

The special issue of *Ambio* is being edited by Dr Frank Barnaby (formerly Director of SIPRI), Jan Prawitz (adviser to the Swedish Ministry of Defence), and myself. Our hope is to provide a generally useful and factual basis leading to a more realistic conceptualization than is currently widespread of this extremely frightening and complicated matter. I am sure that this problem will also be of special interest to the world-wide readership of *Environmental Conservation*.

No effort should be spared in working, all of us everywhere, and together, to avoid a nuclear holocaust. Even if this might not mean the end of mankind, it would almost certainly mean the end of civilization, at least as we know it now in the regions involved—which, for all we can foresee, could well consist of the whole Earth. Both environmental issues and peace issues have recently caught the interest of a growing number of thinking people in many countries. Let us hope most ardently that full realization of how war and environment are inseparable questions, will also help to ensure that concerned people throughout the world will join forces in working for a redirection, towards worth-while goals, of the current catastrophic trends.

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## OPEN LETTER

### Disarmament and Preservation of The Biosphere

In December 1979 the United Nations General Assembly adopted a resolution on strategic economic development based on due protection of Nature and the environment, and in a special letter in March 1980 UN Secretary-General Dr Kurt Waldheim solemnly announced the beginning of such a long-range strategy in cooperation with Member States of the United Nations, UN agencies, and scientific institutions concerned with optimal utilization and preservation of the world's natural resources.

The period of 1982–92 is destined to be 'The World Decade of The Biosphere', uniting the systematic efforts of all nations and peoples of the world in the protection, sound utilization, and where possible improvement, of The Biosphere of the Earth—the only planet of our galaxy that is known to support Man and other living forms, and to have conditions favouring the existence of life.

#### *End the Arms Race*

Prevention of wars—particularly atomic or nuclear ones—as well as measures for cessation of the 'arms race' and ultimate disarmament, must occupy a paramount position in the general strategy of mankind's progress, which in turn is dependent on due biospheric preservation.

Modern war-linked industry, the manufacture of ammunition and weapons, their testing and storage, together with the millions-strong armies of soldiers and their servicing, bear responsibility for a substantial proportion of the pollutants and toxicants that infiltrate air, water, soils, living organisms, and finally Man. Many hazardous effects of such pollutants as sulphur, mercury, lead, cadmium, etc., on the general environment, on soils, and on Man, are only too well known. The geochemical mechanism of their migration and action is clear, and preventive measures have been found. However, the industry of war, with world economy answering the demands of a potential war, is in principle foreign to the care of Nature and Man.

Cessation of the arms race, of war tension, and of war manifestations, should make an instant and positive contribution to the anxiety-causing build-up of CO<sub>2</sub> in the atmosphere and would, hopefully, reduce materially the sulphuric acid and nitric acid precipitation on soils and waters. It should also reduce smog formation and the regional soil and drinking-water pollution with heavy-metals, nitrogen compounds, and oil products.

Massive financial means, freed in this way, would make possible urgent work on the actual introduction of waste-free and low-waste technology, on 'ecological' renovation of industry and transport, on utilization and recycling of many wastes, and on large-scale organization of compost production to use organic and some mineral wastes as fertilizers. Thus disarmament would provide a powerful organizational and financial basis for international work for Biosphere protection, whereby engineers, technicians, and other workers, could switch over to modernization and reconstruction of world industry, thus reducing or even eliminating unemployment and inflation.

#### *Threats to The Biosphere and to Man*

We referred above to the forthcoming World Decade of The Biosphere: its primary objective will be to educate people throughout the world about The Biosphere and Man's ultimate as well as intimate dependence on it as his only life-support system.

Yet The Biosphere and Man are threatened not only by pollution with industrial and municipal wastes. Deforestation, depletion of grass pastures, water erosion and wind deflation of soils, growing salinization of irrigated fields, and many other circumstances and situations, threaten destruction of the leading set of mechanisms of The Biosphere, namely the soil–vegetational ecological systems that photosynthesize the necessary biomass, fixing cosmic energy, generating oxygen, and removing CO<sub>2</sub> from the atmosphere. Very substantial investments will be needed to secure effective research on these phenomena, work out and realize projects of reforestation and restoration of productive pastures, and control erosion, depletion, and salinization, of otherwise productive soils.

### *Control Desertification*

The devastating damage to The Biosphere and sufferings of people caused by land desertification and repeated severe droughts of the type experienced in the Sahel during the early 1970s, is now well known. The UN Conference on Desertification, held in 1978, considered and approved a programme of local, regional, and global, actions to control desert encroachment and extension. By 1981, financial costs of this Plan of Action were estimated at the level of about 30 thousand million US dollars up to the beginning of the twenty-first century. Although this is not a negligible figure, if compared with the arms expenditure and war preparation costs of the world, it equals only fifteen days of military demand!

Desertification of the Earth which, in one or another form, has taken hold of all inhabited continents, brings about deprivation and hunger not only to the people living in arid regions but, in the prospect of only one to two generations, threatens the well-being of the population of the temperate and humid belts. There is no 'more biospheric' problem than that of desert growth-control and ultimate utilization through irrigated agriculture and forestry.

### *Hunger, Poverty, and Deprivation*

Mankind has inherited shameful calamities from the past: undernourishment, hunger, diseases, homelessness. They haunt hundreds of millions of people in a number of so-called developing countries, and are found in the outskirts and slums of large cities of some developed states.

To my mind, the problems of hunger and poverty can and must be solved. Disarmament and abolition of war from Man's environment would permit organized integral efforts of scientists, other people, and governments, to bring to normal within 25–30 years the cultural level, nourishing conditions, and life standards, of those who fell victim to past invasion or other strife.

To eliminate hunger and undernourishment in the world, it would be necessary in 25–30 years to increase food production to 2.5–3.0 times the present level. From a scientific and technological point of view, this is a realistic objective now that we have at our disposal heavily-producing varieties of rice, maize, wheat, barley, and millet. We also have the experience of irrigation, soil amelioration, and field fertilization, as well as very productive mammal and fish breeding and the use of wild animals. But there is need of greatly increased cultural and technological education of people and enhancement of their material means.

Estimates made by Dr Walter Orr Roberts and myself have shown that some \$4.5–5 million millions (US trillions) would be sufficient finance for the realization of this noble aim in 25–30 years. Calculation shows that the sum total for one year would constitute less than \$200 thousand millions, which is much less than the annual expenditure on armaments.

### *Destruction by War*

The terrible experience of the Second World War testifies to the fact that war not only destroys people, ruining their life, health, and amenities; war also destroys Nature and life itself. After-effects of war-damage show in the physiographic relief, vegetation, and soils, of the plains of the European part of the USSR, in Western Europe, and on sandy deserts of North Africa where we still encounter pits, anti-tank trenches, silt-covered shell-holes, unexploded missiles, and sharp shell-splinters.

War actions in Viet Nam were accompanied by wide use of contaminating agents, with destruction of irrigated rice-paddies, forests, and perennial plantings, over large territories. Years of intensive labour are needed to rebuild destroyed hydroconstructions, bridges, and roads, and to restore fields and farmlands that have been mutilated by napalm and tanks.

### *Atomic or Other Thermonuclear Dangers*

When speaking of future strategies for The Biosphere, we must emphasize the fact that atomic or thermonuclear war could practically extinguish civilization by exterminating major parts of the populations—not only of humans but also of other animals, and of plants on which practically all are dependent. The experience of Hiroshima is terrible, tragic, and conclusive.

Mutations, diseases, and deformities, could unrecognizably change anything that might survive nuclear war. The top layer of soil-cover, and river-, lake-, and sea-silts as well as ground-waters, would retain in their surface strata radioactive isotopes of strontium, caesium, carbon, tritium, cobalt, and other elements. The half-life of these isotopes can be widely different (days, years, decades, or many hundreds of years). Some of them could for a long time 'flow' from soils into plants, food, and water, affecting those who might survive an atomic attack and doubtless their descendants.

At the locations of ground atomic explosions, millions of tons of earth are injected into air-streams. Atmospheric air-masses transfer radioactive particles over the planet, and radioactive fallout from the stratosphere onto the land and ocean may continue for years. Nitrogen oxides (NO<sub>x</sub>) formed in the course of atomic explosions also reach the stratosphere, as do the synthetic halocarbons that are used so widely by mankind, catalyzing the destruction of ozone in the ozone screen which will, in its turn, facilitate penetration of ultraviolet cosmic radiation to Earth, predictably resulting in increased skin-cancers and widespread sterilization of living organisms.

### *Arch-wickedness of Arms Race*

If one defines wickedness as anything which is against the welfare of The Biosphere, as has been done in the editorial columns of *Environmental Conservation*, then the arms race seems to be doubly wicked in threatening the world economy and damaging The Biosphere. Already there are probably more than enough people on Earth, but the accumulated nuclear weapons are said to be sufficient many times over to exterminate Man and destroy his cultures.

It is accordingly time to use reason and humanism to overcome militarism and imperialism—to eliminate the risk of a third world war and nuclear disaster. Indeed it is imperative for the negotiators of the nuclear powers, whether they be socialist, capitalist, or otherwise, to make binding and effective agreements on urgent cessation of the arms race, on the steps to be taken for disarmament, on war *détente*, and on banning all military means of solving political and economic issues.

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## OPEN LETTER

### Fewer People for a Better World: A Plea for Negative Population Growth

I would like to offer both my congratulations and my thanks for your stressing, in your excellent Autumn issue, the problems that result from over-population, and that are aggravated by further population growth.

There is a growing consensus that further population growth in an already vastly over-populated world threatens to destroy—for centuries to come, if not for ever—Man's ancient dream of a good life for all, free from material want.

More and more informed individuals believe that the central issue of our time is how to halt and then reverse population growth, so that population size can eventually be stabilized at some fraction of today's numbers. Yet, two very powerful forces in our society—religious and environmental organizations—have failed, until now, to recognize and focus on that issue.

The Roman Catholic Church has often—and entirely justly—been singled out for criticism for its failure to recognize the critical nature of over-population, and the urgent need to find a solution for it. Yet, in all fairness, no other major religion has really come to grips with the problem of over-population, and of further population growth. In the United States, for example, no Protestant denomination advocates measures of real population control, namely the planned and conscious regulation by society of total population size.

It is particularly baffling that more environmental organizations have not long ago acknowledged the utter futility of trying to halt the degradation of our environment unless population growth is also halted and then reversed.

As Sir Julian Huxley asked many years ago, 'What are people for?' As a variation of Sir Julian's question we should ask ourselves, 'What business are we in?'

Are we in the business of trying to determine how many people the Earth can possibly be made to support (never mind for how long), of trying to transform our infinitely varied and beautiful planet into one gigantic food factory (never mind if all other animal species are driven to extinction), of trying to become a sort of planetary ant-heap where people will exist like so many farm animals, cheek-by-jowl at the feeding trough (never mind the quality of life, never mind art, science, and culture)? If so, let human numbers continue to increase.

On the other hand, if we are, or should be, in the business of trying to eliminate hunger and poverty—of trying to create a society that will be sustainable indefinitely in a sound and healthy environment, with a base of material prosperity that will minimize human suffering and allow civilization to flourish—then we had better, without further delay, set about actually reducing population size. The weight of scientific opinion supports the view that a sustainable world population could not exceed two thousand million humans, and might well be not more than half that number.

How could a substantial reduction in population size be achieved? In the 'developing countries' (where 90% of future world population growth is projected to occur), total fertility rates are very high—about 5.3, excluding China. This means that there are more than five children in the average-size family. Marginal, or even fairly substantial, reductions in fertility are clearly insufficient even to halt population growth, much less to reduce population size, in those countries.

Even the two-child average family is not the answer to the problem of halting population growth immediately. If the two-child average family were achieved now, on a world-wide scale, world population would continue to grow for about 70 more years, because of the preponderance of young people in today's population. If the two-child average family became the norm, population growth would finally stop, but only after a further increase of more than 50%, or over two-and-a-quarter thousand million more people!

The question we must ask ourselves is the following: What total fertility rate is needed on a world-wide basis in order to halt population growth almost immediately, and then to start a slow and gradual decline in human numbers? The answer to that question is a total fertility rate of 1.0, or the one-child average family. Such a total fertility rate (about one-quarter of the present world rate) would only be needed for a few decades in the developed countries, and somewhat longer in the developing countries because of the different age-structure of their populations.

After a few decades with a total fertility rate of about 1.0, the rate could be allowed to rise gradually to the long-term replacement rate of 2.1. If the world fertility rate were to follow such a pattern, after about 100 years or so of population decline, world population would stabilize at about half the present number of *ca* 4.5 thousand millions.