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THE NPG FORUM

The Biologist and the Economist: Is Dialogue Possible?

by Nathan Keyfitz

When population issues arise in government or the press, economists' advice is regularly sought, even though modern post-Keynesian economics offers very little methodological help in dealing with secular change or limits. Biology is perhaps the discipline best suited to offer systematic insights into the relationship of human populations to the biosphere that supports us, but biologists are seldom consulted. Nathan Keyfitz here offers a proposal for a way to a dialogue between the two disciplines that offers the hope of using the strengths of each.

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— Lindsey Grant, Editor

Resumption of the nineteenth century dialogue between economists and biologists could resolve ambiguities in current policymaking. Beyond that, however, we need a sustained effort to educate the country and eventually the politicians if demography is to be brought into policymaking.

Leaders who seek to protect the environment ask advice from biologists; leaders uninterested in environment ask advice from economists who share their indifference. That applies in particular to population; biologists on the whole see the current multiplication of our species as a potential disaster for the planet; economists say that population increase may hamper development, but not much, and with sound economic policies little or not at all.

I recently attended a meeting called by Brandeis faculty to reconcile the thinking of biologists and economists on population. It included prominent scholars on both sides, all courteous, even amiable. Each waited in silence until the other had finished, then expounded the perspective of his or her own discipline, neither contradicting nor agreeing with anything the other had said, in fact taking no notice of it at all. In three days of pleasant talk and good fellowship no one made the leap required to understand enough of the other discipline to say why it seemed wrong.

Biologists gave concrete expositions of species destruction, desertification, etc. while economists did not speak to such points but expounded the elementary principles of market economics. They insisted that those principles are universally applicable; they could be applied without any need to be modified to recognize the limited capacity of the ecosphere to stand what 5 billion people and something like 20 trillion dollars worth of economic production are doing to it.

We need some device for lifting the interdisciplinary dialogue off dead-center, where it was stuck in our meeting and in other forums. Before suggesting such a device, which is my purpose here, it may be worthwhile to see how this apparent deafness to ideas from another discipline has arisen and is maintained.

Such a difference did not always exist. Running parallel to the economic theory of development, from Adam Smith to the present century, has been expression of concern by biologists, what may be called an ecological preoccupation, about the capacity of the planet to support the increasing human population and to withstand the operations humans were carrying out on it. For Malthus this focussed especially on limits to food supplies,

for his successors on limits of other raw materials, then about the middle of this century on the limited capital available for development.

At the start there was no problem of communication between the economic and the ecological side; the same scholars wrote on both and they could be consistent with themselves. Alfred Marshall, the leading economist of the late 19th century, said that biology was the natural science that had most to teach economics. But in the past two or three decades the two sides have diverged. It would be too much to say that a debate is going on, for a debate requires that each side answer the points raised by the other. How can the conditions for debate be established, and the public understanding and democratic decision making advantages of a debate be secured—that is another way of putting the question of this article.

The non-communication with which we are concerned arises because of the organization of academic life.

Disciplines are practiced in separate departments, with separate budgets, separate national societies, separate journals. Each has its own criteria for selection of students, its isolation of practitioners starting with the beginning of graduate study, its distinct vocabulary. Students are selected and ultimately given degrees; they are hired as assistant professors and elevated to tenure or not, their researches are funded or not, all according to the judgment of practitioners in one single field. That does not make a discipline a mutual admiration society. Work within any discipline is subject to the harshest of criticism, but always by other practitioners of the same discipline, with both the critic and the criticized animated by the same loyalty to a certain body of thought. (Nathan Keyfitz, 1992. "Interdisciplinary analysis in four fields." *Bulletin of the American Academy of Arts and Sciences*, Vol. XLV, No. 5, p. 6.)

Yet this separation of the disciplines still does not explain how economists could arrive at the conclusion (that seems so strange to biologists) that population and its growth do not make much difference to development and hence to human welfare. One way of understanding the logic of that is in terms of the limits to population and its welfare, as these have come to be seen by economists, especially in the last two or three decades.

The Changing Meaning of Limits

For Malthus the limit on population numbers was food, and he saw availability of food as in all times and ages drawing a line beyond which mankind could not numerically expand. At their own choice, in deciding the number of their children, people could press against that line, or they could stay well inside it. Before the food limit was reached Malthus foresaw misery, as though within the boundary that surrounds us is a ring of increasing trouble. Like other economists of his time, Malthus did not foresee the technical changes of the 19th and 20th centuries.

Yet now we are all aware that limits to the numbers and prosperity of mankind depend on technology, and a limit that

crowds mankind in one epoch can suddenly widen with some innovation. The Green Revolution is to be interpreted as a moving outward of the food limit to population. Of course localities must be differentiated, for some countries and parts of countries have little access to world supplies. We had better think of each area having its set of concentric circles, representing the various limits to which it is subject, and for some the food limit is already very close.

As the 19th century advanced it came to be thought that minerals (for Jevons it was coal), at least from the viewpoint of economic progress set a closer limit than food. But now economists believe that with the advance of technology and observation of the possibilities of substitution the minerals limit has moved far out, so far that it can be disregarded for all minerals except oil. However, water is essential, and in particular fresh water is one resource that cannot be substituted, whose lack is in some parts of the world already making life miserable. On the whole the neglect of all natural inputs to the productive process represents a degree of technological optimism that is hard to accept.

When all these limits of natural resources are pushed far out there remains shortage of capital, the tools and equipment that would enable people to be productive. That was the limit to be found in the work of economists Arthur Lewis, Coale and Hoover, and others writing in the 1950s and 1960s, and universally applauded. Yet that has since been increasingly dismissed by economists; capital is seen more as the result of development than its cause. Labor, they say, can make the tools with which its work will be productive. The difficulty that unequipped workers would have in creating modern agricultural and factory equipment is dismissed. Yet to one not an economist the current shortage of capital in the world makes it hardly possible that population can grow without reducing the share of each of us, and so reducing welfare by making our work less productive.

But overlooking all limits of food, other materials, and capital, there remains the strongest argument of all for holding down population numbers. That is the stability of planetary support systems, everything from species diversity to the ozone layer to global climate. Especially because of our ignorance of these there are many advantages in not pressing against the world population carrying capacity, whatever that may be. In terms of the limits concept, this translates into having mankind's numbers stay well within the boundaries set by the concentric circles of the various kinds of life sustaining resources. I have to stress our ignorance of just what we are doing to the terrestrial support systems on which we press; in our ignorance we may unwittingly be bringing some other limiting circle uncomfortably close to us; more than that we may be preparing a sudden disaster.

To establish the boundaries set by various essentials for human life that are finite in quantity is a complex matter, as many of those that write about carrying capacity do not sufficiently recognize. The circles that bound us are constantly in motion, with the advances of technology and changes in natural conditions, many of them initiated by human action. The global warming of the next century will extend deserts, and so probably bring closer the food limit for the world, and will without question bring it closer for many already dry localities. In the face

of complexities and uncertainties, and without any deeper knowledge than we now possess, it is fortunate that some actions can be clearly specified, some sequences of behavior initiated, that unambiguously make the human population more secure and prosperous, irrespective of what the ultimate total solution of the overall environment problem may turn out to be. Of these reducing the population by having fewer births than deaths is the easiest and surest.

Economists have insisted that no one yet knows enough about those limitations for economic policy to take the environmental constraints into account. Much of the discussion has been on points of fact: what will global warming do to agricultural productivity in various regions, is the ozone hole really going to spread, will we not be able to get along without those species that are being lost, can we really not find places to dispose of toxic waste?

Indeed uncertainties abound on these and other matters. Yet few seem to have noticed that every economic question from whether or not to buy a dozen eggs in the town market to national policy on money supply has to cope with uncertainties. It is not explained why uncertainties have become such an obstacle to serious thought and action just on one matter of supreme importance—the environment. And on what is central to that, the role of population in damaging it.

Notice how uncertainty is for some of us a strong argument for holding down population, for not pressing against the limits we know, for there may be other limits that will do bad things to mankind long before the limits we can clearly discern are reached. On the other hand some economists (and President Bush at one point) say, in effect that the scientists yet do not know exactly what is happening, so let us continue business as usual until they can make up their minds. This is not the first time that the same fact (here uncertainty) is used to justify contrary attitudes.

Bringing the Two Sides Into Contact, and so Initiating a Real Debate

The device I propose for getting the debate off dead center is to ask each side to accept, just for the sake of the argument, the facts and conclusions presented by the other side. To ask, that is, IF the biologists' worst horror stories are true, what WOULD BE the right economic policies? And IF the economists' characterization of the merits of markets and the incompetence of governments are correct, what action would biologists recommend to avert catastrophe?

I am not the best student to go on from here, but can offer some suggestions. Making the extreme assumption that the present course of economic growth and population increase would turn much of the planet into desert within the next century or two, what change in economic policies should be initiated now? Simply checking economic progress, stopping the clock, freezing haves and havenots where they are now, will not do. What are the minimum and most likely-to-be-accepted changes in the direction of progress, what limits on the trajectory of the economy and of the population, would deflect spaceship Earth from the disaster (of warming, of desertification, etc.) towards

which we will assume it is heading?

Asking economists to forego debate on the findings of the alien discipline, and to accept them for the argument, has as its dual asking the biologists to accept the economists' view that the market is the best decider on all issues, infinitely wiser and more farsighted than government. Of course there are cases of market failure, through externalities, or increasing returns to scale that lead to monopoly, or gross inequities where some individuals are disadvantaged through initial poverty, or commercial rates of discount too high to protect later generations. But attempts of governments to correct these failures can often go wrong. Let us suppose that biologists accept the market, notwithstanding the many instances of market failures, that can after all be corrected.

Then what lines of biological research would develop new technologies—say in agriculture—that could make the tread of humans fall more lightly on the earth. No one, least of all demographers, would want to go so far as to prescribe how many people can be sustained on the earth and its separate regions, that being intertwined with unforeseeable technical and social changes. But IF those deserts are truly spreading, warming accelerating, etc. THEN one would have to accept the conclusion that the number of increase from the present ought to be as small as can be secured with the widest distribution of family planning instruments and the most vigorous presentation of information on why they ought to be used.

This was exactly US policy until the last decade and it was beginning to work, when we officially reversed ourselves. Many in the social science community went along with the official change, and found reasons (reasons are always to be found) why the reversal was justified, why population increase did not make all that much difference to development, and why conditions of sustainability no longer had to be taken seriously. Man's inventiveness, human capital, they said, would overcome all difficulties, and the more people the more geniuses who will provide the necessary inventions.

The conclusion of economics that biologists on their side would be asked to accept is the shortsightedness of governments. The myopia of the market cannot be corrected by official agencies that are more myopic than businessmen. If business is only concerned with the profits of the next few years, governments are only concerned with the next election. That is if they are democracies; if they are dictatorships they do have the power to protect the environment without asking approval of an electorate, but I know of no case where they have seized the opportunity to protect the environment so presented.

The conditional acceptance on the part of each discipline of the conclusions of the other could even become a habit. Economists and biologists would each find that they can live with the results of the other, a mutual acceptance not to be found today. Neither side could argue for the kind of facile solution that one now hears. Economists would accept the facts and estimates made by biologists, who on their side would give up the hope that governments would act against the wishes of their constituents, however noble the purpose. Recognizing that the limits are severe and permanent—that they are going to be with us for all of the remaining tenure of man on Earth—would become part of the basic assumption of all disciplines.

Science, Education, and the Political Process

But if the disaster is truly facing us within the next century, and there are means to avoid it but we cannot push legislators out ahead of their least informed constituents—that way leads to electoral failure—then what is to be done by the union of economists and biologists here postulated? The answer can only be in more knowledge—creating that is what scholars are expected to do anyhow—AND its diffusion to the public.

Effectively getting knowledge into the minds of the public is frustrating for scholars. We have seen in Europe that a steady 10-12 percent of electorates vote for green candidates, and the prospect of increase in this percentage is not imminent. In the attempt to increase their following the greens widen their platform to include matters unrelated to environment, but this dilutes their appeal. Nothing is going to change this quickly, but that need not make us despair.

The results of science do in fact get to be disseminated. The extraordinary change in health practices shown by current statistics of meat consumption, smoking habits, exercise, have all been occurring within a very few decades of the first announcement of the Framingham study results, the Surgeon-General's Report, and other analyses. Similarly it must be with environment questions: a result comes out of the laboratory or the field, it works its way through undergraduate courses, and from there it penetrates downwards via the Sunday Supplements to the literate population, and it penetrates upwards to the legislators.

In short the process of change can only be as fast as the creation of knowledge and its diffusion through conventional paths in societies with free flow of information. Our public sensitivity to environmental problems may not be instant and complete, but compare it with the total lack of sensitivity under totalitarian regimes! And in any country the environment can only take its place within a scheme of priorities. It lost its place on the front page with the opening of hostilities in the Persian Gulf, nor has it entirely regained that place now that hostilities have died down. The process of scholarship and its diffusion goes at its own pace, and sooner or later gets its results accepted even among the most fickle of publics.

Thus the process of communication in which the relevant new knowledge emerges into the public domain includes a first stage (after initial discovery) in the college classroom, a second stage in the media, a third by word of mouth for those who are neither students nor readers. It can well be that politicians are among the last to be reached, or at least the last to be convinced to the point where they take action.

A democracy requires independence and leadership on the part

of its legislators, at the same time as it requires them to do what constituents want. No one has shown how these two contradictory requirements can be reconciled, and in our age of opinion polling followership on the part of democratic rulers has become more prominent than leadership.

Thus the necessary knowledge to understand the condition of the ecosphere spreads through the schooled part of the public, and then to the less schooled, and more informed publics can then move the politicians in various desired directions. We have gone through these stages in respect of personal health consciousness, and in respect of family planning in the developed countries, so let no one say that the sequence described is impossible.

What must come sooner or later are such changes as moving from an income tax to an expenditure tax, with differential rates according to the impact on the environment of various kinds of expenditure. Critics will be quick to say that an expenditure tax is regressive, but progressiveness can be restored by services to those of lower income, even a demogrant or negative income tax. And once this becomes general in the MDCs it will be noted and taken up by the LDCs just as surely as they have taken up our refrigeration, our supermarkets, and our motor cars. That will complete the worldwide change. But it will not happen this year or this decade.

I emphasize that in the initial stages of its diffusion the discovery proceeds by instruction and precept. Some countries will apply it and show how it works, and others will follow their example. Such a path of change, going by example from rich countries to poorer countries, is exactly what took place in the field of birth control. It is hard to imagine any other route of transfer. Imagine what the response would have been if we had continued to have 8 children and urged the LDCs to stop at 2!

Natural science tells us that with growth of population and of the world economy on its present consumption path the environmental condition is bound to become more critical year by year. Some of the problems will be resolved by individuals acting in free markets, while many others require collective action. When the condition becomes severe enough the action to be taken will be obvious to all, so that policy makers will act vigorously, but it may then be too late to reverse the worst effects. In that sense we have a race between deterioration of the planet on the one side, and the fostering and spread of knowledge on the other.

Thus I am saying that we should assume that biologists and economists are both right, each in their own field. A debate carried out with that assumption should then reveal what feasible path of discovery and diffusion of knowledge will deal with the most pressing problem of our times, and actuate publics and the politicians representing them to deal effectively with it: the destruction of the physical habitat within which mankind and its civilization will have to sit for all foreseeable time.

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