also true that some costs, such as long delayed illness, may be sufficient reason for improving the environment for them (poor people). But it should not be assumed that this is always the case--our concern for the quality of the environment (elitism) must be tempered by the needs of those for whom we are providing the environment (participation).

Education provides another example. In ghetto areas large numbers of windows are broken in schools, the noise level is high and the air is often poor. The response of school builders has been to build schools without windows. This may have improved the environment within the school (if non-distraction means improvement) and perhaps increased the capability of

⁺Noise may be a benefit in an industrial society. See New Society, November 6, 1969, p. 730.

children to learn. Yet the dis-benefits of this action have been large.

Outside the schools, the community has seen such buildings as being a slur on their area. Inside, it is not obvious that the artificial environment is really a better one. Perhaps the exposure to the external environment would result in children who are more capable of seeing the connection between their school and the outside world.

Another example is related to open space. For most cities, accessibility to open space is poor. When transportation systems are evaluated, insufficient weight is given to systems providing for access to recreation areas. If we count the number of transported passengers, then we find that most transportation serves people going to and from work, rather than those travelling to recreational areas. Yet, the poor in the central cities need transportation to open space as much as the rich in the suburbs need transportation to work.* Yet, tax deductions for open-space gifts, means that the poor pay for rich open-space.**

A similar question arises when we decide on the location of recreational facilities. In doing large scale water management, the development of recreational lakes up in the mountains seems reasonable and serves, in part, as a justification for such projects. But who has access to such environmental improvements? Not the poor. Should environmental improvements be in cleaning up the East River or the Hudson River, so that the recreational facilities will be available to the dwellers of the central city (New York), rather than in the development of recreational facilities in the Adirondacks?

Limited resources available for environmental quality improvement makes redistributive efforts more difficult. The population is expanding, yet resources may not be expanding at a commensurate rate. It is quite likely that much of the improvement of the environment benefits middle and upper class people.

* For another statement of this see the paper by S. Chapin in Perloff, op. cit. (pp. 331, 332).

** Perloff, op. cit., p. 168.

Paradoxically, facilities available for people who have been able to raise their incomes may decrease since so many others are doing the same thing. Thus, people with rising incomes are becoming less contented with the environment as they discover that rising income does not necessarily buy them more amenity.

Greater wealth is likely to create a greater demand for environmental quality. There may be some problem with the possibility of supply meeting this demand without raising the cost of environment. If the supply is not sufficiently elastic, then the better-off will soon discover that their riches do not buy them better environment. The elasticity of supply depends on two factors. The first is the willingness of the public to spend extra funds for the creation of more environments of high quality. Second, there is a dependence on the capacity (productivity) of the environment--a given environment with given technology can only support a certain number of users no matter how much is expended on its improvement. The interplay of supply, demand, and capacity determines how well we can provide for an equitable distribution of the environment.

Improvement of the environment may create some worse problems than we originally had, create greater inequities than we originally started with, and disbenefit more poor people. The ironies do not end here.

The analysis discussed in the appendix suggests that a poor family benefits from \$60 per year of environmental quality expenditures by the federal government, a middle income family by \$90, and a rich family by \$240.

The Politics of Ecology and the Politics of Poverty: A New Ecology of Politics.

People who are afflicted with the poorest environmental quality are least likely to be in the vanguard of those who are complaining. Their needs for greater income and better living facilities probably take precedence over

needs for better recreation and cleaner air. The well-to-do, however, are the leaders of the pressure groups desiring improved environmental quality.* For them, environmental quality represents an area where governmental action can make life substantially better.

The poor and rich have different symbolic expressions of their concern for the environment. If the poor must be concerned about immediate needs, then their environment, the ecology to which they belong, is likely to be housing and work. If the rich can afford a longer time span perspective, a deferred gratification of their needs, then the ecology that they would be concerned about is the ecology of the conventional kind. Very few environmental problems are obviously urgent to all.

Improved environmental quality can benefit the poor as well as the rich, if it is sensitively administered, yet it is the rich rather than the poor who are leading the fight. For the rich, environmental quality is an issue affects their ability to enjoy the pleasures of life that they believe their wealth should provide them with. Also, environmental quality, as it is conceived today, is not likely to disturb the distribution of privilege within the society. Environmental quality policy is one of status-quo for the people and change for the trees.

The beneficiaries of a certain set of political actions may not be the majority. Special interest groups must somehow get coalitions going. What is happening nowadays is that the rich are looking for allies among the middle classes and the poor in their fight for better environmental quality, just as the poor have searched for allies among the well-to-do in their search for better quality of life.

The economist provides us with a straightforward policy solution. Funds spent under the rubric of environmental quality, as conventionally

* The title of a recent paper is revelatory of this well-known aspect of this question. See J. Harry, R. Gale, J. Hendee, "Conservation: An Upper Class Social Movement," J. of Leisure Research, Vol. 1, #3, Summer 1969.

Albert Lepawsky has specifically suggested this in a wilderness conference, "Why should we assume that, in the struggle for appropriations and legislation, they will vote for our favorite conceptions of parks and primitive areas and seashores, instead of for their own more essential preferences and priorities? . . . We should, therefore, search diligently for such common ground....We must look for our natural allies among more of the common citizenry."* In the above quote we refers to the conservationists and they refers to the poor.

Another political scientist, Aaron Wildavsky, suggests that much of the concern for the new economics, which has been used as a justification for much of the governmental intervention into the environment, has been to say, "How shall society be organized so that the preferences of the morally or aesthetically sensitive minority will triumph?.... The term new economics of natural resources is used to designate an emerging trend..[which] permits economists to avoid direct confrontation with political problems by bringing in aesthetic factors to make economic analysis come out 'right.'""**

The welfare economist provides us with a straightforward policy solution. Funds spent under the rubric of environmental quality, as conventionally

* Albert Lepawsky, "Wilderness--The Citizen's Evaluation," in Wm. Schwartz, Voices for the Wilderness, Ballantine, New York, 1969.

** Aaron Wildavsky, "The New Economics: A Political Analysis," Daedalus, Fall 1967, p. 1115.

conceived, are more efficient in satisfying the needs of the well-to-do, while poverty money is more efficient at meeting the needs of the poor. Equity considerations might be introduced by saying that we should spend money on environmental quality programs in proportion to the number of rich people and on poverty programs in proportion to the number of poor.

But things are not so simple. The poor can have some of their needs most efficiently met by environmental quality program (e.g. recreational facilities) and not poverty programs. And the rich benefit, often indirectly, from poverty programs. Although we might try to disaggregate programs into rich programs and poor programs and call them that, I believe this would not be wise politically in light of the manner in which American government functions. The equity-environment quality problem could be resolved by means other than coalition politics. We could try to create new resources and allocate these resources in a more equitable manner than we do with present resources, rather than try to reallocate the old ones. Limitations on funds and on nature's resources suggest difficulties with this approach. We could create new resources of a psychological kind. "Soul" might be one of these.

In the end, I would suggest that we have to admit that environmental improvements may be technically but not politically feasible. Our cultural system forces us to have a bad environment. I will discuss this point shortly.

Goals for Environmental Quality

The politics of ecology and the politics of poverty are not irreconcilable. Conservation and ecology are not the best concepts for dealing with this reconciliation however. We need to restate our goals for environmental quality in a different form which explicitly deals with equity effects.

Arguments for the eco-system, conservation, and ecology, except in rare

emergency cases, are too narrow in scope in a society that has rich men and poor men.

We need to emphasize the needs of men over the needs of the rest of the environment, including the rest of the animals and plants. I realize that there is a land ethic, as Aldo Leopold suggests, which emphasizes our dependency on the animals and plants.* It is not that I would want to deny this community, but I rather would emphasize our need for community and mutual sensitivity among men.

Lynn White points out that the Judeo-Christian tradition separates man from the rest of the environment and inhibits the eco-system concept from playing a primary role in our political processes.** If we were better off, I think we could afford to try to be more ecosystemic. For the moment, our goals need to be stated in terms of the needs of men. If you die of starvation now, you do not care if the air will give you lung cancer in 25 years. It will be worthwhile to emphasize the needs for food and shelter over the need for many other aspects of environment.

In the past, we could say that the motivating value of the ecological system on earth was survival. And for most of man's time on earth, he was not so special that he could affect this value. Now we realize, if we are rich, that our survival depends on regulating the rest of the system, as well as ourselves. However, there is no single ecology that must exist. Our highly artificial environment necessitates both new statements of values and new

* A. Leopold, Sand County Almanac, Oxford Univ. Press, 1949.

** Science, vol. 155, 1967, pp. 1203-1207. For a critique of White's position, see P. C. Ritterbush, "Environment and Historical Paradox," General Systems, XIII.

modes of intervention into the environment. What contemporary American politics has added to this value system is a commitment to equity. There can be a politics of survival and equity; I think there must be.

But, what about our drowning in our own wastes, it is asked. There is very little that is terribly poor in our environment. Most of our air is breathable; a substantial amount of our water is drinkable; we are not yet completely deaf; and we have not yet been poisoned. I do not mean that such problems are unimportant, but I am suggesting that the crises we see in these problems must be weighed against the crises that exist in a society where there are poor people and rich people.

We shall need more global measures of the quality of our environment that take into account the tradeoffs between clean air and the betterment of people, between people who can hardly afford good schools and people who want larger parks. It is true that many of the functions served by any one kind of improvement of the environment may well be served by another kind, especially if we can construe the environment in a broad sense.

Priorities for Environmental Improvement

Not every problem in environmental quality is urgent. Nor need we improve every undesirable condition that exists. Some conditions may well be able to wait until we deal with more urgent problems.

I want to suggest a way of ordering environmental quality projects among themselves. I then wish to consider the problems of how we are to measure the tradeoffs between environmental quality projects and others. I will also discuss the special problems related to the preservation and development of rare environments.

Below is a classification of environmental quality problems that would make it possible for us to choose among the possible improvements we might make.

1. There are conditions about which we must do something soon or we will lose a super-special thing. These pertain to rare environments, environments we wish to preserve for their special beauty or their uniqueness.* We might allocate a fixed amount of money every year to such super-urgent problems. Niagra Falls might be one of these and might cost a few cents per family to keep it in good repair. Wilderness and monument maintenance cost about \$10/year per family, ignoring opportunity costs.
2. Then there are situations which are stably poor. In these, the conditions are rotten, but are not getting worse too fast; we might be able to handle the problem in ten years without too much loss. These are environmental problems whose solutions could be deferred for action in the future. The losses to the society due to the delayed improvement of these facilities need be carefully computed. For example, the eutrophied Lake Erie might be such a project. There are losses due to unusable fishing and recreational facilities. It would cost \$1000/family, locally, to clean up the Lake. Perhaps our environmental dollar should be spent elsewhere. I have ignored, for the moment, the possibility that our environment dollar should be traded in for a housing or education dollar.
3. There are also situations where things are rapidly changing and getting much worse and where a small injection of environmental

* See J.V. Krutilla, "Conservation Reconsidered," American Economic Review, Sept. 1967, and B. Weisbrod, "Collective-Consumption Services of Individual-Consumption Goods", Quarterly Journal of Economics, 78, no. 3, August, 1964, p. 471.

improvement and amelioration would be able to cause dramatic changes in a trend. Smog control devices have probably raised the cost of driving by only two or three percent, yet their contribution to the relative improvement of the environment in certain areas (e.g. Los Angeles) has been substantial. Fifty dollars a year per family is a rough estimate of the current cost to the car owner.

4. Then there may be problems which need large infusions of money to stop a change. These problems are especially irksome. The response here may be to change the system enough so that we can avoid such costs. The costs of such change, one time costs we hope, may be much smaller than the long term costs of such problems, though this need not be the case. The development of new industrial methods that are "clean" is a case in point.

This is not an all inclusive or especially inventive classification of problems, but I have devised it to suggest that many of the "urgent" problems are not so urgent.*

Rare environments pose special problems. The economists have attacked this question in terms of future needs for the environment as well as the possibility that someone who does not use an environment will still want to know that it is available.** The conservation groups have tried to identify especially important areas and pushed vigorously for their preservation.

* We can, in fact, classify the above set of four types of problems in terms of a costing problem related to the discount rate. Problems of the first type have zero or negative discount rate. In any case, we may not wish to argue their value economically--the bits of environment saved are intrinsically worth saving. The prices assigned for saving them do not reflect their long term value. For the second case of stably poor environments, the discount rate is small and positive. Problems of the third type can be said to have a very high discount rate, while for the fourth type the discount rate is even higher.

** Krutilla and Weisbrod, ops. cit.

Rare environments, however, need a point of view different from other environmental quality programs.

A poor nation will not destroy very much of its special environments. It is too impotent to do so. It may certainly perform minor miracles of destruction with a tyranny of small decisions. But, I suspect, these are reversible more easily than the errors of the rich.

The middle nations of the industrialized world have wreaked havoc on the environment in their efforts to gain some degree of wealth. It is interesting that they are willing to tell the poor world that they should not do so when this may be a very fast way of developing (the nuclear non-proliferation treaty has been seen in this perspective).

The rich nations (of which the United States and some European countries are probably the only representatives) can afford to have environments that are rare and consciously preserved. They are analogous to pure research; high energy physics and its accelerators has been compared to the temples of old as the monuments of our time. This perspective, something of a relic of the past, strikes me as being good. A spiritual justification for some action is a good idea in the cost-benefit days we are in now.

However, we do not get a way of deciding how much we should spend on "temple building" from such a criterion. I think that we shall have to decide on our temples in almost a religious way. The amount we need to spend for temple building in a rich society is a small proportion of our wealth (very different from the churches of the medieval times). So let us use no more than pin money (\$500 million per year?) for our temples. We use "pin money" for the poor.

Our second problem is how we can consider the side effects of environmental quality programs and their interrelation with other goals (e.g. income redistribution) in deciding on which projects we should pursue.

We might rank projects in terms of the net benefits to the group we wish to benefit. Stephen Marglin has suggested how we might explicitly include income redistribution goals in cost benefit calculations of environmental quality programs.* If we wish to take into account efficiency concerns, we could minimize costs minus benefit with a constraint of redistribution. This turns out not to be so simple, since pricing some commodities at zero dollars, a seemingly best way of doing the redistribution, may not be politically desirable or feasible. As Clawson and Knetch have pointed out, we have to be sure that in making some prices low, there are not others that are prohibitively high and do not permit the persons who are to benefit to gain access to the low priced goods.** In any case, Marglin points out that we must realize that the degree of redistribution will depend on how we might spend the money in alternative activities (marginal opportunity cost). This has a nice symmetry with the point of view often articulated by Allen Kneese that the level of pollution that we tolerate or is "optimal" is that at which the marginal benefits of increasing pollution are balanced by the marginal costs of abatement measures.***

In doing these calculations of cost and benefit, we shall have to look at the relative value of ten years of clean lake (if we can clean up the lake now) versus ten years of uneducated man (if we wait ten years for a manpower

* See Steven A. Marglin, "Objectives of Water Resources Development: A General Statement." in A Maass et. al., Design of Water-Resource Systems, Harvard U. Press, Cambridge, 1962.

** M. Clawson, op. cit.

*** A.V. Kneese and B. Bower, Managing Water Quality: Economics, Technology, and Institutions, Johns Hopkins, 1968.

training program). We shall have to include, as costs, some of the unexpected consequences of programs suggested earlier in this essay.

Another possible measure of priorities would be a measure of the success of certain environmental programs, not in their reduction in the incidence of pollutants on different physical areas, but in their incidence on different sub-groups of the society. Such a disaggregation would avoid problems related to the low visibility of poor people. If ten percent of the population is poor, and this sub-group received a major amount of the pollution, the mean level of pollution may be very low. If this ten percent is not spacially agglomerated, it will not be noticed in physical surveys and we may have serious problems in our midst without being able to detect them.

The purpose of this paper has not been to belittle the importance of environmental problems, but to put these problems into the total environment of the problems of this country. There are some urgent environmental problems, such as those related to pollution and solid wastes. However, it is important that we think broadly about our environment. Environmental quality advocates often take on environmental quality as a "motherhood" issue, without recognizing that certain environmental policies would only exacerbate existing societal inequities.

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Appendix: Measuring the Distribution of the Environment

If we are concerned with equity considerations (as well as ones of efficiency) we shall want to know how the environment is distributed among the populace. Let me suggest several schemes for looking into this question and give some results of investigation.

The Distribution of Environmental Expenditures:

We shall try to measure how the money spent for environmental quality is distributed among the various income groups. If we are interested in knowing how much each person receives, a standard for equity could be that each man should receive an equal amount of the benefit of the monies spent for environmental quality.

First, we shall need to know how many families (the unit used for measurement here) are in each income class. We find that 45% have incomes less than \$7,000/year, 45% have incomes between \$7,000 and \$15,000/year, and 10% have incomes greater than \$15,000/year. (1968 U.S. Statistical Abstracts, p. 324). Since this is a distribution for all families, we would expect the distribution to be somewhat more skewed to the low end for blacks. Thus, if we do find in our analysis that poor people are inequitably provided with environment then it is likely that some suffer even more inequitably. Also, the mean size of the family tends to be larger for lower income groups; therefore the monies spent per person will be even more inequitably distributed.

Next we need to know how much money is being spent in the fields of environmental quality improvement. The analysis reported on here has been done for federal expenditures since the data is easily available. (A cross-walk of the estimated budget for 1968 can be found in L. L. Lederman. An Analysis of the Allocation of Federal Budget Resources as an Indicator of National Goals

and Priorities, Battelle Memorial Institute, Columbus, Ohio, 1969.) Using Lederman's categories we can readily produce a list (perhaps not complete) of federal programs in the environmental field.

In order to determine who receives the benefits of environmental programs, we need a way of dividing up the pie. The criterion here will be imprecise; the data that is available does not warrant more sophisticated procedures. We shall look at how much a program is used by a certain group as a proxy for how much a group benefits from that program. Not all expenditures result in positive benefit, but that is what we shall assume here. Also our decisions as to utilization are guesses for lack of much better information for many of the programs.

For each program we decide (a guess) whether the poor, middle, and rich have equal utilization (per family) of a program (case "0/0/0") or whether there is some one group which benefits more than another. In the following analysis, for the latter case, we assume that of the three groups: one benefits, one loses, and one receives the equitable share proportional to the number of families in the category. For example, if the poor receive more benefit and the rich receive less, we would classify the program as being "+/0/-."

We then decide on the benefits of a group (i.e. the amount of money from a certain expenditure that accrues to a group). If the classification is 0/0/0 then we distribute the money 45%/45%/10%. The unequal case is somewhat more complicated. The way in which we decide to do the allocation must be arbitrary in that we do not have exact figures as to number of users.* Knowing the relative number of users does not really solve the problem since we do not know if some users benefit more from a "use" than others.

* See Benson, op. cit. for a case where this information has been obtained.

What I do is to give to the "-" group one-half of what it should receive, and the "0" group its proportional share, and to the "+" group the rest (which is more than its share). The benefit to the "+" group depends on who is losing.

We then sum up, for each group, the total expenditures for which they receive benefit and compute the fraction of the money they get. We can also compute the amount of money that a group is "cheated of" by comparing the total for a group with its equitable share. The table on the next page gives the results.

TOPIC**	Poor/ Middle/ Rich	TOTAL*	Poor	Middle	Rich	
Area Regional						
Dev. EDA	000	\$153	\$ 69	\$ 69	\$ 15	
Appalachia	+ -0	159	107	36	16	
Conservation of Land-Farm	-0+	211	48	96	67	
Soil Conservation	000	115	52	52	12	
Public Housing	+ -0	295	198	67	30	
Model Cities	+ -0	25	16	6	3	
Urban Renewal	-0+	499	110	225	164	
Open Space	-0+	60	14	27	19	
Water and Sewers	000	90	40	40	9	
OEO	+ -0	926	624	210	92	
Army Corps of Engineers	-0+	1,341	300	600	441	
Reclamation	-0+	291	80	160	51	
Water Pollution	000	190	85	85	19	
Saline Water	000	31	14	14	3	
Bureau of Land Management	-0+	83	19	37	27	
TVA	0+ -	109	50	54	5	
Soil Conservation Watershed	-0+	106	23	46	37	
Forest Service	-0+	495	113	225	157	
BLM - Forest	-0+	22	5	9	8	
B. of Outdoor Rec.	-0+	105	23	46	36	
National Parks Service	-0+	140	31	62	47	
Fish	-0+	153	35	70	48	
ESSA	000	168	76	76	17	
All except OEO, Model Cities and Public Housing		4,511	1,293	2,030	1,200	
"Conventional Case"			29%	45%	27%	%
			-737	0	+750	Redistri- buted Fund:

** Taken from Lederman, op. cit., Sections 6, 8, 13, 14.

Redistributed Funds = Σ group - Σ totalX (fraction of families in group)

* Millions of \$

	TOTAL	Poor	Middle	Rich
w/o OEO	\$ 4,841	\$ 1,501	\$ 2,107	\$ 1,231
		31%	43%	25%
		-700	-100	+747
All	5,767	2,131	2,312	1,323
		37%	40%	23%
		-470	-290	+747

Several points emerge from this analysis.

1. Conventional environmental quality programs (on the federal level) tend to be regressive in their redistributive effects. Even if we include so called poverty programs and programs that are aimed at the central cities, things do not change dramatically.

If we look at the redistribution by family we find the following for the conventional case.

	Poor	Middle	Rich
Amount of EQ money received per family	\$60	\$90	\$240
Difference from equitable*	-\$30	0	+\$150

The data speaks for itself.

2. Since the assignment of redistributive effects for the programs has been done by myself, there may be some errors due to some single random error in an assignment or a systematic error in the assignments. For the first case, we can get a handle on the magnitude of the problem. The Corps of Engineers programs are, by far, the largest expenditures. I have altered the assignment somewhat for this program and have made the following tabulations of the change in the redistributive measures. The net effect is to change the amount that the Middle benefits, but we do not have to change our conclusions about the regressive nature of environmental programs.

* An equitable distribution is defined as one in which environmental quality expenditures are distributed equally to each family. The "difference" is the amount received minus the equitable amount. The analysis given by W.I. Gillespie, "Public Expenditures and Income Distribution," in R. Musgrave, Essays in Fiscal Federalism, Brookings, 1965, is similar to the one done here.

Assign Corps of Engineers "-/+/0"

\$ 4511	\$1293	\$2327	\$900
	29%	52%	20%
	-737	+300	+450

"0/0/0"

4511	1593	2030	900
	35%	45%	20%
	-450	0	450

The possibility of systematic biases is real. The purpose of this analysis is to suggest a technique for the analysis of policy and possible outcomes of such an analysis. More data on how programs are utilized by the various sub-sections of the population could make this work more precise. As a proxy for more data, we might use a Delphi study among a group of experts in the field.

3. Substantial amounts are spent by state and local governments on environmental programs. Analyses of these expenditures need to be done. Finally, it would be interesting to see how private expenditures for environment are distributed. Some interesting questions include how are the extra expenses for pollution abatement devices being distributed to consumers, and who is really harmed when a watershed area is created.

4. The interesting and probably too difficult to calculate quantity is an estimate of the side-costs (external dis-economies) of environmental change. This would involve specific estimates of the redistributive effects referred to in the body of this paper. At the same time, we need to do estimates of the net benefits of cleaning up a lake vs. those of a welfare program.

Other Methods for Analysis of Distribution of Environment

1. We could look at redistribution of wealth.^{*} The previous analysis of the distribution of the benefits of environmental quality can be used to compare the amount of benefits to a group with the costs to that group (in terms of taxes paid). Looking at income tax payments (leaving out excise taxes--which are regressive) for the moment, we find (U.S. Statistical Abstracts, 1968, table 556.):

	% paid in taxes - 1966	% received as beneficiaries of environment 1968	% of population
Poor	8%	29%	45%
Middle	52%	45%	45%
Rich	40%	27%	10%

Yes, it seems that the Rich get less than they pay for. It is not the purpose of the federal government to act as a holding company for the distribution of resources in the same proportion as they came in. More to the point, both equity considerations (politically) and effects of scale (practically) mean that the Rich should get less than they pay.

^{*} An analysis of this sort is found in W. Lee Hansen and B.A. Weisbrod, "Distribution and Direct Benefits of Public Higher Education: The Case of California," Journal of Human Resources, Spring, 1969, vol. 4, no. 2, p. 176. B. Weisbrod suggests a similar analysis in S.B. Chase, ed., Problems in Public Expenditure Analysis, Brookings, 1968.

2. Another possibility is to look at the redistribution of resources. The environment is said to belong to all of us equally. Therefore let us divide it up, say land, water, air, silence...into equal parts for each family. Assign to each group the total resources of the members of that group. Then we look at the utilization of these resources in fact. We would have to do an analysis like the one done for the distribution of environmental expenditures. We could then measure the flow of the environment and the redistributive nature of our environmental quality policy and user system.

A seemingly useful related kind of analysis is to look at the production-consumption redistributions effects of environment. Do the people who create pollution absorb all of it themselves? Do those who pay for open space programs use the space? These interesting questions are plagued by the problem that the units of production of good and bad environment, frequently businesses and manufacturers, are not the best units for the measurement of the consumption of the environment, frequently persons. This technique may still be useful in certain cases, as in the analysis of the use of a stream by various factories.

3. Another possibility is to measure the redistributive effects of a single given project. Given the environment (this assumes that we are capable of doing an inventory of it), we can see how it is changed by a major project. BART in the Bay Area would be an example of such a project. This is discussed in the main text.