# GUEST EDITORIALS

## Dangers of Uninformed Optimism

The latest annual report of the United Nations Fund for Population Activities (UNFPA) was optimistic that 'The earth's physical capacity to feed 10.5 billion [thousand million] people is not really in doubt', while commenting 'Indeed, some estimates suggest that four times that number could be fed on present land and present technology' (International Herald Tribune, 1981). This would seem to disregard the frequently-expressed doubts of other concerned agencies—including the Food and Agriculture Organization of the United Nations (FAO)—about feeding the world's growing population even for the next decade or two, during which time the population is expected to increase by less than 50%. Already a third or more of the human beings on Earth are at best marginally nourished, and at least 10% (by the FAO's conservative criteria) are seriously underfed. The outlook for many of the regions where food supplies are short is for them to become even shorter (e.g. FAO, 1979).

As has often been pointed out, sufficient food is being produced to feed the world's present 4.5 thousand million people quite adequately *if* it were equitably distributed. But this (1) is a very big 'if', and (2) says nothing about how several thousand more millions of people might be cared for. The low probability that the inhabitants of Europe, North America, Japan, and other rich regions or countries, will voluntarily give up eating meat so that South Asians and Africans can eat more grain, is only one (albeit huge) obstacle to improving the food situation. (Greatly increased costs of producing meat and enhanced needs for export revenue, of course, might lead to another story; but the same economic phenomena might also raise the prices of grain beyond the means of poor countries.)

### *Doubtful Prospects*

Given, then, that the present inequities in food distribution are likely to persist (if not worsen) for at least the next few decades, what are the possibilities for greatly expanding food production? Moreover, to meet UNFPA's population-growth scenario, how much will be needed, and how soon? Where are the greatest needs, and where are the smallest?

UNFPA's medium population projection (Salas, 1981) shows the global population reaching 10.5 thousand millions in 2110 and then 'stabilizing' (i.e. remaining at that level). The most rapid growth is expected to occur during the next several decades because of population momentum, whereas forty to fifty years from now, growth should have slowed markedly in response to continued declines in fertility. Nevertheless by then the world is expected to be trying to support 8 thousand million or more people.

It is curious that UNFPA apparently has not yet entertained the possibility (let alone the desirability) of a general population *decline*—even though that happy state has already been achieved in several European countries, and is now an explicit demographic goal for the People's Republic of China. Without having seen the detailed projections, we would guess that this failure to allow for sustained below-replacement reproduction and negative growth also accounts for the surprisingly long periods—50–110 years—required before stabilization is reached in such regions as North America, Europe, and the Far East. This raises the crucial question of time: supporting a population of 10.5 thousand millions for a brief period, after which it slowly shrinks, is quite a different proposition from supporting so large a population in anything like perpetuity.

To return to the above dangerously complacent suggestion that 'four times [10.5 thousand millions] could be fed...', how valid are the estimates on which it is based? Most such studies are simple extrapolations based on per-acre yields of Iowa farms applied to estimates of actual and potential arable land in the world. A host of problems are overlooked in this oversimplification. First, very little land in the world has the productive capability of Iowa farms, whether with or without modern farm technology. Repeated attempts to transfer this technology to the tropics in particular have clearly demonstrated that it generally does not pay off nearly so well in most places—the soil is simply not of the same quality, and the pest situation is fundamentally different. Moreover, there have been some serious social and economic barriers to the spread of such technology in poor countries. Thus, dedicated attempts to raise yields in developing countries to match those of temperate-zone rich countries have largely failed, although admittedly there is still a good deal of scope for improvement. Still, even the most ardent 'green revolutionists' do not claim that present and foreseeable technologies, applied without hitches, could more than double the grain yields of most developing countries.

Furthermore, these studies assume that currently uncultivated but 'potentially arable' lands are (1) readily available for conversion to farmland, and (2) roughly equivalent in quality to the land that is now being farmed. In reality, most of the unfarmed land that remains could not be converted without large expenditures for forest-clearing, drainage, installment of irrigation systems, or other kinds of development. In many areas, sufficient water is simply not available in the necessary amounts. Much land that is uncultivated is now being used for rangeland; conversion to cropland would result in its loss for that purpose. Moreover, the average quality of the land which is not now under the plough is considerably lower than that of what is; indeed much of it, if converted, would produce crops for only a few years at best.

### *New Land Myth*

To put this 'new land' myth into perspective, the U.S. Government study *The Global 2000 Report,* released last year, estimated that the substantial projected increases in world agricultural production would be achieved mainly through higher yields, because the expected *net* increase in cultivated land would amount to only 4% (*Global 2000 Report,* 1980). The net increase is important because, while considerable amounts of new land might be converted, much of it would be offset by the loss of land taken or forced out of production for various reasons: urban development, desertification, salinization, etc. The study also pointed out that the average quality of the new land for



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agriculture would be significantly lower than that of the land which was being lost, thus putting an additional burden on technology's yield-raising capabilities.

Finally, these studies also assume that the possibly forty-odd thousand million people would consume a minimal basic diet consisting mainly of grains—in other words, the maximum population subsisting at the lowest level with no margin of safety. (We'll leave it to readers to contemplate the attractiveness and security of this scenario!)

*Realistic Studies*

What do more realistic studies show? Until now, we have discussed the problem almost exclusively in the context of *feeding* a possibly much larger future population, without reference to other needs and resources. Yet the fact that civilization is already encountering difficulties in obtaining—and affording—the necessary resources, should be obvious to anyone who reads newspapers. Moreover, the availability and cost of *other* resources are vitally important to food production.

In particular, modern high-yield technology is highly dependent on fossil fuels; not only are they needed to run farm machines and pump irrigation water, but they are essential in the manufacture of fertilizers and pesticides. Shortages and high costs of petroleum have already retarded efforts to increase food production. This has been felt most keenly in food-short developing countries, but it has been a problem in rich ones as well. It is quite clear that depletion of the world's petroleum will increasingly be a constraining factor in attempts to expand world food production over the next few decades, quite apart from any political problems that may influence its availability.

Supposedly renewable resources can also be constraining factors. The United States has dramatically raised its already impressive grain harvests since 1970. But these gains have been achieved mainly in two ways: by tapping, for irrigation, vast stores of underground water, and by abolishing the famous 'Soil Bank'. Unfortunately, much of the underground water—nominally a renewable resource—is being drained far faster than it can be replenished by natural recharge. The enormous Ogallala aquifer, underlying the Great Plains, will be seriously depleted by the year 2000 at present rates; in many areas the water-table has already sunk too low to be economically usable.

Most of the 60 million acres (24.3 million hectares) of land that was formerly in the US 'Soil Bank' was marginal in quality; much should never be cultivated continuously. Putting this land into permanent cultivation has provided a temporary boost to the grain harvest and accelerated the losses of American soil to erosion—already a national scandal. Thus economic pressures on American farmers to produce for export are inducing them to make short-sighted decisions; the resources needed for future productivity are being undermined and degraded for short-term gains.

This degradation of the land is basically an environmental problem, and a healthy environment is in a sense another essential resource. Ordinary pollution can affect productivity, as can misuse of pesticide (by leading *inter alia* to worsened pest problems) and of other farm chemicals. Fisheries are particularly susceptible to pollution and to 'development' of streams and estuaries. Most of all, successful sustainable agricultural systems are supported in a myriad ways by the healthy functioning of the natural ecosystems in which they are embedded (Ehrlich *et al.*, 1977; Ehrlich & Ehrlich, 1981; *see also* Ehrlich & Holdren, 1975).

*Ecological Services of Natural Systems*

Among the vital services performed by natural systems that are particularly essential for agriculture are: (1) maintenance of stable climate and weather; (2) regulation of the hydrological cycle; (3) cycling of nutrients and disposal of wastes; (4) pollination of numerous crops; (5) control of virtually all potential pests and diseases of crops and livestock; and (6) maintenance of a vast genetic 'library' that includes wild relatives of plant crops and domestic animals (which are needed for breeding new varieties) as well as innumerable potential new food sources. Assaulting natural ecosystems on a massive scale is one more way in which civilization is now undermining its agricultural base. Indeed, agriculture itself is a major force in exterminating nonhuman organisms—a process that amounts to destroying the working parts of civilization's life-support system.

All these problems, of course, are by no means unique to any one region; they are a world-wide phenomenon. The Sahel tragedy, for instance, was the result basically of a small climatic shift, the effects of which were grossly magnified by overcultivation and overgrazing in a vulnerable environment. It is an extreme example; but the processes of desertification (often a consequence of overgrazing or overcultivation) and salinization of soils and water-supplies (from poor irrigation methods), soil erosion, the draining of aquifers, wholesale deforestation (in the name of agricultural expansion, which often turns out to be temporary), pollution, and other kinds of environmental deterioration, can be seen in country after country, rich or poor. They are constraining factors on agricultural expansion today, and they promise to be even more so in future decades (*Global 2000 Report*, 1980).

Human beings, of course, could change their ways and develop more far-sighted agricultural policies: exercise soil-protective farming methods; use water resources wisely and carefully; allocate needed energy resources prudently while developing other methods that do not depend so completely on fossil fuels; learn the importance of protecting natural ecosystems, and so forth. But, as the global human population continues to grow by 1.7% or so per year, how likely is such wisdom to prevail—especially in poorly-fed developing countries where the overwhelming need is to keep food appearing on the family table this week?

*Adverse Changes of the Past Decade*

The 1970s marked a 'watershed' in the story of world food production since World War II, although most people are unaware of it. Before 1972, global production of grains (the staples of the human diet in poor countries and the basis of meat production for the rich ones) never failed to increase from one year to the next. In the eight years from 1972–79, however, it actually *declined* between 2% and 4% in three of them, and in 1980 it barely increased over

1979—a year of poor harvests. Thus the 1980 harvest was still some 3% below that of 1978. Meanwhile, the world population had grown about 3.5% in those two years. Blame has been variously assigned to 'unusually' adverse weather, rising energy-costs, and problems in extending the 'green revolution'—none of which was unforeseen.

On a *per caput* basis, too, the 1970s saw a change. Averaged over the decade, annual increases in food supplies per person were distinctly smaller than in previous decades. Regionally, the trend was even more ominous: in most of the less-developed regions, there was no significant gain; in subsaharan Africa there was actually a *10% decline* in food production per person over the decade. Such trends, reinforced by the rising world-wide rates of inflation—including the prices of food and farmland—demonstrate that it is becoming progressively more difficult to keep on increasing food production every year. It is also clear that, in many regions, greater and greater pressures are being put on other resources—such as freshwater supplies, soils, and fossil fuels—in order to keep on producing, thus undermining the land's future productivity in order to keep its present production at or near the maximum.

No sensible person, aware of the current and foreseeable food/resource situations, could view the demographic prospect with equanimity. Of course, very laudable progress has been made in the past decade, both in raising global awareness of the dangers of population growth and in encouraging a decline in fertility in a great many nations. For their role in catalysing this unquestionably momentous world-wide social change, the people at UNFPA deserve our congratulations. But apparently they have looked only at the demographic aspect of the human predicament, completely ignoring the visibly tightening constraints on further population growth and the rising international tensions that are clearly associated with them. If the demographers would only raise their eyes to examine the other components of the population/resource/environment balance (in this context, food is clearly a resource), they would quickly realize that this is no time to rest on their laurels.

On the contrary, it is essential that they redouble their efforts and hasten as much as possible the arrival of zero population growth, followed by a prudent reduction in numbers. The goal should be to hold the peak world population, if possible, below 8 thousand millions—less than twice today's population size. If the human population cannot soon be curbed by humane means, Nature will do the job for us—and she is not noted for her kindness and compassion.

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Anne H. Ehrlich, *Senior Research Associate*
&
Paul R. Ehrlich, *Bing Professor of Population Studies*
*Department of Biological Sciences, Stanford University*
*Stanford, California 94305, USA.*

## Population and Pollution

Man's prehistoric ancestors were unhygienic creatures. Archaeologists find the bones and other remains from their meals, mixed with miscellaneous debris, littering the floors of their caves. This enables scholars to put together a picture of their life-style. As human numbers were small, the general effect of this domestic squalor on the world's environment must have been slight. Smoke from their cooking fires was rapidly dispersed to insignificant levels, and the rivers must have been able to cope with the small amounts of ordure by the normal processes of self-purification—even if pathogenic worms and other organisms were transmitted by their waters.

As human numbers increased, and as urbanization developed, pollution became more serious. While the wastes from a family group soon decomposed and re-entered the cycle of nutrients, those from larger human aggregations presented problems. As cities grew larger and larger, the problems became more and more serious, and then, with the coming of industrialization, many new and dangerous substances were added to Man's wastes. Cities thus became stinking, disease-ridden places.

Eventually, things got a little better—particularly in Western Europe—but in some cases, improvements in certain areas meant more serious damage in others. Thus before water-borne sanitation was introduced into London in the nineteenth century, the Thames was a relatively clean river where Salmon (*Salmo salar*) passed upstream through the urban waters. However, conditions on land were apt to be quite dreadful, for the overcrowded slums were highly insanitary. Although some of the 'night-soil' was collected and used as manure (an admirable instance of recycling), dirt diseases were rife in the city, and the death-rate was high. Then hygiene and health were greatly improved with the introduction of the water-closet; but the Thames, which received the untreated waste products, became an almost lifeless 'open sewer'.