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THE POPULATION EXPLOSION AND INTERNATIONAL
RELATIONS

by

Professor B. Cockram

This address was given at a meeting of the Institute on 7th October, 1968, at which the National Chairman, Mr. Leif Egeland, announced the Institute's intention to sponsor a Conference of international experts in 1970, to consider "The Impact on International Relations of the Population Explosion".

Please note that the Institute is precluded by its Constitution from expressing any opinions. The opinions expressed in this address are, therefore, solely the responsibility of the author.

JAN SMUTS HOUSE

JOHANNESBURG

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Lord Snow wrote, in 1959, of the "three menaces which stand in our way: H-bomb war, over-population, and the gap between the rich and the poor." Each of these three is sufficiently devastating in itself, but none of them can be separated entirely from the other two, and it is on their interaction that the future depends. In the words of Robert Louis Stevenson, written nearly a hundred years ago, "we theorise with a pistol to our head; we are confronted with a new set of conditions on which we have not only to pass judgment, but to take action, before the hour is at an end." It is for this reason that the South African Institute of International Affairs has decided that it will (as Mr. Leif Egeland has just indicated to you) hold, here in Johannesburg, some time in 1970, an international conference on the effects of the population explosion on international relationships.

It is my task this evening to summarise briefly some of the problems with which that Conference will have to deal; not, fortunately for me, to suggest possible solutions because that will be the task of the Conference. I also propose tonight to concentrate on the second and third of Lord Snow's menaces: over-population and the gap between the rich and the poor, and to mention the H-bomb war only to indicate that we have hitherto thought of atomic warfare as involving a great reduction of population, if not the eventual destruction of mankind, rather than as a possibly remedial counter by way of sterilisation to a population increase which might otherwise destroy mankind by consuming the natural resources of the world at a rate which would leave no hope for the future. Chairman Mao Tse-tung, some years ago, indicated that China did not fear atomic war because whatever the degree of destruction, the immense population of China - which some now estimate at 750 million - would ensure that there would remain enough Chinese to take over the world after the atomic destruction comes to an end.

There are only four ways in which the number of people in any area can change:

- 1) some one may be born;
- 2) an inhabitant may die;
- 3) an outsider may move in; or
- 4) a resident may move out.

For the world as a whole, however, while some may be born or some die, we need not yet consider the entry of outsiders from, or the departure of residents into, outer space. We have therefore primarily to consider births and deaths.

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The most striking fact which emerges from any examination of these is the comparative modernity of population increase. Homo sapiens is approximately half a million years old, and, up to 10,000 years ago, the number of men was extremely small. During the upper paleolithic period there may have been only 250 in what is now England. But, about 10,000 years ago, an agricultural revolution occurred which changed man from a wholly hunting-gathering-scavenging nomad into a villager with domesticated animals and cultivated fields of wheat and barley. A much larger number of people could then be fed and urban life could begin. The result was that while, in the year 8,000 B.C., the world's population may have been as little as 100,000, in Anno Domini the population was possibly 200 million. By 1650 it had risen to perhaps 500 million, and by 1850 to 1,200 million, but in the next 100 years, that is by 1950, it had doubled to 2,400 million. It is already over 3,000 million and by the year 2,000, if the 1950-1960 growth rate continues, there will be 6,000 million, and in 2,060, 17,000 million. To put it more dramatically, in the last minute over 120 people have died and over 200 people been born, a net gain of about 80. That gives nearly 5,000 an hour, and 120,000 a day. Other calculations indicate that the surplus of births over deaths is adding between 150,000 and 200,000 to the world's population every day, or very nearly the European population of Pretoria. The Office of Population Research at Princeton University has calculated that at the present rate of increase the weight of people would outweigh the mass of the earth in about 1,200 years, and that, in 6,500 years, people could form a solid sphere of live bodies, having a radius expanding at the velocity of light (which would prohibit removal of the surplus by migration to other planets).

Professor Kingsley Davis, the doyen of population experts, has commented ironically that "it is an excellent thing surely to belong to an intelligent and dominant species that can choose its own methods of becoming extinct. We never think of the dodo and the dinosaur without a feeling of quiet pride and thankfulness. Whereas they, poor ignorant brutes, could only evolve a little and then wait for a changing world to find them unfit to survive; we, fortunate masters of all earthly things, including nuclear physics, can venture boldly forth and make the world unfit for ourselves." Dr. von Foerster has calculated that "in just 66 more years, barring some catastrophe, the population of the world will approach infinity, and we all will be squeezed to death." Professor Kingsley Davis is surely justified in his conclusion that "viewed in the long-run perspective, the growth of the earth's population has been a long, thin powder-fuse that burns slowly and haltingly until it finally reaches the charge and then explodes."

It is paradoxical that this tremendous increase in population has not been due to rising birth rates; there would seem to have been a small decline in fertility. To understand this, it is only necessary to remind ourselves that, while to a farmer, children were necessary to the prosperity of the farm, to the city dweller children are no longer "production durables". They do not produce income for parents as they did in the agrarian period of history; they are in fact "consumer durables", costing

3/money to ...

money to bring into the world and to rear. The United States Department of Agriculture has estimated that it now costs over \$15,000 to rear an American child to his or her sixteenth birthday. Clearly, in a competitive, individualistic, urban society "he travels fastest who travels alone", and it is unnecessary to look further for reasons why the birth rate has already declined considerably in a number of industrialised countries.

The population explosion has, on the contrary, been due to a rapid decline in the number of deaths. While, for example, the birth rate in India remained at about 45 per 1,000 between 1880 and 1960, the death rate dropped from over 40 to under 20. The rate of natural population growth in the same period increased therefore from 5 to 25 per 1,000. In Ceylon, where the birth rate remained constant at about 36 per 1,000, and the death rate dropped from 27 to 8, the rate of growth increased from 9 to 28. Conversely, in North Western Europe, where the birth rate dropped from about 23 to about 13, and the death rate from about 13 to about 8, the rate of natural growth decreased from 10 to 5.

What, in fact, is happening, over large areas of the world, is that the process of delaying death is proceeding much faster than it did, for example in Europe or North America during the past 300 years. Hobbs, writing at the end of the seventeenth century, and looking at his own age, could characterise man's natural state as one of "continual fear and danger of violent death, and the life of man solitary, poor, nasty, brutish and short." That description applies admirably to conditions in Vietnam or Biafra today. Many people in most of Africa, South America and Asia are now living under similar conditions of high fertility and high mortality to those which obtain in Vietnam or Nigeria, but their countries are peaceful, and lowering their death rate will in all probability result in a rapid and possibly lengthy population increase. An elderly Indian villager remarked recently that "we've learned to keep from dying."

Ten factors have been listed as contributing to this decline of mortality:

- 1) The first is an increase in the quantity of food produced. In the United States the maximum use of agricultural machinery on large farms has increased production to an extent which made American surpluses of grain the standby of the world for relieving famines wherever they have occurred. Yet only 5% of Americans now work on farms. To take a second example: most of the soil of Australia is poor, the rain rare and the sun hot. Nevertheless, by the introduction of subterranean clover the ninety-mile desert in South Australia has been made capable of supporting large sheep farms; a lucerne has been developed in North Australia to provide cattle feed during the dry winter months; and experiments have shown that in the moderately well-watered but hilly country of New South Wales, where the rainfall is only 26 inches a year, land can be made productive by covering 10% of it with dams

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to supply spray-irrigation to 25%, and by utilising the remaining 65% of hill scrub for run-off. As a result of these and other measures, including the evolution of types of wheat suited to particularly dry climates, Australia's sheep production went up 40% in the decade 1955/65, cattle production 20%, and wheat production 75%. In Britain 12½ million tons of grain were produced in 1964 and it is hoped that this total will be increased to 17 million tons by 1970. A similar process has occurred in Canada, and, to a lesser extent, in Western Europe.

2) The second factor contributing to a decline in mortality has been the change to a machine-factory system which has increased the amount and variety of the goods available for the well-being of man. It is only necessary to think of provision for the storage and refrigeration of food, the standardisation and the multiplication of medicines, and the mass production of houses.

3) The third factor is the improvement in all means of transportation. Ships of over 300,000 tons have in the twentieth century replaced those of 300 tons common in the eighteenth; railways criss-cross continents; and modern road systems are becoming universal. Air travel has meant that no part of the world is distant from any other more than a day or two. Anything that is wanted anywhere can be moved there, including food, clothing or such specially trained personnel as doctors and nurses. And one-third of the crew and passengers do not die on each voyage.

4) The fourth factor is the effect of such social reforms as maximum working hours and minimum working ages. Working a 12 hour day does not conduce to the longevity of a three-year old.

5) The fifth factor has been the ability to control temperature and humidity, which has led to a decline in respiratory infections during the winter months and a reduction in their severity. Tuberculosis is no longer accepted as such a fact of life that a song like, "Three Jolly Consumptives" would any longer be thought amusing.

6) The sixth factor is the improvement in public sanitation, especially in urban areas; Shelley could describe Hell as a "city much like London, a populous, smoky city" (and without, incidentally, a safe water supply or drains).

7) The seventh is personal hygiene. Until quite recently modesty had its own Queensberry rule - no washing below the belt.

8) The eighth is asepsis and antisepsis.

9) The ninth immunology, and

10) The tenth changes in the virulence of various diseases.

With Dr. Christian Barnard in mind, one should perhaps add an eleventh factor, improvements in surgery, for, of the 13,000 amputations performed during the Franco-Prussian war in 1870-71, 10,000 were fatal.

It must however be admitted that an improved environment is not the only factor conducive to longevity; those wishing to increase to the maximum their expectation of long life should accept Oliver Wendell Holmes' prescription: "one of the best ways to ensure a long life is to make a careful and wise selection of grandparents."

It is singularly fortunate that the planning of the Conference in South Africa has coincided with the publication of the massive report by Gunnar Myrdal on the results of the research which he, and his team of specialists, had undertaken into the extent of the problem in South and South-East Asia during the ten years from 1957 to 1967. [From my point of view there has been a plethora of riches because I have had to try to digest the three volumes and well over 2,200 closely printed pages of "Asian Drama" with the deadline of tonight looming ever nearer.] Myrdal quotes various estimates for the present and future populations of the countries of the area, and these enable the extent of the problem to be grasped. In 1971 the population of India is estimated to be between 532 million and 558 million, and in 1981 between 682 and 730 million; the population of Pakistan in 1971 between 117 and 126 million, and in 1981 between 152 and 170 million; the population of Indonesia in 1970 between 111 and 120 million, and in 1980 between 139 and 160 million; the population of the Philippines in 1970 between 36 and 39 million and in 1980 between 51 and 57 million. Nobody knows what the population of China is - 750 million has as I have mentioned recently, been suggested - or what it will be in 1981, possibly 1,200 million. Mrs. Irene Green, in the first population study undertaken in the Department of International Relations at this University, has calculated that in the 60 years from 1915 to 1975 the population of the small island of Jamaica in the West Indies would have increased from 864,000 to 2,343,600. Since the Caribbean is one of the areas of rapid increase, a similar study is now being undertaken here of the island of Puerto Rico. A third such area is North Africa, particularly Egypt and Algeria. In Algeria the population is said to have increased in ten years from under 10 to nearly 15 million; in Egypt over the past 80 years the increase has been from 7 to over 30 million, although 95% of the land is uninhabitable desert. Again, similar studies are being made here of the effect of these increases on the international relations of the two countries in question, as well as a further study of the problem in Burundi which will be available to the Conference in 1970.

You will have noticed the wide variety of both present estimates and future forecasts. The explanation is that in many of these countries the taking of a census has always been associated with the assessment of taxes, and to contrive to be omitted from the returns was to practice "tax avoidance", possibly even "tax evasion", by the only means known to the taxpayers.

In those countries of Africa where hut-tax has been usual, we have only recently begun to realise how many potential taxpayers succeeded in their efforts to avoid registration; in Nigeria the United Nations estimate of the population, based on British-taken statistics, was 34 million in 1960, but the post-independence census of 1963 which carried a vote showed 56 million. In Swaziland the best estimate in 1962 was 225,000, but the recent census revealed 390,000. Obviously it was not only the Jewish people which believed that "Satan stood up against Israel and provoked David to number Israel." To come nearer home Dr. F.W. Fox of the Institute of Medical Research has estimated that there will be 42 million South Africans in the year 2,000, of which 6.2 million will be whites, 1.5 million Asians, 6.1 million coloureds and 28.5 million Africans. As recently as 1964 the National Resources Development Council had estimated the total to be only 36 million in the year 2,000 but, as Dr. L.T. Badenhorst commented, "there had been a tendency to underestimate in the past." W. and P. Paddock in their forecast, "Famine 1975", have predicted that, taking 1957 as the starting date, the populations of the following countries will have doubled by the dates given:

Costa Rica, 1973 (i.e. within 16 years), Syria and Burundi, 1974, Venezuela, 1978, Mexico, 1979, and Brazil, 1980 (I have picked out only countries which I have not previously mentioned).

The Paddocks' advice is simple: "when you read any population figure from an undeveloped country, add to it - and also from anywhere else"; and they quote the U.S. officials who talked in 1964 about a world population of 6 billion in 2,000, and were talking, in 1967, of a population of 7 billion.

I have mentioned that, taking the world as a whole, there has so far, thank God, been no question of migration either in or out, although Science Fiction has revelled in the arrival of bug-eyed monsters from outer space. But the existing population of particular countries, and the internal distribution of population within a country, are both subject to migration which can greatly increase the problems. Immigration from without was the major factor in the development of the U.S. Until World War I, between 1901 and 1910, 8,795,386 immigrants entered the country, or about 1 million a year. By way of contrast only 271,344 entered in 1961. As regards internal migration, 58% of the population of the State of Florida, in the period 1950-60, had come from other states, 54% of that of Nevada, 44% of that of Arizona, and 30% of that of California. It is probable that Florida and Arizona filled up with 'oldsters' in search of the sun, Nevada with gamblers and would-be divorcées, and California with Mexicans and would-be film stars. But it was the disturbed condition of China after the overthrow of the Manchu empire which led to the migration, between 1910 and 1930, of about 30 million Chinese into the bleak northern province of Manchuria, completely destroying the old belief that the Chinese would only migrate to countries with warm climates.

The other, and much more important aspect of internal migration, almost always accompanied by a rapid increase in the population as a whole, has been the migration from the countryside to the cities. In 1900 only 5% of the world's population lived in towns, whereas in 1960 70% lived in them. In 1800 there were only 45 cities in the world with over 100,000 inhabitants out of a world population of 906 million; in 1950 there were 875 cities out of a world population of 2,400 million, and we are approaching megalopolis. In North America, New York has already over 14 million people, and Chicago and Los Angeles over 6; in Asia, Tokyo has nearly 12 million and Osaka, Calcutta and Shanghai each over 6; in Europe, London has about 11 million, Moscow $7\frac{1}{2}$, Paris 7 and Essen $5\frac{1}{2}$; and in Latin America Buenos Aires has nearly 6 million and Mexico City 4 million. The whole Atlantic coast of the United States, from Norfolk in Virginia northwards to Portland in Maine, a distance of 600 miles, has been described as a "linear city" in which one urban aggregation shades into the next. This means that one-fifth of the population of the United States is living in 3% of its total area.

The problem of urban renewal has already become the principal internal preoccupation of the United States, one which, as yet, appears insoluble because of the fantastic cost, and which has already had a major effect on the policy of the United States towards other countries. In the dead hearts of the great American cities run-down apartment houses turn into Negro ghettos, business and factories flee to the white suburbs, the value of property steadily deteriorates and the unemployed and the unemployable are bringing the welfare services to a standstill; violence, arson and looting are becoming endemic. The cities have mounting deficits and are unable to rehouse, educate or look after the health of the inhabitants. Even burial of the dead is becoming a major problem. A Rhodesian friend, with whom I was driving past the immense cemetery in the centre of Brooklyn, N.Y., commented that while Salisbury was only half the size the cemetery was twice as dead! I have myself never forgotten the smell in East Side New York, only ten blocks from the United Nations building, when the old incurables totter out for the day from Bellevue Hospital to sit on the benches on the sidewalks. When the North End of Boston was blacklisted for mortgage loans this meant that "it was shut out from the American credit system almost as effectively as if it had been a community in Tasmania." Some of you may have read the descriptions of the dregs of city life in Upton Sinclair's "Jungle", which portrays the back of the stockyards in Chicago. Merely in order that the City's own ordinances for the maintenance of houses and apartments could be implemented, New York found it necessary to obtain state legislation to set up a special loan fund for those property owners in Harlem who had no resources of their own on which to draw. The speed with which cities and neighbourhoods change can be realised if we remember that Los Angeles was the Mecca of the thirties, while Watts is a hell-hole of the sixties; or if you prefer to see it the other way round, that in seven years Sophiatown has become Triomf.

One of the most serious aspects of the growth of the cities is the disposal of waste. This can be either solid, liquid or gaseous. Although we burn, bury, grind or flush the material survives and technology adds to its longevity. An aluminium can will outlast the Pyramids and 48 billion are produced each year in the United States, and the number steadily increases. There are also 28 billion long-lived bottles and jars. New York City produces 375,000 lbs. of solid waste per square mile of its area per day and 1,600 lbs. of similar waste have to be removed each year for each American man, woman and child. Its disposal costs three billion dollars a year. The power-generating stations of the Trent Valley in England have already produced an accumulation of 30 million tons of ash. At present ten trains a day, each carrying 1,000 tons, carry the ash to the holes left by disused brickworks near Peterborough. By 1970 ten million tons of this ash will have to be removed, and by 1980 20 million tons. It is being used also for runways and roadbuilding, but no methods of use or disposal yet devised can catch up with the increasing production.

Sewage is polluting rivers and lakes all over the world. The river Rhine has been described as the world's biggest open sewer. The estuary of the river Elbe in the North Sea used to be a major fishing area; there are no longer fish to be caught there. Nothing lives in the river Seine below Paris, and Lakes Zurich and Geneva in Switzerland are already biologically dead. Lake Erie, between Canada and the United States, is not only biologically dead, its water is a menace to man as well as fish. New York disposes of 200 million gallons of raw sewage into the Hudson River each day, and is battling with Philadelphia which has similarly polluted the lower Delaware for the water of the upper reaches of the Delaware. Many other cities use the same run-off systems for both sewage and drainage, and these go straight to sea or river. The effluents of industrial plants add their own poisons and it is unnecessary for me to describe the incredibly complicated procedures which have to be dealt with to dispose of the radio-active materials from atomic plants, which retain their deadly effect for hundreds of years. At the same time industry is siphoning off water from the rivers and lakes at a rate which is rapidly reducing the quantities which have been available over the centuries for agriculture. Johannesburg is going to take water from the Orange to supplement the Vaal, - in 1966 there was no flow in the Vaal for 50 miles, the drought that year cost R100,000,000 in crop failures, and the north-western Transvaal at the same time lost 400,000 cattle. Mr. Botha, the Deputy Minister for Water Affairs, has forecast that all the water available in South Africa will be distributed before the year 2,000.

What of the air? The average American's lead content has increased 125-fold since 1900, because of the internal-

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combustion engine, and is now near to the maximum of tolerance. Smog is caused regularly by inversions due to rising warm air from the cities in the winter months, and the carbon dioxide content of that air is steadily increasing owing to the use of fossilised fuels of all types. The rate of oxygen regeneration is correspondingly reduced, and the amount of oxygen in the air may suddenly start to decline dangerously.

Add to the destruction wrought by the cities the removal, from all possibility of cultivation, of tens, hundreds and thousands of square miles of fertile land, which they are taking over for new suburbs, industrial complexes, and satellite towns in every province of every country every year.

Within each country, as well as between countries, the competition for land, water, and even air is becoming fiercer each year. It may not be obvious in North Johannesburg; it is already deadly in the slums of Calcutta, the asphalt jungles of Harlem, the favelas of Rio de Janeiro, and the alleyways of Cairo. It is almost as desperate in the rice paddies of East Pakistan, the grey industrial districts of Tokyo, or the Andean towns where the copper and tin miners of Chile and Bolivia live out a bleak existence. The contrast between the lives of rich and poor is glaring and obvious, and the reaction is no longer resignation but protest. Where the social division is also a racial division the transition from protest to violence is easy and may, to the protestor, appear compelling. Poor housing, poor schools, and finally poor jobs give little hope for the future and therefore make an immediate gain seem worth while whatever the consequences: looting follows arson.

If, among countries, the problem of over-population is sufficiently general to be called world-wide, it is obvious that it will be most serious where over-population is accompanied by low incomes and marginal living standards. At present the percentage of the population living in countries with average calorie intakes below the minimum recommended by the WHO of 2,400 calories a day is 92% of Asia, 38% for Africa and 29% for Latin America, a total of 72% of the population of the under-developed countries and 56% of the population of the entire world. This has been partly due to the comparative youth of the population of the underdeveloped countries where 42% are under the age of 15 - in itself a consequence of the population explosion. Who eats more than teenagers? 10-15% of the world's population is always hungry and sometimes starving, and 30% are undernourished. It is no wonder that, in addition, the population of the under-developed countries include among their number 50 million

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sufferers from yaws, 150 million from bilharzias, 250 million from filariasis, and 400 million from trachoma. That they are not cured is easily understood when the information is added that there is only one doctor to 50,000 people in up-country Burma, 1 to 15,000 in up-country Pakistan, and seriously inadequate medical facilities everywhere. Even if enough food and enough doctors were available, the rural worker could not pay for them. The estimated income per head of an American in 1954-6 was 50 times that of a Pakistani, 40 times that of an Indian, and 12 times that of a Philippino. It is no wonder that social cohesion is generally absent and morale low. "For the Indian villager, the Latin American peon, and the African tribesman life is getting better at a rate which economists may compute at 0.5% a year but which in human experience may as well be put at zero." If the rise in population is included the poor world will cease to have any growth rate by 1975, and a minus quantity thereafter. To the poor of the underdeveloped world there must be a bitter irony in the talk of the "revolution of rising expectations."

What are the prospects of improvement in the immediate future?

(1) Food - the Director of the Harvard Centre for Population Studies, Roger Revelle, has pointed out that "today" 12,000 people died of hunger in the world and that "tomorrow" another 12,000 people will die, and he was writing before the word 'Biafra' had entered the vocabulary. The Paddocks write in the book from which I have already quoted that "by farming further and further up the hillsides until all the extra land is used up and by borrowing more and more funds from international agencies until credit is exhausted, by receiving from the well-fed countries more and more of their surplus food, the hungry world has been able to keep its children alive. But the children are getting bigger, they eat more, they need more calories to stay alive and now there are more and more of them, and, worse even, the children themselves are having children." Indeed, the undeveloped countries are not even keeping up with their own rates of production. Prior to World War II the undeveloped countries were actually exporters of grain. In the 1930's Latin America exported more grain than the United States and Canada combined: in 1949 Latin America became a grain importer. The Netherlands Indies was a major prewar supplier of copra to the world market: Indonesia, the successor state, in contrast, exported in 1963 only one-fifth of the amount exported in 1938 although the amount grown was greater than the 1938 crop; the increased population is consuming the other four-fifths that had previously been exported. Beginning in 1963 the FAO has issued regular statements that the world's population is consuming food 1% faster than it is producing it. In 1965, Mr. B.R. Sen, the Director, stated that

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"the FAO had calculated that a sustained increase of 4% per year in food production against a population growth rate of 2.5% would be needed over the next fifteen years to avoid any serious breakdown of the precarious balance between population and food supplies." 10-15% of the world's population was permanently hungry and sometimes starved, and 30% was under-nourished. In 1966 his annual report stated that "if the rate of food production cannot be significantly increased, we must be prepared for the Four Horsemen of the Apocalypse." And this year (1968) the FAO have proposed that a world food reserve should be created, equal to 8.5 million tons of cereals, and \$330 million of stocks of other foods, in order to provide for disasters alone. There is as yet no indication that the reserves will be created. The Paddocks calculate that Latin America's, Africa's and Asia's food production has actually dropped, so that there is now 14-15% less food from local sources available for each person than there was in the previous year. They add that the fall in acre-yields, owing to inefficient methods of agriculture, lack of fertiliser and so on is likely to become more and more evident, because land has been put into production which simply lacks the qualities to maintain it. The surpluses of the past have already been distributed without there being any indication that famines which they relieved will not recur. The Paddocks are certain that they will: "the famines which are now approaching will not, in contrast, be caused by weather variations and therefore will not be ended in a year or so by the return of normal rainfall. They will last for years, perhaps several decades, and they are, for a surety, inevitable. Ten years from now parts of the undeveloped world will be suffering from famine. In 15 years the famines will be catastrophic, and revolutions and social turmoil and economic upheavals will sweep areas of Asia, Africa and Latin America."

One possibility of increasing the food supply is to use the 1% of heavy wax, produced by the cracking of crude oil, as a base for the growth of yeasts which would yield valuable protein. Research and experiment was being conducted near Port Harcourt, but the Nigerian civil war may have interrupted progress.

(2) Water - So far as the use of water on land, whether for irrigation or industry, is concerned much has been written of the prospects of reducing the costs of desalination of seawater, but even twenty years of research and experiment have so far only proved that desalination can be economically worth while where for other reasons the economy can afford to pay an exceptionally high price for water; in, for example, Kuwait, where there is untold oil but no water at all, the Canary Islands, where hotels must have it and tourists will pay for it, and in the Channel Islands where it is needed for the cultivation under glass of early vegetables which sell for exceptionally high prices.

Major Louis Kraft, a former Director of the South African Institute of International Affairs, recently drew attention to the possibilities of farming the seas themselves to increase the supply of food. Hook and net, the methods still in use for fishing, both predate the bow and arrow, and although radar and the use of catchers and factory ships has doubled the total catch since 1945, many fishes are little used or not at all. Sharks, for example, are both plentiful and edible, but have so far been hunted mainly for their liver oil. Two-thirds of the earth's surface is sea, and the production of fish could be greatly increased by farming them in enclosed areas.

(3) Capital - Much of the capital provided to under-developed countries in the past has been used for the purchase of consumer goods, but the remainder helped to provide them with the industries which they now possess. Aid has been provided at the rate of about 1% of the national product of the developed countries: this amounted to \$7,600 million in 1965. Since that year the economies of the developed countries have been experiencing balance of payments difficulties and they have either stabilised their aid at the previous rate or reduced it. I saw a forecast last week that the U.S.A., where Congress this year cut the aid programme by one-third, might next year be providing bilateral aid on a still further reduced scale. Neither France nor Britain seems likely to be in a position to increase its provision even if they do not reduce it. Mr. McNamara, the new chairman of the International Bank, has sought to find a replacement for bilateral aid by proclaiming the duty of the Bank to provide greatly extended aid which it will finance by contributions from national banks. So far I have seen no indications of response - or even verbal enthusiasm from the bankers in question.

The gloomy prospect for aid led the under-developed countries to stress at the UNCTAD Conference at Delhi recently the importance of an alternative, which, incidentally, they would much prefer: steps to prevent the fluctuations in the prices of raw materials which constitute the bulk of their exports. They argued that these prices had tended to fall rather than rise and that they had, as a result, lost more in income than the total of the aid which they had received. Sympathetic noises were made by the representatives of the developed countries, but so far that has been about all.

The implications for international relationships of what I have so briefly outlined are as ominous as the facts themselves.

(1) Since the main causes of the population increases all over the world has been the decrease in mortality the obvious way to produce an immediate improvement would be to make sure that there would be a speedy increase in mortality: either by removing the causes of the improvement, or by killing off the aged before they would otherwise die. The former course might be achieved by ceasing to supply antibiotics, sera, etc., and refusing to train any more

doctors/.....

doctors and nurses, but it would take time and, in the name of humanity, would be rejected by most countries and the majority of individuals. Euthanasia for the aged would probably be preferred if a choice had to be made: we are always much more shocked by the death of children than by those of grandparents towards whom our attitude is more likely to be that they have at least had a run for their money. Governments might even welcome this since they would save in pensions and gain in death duties.

(2) Much might be done to restrict births but only if all major countries are in agreement. Otherwise some would see in the restriction of the populations of others chances to assert themselves. If all were agreed then the services of the doctors and nurses released by getting rid of the old might be concentrated on restricting births. It is the lack of doctors and nurses which is restricting the efforts of governments which want to reduce their present birth rate: in Delhi an Indian woman superintendent of a hospital told me that she was so busy dealing with maternity cases that she had, quite literally, no time for birth control.

(3) More might be done to improve food production, even if the extra quantities were produced uneconomically. They might tide over the next generation. India uses only 3 lbs. of fertilisers to the acre against Japan's 300 lbs., but the price at which fertiliser can be made available from the national plants is at present far beyond the pockets of the peasants. Only 10% of the world's output is used in the underdeveloped countries. It has been suggested that if ammonia were produced at the oil wells of the Middle East it could be sold to East Africa at half the present price (due to freight costs) of the ammonia produced in Europe or the United States. East Africa in turn might then grow surplus food for India. Hundreds of similar co-operative arrangements might be possible, but the speed with which they can be arranged is too slow to meet the needs. Something may be done - as it has been in India and Pakistan - by planting a Mexican wheat which bears twice the protein content of the older varieties. The use of varieties of sugar and corn with double or treble the normal chromosome counts can help similarly. But in the underdeveloped countries less than 1/500th is spent of the amount spent in the developed countries on agricultural research, and the research is needed on the spot. They cannot provide the funds themselves.

(4) Aid at five, or ten times the present amount is needed and there could be no hope of repayment. The annual amount required to service the foreign indebtedness of Latin America (including amortization payments) was in 1956 \$455 million, in 1964 \$1,624 million, and in 1965 \$2,100 million. In 1965 the charges in fact already exceeded the total aid envisaged when the Alliance for Progress was established by President Kennedy in 1961.

(5) Or/.....

(5) Or the population increase can be allowed to continue, and the gap between the haves and the have nots to increase until the have nots turn, in desperation on the nearest haves and take what they need. The ensuing chaos would reduce production and make the world situation that much worse. War or preventive war would ensue, and revolutions in the past have shown that while a Red terror can be shocking, the white counter-terror (I am speaking politically and not racially) can be as bad or worse.

May I remind you of the title of the Paddock's analysis: "Famine, 1975"; may I quote to you Gunnar Myrdal: "a world calamity in five or ten years". If the proposed conference serves only to bring us, here in South Africa, to an awareness of the danger, it will have been more than justified. If it contributes, to however small a degree, to the development of a similar awareness outside South Africa, I cannot believe that a more useful meeting could be held in 1970.