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The Quality of Life: What Quality? Whose Life?

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ABSTRACT: As a consequence of industrialization, we face unprecedented pressures on the carrying capacity of the earth. Desertification, pollution and global climate changes can only increase these pressures, and will cause vast increases in the number of refugees and widespread risks to human health. Increasing inequalities between rich and poor nations are potential causes of conflict. Since the industrial countries are mainly responsible for our economic problems, they must give a lead in global arrangements to alleviate them. A major change in our habitual patterns of thought is essential, in which we reassess how we perceive values, and how we measure wealth and well-being. This must be accompanied by governmental action: on population numbers and the refugee problem; on the efficient use of energy; on new methods of land use, and on regulation of damaging industrial activities. To act in these ways, governments must reorganize their domestic policies and increase international co-operation.

KEYWORDS: Climate change, economic values, environmental policy

I was recently in south west France. We dined in the open air by the light of two candles under the immensity of the Milky Way and half a moon. I was reminded of some eloquent words of Jacques Soustelle when he referred to the movement of human history through a night in which people carrying little lamps like fire flies marched from age to age towards an unknown destiny (*Les Quatre Soleils*, 332). Where are we going? Is anyone leading us? What is in the dark around? Without greater understanding, the quality of life becomes meaningless. We have to ask ourselves: What quality? Whose life?

Let us begin by standing back and realizing that we are living in a highly abnormal moment. Our minds are calibrated to a particular time scale. We understand well enough the changes which can happen during a human life, and with some discomfort and certainly some measure of illusion, those that can happen in two or three generations. But beyond that scale time becomes abstract like noughts added to large figures. Yet understanding of change requires two

things: a stretching of the telescope so that we can see change in its historical perspective; and a widening of the lens so that we can see that what previously took hundreds or thousands of years is now happening around us in our single lives at alarming speed.

Here are some simple points to give a sense of historical perspective:

- in the last two and a half million years, the earth has been in an ice age mode. The rhythm is very roughly 100,000 years of glaciation, and between 10,000 and 15,000 years of warm intermission. We are the second part of the last intermission;
- the last 10,000 years have seen all human civilization;
- in the last 250 years the industrial revolution has changed the face of the planet. It is based on an unprecedented consumption of natural resources, especially fossil fuel which is only stored sunlight;
- the last 20 years have seen growing awareness of some of the consequences.

What are these consequences? In the countries which pioneered the industrial revolution, there has been an amazing rise in living standards which the rest of the world now wishes to emulate. Economic wealth on a familiar definition rose at an almost incredible rate during most of the century. Global gross domestic product was of the order of US\$600 billion in 1900. It stood at US\$5 trillion in 1960 and at about US\$17 trillion in 1988. Such growth was highly uneven: of the US\$17 trillion, around 14.7 trillion came from the industrial countries (accounting for 23.3% of the world's population), and 2.5 trillion from the rest of the world (accounting for 76.6% of its population).

At the end of the eighteenth century Malthus wrote about the relationship between resources and population, and the disaster which would follow disequilibrium between them. The manner of his calculations may have been wrong. Every time a critical point was reached, we have so far managed to find ways of evading or concealing the problem. Perhaps the last such was the green revolution. Unfortunately that does not mean that we can be equally deft in the future.

The success of the industrial countries was founded on their ability to feed their growing populations. They each had an agricultural revolution before an industrial one. Others have not done so well. Total world population rose from 2 billion in 1930 to 5.3 billion now, and will rise again to over 8 billion in 2025. But the ability to feed this population is in doubt (more and more poor countries, for example, in Africa and Latin America, have to import food), the drift from country to towns greatly complicates the issue, and the prospect of any substantial rise in living standards in countries without the resources and skills in industry must be illusory.

The carrying capacity of the earth is inevitably a relative if not subjective concept. But some recent calculations are of interest. I quote from Norman Myers (1990):

- if we all had a vegetarian diet and shared our food equally, the biosphere could support around 6 billion people;
- if 15% of our calories came from animal products, (and again food were shared equally), the figure would come down to 4 billion people;
- if 25% of our calories came from animal products, then it would fall to 3 billion;
- and if 35% of our calories came from animal products, as in North America today, then it would fall to 2.5 billion.

So even if all sorts of improvements could be envisaged, the prospect of a rise in human population to 6, 7, 8 billion and upwards is alarming indeed. Even allowing for war, famine, and disease, the rate of increase – at present some 90 million more people every year – suggests that we are on the back of a tiger.

Even if resources were limitless, and living space could somehow be extended, the condition of life – in short the environment – would sharply deteriorate. It is of course doing so already. We have to look at the repercussive effects of the industrial revolution on land, ocean and air.

The most significant change in land use has not been the spread of brick, stone, concrete, houses, factories, roads, etc. (although these now account for around 10% of Britain) but the acceleration of the destruction of forest cover and declining fertility of soils. According to the Worldwatch Institute in 1990, some 35% of existing crop land world wide is already subject to some measure of desertification. Although forest cover is slightly increasing in industrial countries, its destruction elsewhere, with accompanying loss of species, is on a sufficient scale to change the global ecosystem. Whatever the differences in different parts of the world, the total impact is that human beings are consuming the capital of the earth's resources rather than the income from it.

Fresh water is a particular problem. The global use of water doubled between 1940 and 1980, and is expected to double again by the year 2000. 97% of the water of the earth is sea water, and of the other 3%, 2% is locked up in ice at the Poles. The remaining 1% is already in excessive demand, not only for agriculture and human consumption, but also for industry. Many countries already suffer severe shortages and droughts. Competition for water was a prime source of conflict in the past, and is likely to be so in the future, for example:

- over the Nile, which flows through nine states, each with their own interests and demands;
- over the Euphrates and the Jordan which nourish Turkey, Syria, Iraq, Jordan

and Israel;

- over the Ob, which could be diverted with effects touching the whole Arctic circle.

Then there are the direct effects of industrialization: pollution and recent accidents have demonstrated the international character of industrial hazards. Within the vast land mass of the Soviet Union, some 16% (or 1,382,000 square miles) was recently declared an ecological disaster area by Soviet scientists. Pollution in the Soviet Union and Eastern Europe is perhaps the worst in the world. But every industrial country has its own pollution problems which touch directly on the quality of life.

Chemical disasters tend to be of limited scope. Nuclear ones reach further; the fallout from Chernobyl was some 50 times that of Hiroshima. Western Europe is one of the most crowded areas of the world, and an accident of comparable magnitude in any of its major countries would create horrendous problems for all. Of the four main nuclear hazards, safety could be greatly improved; costs could conceivably come down; but there is so far no completely satisfactory solution to the problem of nuclear waste disposal; and no-one wants proliferation.

Marine pollution is serious but less of an immediate source of conflict; but competition for fishing resources, and again the transnational character of pollution, make the seas a potent source of trouble in the future. The central problem of the Law of the Sea, however useful in some respects, was that it was based on old style notions of national sovereignty.

Next I come to the problem of the atmosphere. Acid precipitation is a problem for those down wind of industry, but it is essentially local or regional in character and can be solved if there is political will to solve it. Depletion of the ozone layer is much more serious. The miracle molecules known as chlorofluorocarbons and halons (for use as refrigerants, deodorants, fire extinguishers, etc.) have been depleting the protective screen which prevents short wave ultraviolet radiation reaching the surface of the earth. Damage to the human metabolism (melanoma, etc.) may seem alarming to us, but the more fundamental problem for the planet could be the effects on critical organisms in the food chain, not least phytoplankton in the oceans.

Global warming through enhancing the natural – and indispensable – greenhouse effect could affect almost every aspect of human society. The main conclusions of the recent Intergovernmental Panel on Climate Change represented a broad scientific consensus. On the assumption that we continue to pump carbon dioxide, methane, chlorofluorocarbons and nitrous oxide into the atmosphere, there will be:

- a rise of global mean temperature of about 0.3°C (between 0.2°C and 0.5°C) per decade, leading to a rise of 1°C by 2025, and 3°C by the end of the century (compare a fall of around 4°C in the last ice age)

- marked regional differences:
 - with land areas affected more than oceans
 - with Southern Europe and North America more affected than average, with less summer precipitation and lower soil moisture
 - with snow cover and ice eventually reduced
 - with a general redistribution of weather patterns with drastic local effects
- sea level rise of around 6 cm per decade, leading to a rise of around 20 cm by 2030, and around 65 cm by the end of next century
- a long lag-time between cause and effect due to the stabilizing effect of the oceans.

There are of course many uncertainties, but none, singly or together, affects the main predictions. Among the uncertainties are: variations in solar radiation; clouds and the hydrological cycle (negative and positive feedback); the role of oceans as a thermostat (exchanges with the atmosphere); the carbon cycle (we cannot yet account for some 40% of the human generated extra carbon); the behaviour of polar ice sheets and sea ice.

I have left to the end the consequences of the industrial revolution on other forms of life. Biodiversity, or the variety of life, is under heavy and sustained assault. Like many other animal species, we have changed the environment to suit our needs. The effects on other organisms have been devastating. Indeed they can be compared to earlier disasters in the history of the earth: the elimination of 90% of species at the end of Permian times 250 million years ago, or the famous extinction of the dinosaur family and many less famous ecosystems at the end of Cretaceous times 65 million years ago. Since the end of the ice age 10,000 years ago there has been an unquantifiable loss; but current calculations suggest that perhaps a quarter of the earth's remaining biodiversity is at serious risk in the next quarter century.

The destruction of one species can profoundly change a whole ecosystem.

Ancient balances can be rudely upset. Some changes could be quick, like the evolution of new viruses and bacteria; others could be very slow, like the replacement of dinosaurs by mammals in Palaeocene and Eocene times over millions of years. Of course once a species is destroyed it has gone for ever. As has been well said: "Death is one thing; an end to birth is something else".

Most of the current losses come from destruction of moist tropical rainforest, and to a lesser extent coral reefs. Such forests cover only 7% of the earth's land surface but they contain at least 50% of its species. As other species recede in importance, so ours increases. Human beings now use, waste or co-opt some 40% of all net primary productivity, with all that implies for other species and their life support systems.

It is legitimate to ask: does all this matter? The trouble is that although instinct tells us that it matters a lot, we do not yet have means of measuring the degree and scope of our dependence on other organisms. But an ecosystem can be likened to the structure of a boat. We can remove one, two or ten rivets without apparent damage. but at a certain point – it could be the eleventh or the thousandth rivet – we cause the timbers to fall apart.

Almost any forward look compels the conclusion that we cannot continue as we are. We face not the end of Nature (the foolish title of a recent book), but a change in Nature, in many ways an acceleration of the processes of life. In looking to the future we must reckon with:

- our alarming degree of ignorance. We simply do not know enough about how the world works. Much current science is about detail and the short term. Few even try to encompass the scene as a whole; they are often regarded with suspicion when they do;
- the character of much change. We tend to see change as something gradual, like upward or downward curves on a graph. But critical change is often abrupt. It proceeds by steps or thresholds rather than progress from one apparently stable state to another, and the bouncing (and necessary readjustment) can be extremely painful for those around at the time;
- the prospect of surprises. Most people feel that something will always happen to stave off disaster; but disasters have happened in the past, and will happen again. The world's life systems are robust in general, but history can show positive as well as negative feedback as systems come under stress. The discovery of ozone holes was entirely unexpected. We must expect more of the unexpected.

Ignorance and uncertainty are no excuse for not making the best judgements we can and taking action where necessary or possible. There are certain obvious catalysts which affect both the quality of human life, and life itself. The most obvious is the impact of population increase. When combined with such other factors as environmental degradation and global warming, we could find a further widening of the gap between rich and poor, and some redistribution of the world's assets in terms of soil fertility, and ability to sustain patterns of life. As supremely adaptable and ingenious mammals, we could modify our practices, especially in countries covering wide areas and those equipped with modern technology. But the time available would be short, and most countries would be unable to adjust without disruption.

Likewise we would suffer from sea level rise. A substantial proportion of the human population lives in low lying areas, which would be flooded or liable to high tides or storm surges. Rising sea levels would also affect underground

aquifers and fresh water supplies.

It would be pointless to try and work out all the consequences. But two stand out of particular importance. First, we should expect a great increase in human displacements. In 1978 there were something like 5 million refugees in the world on a narrow political definition. By 1989 that figure had risen to 14.5 million on the same definition. I believe there are now more than 17 million. If we add in some 10 million environmental refugees or economic migrants, it means that at present there are around 25 million refugees worldwide. With disruption of current patterns of life, that number would increase dramatically. It is not fanciful to estimate that with world population rising to 8 billion or more, the refugee rate could rise disproportionately with alarming consequences for the integrity of human society as a whole.

There would also be more direct risks to human health with changes in existing patterns of disease. Temperature and moisture are both critical to the ability of viruses, bacteria and insects to multiply. Thus we could see the spread of such non-parasitic diseases as yellow fever, dengue, poliomyelitis, cholera, dysentery, tuberculosis and pneumonia; such parasitic diseases as malaria, leishmaniasis, schistosomiasis, hookworm, tapeworm and other helminthic afflictions; contamination of water supplies, including problems arising from drainage and sewage disposal, algal blooms, salinization, aluminium toxicity etc.; increase in skin cancer, melanomas and cataract arising from atmospheric ozone depletion; respiratory problems caused by petrochemical smog in urban areas; hypothermia and diseases related to heat stress; malnutrition and diseases related to poverty; and the spread of new unforeseeable diseases (on the pattern of syphilis in the sixteenth century, and AIDS in our own times). Nor should we forget that with loss of biodiversity, it will be less easy to tap the natural world for the constituents of drugs to cope with changes in bacterial and viral populations.

The profound division between industrial and other countries is likewise a prime cause of future instability. Economic growth on a familiar definition is closely related to consumption; and consumption in industrial countries vastly exceeds that elsewhere. In the comfortable West the need for equity in future international arrangements for mitigating or adapting to environmental change is conveniently forgotten or regarded with scepticism. It is easy to say that the misfortunes of others are their own fault. Sometimes they are. I have excessive military expenditure as well as wrong headed economic policies in mind. But more often the countries not blessed with resources and skills are simply caught up willy nilly in the functioning of a world system which has been imposed on them. Just as we find intolerable – and destabilizing – excessive disparity between rich and poor within our own society, so increasingly will we find disparities between different parts of the world unsustainable in political and economic as well as social terms. As recently as 1880 the ratio of real per capita

income between Europe on one hand and India and China on the other was 2:1. By 1965 this ratio had become 40:1. It is now nearly 70:1 (Swaminathan, 1991).

By any reckoning the industrial countries are directly or indirectly, and however unwittingly, responsible for most of the environmental mess. Over 70% of current carbon emissions come from them, and 23% from the United States alone. In 1988 average per capita emissions of carbon from industrial countries was 3.36 tons, and from the rest of the world 0.43 tons. So when people complain about the unwillingness of the so-called developing countries to join the global arrangements to save the planet, and their stubbornness in wanting to develop their economies as the industrial countries have done, it is as well to remember how they see things and why they think it necessary for the industrial countries to give an example as well as a lead. Unless the industrial countries give such an example by reorienting their own economies, they will fail to carry conviction with anyone else.

On the other hand (and it is no consolation) global warming, and environmental change generally, will have far more damaging effects on poor countries than on rich ones. They are supremely vulnerable: most are in zones affected by small climatic shifts; without government structures capable of organizing adaptation to new circumstances. So they have a strong national as well as international interest in a new international system. Logically they should be the leaders rather than the laggards.

In general the prospects are bleak. A combination of unfavourable circumstances could all too easily lead to the classic symptom of disruption within and between countries and societies. Conflict, famine, disease and breakdown are not uncommon in history, and could creep upon us as they have crept on others, lurching from crisis to crisis until they become unmanageable.

What then needs to be done? Already we have come some way. Over the last 20 years there has been a remarkable change in public awareness. Individuals, groups, governments and the international community have in different ways taken the first step towards wisdom: to recognize that this complex of problems exists, and to begin, albeit in piecemeal fashion, to do something about it. It is certainly too late to avert or prevent over-population, resource depletion, environmental degradation, industrial pollution, ozone depletion, global warming and the rest, but it is still possible to mitigate some of their effects and to adapt ourselves to a different sort of world. Next year a major test will come in the Earth Summit, or United Nations Conference on Environment and Development, when the governments of the world will come together to set a framework for dealing with problems more difficult even than those created by the introduction of nuclear energy and weaponry forty years ago. Work is already in hand, albeit slow, on climate change and biodiversity, on an Earth Charter, and

on specific action to follow (the so called Agenda 21 for the next century).

But in relation to the size and scope of the issues, we have hardly started to cope with them. We are still at the beginning of the beginning. We need not only to behave differently but to think differently. Thinking differently is most difficult of all as it involves much more than a change of direction. We need to abandon assumptions, change hallowed habits, create new models of thought, accept different values, and see the world through other eyes. I underline five points:

- we need to recast our vocabulary. Words are not only a means of expression but also the building blocks of thought. The instruments of economic analysis are blunt and rusty. Such words as “growth”, “development”, “cost benefit analysis”, even “gross national product”, are used in such a misleading way that they are ripe for redefinition;
- we need to realize that conventional wisdom is sometimes a contradiction in terms. Some trends, for example consumption of non-renewable resources, are going in the wrong direction. But as René Dubos well said, “Wherever human beings are concerned, trend is not destiny”. Nothing is inevitable unless we make it so. In some ways humans are almost too adaptable. As Dubos also pointed out, people can adapt themselves not to mind car exhausts, urban sprawl, “starless skies, treeless avenues, shapeless buildings, tasteless bread, joyless celebrations”. Loss of perception would, he predicted, be compensated by the stimulus of loud noises, bright lights and drugs. “We do not live *on* the planet earth but *with* the life it harbours and *within* the environment that life creates” (Moberg and Cohn, 1991);
- we need to change the culture. Many have lamented the division between the cultures of science and the arts. They are right to do so. But neither is now in charge. Our real bosses are the business managers. It was Edmund Burke who feared that the age of “sophisters, economists and calculators” had come. The problem is that their calculations are usually short term;
- we need to recast parts of our educational system to promote better understanding of the environment. I welcome many elements in the new core curriculum in Britain, although I wonder if they go far enough. In talking to the young about environmental problems, I have found that teachers are often more in need of education than their pupils;
- we need a value system which enshrines the principle of sustainability over generations. Sustainable development may mean different things to different people, but the idea itself is relatively simple. We must work out models for a relatively steady state society, with population in broad balance with resources.

By comparison behaving differently is almost easy. It follows naturally from thinking differently. Much of such behaviour comes from individuals and groups. Little is possible without a vigorous public opinion putting pressure on local authorities and governments. But the governments themselves are best placed to exercise leadership. I suggest four main areas for action. They relate to people, to the way they generate and use energy, to their use of land, and to their industrial activities.

On people we need to:

- support international organizations seeking to limit human population increase. It is not enough simply to try and raise living standards in the hope that it will limit population growth. Higher living standards often invite higher consumption and thus more pollution;
- promote the status of women and family planning;
- anticipate and cope with likely displacements of human population; if possible refugees should stay at home even if they need help from outside to do so.

On energy we need to:

- investigate and apply the social costs of different sources of energy;
- increase efficiency and improve conservation, with more economical power transmission, dissemination of such energy saving devices as the new light bulbs etc.;
- develop alternative sources and cut back consumption of fossil fuel;
- introduce new transport systems;
- promote new building design and urban infrastructure.

On land use we need to:

- promote reforestation and agro-forestry;
- introduce new agricultural methods to manage a carbon dioxide richer world, and make more economical use of fresh water, including desalination;
- create ministries of land use (rather than divide responsibility between bodies representing vested interests).

On industry we need to:

- respect biodiversity as part of the earth's natural capital, and regularly remind ourselves of our extreme dependence on other organisms.

For governments a measure of internal reorganization is necessary. In the case of Britain foundations have been laid, both at the national level and that of the European Community. Much is already being done. For others less far down the road, I have a little check list. We need:

- tight coordination at the centre to ensure integration of policies;
- environmental audit within ministries, and environmental accounting in annual budgets;
- environmental costing and pricing;
- use of fiscal incentives and disincentives (for example over energy generation and vehicle propulsion);
- clear ground rules for the free market.

It should go without saying that all this amounts to a refashioning of our society. But the prospect need not stun us into inaction. I suggest five principles on which governments should act, singly and together.

First they should now do what makes sense for reasons other than any one environmental factor. For example, global warming might suggest the conservation of forests and the creation of new ones to draw carbon out of the atmosphere, and using fuels which do not add to atmospheric carbon dioxide. But there are other excellent reasons for so acting (and we are already creating a new forest in the middle of England). There are equally good reasons for not running down too fast our non-renewable resources of coal and oil. With proper coordination of environmental policy, many things will be seen as pointing in the same direction.

Next they should take out insurance policies against disaster, and pay the necessary premiums in terms of precautionary investment: for example improving coastal defences, building bridges and oil rigs higher out of the water, and anticipating changing patterns of rainfall and thus availability of fresh water.

They should retarget and give more financial support to relevant scientific research and coordinate the results on both a national and a global basis. In Britain the National Environment Research Council and the Economic and Social Research Council are already embarked on admirable programmes. At a global level we need better means of observation from satellites and ground stations, and regular monitoring of changes in land, sea and air.

They should work out an international strategy which recognizes the realities, sets the framework for collective action, takes good account of equity, and above all is founded on national as well as international interest.

Last they should always see and deal with environmental issues together. Isolated measures to cope with one of them can sometimes make others worse. Above all we must recognize that human society is fragile. All previous civilizations have collapsed. Ultimately we are as subject to biological restraints

as any other animal species. But unlike them we can consciously shape our future. If we fail to do so there will be none to blame but ourselves.

So I have a simple message. Wealth is a highly subjective concept. It is a product of the quality of life. But to have meaning, such quality must be seen in two perspectives: that of all human beings (but not too many of them) in a global society; and that of our countless other companions in life on whom we unwittingly depend. We need a new respect for both.

Slightly adapted from the text of an address delivered to the British Association for the Advancement of Science in Plymouth, England, on August 26th, 1991.

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