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Setting Environmental Standards: An Economist's View

by

John R. Meyer

National Bureau of Economic Research
and Yale University

Growth: Meeting the Challenge

by

Edward K. Smith

National Bureau of Economic Research



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**SETTING ENVIRONMENTAL STANDARDS:
AN ECONOMIST'S VIEW**

by

John R. Meyer

**National Bureau of Economic Research
and Yale University**

Much has been written about economists being rather gross fellows who pursue something even grosser called the Gross National Product (GNP). In particular, it is asserted that economists advocate growth in the GNP regardless of its consequences for the environment and for all or most other civilized amenities as well.

The truth of the matter is that many economists have long been concerned with environmental problems—much longer, in fact, than most physical scientists. Economists long ago confronted these problems under the heading of what they call “negative externalities.” For instance, many leading 19th century economists addressed themselves to such problems as the “dastardly effect of smoky, cindery steam engines on the countryside” and the kinds of economic taxes or adjustments that might alleviate these problems. They also gave attention to noise, odors and similar unpleasant side effects of increasing industrialization and to the costs that these pollutants imposed upon the community.

Negative externalities were, indeed, a central concern to economic theory in the first two or three decades of this century. The only topic that rivaled it in importance, at least in the Anglo-Saxon countries, was probably international trade. Many of the great names in economics of that era are associated with this interest in externalities: Pigou, Knight,

Marshall and Clark. Later, Simon Kuznets, while laying the conceptual foundation for modern national income accounting at the National Bureau of Economic Research, was very careful in his work to differentiate between income accounting with an emphasis on available market measures and what would be needed to gauge the growth of real income and welfare. Indeed, Kuznets pleaded (as early as the 1930's) for an extension of the conventional market measures in order to capture non-market contributions to and deductions from aggregate economic performance.

One could even argue that economists in the first part of this century devoted entirely too much time to environmental concerns. One might suggest, for example, that it was this preoccupation, among others, that left economists totally unprepared intellectually for the coming of the great depression in the nineteen thirties. Instead of attempting to determine what made the economy contract and expand cyclically and what kinds of policies would minimize or eliminate such fluctuations, economists spent their time worrying about noise, soot, smells and smoke created by such diversely offensive manifestations of industrialization as the steam engine, stockyards, chemical plants and the like.

Needless to say, all that changed, though rather more slowly than it should have, when

Note: Presented to the Western Electric Environmental Seminar, New York City, December 1971—an experiment in interdisciplinary exchange of information and views on a contemporary problem of concern.

the Great Depression arrived. By the early 1940's, if not before, economics as an academic discipline and science had been "revolutionized" by a combination of Keynes' theory and Kuznets' measures of aggregate market activity (as perfected in the U. S. Department of Commerce and other government agencies). Certainly, from 1940 through 1967, the economic profession did focus a very substantial part of its energies upon the issues of eliminating business cycle fluctuations and of keeping the economy growing at a rate sufficient to absorb the available and increasing supply of manpower.

But, this trend ended in the late 1960's. At that point the environmental issue began to "re-emerge"—and, in a way that at first was quite startling to economists since they were characterized as being in some way major villains contributing to environmental deterioration. Yet, the first new or mid-1960 committees on environmental quality in the Federal Government were chaired and encouraged by the then Chairman of the Council of Economic Advisors, Gardner Ackley (who is now a member of the National Bureau's Board of Directors).

Economists, when thus confronted, did that which usually comes naturally when any discipline faces new challenges: they reached back into their intellectual history to see if there were any guidelines or suggestions for handling these problems. It was easy enough to identify that the concepts of so-called "welfare economics," and particularly the contributions of Pigou, were potentially quite applicable. The main policy prescription to be found in that body of economic thought was that polluters should be taxed for the act of polluting. In a market economy producers could be expected to respond to these taxes by reducing pollution by whatever amounts seemed most efficient in light of the socially or politically determined price (i.e., cost) attached to the act of pollution. In essence, this act of attaching price or tax to pollution would make it possible to "internalize" pollution activities into producers'

decision making processes and thereby also into the market system on which we rely for determining the allocation of resources within our society. In short, the economist would say that the sensible way to set environmental standards is to determine what costs are attached to harming the environment and then set a tax to reflect these costs so that individual producers and businessmen, as well as consumers, adjust their activities correspondingly.

In keeping with this emphasis on the market mechanism, economists also emphasized that reducing pollution or improving the environment almost invariably involves new or additional costs of one kind or another. Or to put it rather more dramatically, to a considerable extent we have relied too much on the assimilative capacity of our environment to absorb pollution created by production and consumption; we must recognize that the absorptive capacity of nature may well be limited and therefore is a scarce resource which needs to be priced like any other scarce resource. In essence, treating nature as a free good has led us to overuse it!

Accordingly, as the first step in intelligently analyzing environmental problems, economists would recommend that we determine the valuations placed on environmental improvements. Moreover, using a most fundamental economic theorem, the rational way to proceed with environmental improvement is to do so as long as the marginal costs of such improvement are less than the marginal benefits. From the economist's standpoint the proper environmental standard, always assuming that we have properly and *fully* measured benefits and costs, is determined by the intersection of the relevant marginal benefit and cost curves.

It should also be clear what the economist's approach excludes. In particular, it abhors oversimplified statements to the effect that "we must" eliminate this or that source of pollution "entirely." Such drastic either-or statements are to the economist simply emotional oversimplifications. The economist is

particularly disturbed when he observes, as he often does, that the costs of eliminating pollution or of improving the environment tend to rise steeply as we approach some idealized goal of zero pollution or of perfection in our environment. The economist further realizes that the resources that may be squandered on this pursuit of an idealized perfection are likely to be resources that *may* not be available for other very worthy purposes, such as reduction of poverty or improvement of our educational system.

The economist also tends to view dimly those prophets of doom and gloom who insist that short of such perfection our society will drop into some abyss or cataclysmic trauma. Apparently, many physical scientists work with models that embody a great deal of instability, that is have a tendency to degenerate into some extreme boundary condition when disturbed. The economist's experience, in contrast, is with systems of considerable stability; he observes that the economic system when dislodged from equilibrium has a strong tendency not to move exponentially toward some boundary but rather tends to react or move back toward equilibrium. In particular, the economist identifies many corrective mechanisms in human or social systems that tend to keep man from behaving utterly foolishly. I will admit, though, that I am not totally convinced that the economist's optimism about human nature and institutions is *always* well placed; nevertheless, I think that the economist's generalization about the stability of social systems stands up reasonably well to the test of empirical observation.

In short, the economist's typical advice about environmental standards would be: Have the public state what environmental protection is worth, apply a tax reflecting this valuation and let the market mechanism do the rest. But economists, being the argumentative fellows that they are, haven't been content to let matters stand at this. One group within the profession insists that the whole problem of environmental damage, pollution and other negative externalities is a "phony,

trumped-up piece of nonsense" that would be quickly corrected in any good market economy, such as that of the United States; by those who are harmed striking bargains with those who do the harming. Discussion of how private bargains could eliminate the problem has led to some very interesting economic theory but not to much insight into the real problems of environmental maintenance. In essence, these models (in which the pollution problem disappears as a public concern) are based on assumptions that bear little resemblance to the realities of the American economy—or for that matter almost any other economy. An ex-president of the American Economic Association, Kenneth Boulding, has even gone so far as to characterize some of these contributors as "our (the economics profession's) lunatic fringe who virtually deny the existence of public goods and public bads and think that all things can be done by private bargains between smoky railroads and rational dairy farmers."

The majority of the profession, in fact, has adopted a rather more pragmatic approach. Their starting point has been to worry whether the simple prescription of pollution taxes was really enough or necessarily the best way of attacking environmental problems in all possible circumstances. Furthermore, some economists, usually those with more practical experience, also wondered about the administrative practicality of using taxes in many applications.

Actually many, if not most, economists have apparently come to the conclusion that probably taxes aren't necessarily the only or even always the best solution. In a world in which the market works, but not necessarily all that perfectly, the imposition of a pollution tax frequently could actually reduce total welfare in the society. For example, if one imposed a pollution tax on a monopolist, this could result in his reducing production—and it is a simple truth of economic theory that monopolists tend to produce less of their goods than is usually optimal from a social standpoint, even without pollution taxes. One

perverse result is that in such cases, everything else equal (a big assumption!) and other policy solutions not being available, government perhaps should subsidize monopolists to reduce their pollution; indeed, on purely economic grounds it might be desirable to carry that subsidy to the point of exceeding the actual costs of whatever equipment was required to eliminate the monopolists' environmental harm. Needless to say, I shall leave it to others to sell that particular proposition to Congressmen!

Economists, though, hardly are enthusiastic about subsidies (e.g., for acquiring equipment to reduce pollution) as a universal solution to environmental problems. Quite the contrary, economists believe such subsidies should be avoided wherever possible since, in essence, a subsidy amounts to subsidizing patterns of consumption and production that are high in pollution content. One of the great appeals of the tax approach is that in the long run it should induce people to consume less of the goods turned out by polluting activities and lead producers to use such processes less in production.

Economists have also been concerned that taxes as a solution to environmental problems could weigh heavily upon small producers or firms, thus running contrary to the whole thrust of anti-trust and other competitive policies promoted by governmental agencies. In the same vein, the imposition of taxes could have some very curious redistributive effects within our economy; for example, a tax imposed by a federal or state environmental protection agency on contaminated municipal sewage effluents would work directly counter to "revenue sharing" or other programs intended to alleviate the fiscal problems of cities. Furthermore, there are very practical difficulties with tax solutions to environmental problems, e.g., determining the appropriate tax level could be an extremely difficult and complex process. And once one moved to a consideration of a dynamic economy, with investment decisions and planning carried out over a long time

horizon, the complexities and unforeseen adverse side effects of anti-pollution taxes could (and probably would) multiply.

As a consequence of these and many similar considerations, all inducing caution or reservation about simply imposing taxes on effluents, economists have been led to look ever more kindly on straight regulation or physical controls as a means of solving environmental problems. This has occurred in spite of the fact that economists generally consider the application of physical controls or standards as being potentially arbitrary and often self-defeating in a reasonably free market economy. Nevertheless, some professional consensus has emerged that in many cases simply setting regulations or physical standards might be the easiest and perhaps the best solution achievable. Certainly, such an approach would usually be preferred by economists to the use of subsidies—though important exceptions might be expected, as already noted.

As a consequence of all this, economists have become rather eclectic in their approach to environmental problems, that is a bit less dogmatic than their usual custom. Along with this new eclecticism, economists also have become increasingly impressed with the importance of institutional arrangements, in particular the need of creating new and possibly very different kinds of governmental agencies, as part of the environmental solution. Regional planning agencies have come into particular favor.

In essence, this conversion of market-oriented economists to advocacy of planning was induced by a growing recognition that many environmental problems involved a remarkable number of interdependencies and what economists would call complex general equilibrium problems. A regional watershed or river valley provides a particularly good illustration of these. For example, a minimal cost solution to depolluting a river usually involves very complex decisions: about where to locate treatment plants; what kinds of relocation of industrial activity, if any, one

should require; which communities and industries one should group together to achieve scale economies in treatment; and where and to what extent one might take advantage of natural assimilation. Air pollution problems demonstrate many of the same characteristics. Similarly, it has been recognized for some time that regional planning on a fairly extensive scale is the only sensible way to approach several transportation planning problems, for example airport location and highway alignments.

In short, economists have taken what one could describe as more of a "systems approach" to environmental problems and increasingly find themselves collaborating with engineers and other disciplines. Systems analysis is, of course, perfectly consistent with adopting a more eclectic approach to the setting of environmental policies. For example, a regional agency dealing with one or more classes of pollution problems might well find it expeditious to use a mix of subsidy, tax incentives and regulatory standards to

achieve a minimum or lower cost solution to its problems. Indeed, and as implied by my previous remarks, such a mixed strategy may be absolutely essential.

If all this seems a bit less emphatic or clearcut in its policy implications than some would wish, I would say so be it. I am afraid that problems of economic externalities, of which environmental problems are only one example, are exceedingly complex and difficult, especially when we move from the simplified models of economic analysis to the realities of policy. Notwithstanding these obvious imperfections or limitations of the economist's contribution, I am also willing to argue that the economist is rather more advanced in his thinking on practical solutions to these problems than most of his academic colleagues in other disciplines. To again quote Kenneth Boulding:

By comparison with the ignorance and even obscurantism of the natural scientist [on these environmental problems], economics stands out like a clear beacon of eighteenth century enlightenment.

GROWTH: MEETING THE CHALLENGE

by

Edward K. Smith

National Bureau of Economic Research

The betterment of mankind has always been the highest concern of Western civilization. It is a recurring theme of our poetry and novels. It is evidenced in our art and music. It is the basis of much of our religious and philosophical thought. And, of course, it is expressed in our political and economic institutions.

It should not be surprising, then, that every age has aspired to improve man's condition. It should not be surprising, either, that in every age, no matter how great its power to advance man's welfare, there have been those who have not deemed their own era a resounding success. Since man has been recording his fate, complaints have been registered that his progress has been either too fast or too slow, his institutions too rigid or too shaky, his ideas too radical or too conservative, his future too uncertain, his past too neglected, his aspirations too great, and his performance too little.

Why should we, therefore, be surprised that in our own time, our own institutions and aims should be neither wholly accepted nor proven to be wholly workable? When has there been, ever, total devotion to and perfection in man's affairs?

Thus, in our age, the age of scientific man, we always find debate on the proper ends of mankind hinging on the uses to which science can be put; and, once science has been put to use, on whether or not the application is successful or proper. When scientific progress was sporadic and slow, our institutions had at least more time to debate and to adapt to

the implications of change. But now it is common knowledge that in this and the last centuries our scientific and technical advance has proceeded so much more rapidly, and the application of knowledge has created so many more uses for and demands on our physical and spiritual resources, that questions understandably arise as to the ability of our institutions — social and economic — to encompass and control the multitudinous effects of such changes.

Our present day is but a moment in the history of man, but to us it is an *important* moment; because we now realize that our ability to do the right thing or the wrong thing is likely to have a much greater impact on future generations than in previous generations.

But perspective is needed. The cries of alarm at what we now do are, if history is any guide, exaggerated. Man has demonstrated that he will not queue up for disaster indefinitely, our instincts for self-preservation being as strong as our penchant for predicting disaster itself. Indeed, our historically demonstrated unease over the future is deep in our psyche, and stems from our instinct for self-preservation and our wonderment about the purposes of life and the meanings of death.

For our own civilization, and especially in the countries of Western Europe and America, the present age has been characterized most by a rapid and substantial improvement in the material well-being of man. This benefit has not been without its costs, both material

Note: This is an amended version of a luncheon address to the Northeast Industrial Developers Association's Annual Conference, Manchester, N. H., Oct. 3, 1972.

and otherwise. Some of these costs are measurable and have been measured. Some are measurable but have not been measured. And some are immeasurable, but are thought to have been measured.

Two major variables that affect our average well-being are population and industrial production. They have been growing at exponential rates. But our physical resources are fixed, in the sense that the world has bounds. Further, substantial elements in our present system of production appear to have side effects that are unaccounted for and are deleterious and possibly disastrous for our well-being. Put all these together and you get the proposition that at some time the *limits* to expansion will be reached; that, given exponential population growth and the great increase in output and consumption attendant to it, the system is bound to reach its limits sooner rather than later; and that the consequent disasters may be more traumatic as a result of their appearing too soon for us to adapt ourselves to them.

This argument is not new. It was given in its purest form by T. R. Malthus, the parson turned economist. Every student of elementary economics has been exposed to the proposition advanced by Malthus that the world population was going to outrun the food supply, so that starvation would ensue as the final limit to population growth. With the technological advances in agriculture, his gloomy prediction happily did not materialize. But the proposition he advanced did not die with lack of proof. It has attained new life and vigor by admitting as an exponential variable one that Malthus assumed to be a constant—technology. Technology is the means whereby we not only exploit the earth's resources but also raise consumption per head. This ever-increasing consumption on the part of an ever-increasing population, this pushing back of the law of diminishing returns—while sustaining the present—will, it is said, impoverish the future. To make matters worse, the less developed nations are cited as examples of both Malthusian versions, the

new and the old, at work at the same time.

The developed nations, on the other hand, with their voracious appetites for resources, are accused of using up the world's natural wealth at a rate that will only speed up the process, to the ultimate detriment of rich nation and poor nation alike.

These are not the only effects of growth which are viewed with alarm. Our industrial technology produces a volume of effluents that pollute and sometimes even destroy our air, our rivers, lakes, and seas, and our bodily mechanisms. Indeed, a long list of bad effects of the industrial and scientific age has been drawn up, long enough for many to call for an immediate indictment of growth before the bar of history.

On the basis of this reasoning, growth is not only condemned, it is denied—denied in the sense that, while admittedly our modern age has increased its output, it has not increased its welfare. According to this line of argument, our growth is not real, or at the very least, nowhere as real as we think it is, for we have neglected to count all the costs. A growing gross national product is not the proper measure of our well-being. We need new measures of our well-being. GNP may be at the base of these measures, but much else has to be included, and many adjustments to or deductions from GNP have to be made before we are able to get a proper evaluation of reality. Our system of income and product accounts is said to be suspect, especially because it does not give a true picture of economic welfare and virtually ignores measuring social welfare.

Thus, we have been not only worshipping a false god—growth—but also measuring the effects of growth, and growth itself, incorrectly. The climate of opinion has changed dramatically. Growth is suspect.

Is it obsolete? If so, this is a sorry state of affairs. Before bitter despair sets in, perhaps we had better investigate the allegations. This the National Bureau is doing, true to its history of seeking facts and tested measures of economic performance rather than subjective

opinions. Our past research that has led to the development of and improvement in the national income and product accounts as primary measures of economic performance and the path-breaking work of Simon Kuznets on economic growth, for which he was awarded the Nobel prize in economics, are now being extended by new investigations into an expanded set of economic and social accounts. These include measures of nonmarket time use, the division of output between current and future use, and the economic and social costs associated with environmental change. In this connection, James Tobin and William Nordhaus of Yale have completed for the Bureau a very interesting and important piece of work which is a pioneering attempt to quantify some of the important differences between the concept of goods and services produced in the market and the welfare concept of goods and services available for ultimate consumption. Their study, published in one of the National Bureau's 50th Anniversary Colloquium Series, that on *Economic Growth*, is entitled "Is Growth Obsolete?"

Tobin and Nordhaus discuss the development of economic growth theory from the classical theory of the stationary state to modern neoclassical growth theory and the acceptance of the economic growth norm and its proclamation in the early 1960's as an objective of government policy: to get the economy to produce at its potential, and perhaps to raise that potential by accelerating the productivity of labor and increasing the accumulation of human and physical capital. Growth advocates have always been aware of the difficulties of increasing growth rates and of the necessity for sacrificing present consumption for the benefit of future generations. Thus, Tobin and Nordhaus note both that those who advocate growth place future above present and that, ironically, "the antigrowth men of the 1970's believe that it is *they* who represent the claims of a fragile future against a voracious present."

They direct their attention to three problems raised by those who question the desira-

bility and possibility of future growth. First, the usefulness of output measures for evaluating the growth of economic welfare; second, the question of whether the growth process must waste our natural resources; and third, how the rate of population growth—especially zero population growth—affects economic welfare.

In meeting their first problem, Tobin and Nordhaus construct, within the existing national income and product accounts (NIPA), a new measure of economic welfare (MEW). I will not trouble you with all of the complicated adjustments and many pitfalls inherent in constructing such a measure. The authors admit their measure is "primitive and experimental"—but it *is* a *measure*, at least—and I think it a remarkable start toward the kind of work that needs to be done to guide us in the future.

Briefly, the work involved adjusting personal consumption by (1) *deducting* instrumental expenditures (i.e., intermediate rather than final goods) such as defense and sanitation expenditures, durable goods and other household investments, and an amount for "disamenities of urbanization," and by (2) *adding* the services of consumer capital, an imputation for leisure, and an imputation for nonmarket activities, along with government consumption and the services of government capital, to arrive at MEW total consumption (MEW net investment is deducted to arrive at sustainable MEW). MEW is, then, quite different from our conventional measures of output.

The authors conclude that *per capita* MEW has been growing at a 1.1 percent annual rate since 1929, while net national product, the conventional measure, has been growing at 1.7 percent annually. Thus, "the progress indicated by conventional national accounts is not just a myth that evaporates when a welfare-oriented measure is substituted." Our growth *is* real, both materially and in terms of economic welfare.

So far as natural resources go, the Tobin-Nordhaus simulations, made both over a

three-hundred-year and a fifty-year period, imply that "growth will accelerate rather than slow down even as natural resources become more scarce in the future." Their results are consistent with the fact that the substitution of capital and labor for resources is high (significantly greater than unity), or that technological change is relatively resource-saving, or both. Tobin and Nordhaus have *not* found evidence to support the fear that natural resources will be an increasingly severe drag on economic growth. Indeed, the opposite is true: "Growth of output per capita will accelerate ever so slightly even as stocks of natural resources decline."

We all know that population growth cannot continue forever. There is little to guide us in developing a theory of fertility to fit the observed facts, however. The National Bureau's work under the direction of Victor Fuchs and others is continuing research on fertility patterns and their economic determinants. Tobin and Nordhaus concluded that "in a ZPG equilibrium sustainable consumption per capita would be 9-10 percent higher than in a steady state of 2.1 percent growth corresponding to 1960 fertility and mortality, and somewhat more than 3 percent higher than in a steady state of 0.7 percent growth corresponding to 1967 fertility and mortality." They also found that "as between 1960 equilibrium and ZPG, the diminished drag of resource limitations is worth about one-tenth of 1 percent per annum in growth of per capita consumption."

Their conclusion:

Although GNP and other national income aggregates are imperfect measures of welfare, the broad picture of secular progress which they convey remains after correction of their most obvious deficiencies. At present there is *no* reason to *arrest general economic growth to conserve natural resources, although there is good reason to provide proper economic incentives to conserve resources* which currently cost their users less than true social cost. Population growth cannot continue indefinitely, and evidently it is already slowing down in

the United States. This slowdown will significantly increase sustainable per capita consumption. But even with ZPG there is no reason to shut off technological progress. The classical stationary state need not become our utopian norm.

I might say that, as to a choice between zero population growth or zero economic growth, the former need not result in an unacceptable state of affairs, but the latter undoubtedly will. ZPG can, under the proper conditions, raise *per capita* welfare, but zero economic growth will make it very difficult to avoid internal social and political stress.

But I wish to go beyond the conclusions reached by Tobin and Nordhaus. It is folly to ignore the political and social effects that might ensue from a blind adherence to the notion of a stationary state. While we may all agree that growth *per se* is not an end to be sought as a thing in and for itself, it would be foolish of us to attack technological change when technological change may be the only effective route to an increase in the general welfare of man, or to attack education and science because education and science can be misdirected, or to turn to antiscientific and Luddite behavior because science and machines have not brought us Heaven in our time. The fact that we do not live in paradise has long been recognized, but this does not mean that the alternative is Hell on earth. And surely a no-growth economy will create troubles. For example, will domestic tranquility increase when the poor ask the rich for a larger share of the unchanging total product (or a total product which increases only enough to keep per capita product constant)?

A no-growth economy will have to beg resources from one use to put them to work elsewhere; government revenues will not create via the fiscal dividend the wherewithal to finance new programs considered socially necessary; and the resources necessary to win the battle against pollution, poverty, and disease will be harder to come by, not easier.

The prospects, however, for a stable-state, no-growth economy coming into existence after a long history of growth which has shown the way to progressive improvement in mankind are slim. In the first place, it is politically unlikely. In addition, it is technologically unlikely. This is an important, and too often neglected, point. We must not forget that, even if we wanted to, we probably could not invent a political system and a social ethic that would contain, restrain, or prevent technological change. We would literally have to overturn Western civilization and its ethical norms. We would have to completely control science. Science has a life of its own. We cannot predict where it will go, or take us; if we knew, we would already be in possession of the secrets of the universe. Nor can we control or inhibit the minds of men. We will always tinker with our world. The problem is to put scientific method and scientific results to the proper uses of mankind. Antiscientific biases lead only toward myth and simplistic solutions, with all their ideological dangers.

Thus, my view of the no-growth economy is that, however undesirable or unnecessary it may be from an economic point of view, it is far more undesirable, indeed dangerous, from a political point of view.

So far as ZPG goes, the most recent census projections show us now to be at a reproduction rate of 2.1, or about the ZPG rate in the absence of immigration.

We have found, then, that there is substantial evidence not only from our observations of the historical development but also from the Tobin-Nordhaus work that the answer to the question "Is growth obsolete?" is *no*. And if it is *no* from the point of view of economic welfare, it certainly reinforces the necessity

of growth from a political and social view.

The choice before us is not to slow down or to stop growth. It is to direct growth, as best we can, into useful and socially productive channels. If our population growth slows down, consumption per capita can continue to rise without serious effect on our resources. And certainly the poorer nations will demand a significant increase in *their* material well-being, even if we do not.

However optimistic we might be about events in the future, there are sure to be cries of impending doom. Nowhere is this more evident than in the recent *The Limits to Growth*, which was given the endorsement of the Club of Rome and greeted with much fanfare a short while ago. Carl Kaysen, in a perceptive and pointed review in *Foreign Affairs* entitled "The Computer That Printed Out W*O*L*F*," rightly takes issue with its major conclusions. Systems Dynamics and the invocations of the computer combined to produce a good deal of nonsense. Kaysen shows why the "authors' analyses are gravely deficient and many of their strongest and most striking conclusions unwarranted." This work predicts catastrophe, about a generation away, with a point of no return if we go on as we have been. The argument follows the one I mentioned previously, essentially the new Malthusian cause. But, as Kaysen points out, the computer cried W*O*L*F*, for the conclusions lack analytic underpinning, no matter how important the questions raised may be. Thus, the prescriptions are wrong and the urgency with which they are advanced misplaced. There are many more immediate and pressing problems. With Kaysen I think we can all say: "A good sentry does not cry up tomorrow's wolves and ignore today's tigers."

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Restrictions 23AA _____ 23AB _____ 23AC _____ 23AD _____
R.R. No. 25AA R001098 C Roy % Mic 25AB 10000 Roy % Xerox 25AC 10000
LC Class No. 27AA _____ LC Card No. 27AB NUC74-180026

COMMENTS:
1/17/78pb

Class number?

