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NUTRITION AND THE INTERNATIONAL SITUATION

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FREEMAN H. QUIMBY
LIFE SCIENCES SPECIALIST

AND

CYNTHIA B. CHAPMAN
BIOLOGICAL SCIENCES ANALYST
SCIENCE POLICY RESEARCH DIVISION
CONGRESSIONAL RESEARCH SERVICE

FOR THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS
...ED STATES SENATE

MAY 1974

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PREFACE

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May 13, 1974

TO: Select Committee on Nutrition and Human Needs
Attn: Mr. Gerald Cassidy, Special Counsel
Mr. Kenneth Schlossberg, Staff Director

FROM: Freeman H. Quimby
Specialist, Life Sciences
Science Policy Research Division
and
Cynthia B. Chapman
Analyst, Biological Sciences
Science Policy Research Division

SUBJ: Compilation of key articles on nutrition and:
(1) health, (2) special groups, (3) consumer issues,
and (4) government research.

In response to your request of April 23, 1974 we have conducted a considerable review of basic articles dealing with contemporary issues in food and nutrition. From the numerous sources studied we have selected comprehensive articles which were judged to be useful to the Committee's immediate needs. The list of materials provided is arranged according to a set of logical subject headings and is submitted under the general title, "A Compilation of Key Papers for Use by the Select Committee on Nutrition and Human Needs." As an addendum it is suggested that the Committee note "U.S. and World Food Security", a publication of the Senate Committee on Agriculture and Forestry. March 15, 1974.

While some excellent works may have been overlooked in preparing the list, it is believed that the material presented is a representative sample of the dialogue now developing in the vast literature on national and international food and nutrition policy.

Please let us know if we can be of any further assistance.

Enclosure

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THE NEXT CRISIS?
Food

by Lester R. Brown

This year's global food scarcity is often treated by both official Washington and the communications media as a temporary phenomenon, an aberration that will shortly disappear if we will only have patience. But several factors suggest that the world food economy is undergoing a fundamental transformation, and that food scarcity is becoming chronic.

The soaring demand for food, spurred by continued population growth and rising affluence, has begun to outrun the productive capacity of the world's farmers and fishermen. The result has been declining food reserves, skyrocketing food prices, food rationing in three of the world's most populous countries, intense international competition for exportable food supplies, and export controls on major foodstuffs by the world's principal food supplier.

From a global perspective, the world is likely to be in a very vulnerable position on the food front in the years ahead. In this context, official American urgings of patience, even complacency, can only be viewed by the rest of the world as indifference rather than reassurance. Global insecurity in an area so basic to human welfare calls for strong new policy responses, measures which the United States has so far appeared reluctant to support.

During the 1960's, the world food problem was perceived as a food-population problem, a race between food and people. At the end of each year, observers anxiously compared rates of increase in food production with those of population growth to see if any progress was being made. Throughout most of the decade it was nip and tuck. During the 1970's, rapid global population growth has continued to generate demand for more food, but, in addition, rising affluence has begun to emerge as a major new claimant on world food resources. Historically, there was only one important source of growth in world demand for food; now there are two.

At the global level, population growth still generates most of the additional demand. Expanding at about 2 percent per year, world population will double in little more than a generation. *If growth does not slow dramatically, merely maintaining current per capita consumption levels will require a doubling of food production over the next generation.* In demographic terms, the world currently divides into two groups of countries: the rich countries that have low or declining rates of population growth, and the poor countries, most of which have rapid rates of population growth. Fully four-fifths of the annual increment in world population of an estimated 70 million occurs in the poor countries.

Some of the relatively small poor countries add more to the world's annual population gain than the larger rich ones. Mexico, for example, now contributes more to world population growth than does the United States. The Philippines adds more people each year than does Japan. Brazil adds 2.6 million people in a year, while the Soviet Union adds only 2.4 million.

The effect of rising affluence on the world demand for food is perhaps best understood by examining its effect on grain requirements. Grain consumed directly provides 52 percent of man's food energy intake. Consumed indirectly, in the form of livestock products, it provides a sizable share of the remainder. In resource terms, grains occupy more than 70 percent of the world's crop area.

In the poor countries the annual availability of grain per person averages only

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about 400 pounds per year. Nearly all of this small amount must be consumed directly to meet minimum energy needs. Little can be spared for conversion into animal protein.

"The United States and Canada today control a larger share of the world's exportable supplies of grains than the Middle East does of oil."

In the United States and Canada, per capita grain utilization is currently approaching 1 ton per year. Of this total only about 150 pounds are consumed directly in the form of bread, pastries, and breakfast cereals. The remainder is consumed indirectly in the form of meat, milk, and eggs. The agricultural resources—land, water, fertilizer—required to support an average North American are nearly five times those of the average Indian, Nigerian, or Colombian.

Throughout the world, per capita grain requirements rise with income. The amount of grain consumed directly rises until per capita income approaches $500 per year, whereupon it begins to decline, eventually leveling off at about 150 pounds. The total amount of grain consumed directly and indirectly, however, continues to rise rapidly as per capita income climbs. As yet, no nation appears to have reached a level of affluence where its per capita grain requirements have stopped rising.

The impact of rising affluence on the consumption of livestock products is evident in trends in the United States over the past generation. For example, per capita consumption of beef climbed from 55 pounds in 1940 to 117 pounds in 1972, more than doubling. Poultry consumption rose from 18 pounds to 51 pounds during the same period.

There is now a northern tier of industrial countries—beginning with the United Kingdom in the West and including Scandinavia, Western Europe, Eastern Europe, the Soviet Union, and Japan—whose dietary habits more or less approximate those of the United States in 1940. As incomes continue to rise in this group of countries containing some two-thirds of a billion people, a sizable share of the additional income is being converted into demand for livestock products, particularly beef. Many of these countries, such as Japan and those in Western Europe, are densely populated. Others—the Soviet Union, for example—suffer from a scarcity of fresh water. Thus they lack the capacity to satisfy the growth in demand for livestock products entirely from indigenous resources. As a result they are importing increasing amounts of livestock products or of feedgrains and soybeans with which to expand their livestock production.

The Soviet Union purchased 28 million tons of grain abroad in fiscal year 1973, *importing more food than any country in history*. Japan imported 17 million tons of grain last year, and will import even more in the years to come. These figures compare with India's largest annual imports of less than 10 million tons during the drought-induced food crisis years of 1966 and 1967.

The recent Russian drive to improve diets is demonstrated convincingly by Charts I and II. Crop shortfalls are nothing new in the Soviet Union; six times in the last two decades Russian consumers have been forced to tighten their belts following poor harvests. What was significant in 1972 was the Russian government's determination, even after a major fall in production, to press ahead with its livestock expansion program and actually *increase* the nation's per capita utilization of grains to a record level—an unprecedented action. The only possible means of achieving the desired dietary improvements was through the massive importation of grain, most of which had to come from the United States. Détente has many faces.

In 1972, world grain production totaled

about 1,200 million metric tons. The annual increase in global production of grains has recently averaged about 30 million tons. Of this increment, roughly 22 million tons per year are absorbed by population growth, and about 8 million tons by rising incomes. With both global population and GNP rising steadily, we may expect an even higher annual growth in demand in the years ahead.

Prospects For Expanding Food Supplies

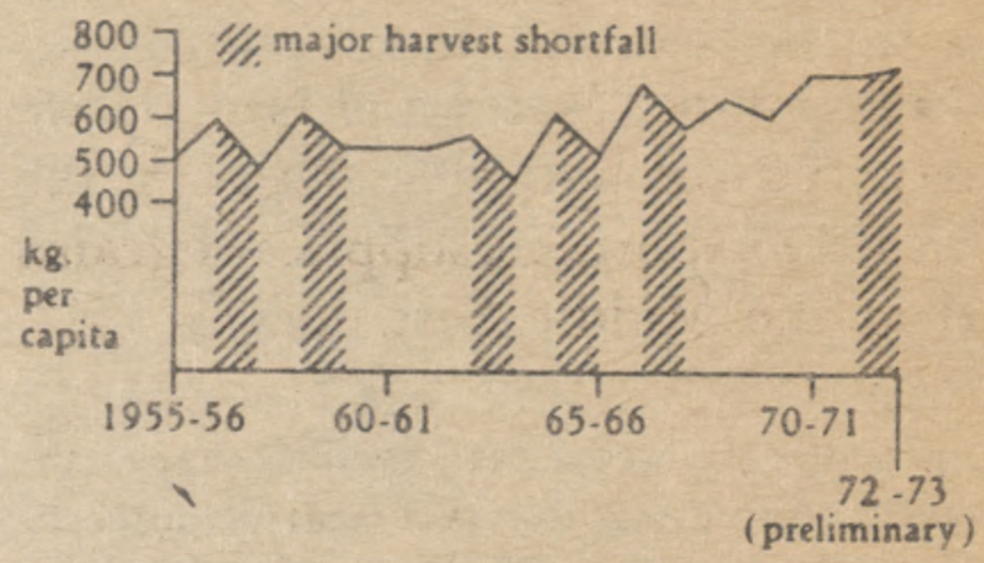
There are two basic ways of expanding the world food supply from conventional agriculture. One is to expand the area under cultivation. The other, largely made possible by the advancements in the use of agricultural chemicals and in plant genetics, is to raise output on the existing cultivated area. From the beginning of agriculture until about 1950, expanding the cultivated area was the major means of increasing the world's food supply. Since mid-century, however, raising the yield on existing cultivated area has accounted for most of the increase. Intensification of cultivation has increased steadily since 1950; during the early 1970's it has accounted for an estimated four-fifths of the annual growth in world food output, far overshadowing expansion of the cultivated area.

One question associated with future gains in agricultural production is the extent to which the trend of rising per acre yields of cereals in the more advanced countries can be sustained. In some countries, increases in per acre yields are beginning to slow down, and the capital investments necessary for each additional increase may now start to climb sharply. In industrial countries such as those in Europe, Japan, and the United States, the resources required to obtain further increases in yield per acre for some crops are rising. For example, rising rice yields in Japan from the current 5,000 pounds per acre to 6,000 pounds could be very costly. Raising yields of corn in the United States from 90 to 100 bushels per acre requires a much larger quantity of nitrogen than was needed to raise yields from 50 to 60 bushels.

Although food output per acre remains very low throughout most of the developing world, several Asian nations have experienced dramatic increases in per acre yields of

Chart I

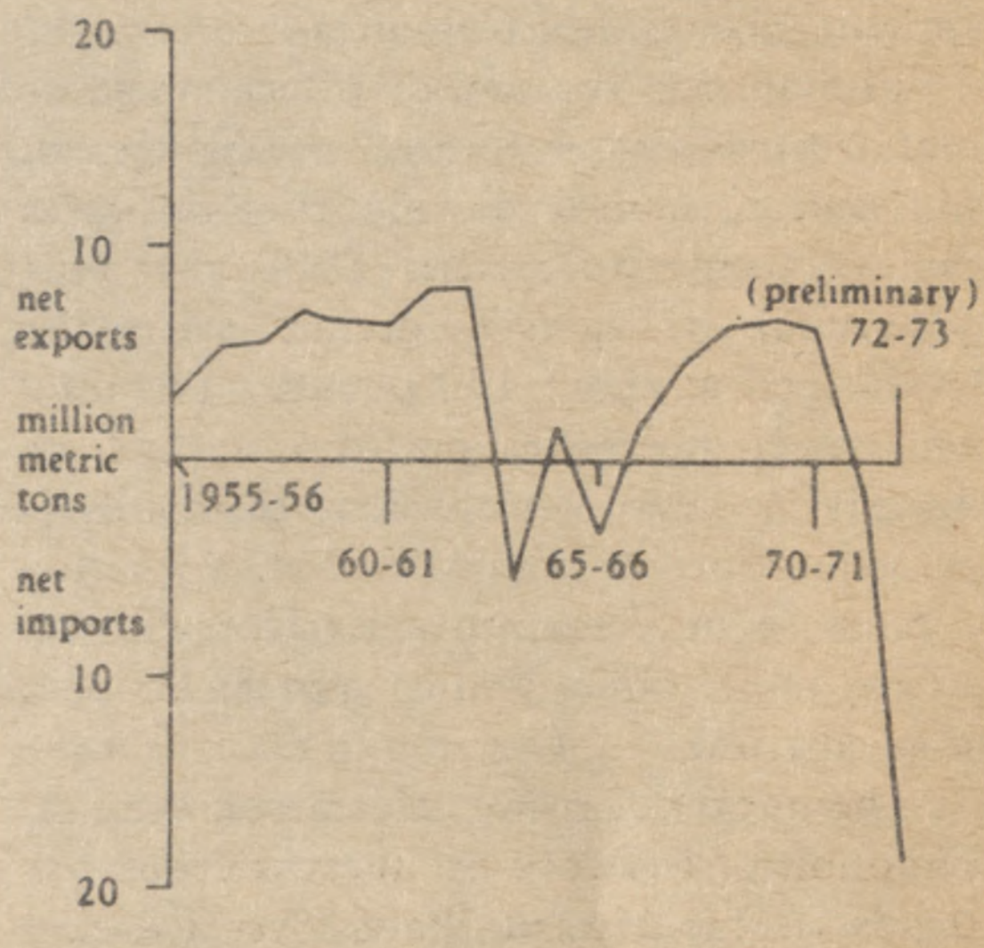
Per Capita Grain Availability in the Soviet Union, 1955-56—1972-73
(Production & Net Trade)



Source: U.S. Department of Agriculture

Chart II

Net Soviet Grain Trade, 1955-56—1972-73



wheat and rice in recent years, particularly in wheat. This has resulted from the rapid spread of new high-yielding dwarf wheat and rice varieties known as the Green Revolution. While the impact of poor weather in the last year has shown how tenuous their food security is, key nations such as India, Pakistan, and the Philippines have approached at least temporary self-sufficiency in grain production in recent years. The widespread famine in Asia which some informed observers in the mid-1960's saw as inevitable has so far been avoided. Great potential still exists for the more widespread use of high-yielding seed varieties in many developing nations, though in any case new seeds can do little more than buy time in which to slow population growth.

The traditional approach to increasing production—expanding the area under cultivation—has only limited scope for the future. Indeed, some parts of the world face a net reduction in agricultural land because of the growth in competing uses, such as industrial development, recreation, transportation, and residential development. Few countries have well-defined land use policies that protect agricultural land from other uses. In the United States, farmland has been used indiscriminately for other purposes with little thought to the possible long-term consequences.

Some more densely populated countries, such as Japan and several in Western Europe, have experienced a reduction in the land used for crop production in the past few decades. This trend is continuing and may well accelerate. Other parts of the world, including particularly the Indian subcontinent, the Middle East, North Africa, sub-Saharan Africa, the Caribbean, Central America, and the Andean countries, are losing disturbingly large acreages of cropland each year because of severe erosion.

The area of land available for food production is important, but perhaps even more important in the future will be the availability of water for agricultural purposes. In many regions of the world, fertile agricultural land is available if water can be found to make it produce. Yet most of the rivers that lend themselves to damming and to irrigation have already been utilized for these purposes. Future efforts to expand fresh water supplies for agricultural purposes will increasingly focus on such techniques as the diversion of rivers (as in the Soviet Union), desalting sea water, and the manipulation of rainfall patterns to increase the share of rain falling over moisture-deficient agricultural areas.

The need for capital inputs, particularly in the form of chemical fertilizers and pesticides, is projected to grow at an unprecedented rate over the remainder of this century. If the United Nations' medium population projection materializes by the end of the century, giving the world a population of 6.5 billion, far more than a doubling in the use of chemical fertilizer would be required, and the eutrophication of fresh water lakes and streams would become a far more serious problem than it is at the present time.

What impact the energy crisis will have on food production costs and trends remains to be seen. With a substantial rise in the cost of energy, farmers engaged in high-energy agriculture, as in the United States, will tend to use less, thus perhaps reducing future production increases below current expectations. For other inputs used in modern agriculture—nitrogen fertilizer, for example—the rising cost of energy can be important. In part this is because one of the principal raw materials for the synthesis of nitrogen fertilizer is natural gas, and in part because one of the major costs in manufacturing nitrogen fertilizer is energy.

In many cases, efforts to increase food production prove to be at least partially self-defeating, as the pressures of growing demand undermine the ecological foundations

of the earth's food-producing system. The rapid growth in the catch of anchoveta off the coast of Peru in the last five years, in order to meet the burgeoning global demand for high protein feeds, may have depleted stocks, damaging the fishery to the point where it will take several years to rebuild. Thus in the drought-plagued Sahel just south of the Sahara in Africa, the need to feed an expanding population has led to over-grazing, deforestation, the hastening of the southward spread of the desert, and the loss of valuable food-production capacity.

Deforestation in the Nepalese Himalayas and surrounding foothills is contributing to an increase in the frequency and severity of flooding in the subcontinent countries of Pakistan, India, and Bangladesh. The effect is to diminish the subcontinent's food-producing capacity—a real and growing threat to its population, now rapidly approaching three quarters of a billion people.

Technological Panaceas?

Over the last decade, many nonconventional techniques have been set forth for expanding the world food supply. From a technological point of view, many have been exceedingly interesting. But few have materialized in the way their proponents have hoped. New foods must not only be technologically feasible, but also economically feasible, and most importantly, people must be willing to eat them.

Among past proposals was the possibility of using all sorts of fish, many of which are not considered edible, to produce fish protein concentrate. This protein concentrate could be added to conventional dishes of various kinds to provide a low-cost method of increasing protein intake and improving nutrition. Unfortunately, technological problems with this approach remain, and as of 1973 it is receiving little attention in either the scientific or food processing communities.

A second widely discussed possibility for augmenting human food supplies is that of using single-celled microorganisms, principally certain strains of yeast, to convert petroleum into edible forms of protein. This process was at one time being actively researched by 26 international oil companies in various parts of the world.

Thus far the hopes for using this process have not materialized on a significant scale. British Petroleum, the leader in this field, has been operating a small pilot plant in France, and has future plans for producing as much as 100,000 tons of protein for animal feed annually. Some petro-protein is apparently being produced in the Soviet Union. However, the plans of two Japanese chemical firms to produce a total of 150,000 tons of protein yearly were recently scrapped, primarily due to extreme resistance on the part of Japanese consumers, who felt that even the indirect consumption of petro-protein might not be medically safe.

Technical problems in the production of petro-protein have proved to be formidable, and clearance for marketing has been achieved only for feed-grade protein to be used in livestock feed. Serious problems must yet be overcome before this protein can be consumed directly by human beings. Beyond this, the economics have recently taken an unfavorable turn now that the price of petroleum is rising.

During the late 1960's, many proposed the use of algae on a massive scale as a supply of nutritious food. To date, however, the cost and palatability problems with algae products remain to be overcome.

Currently, pilot projects and experimentation are under way in a variety of other areas, including the improvement of fish-farming techniques, the recycling of animal wastes, and the nutritional improvement of grain varieties. Research in all such areas should continue and deserves strong support. However, there is little likelihood that any such advancements will have a major impact

on global food supplies before the end of this decade.

Constraints On Protein Production

In looking ahead one must be particularly concerned about the difficulties in expanding the supply of world protein to meet the projected rapid growth in demand. At present, mankind is faced with a number of technological and other constraints in increasing the supply of protein on three important fronts: beef, soybeans, and marine protein.

In the case of beef, two constraints are important. Agricultural scientists have not been able to devise any commercially viable means of getting more than one calf per cow per year. For every animal that goes into the beef-production process, one adult must be fed and otherwise maintained for a full year. There does not appear to be any prospect of an imminent breakthrough on this front.

The other constraint on beef production is that the grazing capacity of much of the world's pastureland is now almost fully utilized. This is true, for example, in most of the United States Great Plains, in East Africa, and in parts of Australia.

A second potentially serious constraint on efforts to expand supplies of high-quality protein is the inability of scientists to achieve a breakthrough in per acre yields of soybeans. Soybeans are a major source of high-quality protein for livestock and poultry throughout much of the world and are consumed directly as food by perhaps a billion people throughout densely populated East Asia. Soybeans are important economically; they have become the leading export product of the United States, even surpassing more traditional farm exports such as wheat and corn and high technology items such as electronic computers and jet aircraft.

The United States now produces three-fourths of the world's soybean crop, and supplies about 90 percent of all soybeans entering the world market. But soybean yields per acre have increased by only about 1 percent per year since 1950; corn yields, on the other hand, have increased by nearly 4 percent per year. One reason why soybean yields have not climbed very rapidly is that the soybean, being a legume with a built-in nitrogen supply, is not very responsive to nitrogen fertilizer. The way the United States produces more soybeans is by planting more soybean acreage. Close to 85 percent of the dramatic fourfold increase in the U.S. soybean crop since 1950 has come from expanding the area devoted to growing it. As long as there was ample idle cropland available, this did not pose a problem, but if this cropland reserve disappears it could create serious global supply problems.

World Fishery Prospects

Until recently, the oceans were viewed as an almost limitless source of protein, either in the form of fish or algae. The outlook today, however, contrasts sharply with that of five years ago because world fisheries are in serious trouble, largely due to over-fishing.

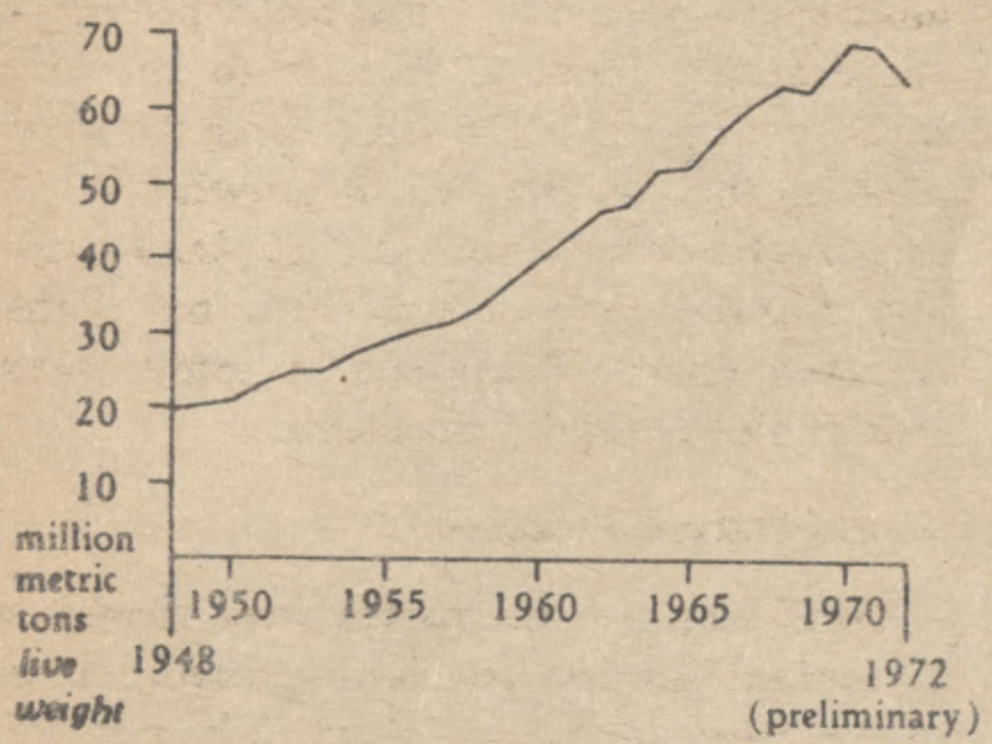
From 1950 to 1968 the world fish catch reached a new record each year, tripling from 21 to 63 millions tons. The average annual increase in the catch of nearly 5 percent, which far exceeded the rate of world population growth, greatly increased the average supply of marine protein per person. Then suddenly, in 1969, the long period of sustained growth was interrupted by a decline in the catch. Since then it has been fluctuating rather unpredictably, while the amount of time and money expended to bring in the catch continues to rise every year. Many marine biologists now feel that the global catch of table-grade fish is at or near the maximum sustainable level. A large number of the 30 or so leading species of commercial-grade fish are currently over-fished, i.e., stocks will not sustain even the current level of catch (see Chart III).

These new and disturbing trends at a time

when the world demand for protein is soaring have intensified competition in world fisheries. In the North Atlantic, Great Britain and Iceland are in continuous conflict over the fishery resources off the coast of Iceland. The Icelandic economy is closely tied

Chart III

World Fish Catch, 1948-72



Source: Yearbook of Fisheries Statistics.
Figure for 1972 is author's estimate based on preliminary FAO *totals.*

to its fisheries, as evidenced by two devaluations of the krona following two poor fishing years in 1967 and 1968. Keenly aware of this dependence on fishing, Iceland has extended its offshore limits to 50 miles in order to prevent British ships from depleting its offshore fishery resources.

Russian fishing trawlers operating just beyond the 12-mile offshore limits along the East Coast of the United States are exploiting fisheries that American fishermen formerly considered their exclusive domain. The state of Massachusetts is threatening to extend its offshore limits to 200 miles in order to prevent the demise of its once vigorous fishing industry. In the North Pacific, the Russian and Japanese fishing fleets find themselves in direct competition with each other. U.S. fishermen off the West Coast face stiff competition from Russian, Japanese, and Korean trawlers. Off the West Coast of Latin America, the United States is in continuous conflict with Peru and Ecuador. During a recent 12-month period, Ecuador seized 56 U.S. fishing trawlers found within its unilaterally imposed 200-mile offshore limit, fining them a total of $2.3 million.

World fishery resources represent an important source of protein. The 1971 catch of 69 million tons amounted to nearly 40 pounds (live weight) per person throughout the world. Of this catch roughly 60 percent was table-grade fish, the remainder consisting of inferior species used for manufacturing fish meal, which in turn is used in poultry and hog feed in the industrial countries. For Americans, fish are important in the diet, but direct consumption averages only about 14 pounds per year, compared with 51 pounds of poultry, 73 pounds of pork, and 117 pounds of beef. These data on direct consumption understate the importance of fish in the diet since a significant share of the poultry and pork consumed are produced with fish meal.

In two of the world's populous countries, Japan and the Soviet Union, fish are significant as a direct source of protein in the national diet. As population pressure built up in Japan during the late nineteenth and early twentieth centuries, the Japanese were forced to turn to the oceans for their animal protein, using their very limited land resources to produce rice to meet minimal food energy needs. As a result the Japanese evolved a fish and rice diet. Fish consumption per person in Japan totals 70 pounds per year, the highest of any major country.

The Soviet Union, experiencing difficulties in expanding its livestock industry at a satisfactory rate, has also turned to the oceans during the past 15 years for much of its animal protein. It has invested heavily not only in fishing fleets, but also in floating fish-processing factories and sophisticated fishing technologies that enable its fleets to

range far and wide throughout the world. The direct consumption of fish by the average Russian consumer is probably at least double that of his American counterpart. Accordingly, as growth in the world catch of table-grade fish slows and, for some important species, begins to decline from overfishing, the Russian and Japanese populations are particularly vulnerable. If they find themselves increasingly unable to meet protein needs from oceanic resources, they may be forced to offset this decline by substantially stepping up imports of feedgrains and soybeans to expand their indigenous livestock production, generating additional pressure on exportable supplies.

Although there are substantial opportunities for further expanding the world's protein supply, it now seems likely that the supply of animal protein will lag behind growth in demand for some time to come, resulting in significantly higher prices for livestock products during the remainder of the 1970's than prevailed during the 1960's. *We may be witnessing the transformation of the world protein market from a buyer's market to a seller's market, much as the world energy market has been transformed over the past few years.*

Dwindling Global Reserves

Since World War II the world has been fortunate to have, in effect, two major food reserves—grain stocks, often at a surplus level in the principal exporting countries, and cropland idled under farm programs, virtually all the latter in the United States.

Grain reserves, including substantial quantities of both foodgrains and feedgrains, are most commonly measured in terms of carryover stocks—the amount in storage at the time the new crop begins to come in. World carryover stocks are concentrated in a few of the principal exporting countries—the United States, Canada, Australia, and Argentina.

Since 1960, world grain reserves have fluctuated from a high of 155 million metric tons to a low of about 100 million metric tons. At this level, severe shortages and strong upward price pressures develop. Although 100 million tons appears to be an enormous quantity of grain, it represents a mere 8 percent of annual world grain consumption, an uncomfortably small working reserve and a perilously thin buffer against the vagaries of weather or plant diseases. As world consumption expands, so should the size of working reserves, but the trend over the past decade has been for reserves to dwindle while consumption has climbed.

World wheat reserves in 1973 fell to their lowest level in 20 years, and the world's population has expanded by half during the interim. In 1974, with good to very good crops anticipated in most key countries, already depleted world grain reserves are expected to decline further (see Chart IV).

In addition, one-seventh of U.S. cropland, or roughly 50 million acres out of 350 million acres, has been idled for the past dozen years or so. Though not as quickly available as the grain reserves, it was possible to get most of this acreage back into production within 12 to 18 months once the decision was made to do so.

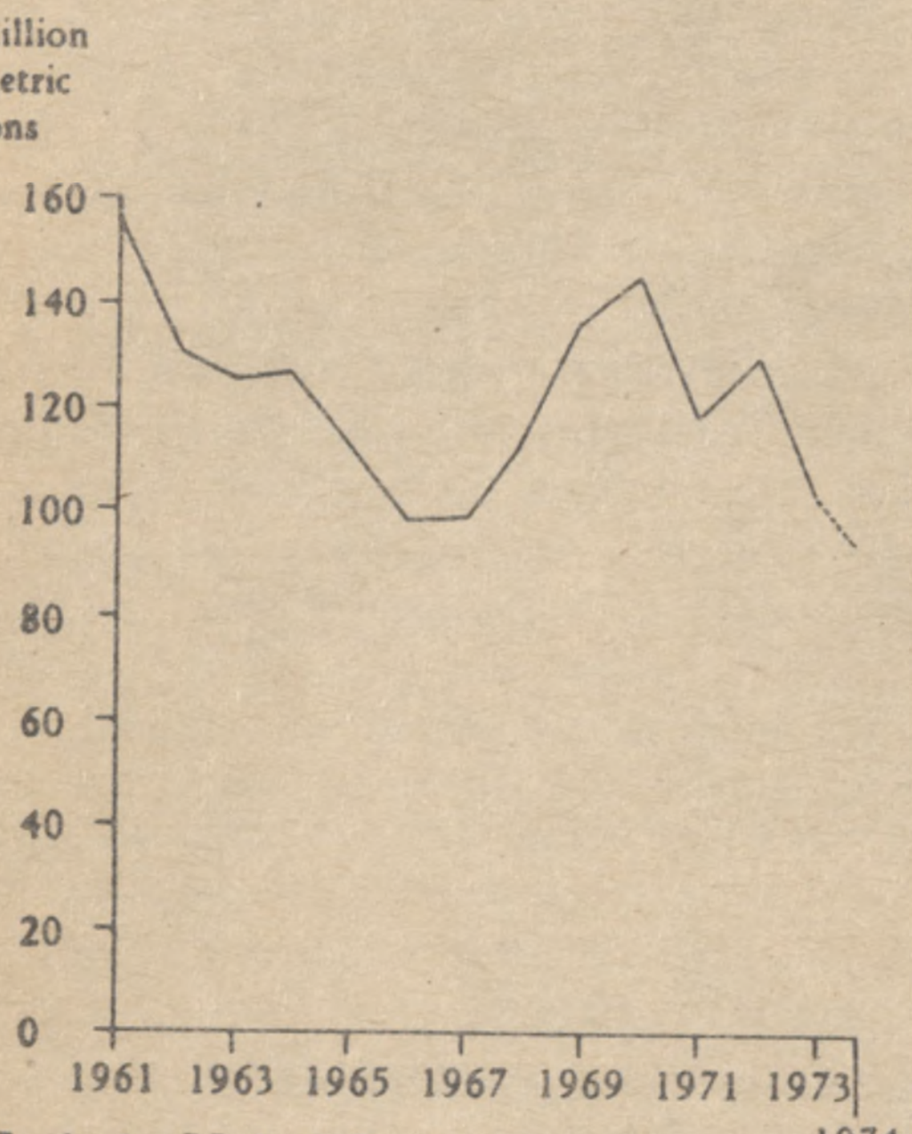
In recent years, the need to draw down grain reserves and to dip into the reserve of idled cropland has occurred with increasing frequency. This first happened during the food crisis years of 1966 and 1967 when world grain reserves were reduced to a dangerously low level and the United States brought back into temporary production a small portion of the 50 million idle acres. Again, in 1971, as a result of the corn blight, the United States both drew down its grain reserves and brought another portion of the idle acreage back into production. In 1973, in response to growing food scarcities, world grain reserves once more declined and the United States dipped into its idle cropland, but to a much greater degree than

on either of the two previous occasions. Government decisions in early 1973 permitted all but a small fraction of the idled cropland in the United States to come back into production, and in 1974 no land will be held idle under government programs (see Chart V).

From the end of World War II until recently, world prices for the principal temperate-zone farm commodities such as wheat,

Chart IV

Total Grain Stocks in Principal Exporting Countries
1961-1974*



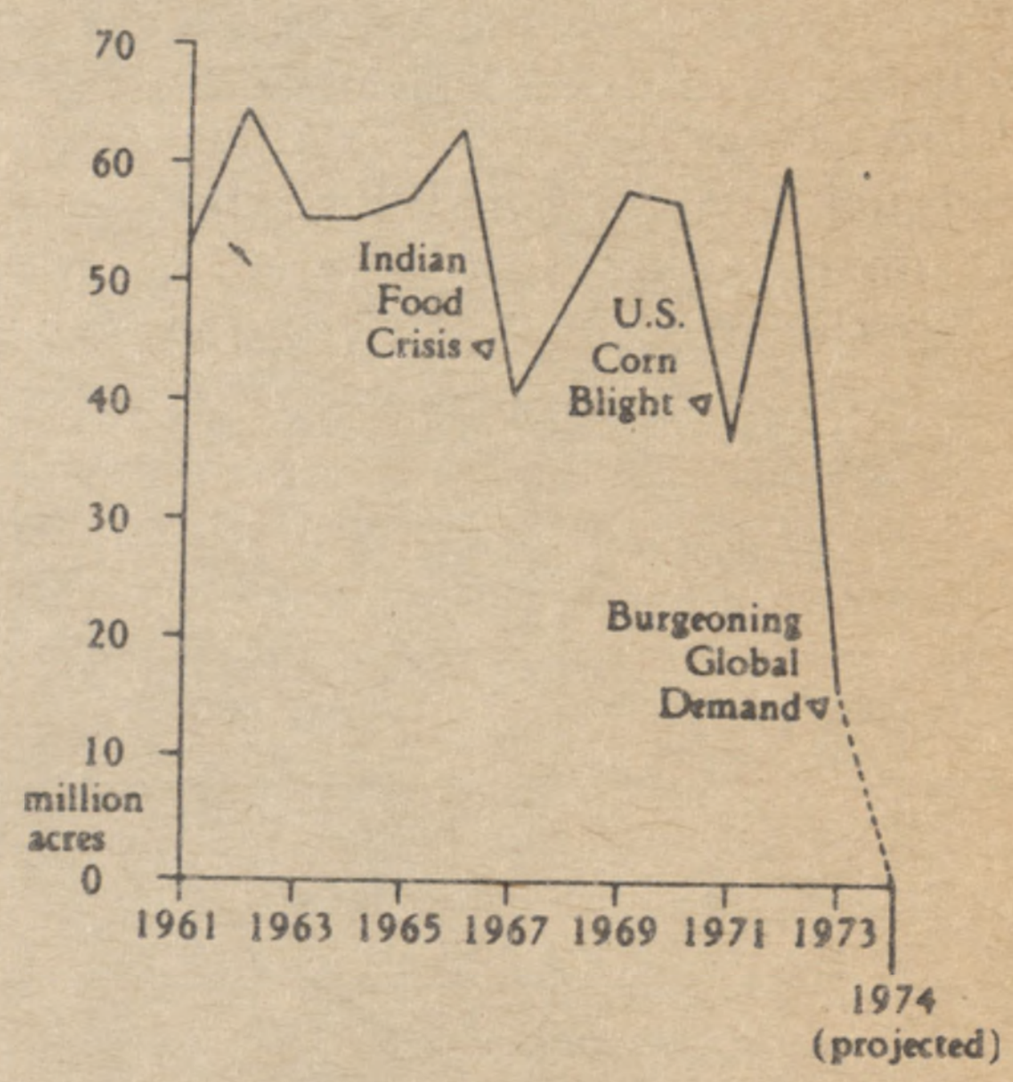
* Includes United States, Canada, Australia, Argentina

Source: U.S. Department of Agriculture

feedgrains, and soybeans, have been remarkably stable. In part, this is because throughout much of this period world prices have rested on the commodity support level in the United States. Since world food reserves have become chronically low, and the idled cropland in the United States has declined sharply and will disappear entirely in 1974, when remaining acreage controls are removed, there is every prospect of very volatile world prices for the important food commodities.

Chart V

U.S. Cropland Acreage Withheld From Production Under Government Programs, 1961-1974



Source: U.S. Department of Agriculture, Agriculture Stabilization and Conservation Service

Over the past generation the United States has achieved a unique position as a supplier of food to the rest of the world. Before World War II, both Latin America (especially Argentina) and North America (United States and Canada) were major exporters of grain. During the late 1930's, net grain exports from Latin America were substantially above those of North America. Since then, however, the failure of most Latin-American governments to make family planning services available and to reform and modernize agriculture have eliminated the net export surplus. With few exceptions, Latin-American countries are now food im-

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porters (see Grain Trade table below).

Over the past three decades, North America—particularly the United States, which accounts for three-fourths of the continent's grain exports—has emerged as the world's breadbasket. Exports of Australia, the only other net exporter of importance, are only a fraction of North America's. *The United States and Canada today control a larger share of the world's exportable supplies of grains than the Middle East does of oil.*

The Changing Pattern of World Grain Trade

Region	1934-1938*	1948-1952*	1960	1966	1972**
			million metric tons		
North America	+5	+23	+39	+59	+84
Latin America	+9	+1	0	+5	—4
Western Europe	—24	—22	—25	—27	—21
Eastern Europe & Soviet Union	+5	—	0	—4	—27
Africa	+1	0	—2	—7	—5
Asia	+2	—6	—17	—34	—35
Australia & New Zealand	+3	+3	+6	+8	+8

* *Annual average*
** *Preliminary*
(Plus=net exports; minus=net imports)

Exportable supplies of the crucial soybean are even more concentrated than those of grains. Although as late as the 1930's, China supplied nearly all the soybeans entering world trade markets, continuing population growth during the ensuing decades has gradually absorbed the exportable surplus. As of 1973, China is importing small quantities from the United States. The position of principal supplier has been taken over by the United States, which provided over 90 percent of world soybean exports in the 1960's and early 1970's. With world demand for high-quality protein surging upward, Brazil —virtually the only other nation capable of producing soybeans on a sizable scale in the foreseeable future—has rapidly boosted its soybean production and exports. However, the United States is likely to continue supplying three-fourths or more of the world's soybean exports for many years to come.

The extraordinary preponderance of the United States in world food markets has not been without its benefits for this country. Farm exports in fiscal 1973 totaled $12.9 billion, greatly ameliorating a generally dismal balance of trade outlook. Russian dependence on American wheat to meet its own food needs has doubtlessly contributed to the recent mood of détente, and may help encourage the Russians to share their untapped Siberian energy resources with the United States.

However, at a time when dependence of the rest of the world on North American food exports is increasing so dramatically, there is also a growing awareness that this extreme dependence leaves the world in a very vulnerable position in the event of adverse crop years in North America. Both the United States and Canada are affected by the same climatic cycles.

Considerable evidence has now been accumulated indicating that North America has been subject to recurrent clusters of drought years roughly every 20 years. The cyclical drought phenomenon has now been established as far back as the Civil War when data were first collected on rainfall. The most recent drought, occurring in the early 1950's, was rather modest. The preceding one occurring in the early 1930's was particularly severe, giving rise to the dust bowl era in the United States.

When the United States experiences its next streak of drought years, quite likely during the current decade, its impact on production will not likely be as great as during the 1930's, due to improved soil management and water conservation practices. But even a modest decline in production, given the rapid growth in global demand and extreme world dependence on North America's exportable margin of food, would create a very dangerous situation. It would send shock waves throughout the world, triggering intense competition for available food

supplies, making the past 18 months appear quite stable by comparison.

Rich-Poor Competition

The probable nature and results of more intense global competition for tight food supplies were foreshadowed this year. Bangladesh, threatened with famine, has pressed with limited success for a diversion of Russian-purchased grain to help feed its population. India, confronted with an unanticipated need to import several million tons of grain, is finding that the extremely high prices resulting from international bidding for available supplies has put serious constraints on the amount it can buy—even assuming it can find any grain for sale. Fortunately, the Russians have agreed to loan two million tons of grain to India, which will help India weather this year's crisis. In the coming year, it appears likely that massive rice purchases by the increasingly affluent oil-rich nations of the Middle East and North Africa will help drive international rice prices still higher, reducing the purchasing power of many poor African and Asian nations which badly need rice imports.

When one spends about 80 percent of one's income on food, as a sizable segment of mankind does today, a doubling in the price of wheat or rice cannot possibly be met by increased food expenditures. It can only drive a subsistence diet below the subsistence or survival level. Today's wheat prices of $5 per bushel will, without doubt, be reflected in higher death rates in many poor nations in the months ahead.

One reason it is possible for the world's affluent to ignore such tragedies is the changes which have occurred in the way that famine manifests itself. In earlier historical periods, famine was largely a geographic phenomenon. Whole nations or regions, whether Ireland or West Bengal, experienced dramatically high rates of starvation and death. Today, the advancements in national and global distribution and transportation systems have insured that famine is generally more evenly spread among the world's poor rather than concentrated in specific locales. The modern version of famine does not often permit dramatic photographs, such as those of the morning ritual of collecting bodies in Calcutta during the Bengal famine of 1943, but it is no less real in the human toll it exacts.

A New Approach To Food Aid

As prices are driven up, seriously limiting the ability of the poor countries (and of the poor within those countries) to buy needed food, sources of concessionary food aid are drying up as well. Since the American food aid program under PL 480 is largely predicated upon the existence of commercial surpluses, these programs are now being cut severely in this time of scarcity. This year, shipments of wheat will be less than one-third those of two years ago; rice, feedgrains, and vegetables less than half; and milk shipments have dried up entirely.

Poor nations, who may be priced out of the market for badly needed food, deserve special rights of access to food supplies. This goal suggests two policy needs. First, financial aid will be necessary to enable poor nations to maintain minimum reserve stocks. This is embodied in the reserve proposals of the United Nations Food and Agriculture Organization described below. Second, the United States must devise new food aid legislation which ensures that needed levels of concessionary and grant food aid are available to needy countries *whether or not commercial surpluses exist at the time.*

American Policy

It is in the context of growing world dependence on the United States for protein and grains that we must view last June's abrupt unilateral imposition of export restrictions on soybeans and feedstuffs by the

United States. The export controls represented an effort to fight food price inflation within the United States, but had the inevitable result of greatly intensifying inflationary pressures in the other nations of the world. This is hardly the time for the United States, a nation becoming increasingly dependent on the rest of the world for key resources, and a nation with a strong interest in a more open world trading system, to set such a precedent—cutting off essential global supplies of a commodity for domestic political reasons. Attempts to export inflation, like attempts to export depression in an earlier era, may well prove self-defeating in the end.

By imposing export controls, the United States placed itself in the morally untenable position of denying food to other nations, all of which have less food than we do. Our reliability and integrity as a trading partner were called into serious question; nations which we have urged over the last two decades to depend on the United States for food suddenly found their promised supplies cut severely without warning. American negotiators at this year's crucial trade talks may not be permitted to forget the export controls as they press other nations to lower agricultural barriers.

Over time, even our most narrowly-conceived, short-term interests will make farm export controls of any significant scale difficult to justify, for it is with farm exports that we are hoping to pay our rapidly rising energy import bill. Those proposing agricultural export limitations must also be prepared to rigorously ration gasoline and fuel oil.

Not surprisingly, the greatest outcry against the imposition of last June's controls came from Japan, which saw the action as another in the growing list of "Nixon shocks." It is difficult to appreciate the vulnerability the Japanese must feel on the food front. Soybeans are an important element in the Japanese diet, and are also an important component of feed for livestock, consumption of which is abnormally low for an industrial society. More than 90 percent of Japan's soybean imports are from the United States; two-thirds of its cereals come from the outside world.

The lack of concern demonstrated recently by the United States for Japan's vital interests during a time of adversity cannot help but raise serious questions among the Japanese concerning other areas where we are urging Japan to rely on us for protection of their vital interests. The defense arrangements we hope to preserve have probably lost considerable credibility in the last year. The U.S. export controls must have appeared particularly ironic to the Japanese, cutting off our principal dollar-earning export at a time when we were placing heavy pressures on Japan to improve its trade balance with us.

If the world food scarcity of 1973 could be viewed as a one-time aberration from promising trends, the issues of export controls and global access would not have great significance. But if, as our preceding analysis indicates, we are entering a period of frequent, perhaps more or less chronic, scarcity, then strong policy measures are called for. The international community must devise guidelines covering the obligations of supplier nations to share essential scarce commodities with importing nations. Such an understanding for food, involving principal exporters (mainly the United States, Canada, Argentina, Australia, and Thailand) on the one hand, and importing nations on the other, might set a precedent of great value for the United States in cases of non-food resources.

A Global Reserve System

The global food outlook also requires serious consideration of the creation of an internationally-managed world food reserve.

Just as the U.S. dollar can no longer serve as the foundation of the international monetary system, so U.S. agriculture may no longer have sufficient excess capacity to ensure reasonable stability of the world food economy.

A world food reserve could be built up in times of relative abundance and drawn down in times of acute scarcity, thereby helping to stabilize consumer prices. In effect, the cushion that surplus American agricultural capacity has provided for a generation would be provided at least partially by a world food-reserve system. A system of global food reserves would provide a measure of price stability in the world food economy that would be in the self-interest of all nations. The world community also has a basic humanitarian interest in ensuring that famine does not occur in the densely populated low-income countries following a poor crop year —an assurance the affluent nations may be less able to provide in the future if the current system of autonomous, nationally-oriented food planning is allowed to continue without modification.

A system of global food reserves, whether a single, centrally-managed food bank, or the FAO plan of coordinated national reserve policies proposed early in 1973, would help provide some semblance of stability in the world food economy, which may otherwise become even more chaotic. The international guidelines called for above concerning the responsibilities of principal suppliers could be included within a reserve agreement. In times of acute scarcity, acceptance of such guidelines would be essential to the successful operation of the reserve system.

Slowing Population Growth

The possibility of a chronic global scarcity of food resulting from growing pressures on available food resources underlines the urgency of halting population growth. Current demographic trends suggest that this could occur in many industrial countries within the not too distant future. In the poor countries, however, it will be much more difficult to achieve; the historical record indicates that birth rates do not usually decline unless certain basic social needs are satisfied—an assured food supply, a reduced infant mortality rate, literacy, and the availability of at least rudimentary health services of the kind now provided by the "barefoot doctors" of Mainland China. Population-induced pressures on the global food supply will continue to increase dramatically if substantial economic and social progress is not made. Populations that double every 24 years—as many are doing in poor nations —multiply eightfold within a single life span of three score and ten years. It may well be in the self-interest of affluent societies such as the United States to launch an effort to meet the basic social needs of people throughout the world in an effort to create a climate conducive to lowering birth rates.

Although the costs of promoting economic and social progress cannot be accurately predicted, there is reason to believe they might be less than imagined. UNESCO estimates show, for example, that in a developing country the cost of making a person literate is about $8—slightly less for an adult, slightly more for a school-age youngster. Accepting that estimate and assuming that there are 1 billion illiterates in the world, universal literacy would require an outlay of $8 billion. If the funds could be mobilized and spread over five years, the cost would come to $1.6 billion a year. And if the cost were allocated among the principal industrial countries, each would have to put out only a few hundred million dollars a year.

Similarly, the cost of providing a minimum nutritional diet for most of mankind may be less than commonly thought. In some ways the Chinese experience is instructive. Development efforts in that country have had a strong social focus, with over-all

economic growth rates being secondary in importance. Despite an unimpressive economic growth rate averaging below 4 percent yearly, the Chinese approach has apparently been successful in providing adequate nutrition and near-universal literacy, even though incomes per person average only about $140 a year. And birth rates appear to be declining steadily.

One inexpensive but meaningful act the United States should take immediately is *official* adoption, either by the President or Congress, of zero population growth (ZPG) as a national goal. Presently we are urging other nations to move toward stabilizing their populations, without having made such a commitment in our own country. If the steady decline in births of the past three years continues, the United States' population will stabilize by 1980. An official American declaration on ZPG would simply permit the United States to take credit for something it is already doing and in the process greatly enhance the prospects for success of the World Population Conference scheduled for Bucharest in 1974.

A close examination of the extent of overfishing in many of the world's fisheries also underlines the urgency of evolving a cooperative global approach to the management of oceanic fisheries. Failure to do this will result in continuing depletion of stocks, declining catches, and rises in seafood prices. This in turn would put additional pressures on land-based food resources, driving up international prices of both high protein products and grains, and increasing competition among countries for available food supplies.

Economic forces may compel those in countries like the United States to reduce the demands they place on world food resources. This can most readily be accomplished through the substitution of vegetable-based protein for animal protein. Such a shift has already occurred in the substitution of vegetable oils for animal fats; in 1940 the average American was consuming 17 pounds of butter and 2 pounds of margarine, but by 1971 consumption averaged 11 pounds of margarine and 5 pounds of butter. Lard has almost been pushed off supermarket shelves by vegetable shortenings, and a dominant share of whipped toppings and coffee whiteners marketed in the United States are now of non-dairy origin.

Technology for the substitution of vegetable for animal proteins has made considerable progress, mainly in the area of soya-based meat substitutes. Food technologists can now compress soya fibers into meat form and, with appropriate flavoring and coloring, come up with nutritious substitutes for beef, pork, and poultry. Soya protein "extenders," augmenting meat proteins in ground meats, are already in wide institutional use in the United States. Their appearance in supermarkets in early 1973 signalled a future trend which should be encouraged.

Increased Support for Agriculture in Poor Countries

One of the most immediate means of expanding the food supply clearly is the return of idled U.S. cropland to production, a process already set in motion. Over the longer run, however, the greatest opportunities for increased production are in the developing countries, the world's greatest reservoir of untapped food-production potential.

The changing nature of global food scarcity and the diminishing capacity of the international community to respond to food emergencies make it all the more urgent to strengthen support for the agricultural development of such populous, food-short countries as Bangladesh, India, Indonesia, and Nigeria. Such support should give special attention to the role of small farms in the production effort. There is growing evidence that in many developing countries, small farmers—provided they have been

given effective access to needed agricultural inputs as well as health and educational services—engage in more intensive cultivation and generally average considerably higher yields per acre than do large farmers. As suggested earlier, by improving the access of the poorest majority to both income and services, this approach to rural development also greatly increases the motivation for limiting family size.

One important step in the right direction is a bipartisan legislative proposal introduced in the U.S. Congress in 1973 that would restructure the U.S. Agency for International Development and increase by 50 percent the support it provides for agricultural and rural development in the years immediately ahead. This proposal seeks to capitalize on the unique capacity of the United States to lead an enlarged effort to expand the world's food supply.

In those countries having the appropriate organization, economic incentives, fertilizer, water, and other necessary agricultural inputs, the introduction of new wheat and rice varieties has increased production substantially. The recent jump in per acre yields in several developing countries appears dramatic largely because their yields traditionally have been so low relative to the potential. But today rice yields per acre in India and Nigeria still are only one-third those of Japan, and corn yields in Thailand and Brazil are less than one-third those of the United States. Large increases in food production are possible in these countries at far less cost than in agriculturally advanced nations if farmers are given the necessary economic incentives and the requisite inputs.

India and the United States, for example, have about the same crop area, with many similar characteristics. If India's yield levels equalled those of the United States, its current annual cereal production would be 230 million metric tons rather than the present total of approximately 100 million tons. If rice farmers in Bangladesh attained Japanese yield levels, rice production would jump four-fold from 10 million to 40 million tons. Brazil, by doubling its present cultivated area, could produce an additional 22 million tons of grain even if its currently low yield levels were not improved.

Concentrating efforts on expanding food production in the poor countries could reduce upward pressure on world food prices, create additional employment in countries where continuously rising unemployment poses a serious threat to political stability, and raise income and improve nutrition for the poorest portion of humanity—the people living in the rural areas of developing countries.

American Indifference

In the face of the current food crisis and the prospects of added vulnerability in the years to come, the American government has assumed a curious posture of complacency. Secretary of State Kissinger's recognition of the world's dangerous food situation at the United Nations in September was a welcome exception to more frequent Department of Agriculture and State Department views, but remains unlinked with actual governmental policies and actions.

The unprecedented early release of crop forecasts for 1974 by the Department of Agriculture last fall was an apparent effort to assure the world community that no crisis exists, that no extraordinary new measures are necessary. It resembled the whistling of a 10-year-old boy walking by a graveyard after dark. In a modern-day version of laissez-faire, the Department is trying to reassure the world with the truism that world grain supplies will equal demand at prevailing prices in the foreseeable future. The less developed countries, who can tighten their belts no further, and the wealthier importing nations, who have already witnessed American readiness to cut off exports when supplies

get tight, are not consoled by this argument.

Rather than continuing to provide paper assurances to a justly insecure world, the U.S. government might begin thinking of immediate steps to build a more genuine confidence in the future. The Department of Agriculture must start building up a minimal level of reserve stocks now, even though prices are high, in order to lessen the chance of chaos should the drought cycle return to North America next year. Instead of dragging its feet in response to international food reserve proposals, the Administration should place its full political and economic support behind the idea. Perhaps most importantly, the Administration must forthrightly recognize the changing nature of the world food situation, and show its ready willingness to help bring about the many new international institutions, guidelines, and attitudes needed to cope with the new circumstances of vulnerability. Global insecurity and instability on the food front may profit the major grain trading firms, but are hardly in the long-term national interest of the United States.

Continued American callousness in the food area will inevitably have repercussions in our relations with the rest of the world in other domains. With large-scale investments abroad, a growing need for outside raw materials, and a strong interest in the evolution of a more open world trading system in forthcoming negotiations, the United States would be wise to help build an atmosphere of international cooperation rather than conflict and competition in an area in which we, more than any other nation, hold the key to a more stable and equitable world system—the world food market.

THE POLITICS OF FOOD

by Stephen S. Rosenfeld

In the lead article in the last issue of FOREIGN POLICY, *Lester Brown outlined the growing danger of chronic world food shortages and pointed to the remarkable dominance that the United States and Canada have in many of the world food markets—a dominance greater than that of the Arabs in regard to oil.*

But how is American policy made on this question? Clearly, a large number of different pressures are at work. Humanitarian and commercial considerations, although well-publicized, are not the most powerful. Others, less visible, carry great force.

Stephen S. Rosenfeld of the Washington Post *Editorial Staff examines here the political factors behind U.S. policy. This is followed by an exchange between Charles Billo, a State Department officer speaking in a private capacity, and Lester Brown.*
—The Editors

If food is becoming chronically short in the world,[1] what does it mean for American foreign policy? What obligations do we have to maintain our traditional postwar role as granary for the world's hungry? What opportunities are still available to use food, as we have for more than a generation, as a political instrument, offering it as a carrot, denying it as a stick? Given the political and economic strength of the American farm sector, can there be any discretionary use of food for diplomatic purposes, or is the role of diplomacy simply to follow behind agriculture—rather as the man with the little shovel follows the circus elephant—and clean up as best it can?

These issues constitute largely unplowed ground. There has been little systematic thinking about the new relationship between agriculture and diplomacy. As Henry Kissinger conceded in his Senate confirmation hearing: "It is a new field for us. We had not in the past thought that agricultural exports required foreign policy decisions." So Kissinger and the rest of us are going to have to learn about this area of international policy—the politics of international food.

Begin with American agriculture's productivity and its political power. Because of our natural endowment, our technology, and the talents of our farmers, the United

> "'Agriculture can turn out to be America's ace in the hole.'"

States has long been capable of producing far more than it consumes. From the time of the Great Depression, the "farm bloc" was strong enough to assure that the government would protect farmers against swings and falls of income brought on by overproduction. For some 30 years, the government, by various means, took these surpluses off farmers' hands, either distributing them below cost in domestic or foreign markets, insulated as best as possible from commercial markets, or storing them. The best known program of this sort was the Agricultural Trade Development and Assistance Act of 1954, known as P.L. 480 or Food for Peace; under it, close to $30 billion of farm commodities have been distributed abroad. Many officials connected with P.L. 480 speak of it warmly as a humanitarian program. In fact, it was a program the government devised to get some political and economic use out of food that it was accumulating anyway for domestic political purposes. The international result was the same: the United States

[1] *As Lester Brown argues persuasively in "Food: The Next Crisis?" in* FOREIGN POLICY 13.

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became the world's "residual supplier" of agricultural commodities, the one place to turn to in emergencies. Both at home and abroad the notion spread that this was the normal and lasting state of affairs.

Surpluses: Blessing Or Menace?

In fact, it was not. The political context began to shift sharply in the 1960's. By the Supreme Court's one-man-one-vote ruling of 1962, for instance, the farm bloc's back was broken. Agriculture Secretary Earl Butz has described the impact: "Urban interests, consumer interests, welfare interests, and labor interests had become the muscle behind the political majority. Cheap food became much more important in the over-all consideration than farm income." This desperate (for farmers) situation was redeemed in part by the Nixon farm legislation of 1970, and in greater part by the explosion of world food demand which took place at about that time. "The Department of Agriculture," Butz has said, "in response to a surplus-weary Congress and a cost-sensitive public, and in line with its own philosophies, was determined to get out of the grain storage business [sic]. We were also determined to compete on the world market." To translate: With a Congress increasingly untuned to farmers, an Administration with a strong free market orientation came along just as, fortunately, market demand was mushrooming. The technological revolution which created the "farm problem" by making overproduction easy 40 years ago "is being overtaken by a revolution in consumer demand," Assistant Secretary Carroll G. Brunthaver, Jr. said happily last spring. He noted that in farm legislation passed in 1973, "the Congress rejected the idea of government stocks of grain in anything more than a token amount."

Quite so. The Congress may lack Butz's ideological zeal for the free market but it shares his conviction that surpluses (or "reserves" or "stocks")—whether accumulated on the domestic market or the foreign market—are not only a menace to prices but a heavy cost item in themselves. Commercial exports are everything. Typically, the Senate Agriculture Committee declared in its report on the 1973 farm bill that "we should urge farmers to continue to produce for the world market so that agricultural exports would be increased." The Agriculture Department, which maintains market intelligence officers ("attachés") in some 60 foreign posts, quivers with pride and achievement now that exports have risen, this fiscal year, to an estimated $19 billion. "Agriculture can turn out to be America's ace in the hole"—to pay for oil, Butz claims. The farm sector's expected contribution to the balance of payments this year is about $10 billion. Says his chief economist, Don Paarlberg, "We have adopted the policy of being competitive in world markets for key agricultural commodities, using our productive capacity to export these crops and earn the foreign exchange necessary to purchase needed imports and to strengthen the dollar." I should add that, as of late December, the Agriculture Department had not publicly factored the world energy crisis into its projections of world demand for American food.

Agriculture's sense of new strength is also apparent in the American approach to trade, particularly in the General Agreement on Tariffs and Trade (GATT) negotiations which began formally last September. Within the Agriculture Department there is a certain residual bitterness that in the Kennedy Round the interests of agriculture were given second billing to those of industry. Now, however, Paarlberg points to recent export figures to show "what our farmers and marketing system might be able to do consistently—several years down the road but with greater price stability—if many of the artificial barriers to import demand in other nations were reduced." American agri-

culture, he said last fall, now seeks "a major, perhaps decisive role" in the GATT talks. "Our resolve must be to put increasing international pressure on those foreign trade barriers which prevent one of the most efficient U.S. industries—one of the world's most efficient farm sectors—from bringing its weight to bear to improve our trade and payments position." Our policy is easy to summarize: food for cash.

Food: For Peace Or Politics?

While commercial exports have climbed toward $20 billion, shipments under Food for Peace have dropped below $1 billion. "The future mechanism for aiding food-deficit countries is," an Agriculture Department publication notes dryly, "uncertain." Now it is true that, for recipients, Food for Peace has not always been an unmitigated benefit: it has sometimes depressed their agriculture and has involved political and psychic costs. It has also become true in recent years, as Butz told me in an interview, that P.L. 480 "is no longer primarily a surplus disposal program. It's for humanitarian purposes and for national security—to help infuse purchasing power into countries on our defense perimeter. South Vietnam is a case in point." Indeed, last year *most* 480 supplies went to Vietnam and to these other countries regarded, in varying degrees, as segments of the American "defense perimeter": South Korea, Israel, Pakistan, and Indonesia.

Nonetheless, through three decades, Food for Peace and its predecessor programs have fed hungry millions. They have nourished our better instincts as a people.

For three decades, moreover, American diplomats have used food as a political tool: to relieve the misery of our friends, to spare them the cost of buying food on the open market, and to help them keep popular discontent within politically manageable bounds; to show off American productivity and generosity; to bargain for other benefits; and so on. It is within this tradition of food diplomacy that administration officials now suggest that we may stop selling food to countries which won't sell us oil.

It is perhaps worth noting here that while countries in duress may appreciate—sometimes through clenched teeth—our food largesse, they tend to react strongly against the overt use of food as a political weapon. During a period of bad relations in 1964, for instance, President Nasser of Egypt denounced the United States for failing to provide emergency food supplies and told the United States to "go drink sea water." During another bad period in 1966 he declared: "The freedom we have bought with our blood we shall not sell for wheat, for rice, or for anything." Three days before President Allende of Chile was overthrown and killed last fall, his government said that the United States had refused to sell it, for cash, vitally needed supplies of wheat, because of a "political decision of the White House"; less than a month after the coup, the United States approved a credit sale of wheat to the new Chilean government in an amount eight times the total commodity credit offered to Chile in the Allende years. Oil states, however, with their cash and small populations —and their oil—are not similarly vulnerable. Plainly, it depends.

Until quite recently, nonetheless, the idea of feeding hungry foreigners was fading for other than political reasons. The chairmen of the two agriculture committees, Senator Herman Talmadge and Representative W. R. Poage, are known for their conservative philosophy and their national, as opposed to international, outlook; they both have pronounced themselves content with America's past and present performance on food aid. Food for Peace is "a drain on American dollars," Poage said, "and it should be treated as just another kind of foreign aid like medicine or printing presses." The Agriculture Department, whose Secretary has been known

to warn darkly of "alarmists," has consistently played down the possibility of famine, playing up the helpful influence of good weather, and pointing to the "international" nature of the world food problem without offering initiative or leadership. Even in the State Department, the attitude was growing more negative. "Food for Peace was based on the ethnocentric idea that we could pacify the world by food," a State Department official said to me last summer at a time when Bangladesh was begging, largely in vain, for a trickle of wheat. "Now our thinking is that feeding the world is an international problem, maybe one for the United Nations. The worst thing we could do for a country would be to put it on a permanent dole. That would just give it the excuse to avoid solving its own problems, especially population." Then Secretary of State William P. Rogers uttered a faint call in his last annual report for "an over-all review of U.S. food production policy in relation to its effect on our assistance to the LDC's [less-developed countries]," but no one answered and his own department did not follow up.

A World Food Reserve

In fact, Food for Peace must be considered all but defunct. Only last summer did a "new" idea appear for a program or mechanism to fill its chief purpose of easing world hunger. The idea was a "world food reserve" and it came from A. H. Boerma, the Dutchman who is Director General of the U.N. Food and Agriculture Organization. To be sure, the idea of a planned reserve is not new. A report prepared in the Senate Agriculture Committee recalls that, as early as 1912, Henry A. Wallace cited the Biblical story of Joseph storing grain against famine, and the Confucians' creation of a "constantly normal granary" in China, in order to urge a similar food storage plan upon the United States. As Secretary of Agriculture, Wallace steered into law in Depression America a storage program intended to protect American farmers' income. A British-American Combined Food Board provided some experience in internationalizing food cooperation in World War II. In 1945, John Boyd-Orr, the Food and Agriculture Organization's (FAO) first chief, proposed a plan for purchase and storage of international food reserves.

His plan foundered on the same rocks that have endangered all like proposals since, whether the reserves be meant for the domestic or international market. That is, essentially, the fear of producers everywhere that at some point the reserves will be dumped on the market, thus depressing the prices. In the United States, the farm bloc for many years had the strength not only to induce the government to buy surpluses but to keep them off the market. Farmers, though politically weaker now, make the same appeal, the more so in a period of strong market demand and high prices. "Food reserves held by government can never be perfectly insulated from the market," Butz warned in December. "Farmers should not be fooled by promises that a system can be designed to protect farmers from a premature release of stocks. Any set of rules would certainly be subject to change—especially in light of public pressures like those which prevailed in 1973, pressures which forced this Administration to impose counterproductive price controls." And even those officials who are indifferent to the welfare of farmers are slowed by the high costs of buying and storing food for a reserve and by the idea, encouraged by the Agriculture Department, that the United States has done plenty in the past and that other developed countries, to say nothing of the developing countries themselves, should do more now.

Now, Boerma, offering his proposal in July, helped publicize the great need to which his proposal was addressed. The "nonaligned" nations, meeting in Algiers in

September, made a like appeal. At the same time, the Brookings Institution sponsored a report focusing on reserves and agricultural trade among North America, the European Economic Community, and Japan. A British economist, Timothy Josling, published a widely circulated paper on international grain reserves. Concern for reserves was in the air, like, if you will, a gas. But given the political and economic facts of life in Washington, a spark was needed to give the idea life within the American government. Such a spark could only be struck by people outside the American agricultural establishment.

The NSC *Study*

This was done on September 11, at the former's confirmation hearing, by Secretary of State Kissinger and Senator Hubert Humphrey. Humphrey first started talking about reserves in the 1950's. Senator Edward Kennedy, among others, now brings publicity and support to the idea, but Humphrey has been the commanding figure among the handful of legislators with not only an internationalist outlook and a conscience but with farm expertise. As chairman of the Senate's Foreign Agricultural Policy Subcommittee, he has produced a prodigious public record on issues of world food security. As a member of the Foreign Relations Committee, he conducted this colloquy with Kissinger, a city boy through-and-through:

HUMPHREY: Would you initiate, after consultation with the Secretary of Agriculture, the Secretary of Commerce, and obviously with the President, a discussion amongst the main exporting nations and the main importing nations as to what we are going to do in the coming year to relieve conditions of human misery and, in some areas, famine, in the light of the world food supply situation?

KISSINGER: You know, Senator Humphrey, that your suggestion runs counter to all our traditional attitudes with respect to agriculture.

HUMPHREY: Correct.

KISSINGER: We have always resisted the idea of commodity-type agreements because we wanted to have the maximum opportunity for the export of American products, and we thought we would have enough to take care of all needs. In this respect the experience of the last year [1972-73] has been a challenge to all our traditional assumptions. We recognize that now we are living in a new world.

We have recently started an interdepartmental study of this problem. The proposal you make is one that some of us were discussing informally earlier this year; at that time it did not receive too much favor because of the weight of previous assumptions.

All I can say, pending the completion of that interdepartmental study, is that the approach you have suggested is needed, and we will look at it with the greatest sympathy.

That "interdepartmental study," a project of the National Security Council, concluded, in essence, that although the world food outlook is uncertain, the United States should explore new ways of promoting an international approach to related issues of food aid and development. Those familiar with the NSC study report that it, and Kissinger's personal impetus behind it, provoked a thorough and continuing review in the downtown departments and made the bureaucracy focus on the new vistas of world food. In turn, the review helped educate Kissinger, who, at his confirmation hearing, was speaking strictly off a staff briefing. He was initially outraged that in 1973, almost overnight, the United States had to stop selling certain farm commodities—with trou-

blesome foreign policy consequences—in markets which it had spent five years trying to expand. He is described now as soberly heedful of the interrelationship of agriculture and diplomacy, and as determined not to leave policy in that area to "economists."

A World Food Conference

Less than two weeks after his confirmation hearing, Kissinger went to the United Nations and proposed a World Food Conference along the precise lines suggested by Humphrey. This was, I am prepared to believe, more than a gesture to show the Third World gallery that the United States is interested in more than countries big and rich enough to be part of the balance of power. It was an acknowledgment, more meaningful for having been made in a political forum and in the expectation of indefinite food shortages, that the United States regards the world food situation as an urgent issue demanding an international solution and transcending the complex ongoing questions of agricultural trade. The Conference will be held in Rome next November under the auspices of the United Nations, with technical assistance by the FAO. It was put under the United Nations rather than the FAO because the U.N. has a universal membership (the Russians don't belong to the FAO) and because grain-exporting countries tend to look at the FAO as a club (in both senses) of the food-deficit countries. The Conference will consider a range of issues chosen, or so the United States hopes, for being particularly amenable to international cooperation—pest control, disaster relief, technical assistance for self-help programs, and so on. But an international food reserve remains the key issue.

As usual, an international timetable is forcing national decisions. Kissinger has appointed a coordinator to oversee the shaping of the American position at the World Food Conference. The fact that the Conference will be under the United Nations, not the FAO, facilitated his effort to put State rather than Agriculture in charge of the American position. The Agriculture Department named the deputy coordinator. The bureaucratic byplay is, by consensus, brisk but positive. The FAO's Boerma has been applying pressure of his own, on Butz, from what might be called the left flank. They seem to have pushed each other into a mutually acceptable position on reserves. Butz now agrees that the government as well as private traders will have to hold reserves. Boerma has eased off his earlier preference that reserves be controlled internationally, rather than by each participating nation. Over-all, the inevitable and healthy difference in viewpoint of Agriculture and State—Agriculture representing a powerful domestic interest group, State representing a more abstract foreign policy "interest"—ensures a lively process of policy formulation. Butz is a tough, able, and outspoken man, a gamecock, and those who know him well are confident that in joining this process with Kissinger, he is quite up to ensuring that agriculture's—and Agriculture's—interests will be properly served.

Games The Russians Play

The Soviet Union needs a separate word. Détente has brought the Russians into the world grain market. Their resources allow them to make a huge impact on world supplies and prices. More than any other single factor, it was the Russian purchases of 1972 which left the United States able to respond only stingily to emergency appeals from West Africa and Bangladesh. Those countries could well have concluded that détente is a conspiracy of the rich against the poor. The 1972 purchases also contributed to boosting food prices here and elsewhere. Yet the Russians still play an irresponsible loner's game. Take carryover stocks: their size indicates whether a country facing a bad harvest or an unexpected surge in demand will go on

the world market. The Russians keep stock information secret. Not even the bilateral Soviet-American agricultural agreement signed at the second summit obliges them to report in that critical area. (That agreement was signed, by the way, before Kissinger started getting wise to agriculture.) Nor do the Russians take an organized part in international efforts to feed the hungry. They shun the FAO. Presumably, the World Food Conference will help smoke them out.

Just what will come out next November, at the Conference, is hard to say. I would guess that we are only at the beginning of composing a national policy consistent at once with our best instincts, with our producers' interests, and with our gathering awareness that we live in a world which may force us into new patterns both of cooperation and competition in order to assure ourselves the resources necessary for our national life. Until now, our thinking and policy on resources have assumed either an adequate domestic supply or adequate foreign access. In this condition of plenty, we could indulge a casual and unplanned approach. But we seem now to be entering a period of shortages, world or national. George McGovern, a farm state politician and former Food for Peace administrator, told the Senate last August:

> We have chosen commercial sales of wheat to the Soviet Union over guarantees of an adequate diet for those impoverished Americans who subsist on surplus commodities. We have chosen, at least indirectly, to feed American livestock—in support of our taste for meat over grain—instead of meeting desperate human needs in West Africa, South Asia and elsewhere. We are forced to such results because we simply have no policy for choosing which needs to fill and which to ignore when we cannot fill them all.

The country is now starting to choose.

AN EXCHANGE ON FOOD

To the Editors:

Lester Brown's article, "Food" (FOREIGN POLICY 13), asks us to take on faith many assertions. We now continually run across formulations and reformulations of Brown's dire predictions in the Washington Post, *the* Wall Street Journal, *or the Overseas Development Council's* Communiques. *He has a beguiling manner with which he leads us into accepting some of his more extreme propositions. For example, one technique frequently employed by Brown is to mix up or blur the time frame in which his projections lie, thus confusing the reader and making him wonder just how imminent a potential world food disaster might be—if there is to be one at all. Sometimes he appears to be predicting calamity by the end of the century, as when he discusses the long-term undermining of the "ecological foundations of the earth's food-producing system"; sometimes by the end of the present decade, such as when he tells us, in the section on technological panaceas, that "there is little likelihood that any such advancements will have a major impact on global food supplies before the end of this decade."*

Another example of the type of sleight of hand Brown sometimes employs is found in an examination of Chart V. This professes to be simply a chart of U.S. cropland acreage withheld from production under government programs as drawn up by the Agriculture Stabilization and Conservation Service of the U.S. Department of Agriculture. Actually, Brown has added some notes of his own, of which the most interesting is the phrase "Burgeoning Global Demand." And in the discussion of Chart V (see page 18) he refers to "growing food scarcities" which, it could be pointed out, were caused chiefly by exceptionally poor harvests in 1972-73. There are numerous other examples of this form of sleight of hand, which, as I have said, can be beguiling to the casual reader.

Leaving aside these "disturbing" (to use one of Brown's favorite words) aspects of his presentation and turning to the thrust of his article, I could agree with some of Brown's conclusions if the case were not so vastly overstated. For example, most informed observers do agree that a fundamental transformation in agriculture is now occurring and that rising affluence in the Northern tier countries will be a problem with which we must cope. However, it should also be noted, and this is not necessarily a contradiction, that the low grain reserves of 1973-74 have, for the most part, resulted from the coincidence of exceptionally poor growing conditions in major producing countries in 1972. Obviously, the world agricultural system is evolving, and official policymakers are perhaps more aware than anybody else that new policies will have to be developed to cope with the change. But the question of imminent disaster, as implied by Brown, is a separate issue entirely.

It does strike me as unfair to accuse American officials of "callousness" and "complacency" when the very measures which Brown is recommending are being implemented at the present time. Surely the proposal of a World Food Conference in 1974, U.S. participation in the FAO's *discussion of world food reserves, and the revision of domestic legislation governing agricultural production represent examples of the Administration's "willingness to help bring about the many new international institutions, guidelines, and attitudes needed. . . ."*

Thus, while the Administration has not for a moment lost sight of the world's potential vulnerability should there be a shortfall in production during the coming crop season, long-range agricultural policy formulation (i.e., for the period after 1980) should be founded upon careful economic

appraisal of the availability of and requirements for world resources and not merely upon momentary, "crisis oriented" glimpses of reality whose only underpinning frequently is personal intuition.

Charles G. Billo
Washington, D. C.

The Author Replies:

The purpose of my piece was to surface some of the issues which need to be examined as the structure of the world food economy changes. Charles Billo, who is an officer in the State Department, is critical of my use of different time horizons in discussing different points. The reason for this is simple. Differential time horizons for different points were used depending on the degree of confidence with which they could be projected into the future. There is little point in projecting a situation or trend to the end of the century when we cannot say anything with confidence beyond the next five years.

What puzzled me most about Billo's criticism was his own apparently confused time frame in referring to the situation over the past few years. He attributes the low grain reserves at present to the coincidence of exceptionally poor growing conditions in major countries in 1972. These poor harvests did contribute to the substantial drawdown in grain reserves; there is no question on that. But what Billo fails to mention is that the world has gone through another cycle of harvests since the poor harvests in 1972. This cycle saw the Soviet Union harvest a grain crop in 1973 that broke all previous records by a wide margin. The United States harvested record crops of wheat, feedgrains, and soybeans. India's foodgrain harvest has also moved to a new high. Food output in China is well above the average for recent years. Despite these record harvests, the U.S. Department of Agriculture projects little, if any, rebuilding of the world's seriously depleted grain reserves (see table below). The critical question then becomes: If the world cannot rebuild depleted reserves following a record harvest, when will it be able to?

The following table combines the world's two principal food reserves into a single indicator or index. It shows how very vulnerable the world is today on the food front. A poor crop in any major producing region of the world next year—Asia, the Soviet Union, North America—could result in a degree of economic instability in world food prices and a degree of political competition for control of available supplies unlike any that we've ever experienced.

Index of World Food Security

Year	Reserve Stocks of Grain	Grain Equivalent of Idled U.S. Cropland	Total Reserves	Reserves As Share of Annual Grain Consumption (percent)	Reserves As Days of Consumption
	--- million metric tons ---				
1961	154	68	222	26	94
1962	131	81	212	24	88
1963	125	70	195	21	77
1964	128	70	198	21	77
1965	113	71	184	19	69
1966	99	79	178	18	66
1967	100	51	151	15	55
1968	116	61	177	17	62
1969	136	73	209	19	69
1970	146	71	217	19	69
1971	120	41	161	14	51
1972	131	78	209	18	66
1973	105	20	125	10	37
1974*	105	0	105	8	29

* Projected

But we need not look to the future to be concerned about the state of the world food economy. Billo uses the term disaster without saying disaster for whom. A doubling of the world wheat and rice prices is not a disaster for either Billo or myself. Our incomes are such that we can offset the 20 percent price rise that this increase in agricultural raw material price translates into at the supermarket check-out counter. But for the better part of a billion people in the world whose incomes average less than $100 per year and who are already spending 80 percent of their incomes on food, it is impos-

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sible to offset a doubling in the price of wheat or rice with increased food expenditures. They must tighten their belts. But for many there are no notches left. Any further tightening pushes a subsistence level of food consumption below subsistence. The result is increasing malnutrition and, for many, death. We have no way of knowing how many hundreds of thousands of lives were lost this past year because of food scarcity.

Billo makes the point that most informed observers do agree that a fundamental transformation in agriculture is now occurring. This is encouraging because it suggests that the Administration is abandoning its position that the current food scarcity is temporary and that we need only be patient for food supplies and prices to return to normal.

In defense of the Administration, Billo cites the proposal of a World Food Conference in 1974 and U.S. participation in the FAO's *discussion of world food reserves. On the first point, it is well-known that the proposal for a World Food Conference came from outside the Administration. It is, nonetheless, to Kissinger's credit that he accepted the proposal.*

Referring to the FAO's *discussion of the need for a new approach to world food reserves, Billo cites "U. S. participation in the* FAO *discussion" as evidence of the Administration's commendable approach to global food insecurity. Note that the decision just to take part in the* FAO *meetings is cited as a positive American policy action. There is not even a hint of leadership in this area where American leadership is so essential.*

I cannot agree more that we need a "careful economic appraisal of the availability of and requirements for world resources" for both the short- and long-term futures. Equally needed is a careful ecological appraisal. Perhaps my article and this interchange will enhance the prospects for this.

Lester R. Brown
Washington, D.C.

1972 Lenna Francés Cooper Memorial Lecture

Nutrition and world health

GRACE A. GOLDSMITH, M.D.
Dean, School of Public Health and Tropical Medicine
Tulane University, New Orleans

Problems of global nutrition and their solutions are tied in with population growth, agricultural productivity and the "Green Revolution," and disease.

It is an honor to present the Lenna Frances Cooper Memorial Lecture which is dedicated to a distinguished dietitian and educator who was a founder of The American Dietetic Association. The subject of this lecture, "Nutrition and World Health," is one in which Miss Cooper was specifically interested. The tenth edition of her book, *Nutrition in Health and Disease* (1), co-authored by Barber and Mitchell, includes a chapter on "Nutrition and Optimum Health," which states that nutrition is a national and international issue and the concern of agriculture, business, and labor. "Committees representative of these three interests have done constructive planning and have published a report entitled 'A Nutrition Program for the Nation.'" In a discussion of the origin of the Food and Agriculture Organization of the United Nations (FAO), it is pointed out that "two-thirds of the world's people never have had enough to eat or the right kind of foods to promote health."

This is essentially true today. FAO, through its World Food Program, is making significant contributions to the improvement of nutrition and health of people throughout the world (2). But, malnutrition and undernutrition, a rapidly expanding population, and inadequate medical care are the most important health problems in the world today, particularly in developing countries. Malnutrition is epidemic in some areas, and most of the victims are children. In Asia, Africa, and Latin America, where two-thirds of the world's children live, malnutrition is the major cause of infant mortality. In developing countries, infant mortality rates are regularly high (50 deaths per thousand live births), even under relatively good conditions, and the rate can exceed 100 or even 200 deaths per thousand (3).

Malnutrition and infectious diseases work synergistically, which worsens the character and course of the disease and increases the death rate therefrom. The common infectious diseases of childhood have catastrophic effects in the malnourished. In Guatemala (4), the mortality rate from measles is about four hundred times that in the United States, and the incidence and severity of acute diarrheal disease in infants are directly related to the degree of nutritional deficiency.

Malnutrition seriously retards physical growth and development; recent studies indicate that mental development is impaired as well (5). Failure to attain genetic potentialities may have serious social and economic consequences.

Nutritional deprivation results in weakness and fatigue; energy output is lowered, and production decreases. (These conditions are often associated with poverty and a meager education.) There is decreased resistance to disease, high mortality rates for children, and a lower life expectancy. Individuals may become apathetic, depressed, lethargic, and show emotional and personality changes. Rebelliousness and hostility can cause changes in group behavior, with important social and economic implications.

Extent of the problem

The magnitude of the malnutrition problem is not completely known. The World Food Survey of FAO (3) estimated in 1963 that at least 20 per cent of the population in developing countries was undernourished, (consumed too few calories) and about 60 per cent was malnourished (consumed nutritionally inadequate diets). The most serious and prevalent problem is protein-calorie malnutrition among infants and preschool children. A moderate degree of malnutrition caused by insufficient protein and calories may affect 50 per cent of the children in developing countries. Deficiencies of vitamins and minerals are also common.

Iron deficiency anemia is encountered frequently, even in developed countries, particularly in children ages six to thirty-six months, in adolescents, and in women throughout the reproductive period.

In developing countries in the Middle East, Africa, Latin America, and, especially, Asia, millions of children are in danger of blindness because of vitamin A deficiency (6). (Xerophthalmia and keratomalacia are the primary causes of blindness in these children.) Remedial action is essential; the cost is minimal, only a few cents per child per year. Deficiency of the B vitamins is an important problem in some areas. Beriberi, pellagra, and riboflavin deficiency have not been eradicated.

The population problem

The rapid population expansion, particularly in developing countries, compounds the problems of hunger and malnutrition. In 1970, the world population was estimated to be 3.6 billion and to be increasing by about 1.4 million a week (7), a yearly increase of 2 per cent. If this rate continues, the population will reach 4 billion in 1975, 5 billion in 1986, 6 billion in 1995, and almost 7 billion by the year 2000, although the first billion in all of man's history was not reached until shortly before 1850. Thus the elapsed time needed to gain an additional billion people is telescoping. It has been estimated that the population explosion will not be slowed until well into the twenty-first century, and that the world's population may reach 20 billion people!

During the past five years, more than 85 per cent of the population increase has occurred in developing countries, where the growth rate is 2.3 to 2.9 per cent a year. In Latin America, the annual increase is 2.9 per cent—and within the fastest growing subregion, comprising Mexico and the six countries of Central America, the yearly increase is 3.4 per cent (7).

The Commission on Population Growth and America's Future has projected (8) the effect of a two- and a three-child family on population growth in the United States for the next thirty and one hundred years (Figure 1). If families have an average of two children, and immigration continues at present rates, our population will be 266 million by the year 2000; an average of three children would increase the pop-

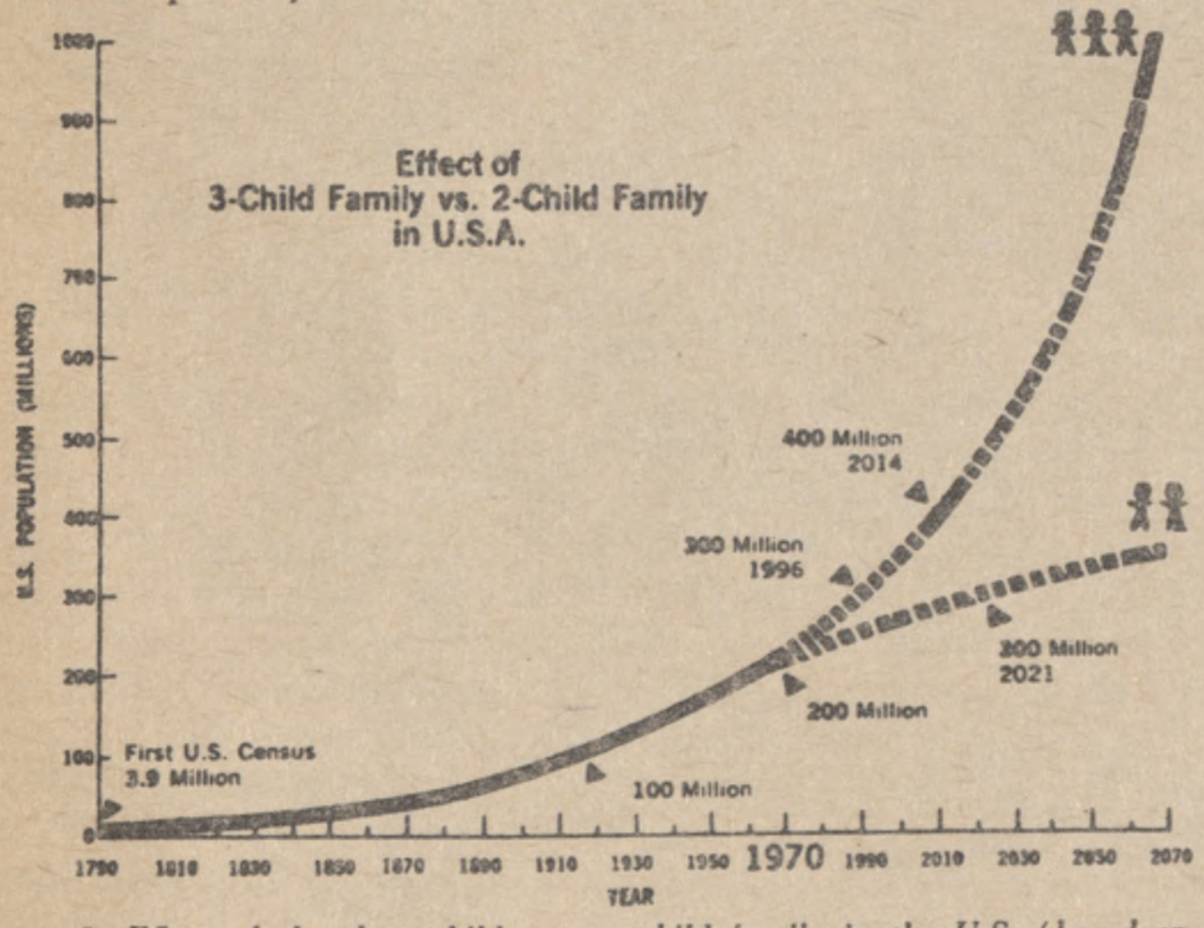


FIG. 1. *Effect of the three-child vs. two-child family in the U.S. (based on [8]; taken from [9].)*

ulation to 321 million. Projections are more menacing for the next one hundred years: a two-child family would produce 340 million Americans and a three-child family nearly a billion.

The population growth must be slowed, or all efforts to augment agricultural production will merely postpone mass starvation. The high birth rate results in a "dependency burden" on producing adults which, in turn, hampers economic growth and social development.

Population research and world-wide family-planning programs have received increased support in recent years. It is believed that the birth rate will decrease in developing countries within the next few decades, but the timing and extent of this decrease cannot be predicted. A necessary precondition for reducing the birth rate is a low infant and child mortality rate, so that parents may be assured of having the desired number of children. Since malnutrition is the major cause of excessive childhood deaths, improving the quantity and quality of food in these countries, particularly for children, is an urgent priority.

Birth rates have been reduced in some developing countries when people are aware that more children survive. Active birth-control programs have resulted in a rapid reduction in birth rates (10) in South Korea, Taiwan, Hong Kong, and Singapore. In Taiwan, the birth rate was well over 50 per 1,000 population in 1955; it is now under 30.

Malnutrition in the U.S.

Undernutrition and malnutrition also occur in developed countries, although to a lesser extent. The recent Ten-State Nutrition Survey (11) showed undernutrition and malnutrition among certain segments of the United States population, particularly in lower economic groups. Malnutrition was most prevalent among blacks, less common among Spanish Americans, and least among whites. There were many underweight and undersize children and adolescents in all population sub-groups studied. Adolescents between the ages of ten and sixteen years had the most unsatisfactory nutritional status, and there was more evidence of malnutrition among males than females. In this age group, high-carbohydrate, between-meal snacks, such as candies, soft drinks, and pastries were associated with dental caries. The prevalence of undernutrition and malnutrition was greater in persons over sixty years old.

Obesity was most prevalent among women (more than 50 per cent in some age groups), particularly blacks. White males were less often obese, and prevalence of obesity was greater in white than in black males.

Anemia is common—a high prevalence of low hemoglobin and hematocrit values was found in all segments of the population. Low hemoglobin concentrations were associated with low levels of serum iron and low serum transferrin saturation. In addition, dietary data from selected sub-groups indicate that low hemoglobin levels were related to inadequate dietary iron. Blacks had the poorest hemoglobin status of all ethnic groups. Hemoglobin levels were most unsatisfactory in the low-income-ratio states, and low values were related not only to poverty but to education of the adult or of the female head of the family in the case of children.

Low levels of vitamin A were frequently reported; riboflavin status was poor among blacks and among young people of all ethnic groups; and serum albumin levels were low in a large proportion of pregnant and lactating women.

Other nutritional problems

The most important role of nutrition in world health today is alleviation of hunger and malnutrition and provision of an adequate diet for growth and development of children and maintenance of health in adult life. However, nutrition has many other roles in medicine and public health. Many nutritional abnormalities result from pathologic states, and nutrition is a major factor in both the prevention and therapy of numerous diseases.

Obesity is a serious problem in many nations. Marked obesity leads to a number of diseases, particularly those associated with aging. Recent studies indicate that nutrition is a factor in the prevention and treatment of atherosclerosis and coronary artery disease, two of the most serious public health problems in the United States. Elevated serum lipid levels, particularly of cholesterol and triglycerides, are associated epidemiologically with coronary artery disease. Dietary manipulation is of great value in lowering serum lipid levels and may prove to be an important measure in preventing deaths from coronary atherosclerosis.

Nutrition is related to some inborn errors of metabolism. An outstanding example is phenylketonuria (12). Proper limitation of the phenylalanine intake can prevent many of the abnormalities that occur with this disease. Relationships of nutrition to intestinal enzyme deficiencies have recently received considerable attention; disaccharidase deficiency is amenable to nutritional therapy (13).

Nutritional therapy is important in many diseases affecting the gastrointestinal tract: malabsorption syndromes, gluten-induced enteropathy, diarrheal diseases, ulcerations, and diseases of the liver and gallbladder.

Metabolic and endocrine disorders are closely related to nutrition. Proper diet is essential in the treatment of diabetes mellitus. Nutritional problems may be encountered in diseases of the pituitary, thyroid, parathyroid, adrenal and sex glands. Interrelationships of hormones and nutrients are becoming increasingly evident.

Many conditions associated with fever and hypermetabolism may increase nutritional requirements. Diseases of the kidney and renal failure often re-

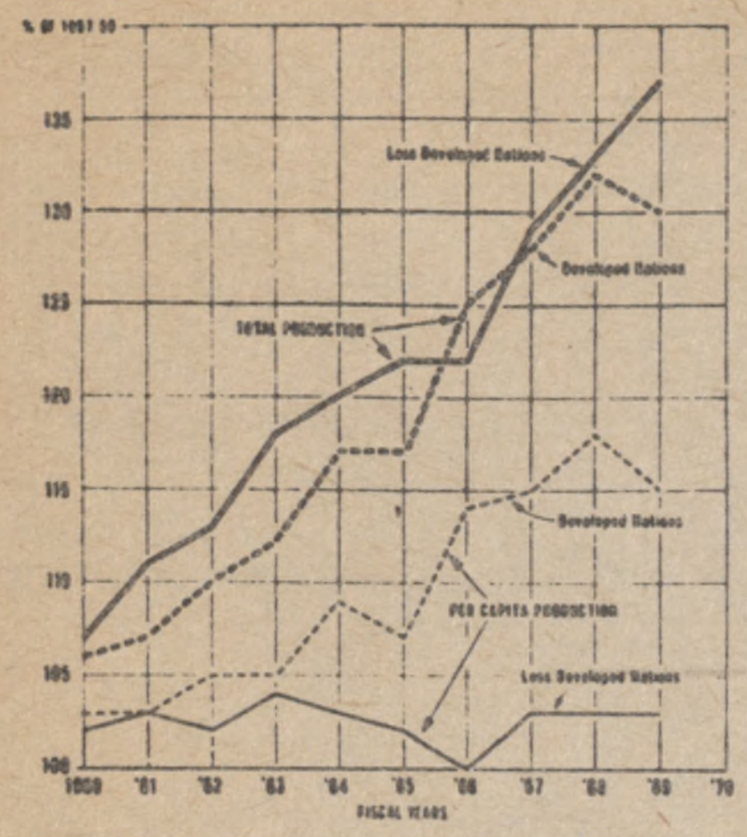


FIG. 2. *Indexes of agricultural production in the developed and less developed nations (from [18]).*

quire therapeutic diets. Nutritional problems can develop in persons undergoing renal dialysis.

Many hematologic problems are related to one or more of the essential nutrients, particularly iron, folic acid, and vitamin B_{12}. Pharmacologic agents can have a profound effect on nutrient requirements and utilization. Chronic alcoholism often results in serious malnutrition. Nutritional problems are encountered frequently in elderly patients, particularly those who live alone and those handicapped by some health problem.

Nutrition is an integral part of the management of all types of trauma, including fractures, burns, wounds, and surgery.

Knowledge of specific nutrient needs has advanced to the extent that a person can now be fed parenterally for prolonged periods. Total parenteral nutrition will support growth in children and will restore weight loss after trauma or surgery and in diseases associated with severe undernutrition (14).

The problem of food supply

Provision of an adequate world food supply is a problem of tremendous proportions. In most areas where malnutrition is extensive, both the quantity and quality of food is inadequate. Calories and proteins of high biologic value and, in some instances, vitamins and minerals must be supplied. The responsibility for solving the world's food and nutrition problem must rest with governments and international agencies, assisted by foundations, industry, private organizations interested in human welfare, and individual citizens. The medical and allied health professions must assume a significant role in this vital endeavor.

In 1967, the Panel on World Food Supply (15) appointed by President Johnson reached four basic conclusions: "(1) The scale, severity and duration of the world food problem are so great that a massive, long-range innovative effort unprecedented in human history will be required to master it. (2) The solution of the problem that will exist after about 1985 demands that programs of population control be initiated now. For the immediate future, the food supply is critical. (3) Food supply is directly related to agricultural development and, in turn, agricultural development and overall economic development are critically interdependent in the hungry countries. (4) The strategy for attacking the world food problem will of necessity encompass the entire foreign economic assistance effort of the United States, in concert with other developed countries, voluntary institutions, and international organizations." These conclusions are valid today, although some progress has been made.

The "Green Revolution"

The term "Green Revolution" refers to the recent spectacular increase in cereal grain production. The high-yield varieties of cereals responsible for this increase were developed through research sponsored by the Rockefeller and Ford Foundations and conducted at the International Rice Research Institute in the Philippines and the International Maize and Wheat Improvement Center in Mexico (16). The International Center of Tropical Agriculture in Colombia and the International Institute of Tropical Agriculture in Nigeria were established recently to stimulate production of certain tropical crops and animal species and to train scientific specialists (17).

The spread of the new wheat and rice seeds has been phenomenal; some 40 million acres have been planted since 1965. The annual increase in yield per acre when Mexican wheat was planted in India and Pakistan has more than doubled (16), and total wheat production in these countries has risen more than 50 per cent in the past four years. Ceylon's rice production has increased one-third in three years, and the Philippines are self-sufficient in their staple food, rice, for the first time since 1903.

These new crops require more water and fertilizer for full capacity yield and more pesticides, as they are particularly susceptible to certain plant diseases and pests. The availability of irrigated land poses a short-term limit to their production. Educational and technical assistance is required to assist farmers, who are often illiterate, in planting the new crops and learning the new skills. Transport and storage facilities must be expanded, and new markets established.

The Green Revolution is not the ultimate solution to the malnutrition-food-population problem, but it provides the necessary time to mount effective family-planning programs. Nations must develop national nutrition policies in conjunction with agricultural, educational, health, and economic development policies and must train manpower for planning, organizing, and implementing these programs.

Figure 2 shows the indexes of agricultural production in developed and in developing countries. While total agricultural production increased steadily until

1966 in developed nations (18), per capita food production declined from 1963 to 1966 in the developing countries and returned to the 1960 level only from 1967 to 1969.

Dr. Norman Borlaug, in his lecture on "The Green Revolution, Peace and Humanity," given on the occasion of receiving the Nobel Peace Prize for 1970 (17), said; "If you desire peace, cultivate justice, but at the same time cultivate the fields to produce more bread; otherwise there will be no peace." He also declared: "I am convinced that if all policy makers would take sufficient interest in population control and in impressively employing and exploiting agricultural development as a full instrument of agrarian prosperity and economic advancement, many of the social ills of the present day could soon become problems of the past."

The interrelationship between food and peace was expressed succinctly by another Nobel Laureate, Lord John Boyd Orr, who stated: "You can't build peace on empty stomachs."

The FAO has indicated (18) that its program for the War on Hunger and Malnutrition will center on six major areas: (a) expanding the Green Revolution, (b) closing the "protein gap," (c) reducing waste, (d) developing new food sources, (e) mobilizing human resources in rural areas and effecting economic and social changes to accelerate development, and (f) increasing the earnings and savings of foreign exchange in developing countries.

It is well known that dietary proteins are not used efficiently when caloric intake is inadequate. Increasing the per acre yield of cereals will close the calorie gap; the protein gap will be closed when more land is available for the production of vegetable proteins (beans, peas, pulses, and so forth).

Controlling waste is vitally important. Land is wasted through erosion, water through mismanagement, forest products by fire, crops by depredations of insects and rodents, and food through poor handling and storage. World-wide crop losses from pests, diseases, and weeds, alone are estimated at 15 to 35 per cent of all agricultural production.

The UNICEF program

The United Nations Children's Fund, which has been extremely active in efforts to combat child malnutrition (19), emphasizes that each country must identify its particular nutritional deficiencies and its resources to combat them, and that no one solution is applicable to all countries. UNICEF and other international organizations must work in concert to assist national government programs and to keep international aid flexible enough to respond to varying needs.

UNICEF has taken the lead in formulating new food mixtures to replace milk products in combating infant and childhood malnutrition. These mixtures are carefully tested in the laboratory and in human feeding trials before wide scale use (20). The World Health Organization (WHO) has supported and supervised this research. These products have saved many lives during famines and emergencies in Nigeria, India, and elsewhere.

World Food Program

The joint United Nations-FAO World Food Program was established in 1961 and began operations in 1963 (2). The primary goal is to use food as finance for long-term economic and social development. Food aid is used to help governments undertake projects to produce more food or effect other forms of economic growth. Food aid given for economic and social development projects now reaches 10 million people in sixty-three countries.

Projects supported by the World Food Program (21) can be grouped under five headings: (a) Development of human resources—feeding in professional and vocational training institutions and elementary and secondary schools, and feeding of pregnant and lactating women, preschool children, hospital patients, and some other special groups. (b) Economic and social infrastructure projects—public health programs for developing and improving housing and public amenities, transportation, and communications (food aid is provided as part-payment of wages) and multi-purpose community development programs (aid provides an incentive for voluntary self-help participation). (c) Directly productive programs for agriculture and industry constitute more than 50 per cent of all projects. Food is a useful capital input in promoting employment of personnel in agriculture and stimulating food production. Projects in this category include: land settlement and reclamation; irrigation and drainage; re-forestation and soil conservation; livestock production, including dairy and milk processing; fishery development; assistance to refugees for development, as opposed to emergency relief; and development of industry and mining. (d) Food reserves for price stabilization. (e) Emergency operations; resources are reserved for emergency food needs by the Director-General of FAO.

FAO, in conjunction with the International Bank for Reconstruction and Development and the United Nations Development Program, has sponsored a Consultative Group on International Agricultural Research in which other agencies participate (2). Major gaps in agricultural research will be identified and appropriate research implemented. The FAO-UNICEF joint program is concerned primarily with applied nutrition and the introduction of high-protein foods. The objective of FAO-Industry Cooperative Program, organized in 1966, is to establish closer links between FAO, private industry, and governments. All programs award education and training fellowships; those granted under all FAO programs total 8,700. Since 1950, FAO has organized 539 training centers with more than 15,000 participants. Regional or interregional seminars are held frequently.

The Agency for International Development (AID) of the United States and the American Public

Health Association's Committee on International Health (22) recently proposed a program for developing and evaluating integrated delivery systems for health, family planning, and nutrition.

The challenge

National and international groups must work together if the world food-population-malnutrition problem is to be solved. A global effort is essential to increase food production and to distribute it more equitably, to provide technical assistance for agricultural and economic development, to educate professional and lay personnel in nutrition, to provide nutritional health services for those in need, and to control the rapid expansion of the world's population. These are some of the challenges of nutrition in the world today. The American Dietetic Association should play a significant role in meeting them.

A national nutrition consortium is being organized for the purpose of developing a nutrition policy for the United States and implementing national and international nutrition programs. The organizations involved in this consortium include the American Institute of Nutrition, the American Society for Clinical Nutrition, The American Dietetic Association, and the Institute of Food Technologists.

The Study Commission on Dietetics defined the dietitian as a "translator" of the science of nutrition into the skill of furnishing optimal nourishment to people (23). In this role, the dietitian can make significant contributions to the solution of world nutrition problems as a member of the health team, whether she be a generalist or specialist, a consultant or counselor, a research worker or teacher. She can continue the work stimulated and furthered by Lenna F. Cooper, a founder and leader of The American Dietetic Association.

References

(1) Cooper, L.F., Barber, E.M., Mitchell, H.S., Rynbergen, H.J., and Greene, J.C.: Nutrition in Health and Disease. 10th ed. Philadelphia: J.B. Lippincott Co., 1947.

(2) FAO's Field Programs. Cajanus 5: 91 (April-June), 1972.

(3) Third World Food Survey. Freedom from Hunger Campaign. FAO Basic Study No. 11, 1963.

(4) Scrimshaw, N.S., Behar, M., Guzman, M.A., and Gordon, J.E.: Nutrition and infection field study in Guatemalan villages 1959-1964. Arch. Environ. Health 18: 56, 1969.

(5) Scrimshaw, N.S., and Gordon, J.E., eds.: Malnutrition, Learning and Behavior. Cambridge, Mass.: The M.I.T. Press, 1968.

(6) Fighting blindness with vitamin A. UNICEF News, March, 1972, p. 14.

(7) Population growth sets record: 72.6 million more people in 1970. War on Hunger 4: 4 (July), 1970.

(8) Comm. on Population Growth and the American Future: Population Growth and America's Future. Interim Report. Washington, D.C.: Govt. Prtg. Off., 1971.

(9) Quest (New Orleans): No. 1, July, 1971.

(10) Notestein, F.W.: Population Growth and Its Control. The American Assembly: Overcoming World Hunger. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969.

(11) Ten-State Nutrition Survey, 1968-1970. Highlights. DHEW Pub. No. (HSM) 72-8134, 1972.

(12) Hanley, W.B., Linsao, L., Davidson, W., and Moes, C.A.F.: Malnutrition with early treatment of phenylketonuria. Pediatr. Res. 4: 318, 1970.

(13) Rosensweig, N.S., and Herman, R.H.: Time response of jejunal sucrose and maltase activity to a high sucrose diet in normal man. Gastroenterology 56: 500, 1969.

(14) Dudrick, S.J., Wilmore, D.W., Vars, H., and Rhoads, J.E.: Long-term total parenteral nutrition with growth, development and positive nitrogen balance. Surgery 64: 134, 1968.

(15) The World Food Supply. Vol. 1 & 2. Rept. of the President's Science Advisory Comm. Washington, D.C.: Govt. Prtg. Off., 1967.

(16) Freeman, O.: Review of Brown, L.R.: Seeds of Change. War on Hunger 5: 6 (May), 1970.

(17) Borlaug, N.E.: The Green Revolution, peace, and humanity. Cajanus 4: 229 (No. 4), 1971.

(18) West, Q.M.: The technical front: The developing countries and U.S. agricultural trade. War on Hunger 4: 13 (May), 1970.

(19) Malnutrition: A global crisis. UNICEF News, March, 1972.

(20) Allan, D.A.: Focus on food mixtures. UNICEF News, March, 1972.

(21) Goncora, J., Lopez, Y., and Ronchi, F.P.: The Role of World Food Programme in Africa. Food and Nutrition in Africa. FAO/WHO Food & Nutr. Bull. No. 10, Dec., 1971.

(22) APHA Awarded Contracts for HMO Studies, Health Care Plans, the Nation's Health. Washington, D.C.: Am. Pub. Health Assoc., 1972.

(23) Study Comm. on Dietetics: The Profession of Dietetics. Chicago: Am. Dietetic Assoc., 1972.

food vs. people

What Will Happen in the Next 10 Years?

By Omer J. Kelley and Howard D. Sprague

The world food situation is of crucial importance to everyone.

To the people of the developing countries, where shortages recur with tragic consequences, the amount of available food is literally a matter of life and death. To the people of the United States and other developed countries, the global demand and production [illegible] has a profound economic impact.

The world's needs and supplies of [illegible] tinue to be vital, especially in the [illegible] will be the situation in the dev[illegible] 1985? Can these countries win th[illegible] population growth and the pr[illegible]

And *how* do they hope to [illegible] pop-ulation growth? By producin[illegible] exceed population growth? Or, by s[illegible] these? On the basis of past perfor[illegible] potential impact of new technology [illegible] is the outlook?

Locality As Important As Quantity

Specifically, to what extent will *each* of the developing countries become self-sufficient in meeting its food needs from the mid-1970s to the mid-1980s? Th[illegible] is the real crux of the problem. Food deficits in qu[illegible] ity, or in quality as to protein, minerals, vitami[illegible] tent, become critical by country, region, or locali[illegible] though reserve supplies exist elsewhere in th[illegible] People may starve or suffer malnutrition un[illegible] are immediately available, precisely where the [illegible] occur. And, if there is a continuing shorta[illegible] troleum, along with increases in prices, the [illegible] could be seriously compounded.

A highly significant aspect of the world food situation is the long-term necessity of assisting each d[illegible] ing nation improve its own food production [illegible] to meet domestic needs. This involves the a[illegible] of improved agricultural technology to insu[illegible] use of the nation's land, soils, and clima[illegible] production of both crops and livestock, an[illegible] vest, processing, and distribution of foodstu[illegible] sustained year-round supply. All developing [illegible] are working on the food problem; and many extern[illegible] assistance agencies are attempting to cooperate.

One of these, of course, is the Agency for International Development. AID's agricultural programs have sought to contribute significantly to the developing countries' efforts to grow more food and to improve the nutritional levels of their populations. Over the past 15 years, U.S. assistance has helped them increase their food production by nearly 60 percent.

A continuing emphasis on agricultural production is reflected in recently enacted foreign aid legislation that specifically earmarks $284 million in AID funds for assistance in programs in food production and nu[illegible] These programs include:

- [illegible] technical assistance projects with-[illegible] countries designed to encourage [illegible] ces and improve transport and
- [illegible] United States and overseas, for [illegible] and farmers—
- agr[illegible] development loans and grants for nec[illegible] items such as fertilizer and pesticides—
- re[illegible] aimed at developing superior [illegible] which will have improved yield [illegible] characteristics as well as greater [illegible] resistance; weed, insect, and [illegible] soil fertility and water manage-[illegible] feeding; agricultural economics—
- [illegible] country campaigns to eliminate or [illegible] livestock diseases, especially in Africa—
- [illegible] designed to aid policy-makers in the developing countries in making decisions for resource and aid allocations and in setting planning priorities.

The cardinal requirement governing all of these programs is that the developing nation must manage its own system, since each sovereign nation has its own goals and culture. Another principle implicit in [illegible]od programs is that mere survival is no longer an [illegible]ptable state. Human diets must meet minimum [illegible]irements not only for calories, but for proteins [illegible]icularly animal proteins—meat, milk, eggs, and [illegible] as well as fats, minerals, and vitamins.

The Global View of Food Needs

The global food problem has been complicated over the past 30 years by a rapidly increasing world population, particularly in developing countries. About two-thirds of the world's population is in the developing nations, and only one-third in the developed countries. The rate of population increase has remained at the high level of about 2.5 percent yearly in the developing countries, despite the increasing efforts being made to

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Dr. Kelley is Director of AID's Office of Agriculture. Dr. Sprague, formerly of Pennsylvania State University, is currently serving AID as a consultant.

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control population growth. World cereal grain and protein consumption have been running slightly ahead of food production in recent years. Our world food reserve margins now are close—too close for comfort or complacency. Fortunately, with modern communications, shortages in food supplies can be widely reported, so that every member of the family of nations may be promptly informed as to where there is danger of malnutrition and starvation. The associated problem of debility and disease that accompany malnutrition, and the realization that young children (and their mothers) are the most vulnerable targets, makes all nations more sensitive to the longer range effects of scanty food supplies on the oncoming generation.

The United States continues to be a major contributor of foodstuffs to meet urgent needs, including relief for disasters such as earthquakes, floods, droughts, pest and disease epidemics, and rebellions. Under the terms of the Food Aid Convention of 1971, the United States agreed to donate or sell concessionally 1.9 million metric tons of wheat and coarse grains in fiscal years 1972, 1973, and 1974. AID will continue to put strong emphasis on the use of high-protein food supplements such as corn-soy-milk (CSM), wheat soy-blend (WSB), soy fortified flour, and bulgur. Almost half of the total food supplies made available by external assistance agencies to the drought stricken countries of the sub-Sahara region of Africa have been provided by AID, which also supplied half of all the grain supplied to Bangladesh during the food crisis of 1972-73. But these rescue and relief efforts of AID and other external assistance agencies are intended to "buy more time" so that each of the developing nations may implement more adequately the twin programs designed to make it more nearly self-sufficient in feeding its people. These twin programs are:

- production of more food;
- control of population growth.

Actually, most nations have increased the actual volume of foodstuffs, but the rapidly increasing population has reduced the food supply per person in far too many instances.

The Food and Agriculture Organization (FAO) in Rome has made intensive studies of world production of foods, and made projections of both *production* and *demand* for the period 1975-85. These studies were published in two volumes in 1967 and refined in a later 1971 study covering the 1970-80 period. The events of 1972 and 1973 have largely confirmed the accuracy of these projections. This summary and the accompanying tables have drawn in large measure on the FAO data, but with our 1973-74 interpretations of the present status.

In making projections, FAO made three groupings of nations. The *developed* nations of North America, Western Europe, Japan, Oceania, and South Africa total 30 nations. The *developing* countries on all continents number some 93 independent political entities in various stages of development. A third category of *centrally planned* nations includes 12 countries, of which the U.S.S.R. and China are the major units.

It is in the 93 developing nations that population growth threatens to outrun food supplies, and where the application of food production technology is in early stages of development. Both the limitation of population growth and increased food production constitute immensely difficult problems, and progress is certain to be slow. This is due to the great numbers of peoples of diverse cultures that are involved and the great expanses of geography with differing national resources of climate, land forms, soils, vegetation, and farming systems. However, there are many signs of progress, and cautious optimism is warranted.



"Every once in a while a world trend of profound importance gets under way without making headlines. According to authorities on agricultural production, something like that may be happening in their field right now. The chemical fertilizer on which the world increasingly depends for food is in short supply, and getting shorter. . . .

"The Green Revolution that we hope will feed the growing millions in the underdeveloped world depends on . . . massive use of chemical fertilizers, not just on the new varieties of rice and other grains. This fact has made worldwide demand mushroom, and production has not kept pace."

Anthony Lewis
The New York Times
January 7, 1974

On the other hand, the energy crisis and lack of fuel for fertilizer and other purposes, if prolonged, could pose a serious threat to developing countries. Most of these countries depend on oil shipments from the Middle East to build their industries and increase their food production. The Green Revolution owes its success to a very large extent to the increased use of fertilizer. Rising prices and declining supplies of petro-chemical fertilizers—due mainly to the high cost of importing fuel—threaten to lower agricultural production in countries which desperately need to increase their food supplies. India, for example, which has begun to develop a fertilizer industry could be severely affected.

The energy crisis also may prevent U.S. farmers from producing at levels necessary to assure adequate supplies of Food for Peace grains.

The most reliable method of making projections is to assume that recent basic trends will continue, but will accelerate or be retarded as certain programs develop. Gross Domestic Product *(GDP)*[1] is a useful indicator of food supplies in developing countries because agriculture is most often the major component of GDP. The statistical records of food production and of population changes are fairly well documented for recent decades, country by country, and these form the base for projections into the future. Certain basic assumptions are needed to make predictions. In this situation, the assumptions concerning GDP and food production are either that rates of change will continue at the level of the most recent decade, or that there will be a substantial increase. For population (where both private and government programs are being undertaken), the recent trend will either be continued, or population growth will be curtailed. When the various combinations of high and low rates of both factors are considered, the element of personal judgment comes into play. Even though cautious optimism is warranted, it seems most likely that there will continue to be a fairly high rate of population growth for the group of 93 developing countries, combined with a modest increase in food production, generally at a rate slightly faster than population.

A broad brush outline of the non-communist world food and population situation in 1985 is suggested by the figures given in the following tables. By that time, the developing countries will account for half of the total world population: while the growth rate of their Gross Domestic Product between 1975 and 1985 will be higher than that of the developed countries (6.5 percent as compared to 4.8 percent), the total GDP of the developing countries will still constitute less than one-sixth of the world total. Per capita GDP will show an even greater gap between developed and less developed countries. At the same time, growth in the total demand for food, based on indices for 1985 and 1975, will increase by 11 percent in the developing countries but actually decrease by 1 percent in the developed nations. Much of the growth in demand for food in the developing countries will result solely from population increase; in Latin America, for example, population growth will account for as much as 91 percent of the higher demand for food. The increased demand for food in the developing countries will lead to some increase in cereal consumption but more importantly, if there are high rates of growth in per capita GDP, the highest per capita increases in food consumption will be in animal products, indicating an improvement in nutrition in the developing countries. Finally, figures



"Concern . . . is not with enduring gasless Sundays, but with supplying light and food to millions of thatched huts and mud-walled villages. Kerosene is a basic requirement, and all the countries, from Afghanistan to Ceylon and Bangladesh to Pakistan, depend on Middle East oil.

"The lingering hope of the South Asians, the world's poorest people, was to use energy to lift themselves from centuries-old misery. Energy is a must for improving outmoded agricultural and fishing technology, and for providing the South Asians a modest intake of calories. The only hope for any sustained industrial development again depends on energy."

Pran Sabharwal
The Sun (Baltimore)
January 13, 1974

[1] Gross Domestic Product includes all current factor payments (wages, interest, rents, and profits) to enterprises located within the country regardless of their nationality, whereas Gross National Product includes current factor payments received by nationals of the country regardless of their residence.

for projected demand for food in the decade ending in 1985, based on both high and low income increases over the period, show that whichever occurs, the demand for food will be far greater than past production.

There are no definitive answers to questions about the balance between food and population in 1985. However, there is sufficient evidence of recent progress in meeting the apparent food demands of the 98 developing countries of the world to warrant cautious optimism that the decade of 1975-85 will result in substantial improvement. Population increase is the greatest factor in the steadily rising demands for food in these countries and any further progress in slowing the rate of population growth will ease the food status. The application of improved technology in food production is moving forward slowly. The problems are immense, not only in developing new technology, but in the programs for transferring knowledge to the multitudes of farmers and herdsmen of every country who do the actual producing of food. Progress in meeting expected food demands will necessarily depend on the will of each country in dealing with this aspect of national development.

Much depends on what the individual governments do to provide technical guidance to the food producers, and to provide the economic incentives to stimulate production. For its part, AID is continuing to assist the developing countries in this task, through research, training, and a broad range of technical assistance programs.

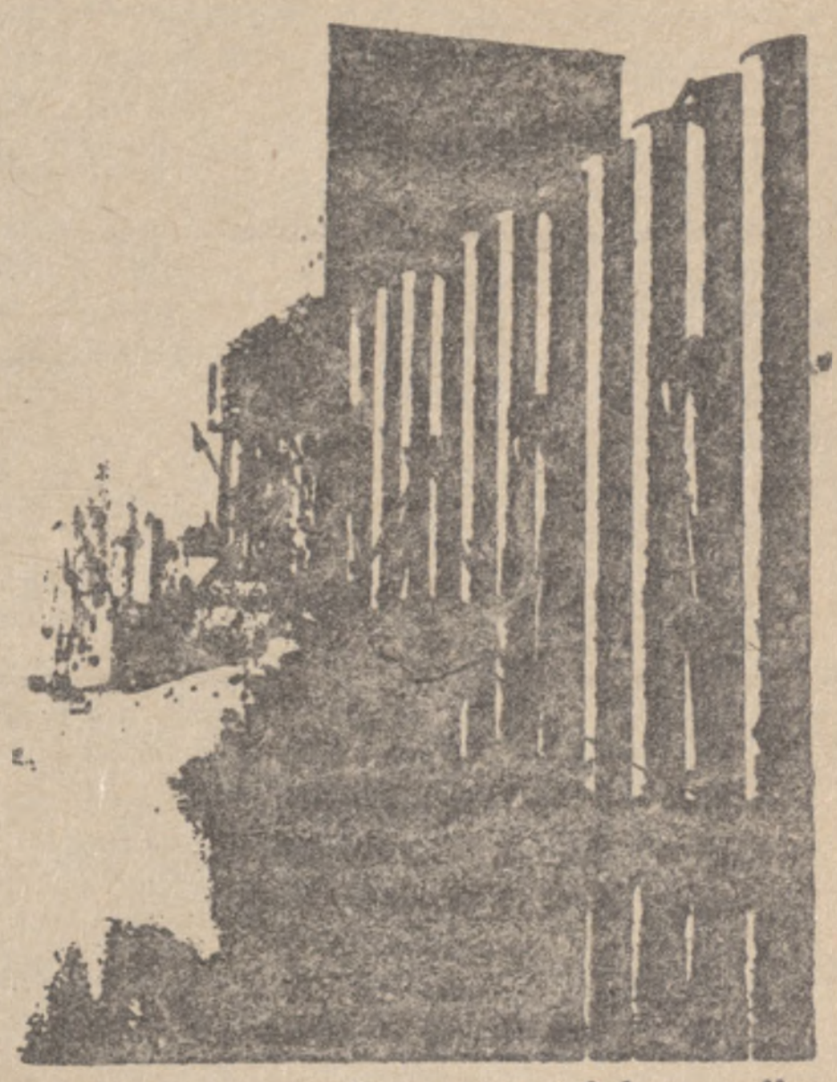
Population Changes

The distribution of population growth rates among *developed*, *developing*, and *centrally planned* countries is shown in Table 1. The 98 non-communist developing countries accounted for 45 percent of the world population in 1965, and because of a sustained higher population growth rate (2.5 percent), these countries will contain 50 percent of the world total by 1985. When examined by geographic regions, the population growth rates are lower in Asia and the Far East, but remain high in Latin America, Africa, and the Near East. In the non-communist world, it is assumed that the developed countries will have a growth rate of only 1.1 percent yearly, in contrast to the average of 2.5 percent average for all developing countries. Thus, the developing countries must find ways of coping with the

TABLE 1: GROWTH RATE IN WORLD POPULATIONS *

AREA	Percentage of World Population 1965	1985	Annual Assumed Growth Rate 1975-85
Developed Countries	21%	18%	1.1%
Centrally Planned Countries	34%	32%	1.8%
Developing Countries	45%	50%	2.5%
Developing Countries by Regions			
Latin America	7%	9%	2.7%
Africa	8%	9%	2.7%
Near East	3%	4%	2.7%
Far East	27%	29%	2.5%
(India)	(14%)	(15%)	(2.2%)

** Projections in all tables are based on high FAO growth variant unless specifically indicated otherwise. Assumed annual growth rates are figured on a compound basis. Centrally Planned Countries category includes Peoples Republic of China. Regional category of Far East includes South Asia plus Asia and South East Asia.*



"The foreign policy aspects of farm policy are very clear. Somehow, some way, we must fashion a policy that convinces the world that we intend to remain the most reliable supplier of foodstuffs on the world market. The key word is 'reliable'. We must remain the best supplier on the world market, [but] the United States cannot maintain a food reserve for the whole world by itself. Yet, determining a reserve policy for ourselves would be somewhat easier if it was part of a broad agreement reached with other countries under which they would do their share. . . ."

Senator George D. Aiken (R-Vt.)
June 19, 1973

greatly increasing numbers of people to be fed. Population growth in some developing countries is slowly declining, but the changes for the developing world probably will come very slowly in the 1975-85 decade.

Gross Domestic Product *(as indicator of food supplies)*

It is assumed that the developing countries of the non-communist world will increase their rate of overall growth for the period 1975-85, at an annual rate of 6.5 percent, as compared to 4.8 percent for the developed countries (see Table 2). This is a most helpful

TABLE 2: GROSS DOMESTIC PRODUCT

AREA	Percentage of World Total 1965	Percentage of World Total 1985	Assumed Annual Growth Rate 1975-85
Developed Countries	65%	60%	4.8%
Centrally Planned Countries	23%	27%	6.0%
Developing Countries	12%	13%	6.5%
By Geographic Regions			
Latin America	4%	5%	6.8%
Africa	1%	2%	5.6%
Near East	2%	1%	6.4%
Far East	5%	5%	8.9%
(India)	(2%)	(3%)	(6.0%)

sign. Even though the gap between developed and developing countries is still great, that gap is predicted to slowly diminish. Of the four major geographic regions, Africa appears likely to have the slowest rate of progress. It is quite possible, however, that the decade of 1975-85 will see the opening up of 4.5 million square miles of the great fertile heartland of that continent by successes in controlling the tsetse fly, river blindness and other diseases, and parasites that now largely deny these lands to the African countries.

Per Capita Gross Domestic Product

The relationship of population to actual volumes of food (as measured by GDP) becomes apparent when they are expressed in terms of *per capita* values as shown in Table 3. The per capita GDP for all developing countries is expected to increase to an average of $255 in 1985, in contrast to $133 in 1965. It is true that the gap between *developed* and *developing* countries will probably not be reduced, but if population could be rapidly brought down in the developing world, the gap would be substantially smaller. On the other front, that of food production, there are instances throughout the developing world that show increased productivity through widespread applica-

TABLE 3: PER CAPITA GROSS DOMESTIC PRODUCT

(1961-63 prices)

AREA	Per Capita GSP 1965	Per Capita GDP 1985*	Assumed Annual Growth Rate 1975-85
Developed Countries	$1,936	$2,185	4.8%
Centrally Planned Countries	$ 351	$ 880	8.9%
Developing Countries	$ 133	$ 255	3.9%
Developing Countries by Regions			
Latin America	$510	$858	5.8%
Africa	$181	$199	3.9%
Near East	$167	$343	4.2%
Far East	$ 89	$167	4.2%
(India)	($ 68)	($129)	(4.1%)

* *Based on high GDP growth variant combined with low population growth rate.*

tion of modern technology could greatly improve food production as a whole, and not be limited to cereal production in selected areas, as occurred in 1965-75.

Projected Growth in Total Demand for Food

The projected values for total food demand are shown in Table 4. The *developed* countries will actually have declined slightly by 1985 in demand for food, so that their capacity to provide reserve stocks for relief efforts should not diminish. However, the *developing* countries of the world are believed to have greater food demands by 1985, largely because of sustained increasing population. However, the higher per capita GDP (Table 3) also will be responsible for improved standards of living which will cause increased food demand. These demands indicate the dimensions of the problems to be faced. It will not suffice to maintain volumes of food production at present levels; the actual amounts of food must increase with population growth, and also must be sufficient to permit improved standards of living that require more food.

TABLE 4: INDICES OF PROJECTED GROWTH IN TOTAL DEMAND FOR FOOD, BY ECONOMIC GROUPS

Economic Groups of Countries	1965-1975	1975-1985
	(1965 = 100)	(1975 = 100)
Developing Countries	135%[1]	146%[2]
Developed Countries	117%[1]	116%[3]

[1] *Low FAO GDP growth assumption.*
[2] *High GDP growth assumption with low population growth assumption.*
[3] *High GDP growth assumption with high population growth assumption.*

Growth Rates in Food Demands

Despite the greater food demands resulting from larger populations and somewhat higher standards of living, the rate of increase in total demand for food in the developing world is predicted to ease slightly in the decade 1975-85. Table 5 indicates that this differs substantially in several regions. The developing countries of Africa and the Near East are expected to increase the rate of growth in food demand. Population growth is a dominant factor in the growth of total demand for food. For all developing countries, population growth is expected to account for 82 percent of the increased food demand. For Latin America, population growth will probably account for 91 percent of the growth of projected food demands; Africa—86 percent; the Near East—77 percent; and the Far East—79 percent. It is this inexorable growth in total numbers of people to be fed, that makes the problem of adequate food production so difficult. It is as though the finish line in a race is constantly being moved out further and further as the racers speed onward.

TABLE 5: GROWTH OF TOTAL DEMAND FOR FOOD IN DEVELOPING COUNTRIES

Region	Percentage Per Year * 1965-75	Percentage Per Year * 1975-85
All Developing Countries	3.1%	2.9%
Latin America	3.1%	2.9%
Africa	2.9%	2.1%
Near East	3.3%	2.6%
Far East	2.6%	2.9%

*Based on assumptions of low increase in GDP, and high population increase.

PERCENT OF GROWTH IN FOOD DEMAND, DUE TO POPULATION INCREASE

All Developing Countries	84%	82%
Latin America	91%	91%
Africa	88%	86%
Near East	91%	77%
Far East	88%	79%

Projected Per Capita Production of Main Food Crops

Actual food production must deal with all of the different types of foods needed to produce a balanced nutritive diet, and to satisfy the food preferences of the many peoples of the 93 developing countries. It is quite important in attempting to forecast food needs in 1985, to distinguish between the advances made in cereal production (rice, wheat, maize) in 1965-75, often termed the "Green Revolution", and the other kinds of foods. It is simply misleading to place undue emphasis on cereals, even though they are highly important foods. The progress in cereal production achieved in 1965-75 has benefited only certain ecological zones of the developing countries. In the decade of 1975-85, it is hoped that improvement of cereal production will penetrate more regions. However, Table 6 indicates that per capita consumption of cereals will increase more slowly than consumption of sugar, of fats and oils, and of animal products (meat, milk, eggs, fish). In general, these other types of foods are expected to increase in utilization five to six times as fast as cereals.

Table 6 also undertakes to project per capita consumption of the several types of foods for 10 designated geographic regions. In all of these the cereal needs on a percentage basis are expected to grow at a slower rate than the projected consumption of other food types. It is believed that consumption demands for animal products will be the greatest, followed closely by consumption demands for fats and oils. There are regional differences, particularly for West and Central Africa where consumption of sugar is expected to become increasingly important.

TABLE 6: PERCENTAGE INCREASE IN *PER CAPITA* GDP, AND *PER CAPITA CONSUMPTION* OF MAIN FOOD CROPS, IN DEVELOPING COUNTRIES

	Projected Percentage Increase for 1965 to 1985				
		Per Capita Consumption (by quantity)			
REGION	Increase in Per Capita GDP	Cereals	Sugar	Fats & Oils	Animal Products
All Developed Countries	+105%	—10%	+16%	+ 9%	+17%
All Developing Countries	+ 67%	+ 8%	+38%	+52%	+53%
Central America	+77%	+ 8%	+13%	+24%	+26%
Western So. America	78%	7%	14%	41%	45%
Eastern So. America	82%	1%	4%	21%	18%
Northwest Africa	82%	4%	27%	44%	42%
West Africa	88%	13%	101%	31%	47%
Central Africa	83%	17%	134%	37%	57%
East African	88%	11%	81%	31%	44%
Near East	91%	3%	53%	49%	54%
South Asia	17%	7%	65%	87%	69%
East & South East Asia	64%	10%	69%	76%	83%

This diversity in projected consumption may appear to complicate the campaigns for improved food production; but it is this diversity that stabilizes food supplies by reducing the risks of possible shortcomings or disaster that are inherent in dependence on a single type of crop. Famines and malnutrition are associated with too narrow a dependence on one type of food. Food adequacy is vastly improved by food diversity.



"The present world food crisis has revealed the poor countries' physical incapacity to produce enough food at present foreign aid levels. It has also shown the United States can no longer be counted upon as the emergency breadbasket of the world. If no increases in United States foreign aid are quickly forthcoming and the poor countries find themselves powerless to escape the vicious circle in which they are enclosed, international politics will be profoundly changed. It is time for individual Americans to strongly support foreign aid. Their children's well-being depends on it."

Richard Critchfield
Washington Star-News
September 30, 1973

Further Identification of Food Types

Much more attention is being given in the decade of 1965-75 to food grain legumes (pulses) as foods, as well as to vegetables, fruits, and to animal products. This changing emphasis is the result of increased concern for the quality of the diet needed for human health and vigor. The food grain legumes (including beans, peas, cowpeas, chickpeas, lentils, mung beans, pigeon peas, broadbeans) are high protein foods, that either supplement or replace animal products in the diets of poorer people. Vegetables and fruits are not only energy sources, but are important in supplying vitamins and mineral nutrients. Animal proteins (meat, milk, eggs, and fish) are highly essential for human diets as the prime sources of such essential amino acids as lysine, methionine, threonine, and tryptophan.

It is useful to note the recent (1971) utilization of food groups in five representative countries—Colombia, India, Philippines, Nigeria, Tanzania. These countries differ considerably in population, as shown

TABLE 7. PRODUCTION OF FOOD GROUPS, 1971

FOR SELECTED COUNTRIES

	COLOMBIA	INDIA	PHILIPPINES	NIGERIA	TANZANIA
Population	21	[illegible]	38	66	13
		Millions			
Food Groups		Thousands of Metric Tons			
Cereals	3,139	119,[illegible]	7,447	[illegible]	1,142
Sugar	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Root and Tuber Crops	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pulses (beans, peas, chickpeas, lentils, etc.)	113	[illegible]	[illegible]	[illegible]	[illegible]
Oil Crops	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fruits (citrus, bananas, pineapple)	[illegible]	[illegible]	[illegible]	—	[illegible]
Livestock Products					
Meats	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Milk	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Eggs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

in Table 7. However, cereals constitute a highly important food group in all countries. In Nigeria, root and tuber crops are the major group, since these replace cereals where the climate is not favorable for cereals.

A category for "fresh vegetables" is not included because of the deficiency in statistical reporting of such crops in the tropics. Similarly, many tropical fruits that are grown do not show up in the reported statistics. No corrections have been made for exports.

The livestock products for all of these less developed countries are quite low in comparison with the situation in Western Europe and North America.

"Fertilizers are the [illegible] Revolution, which ha[illegible] crease in per acre [illegible] developed countries. The [illegible] wheat which made the [illegible] characterized primarily [illegible] larger doses of fertilizer. [illegible] however, India expects a shortfall of [illegible] million tons of fertilizer, [illegible] enough to reduce crop yields by [illegible] cent. Similar shortages are forecast [illegible] and even the industrialized nations face [illegible] city. The problem is that nitrogen fertilizers are made from hydrocarbons, which [illegible] petroleum and, of course, petroleum is in short supply."

[illegible]

Better Diets by 1985?

The expected changes in demand by 1985 for each of the food types listed in Table 7 are presented in Table 8. It is significant to note the projected slow growth in demand for cereals, and the faster increases in demand for other food types. Nutritionists would agree that these changes indicate a movement toward more adequate diets in the developing countries.

Two alternative assumptions are included in Table 8. One assumption is that of a higher rate of increase of GDP (as a convenient food supply index), combined with *low* population increase. The other assumption, which has a greater degree of probability, is for the higher GDP to be combined with a continued high population increase. As expected, the latter assumption calls for substantially greater increases in food demands. Whether these demands will be met, or even exceeded, only time will tell. It may be useful to individual countries to recognise such goals in their plans for sustained development.

TABLE 8: GROWTH RATES OF PROJECTED DEMAND IN DEVELOPING COUNTRIES BY MAJOR FOOD GROUPS AND NUTRIENTS

	Percent Annual Increase		
	1965-75	1975-85	
FOOD TYPES	high GDP & high population increase	high GDP & low population increase	high GDP & high population increase
Cereals	3.1%	2.6%	2.7%
Pulses and Nuts*	3.6%	3.3%	3.3%
Sugar	4.1%	4.1%	4.3%
Fats and Oils	4.6%	4.9%	5.0%
Vegetables and Fruit	3.7%	3.7%	4.0%
Livestock Products	4.6%	4.7%	4.9%
Percent increase in population, yearly			
Population	2.6%	2.1%	2.5%

**"Pulses" is term often used for food grain legumes—beans, peas, evergreen, chickpeas, lentils, mung beans, pigeon peas, broad beans, etc.*

Regional Growth in Food Production and Demand

The 93 developing countries have varied considerably in food production and demand in the period covered by the statistics summarized and interpreted by FAO. Detailed data for individual countries are reported in FAO publications. The general values for the period 1962-75 (largely a matter of record) and the projections for 1975-85, are shown in Table 9. For the period 1962-75, the assumption of higher income generally was not achieved, so that the *projection* based on sustained lower income is closer to reality. For the *projected demand* for food in the decade 1975-85, both low income increases and high income increases are included in the last columns of Table 9. Using the lower income assumption as the more probable, it is quite clear that food demand will *exceed* past production of food in the developing countries. Using the assumption of a higher increase in income, the projected food demand between 1975 and 1985 is substantially greater.

TABLE 9: REGIONAL GROWTH IN PRODUCTION AND DEMAND FOR FOOD IN DEVELOPING COUNTRIES

	Percent Per Year Increase			
	Projected 1962-75 Production		Projected Demand-1975-85	
AREAS	Low Income Assumption	High Income Assumption	Low Income Assumption	High Income Assumption
All Developed Countries	2.0%	2.1%	1.7%	1.9%
All Developing Countries	2.8%	3.6%	3.2%	3.7%
By Geographic Regions				
Latin America	3.9%	3.6%	3.3%	3.7%
Africa	2.8%	3.5%	2.9%	3.4%
Near East	2.5%	3.6%	3.4%	4.0%
Asia and Far East	2.5%	3.5%	3.2%	3.9%
(India)	(2.9%)	(3.8%)	(3.2%)	(3.8%)

It may seem unreal that the food demand will increase so greatly when the increases in income are rather modest. The hidden factor is the great influence of a rapidly growing population, which accounts for 80 to 85 percent of the changed demand for food.

THE WORLD FOOD PROBLEM

FRANCES MOORE LAPPE



Natural causation, economic imbalance or overpopulation?

Historically, people have tried to deny their own culpability for mass human suffering by assigning responsibility to external forces beyond their control. For example, the Black Death was in large measure the result of a particular organization of society: a society that brought people together in commercial cities where it could not extend sanitation to the masses, and deforested the countryside, sending plague-laden rodents into these cities. Nevertheless, the Black Death was pronounced "Divine retribution" by the Church. Today the causes of world hunger are similarly misattributed. Current widespread climatic disasters have made it especially easy to accept natural forces as the sufficient reason for starvation.

If we accept the conclusion of many contemporary analysts that the world faces a "Malthusian food-population squeeze," then persons are indeed blameless. According to this analysis, world food problems are a function of the finite limits of Earth's resources, the vagaries of climate and an inexorable rate of population growth—all "natural" agencies, not human ones. Our response to this diagnosis is inevitably one of resignation to the apparent truth that there is simply "not enough to go around." Only if this apersonal model is true, are we freed from having to confront the human role in generating and sustaining a "world food problem." My contention is that world hunger is now, above all, a political and economic problem to which we directly contribute.

What Malthus neglected to appreciate in the late 18th century was that economic imbalance, not numbers of people, would come to place the greatest burden on the earth's productive capacity. He failed to foresee the enormous economic gap between the rich minority and the poor majority—a condition in which any agricultural abundance that the world could produce could just as readily be consumed by the rich minority. But then, how could Malthus have foreseen that the world would become so economically imbalanced that it would eventually be to the advantage of the rich to concentrate the world's agricultural resources on feeding animals, not people?

Today we currently feed at least 85 percent of all of our corn, barley, oats and grain sorghum, and over 90 percent of our nonexported soybean crop to livestock. We feed about 42 percent as much wheat to animals in this country as we eat ourselves, plus large quantities of wheat germ and bran. Altogether, close to one-half of our agricultural acreage is now devoted to crops fed to livestock. But in addition to this plant food, American livestock are fed hundreds of thousands of tons of fishmeal and over one million tons of milk products each year.

Global figures make it even clearer that we now minimize the earth's capacity to sustain us. Consider for a moment that: 1) the rich minority of the world feeds as much grain to animals as the whole rest of humanity eats directly; 2) there is as much protein in oilseeds, that for the most part go to livestock, as there is in all the meat protein humanity consumes;

FRANCES MOORE LAPPE, *who has contributed to such magazines as* The Nation, Chemistry, American Biology Teacher *and* Ramparts, *is the author of* Diet for a Small Planet *(Ballantine Books, 1971).* *This article first appeared in* The Hastings Center Report, *published by the Institute of Society, Ethics and the Life Sciences, Hastings-on-Hudson, N.Y. 10706.*

and 3) nearly half of all the fish caught in the world, containing protein as good as meat, is fed to livestock.

Thus there is apparently no end to the capacity of today's rich to "economically" use up the world's "surplus" agricultural resources. A diabolical device for coping with a surfeit of grain would be to create a machine which could shrink grain volume while at the same time converting it into a highly saleable commodity. The American steer has been converted into just such a device. This animal can take 21 pounds of inexpensive grain protein and reduce it to one pound of expensive meat protein. The rate of livestock protein consumption has increased dramatically in the last twenty years, especially through the use of gigantic feedlots where steer can eat about 10 times more grain and about seven times more high protein feed each month than they could as primarily range-fed animals. But the American people have contributed: our per capita beef consumption has doubled in the last 20 years.

Perhaps we can excuse Malthus for not foreseeing that livestock would be transformed from their historical role as efficient converters of non-edible substances into high-quality protein—to become the protein reducers, relieving the economies of the rich from the burden of seeming glut. But how do we excuse ourselves? Cultural myths have come to the service of economic realities so that we now can believe that we indeed *need* meat at every meal. (In fact we could completely eliminate meat and poultry and still get enough protein from all the other protein foods which we currently eat.)

A Question of Priorities

What appears then as a problem of scarcity is actually a reflection of the uneven worldwide distribution of economic power. Extreme global inequities in the ability of nations to make demands on world food resources have made possible this pattern of highly inefficient resource use by the rich minority. But of course scarcity is also a function of the level of agricultural development, specifically (as we are now witnessing it) the vulnerability of an agricultural system to climatic disaster. But such agricultural "vulnerability" itself is a reflection of the priorities of the political and economic system.

In the last year, for example, both India and China faced similar drought conditions. In India fifty million people have faced famine; in China no one has feared starvation. The reasons for this discrepancy are not hard to discern: in Maharashtra, one of the hardest hit of the Indian states, the proportion of irrigated crops has increased by only 1½ percent in the last 25 years. Fifty-seven irrigation schemes that might have avoided this catastrophe were stalled for up to eight years for political and economic reasons. To date only 3 percent of India's known water reserves have been tapped. Moreover, since new "miracle" strains of grain (now used on 33 percent of India's wheat acreage and 15 percent of her rice acreage) require a greater amount of water than traditional varieties, crop yields are now more dependent on the willingness and ability of the economic and political system to provide the necessary irrigation.

China, on the other hand, has given top priority to water control for the last twenty years, with intense construction beginning in 1963. In eight years 1,700 miles of the Hai River bed were re-opened or broadened. Thirty-five reservoirs which can store 106 billion cubic meters of water were built in the mountains. In addition, hundreds of thousands of wells have been bored to reach the underground water of the plains.

In this comparison the difference between adequacy and famine is not climatic events but the commitment of the political system to basic agricultural development for the majority. And here the key phrase must be "for the majority." For increased agricultural output itself does not mean the eradication of hunger. Two years ago the Green Revolution economists feared a "rice glut." Several Asian countries had "surplus" grain for export; but hunger was still widespread. The coexistence of "surplus" and hunger proves again the all too obvious truth that hunger is less the fault of nature than the result of an inequitable political and economic system, a system which makes it impossible for the hungry majority to buy the so-called "surplus."

But if hunger is not the result of external natural forces, then isn't it still a product of humanity's "natural," and apparently uncontrollable rate of increase that has pushed its numbers beyond the capacity of the earth? Certainly, with the world's population expected to double in the next generation, it could not long be true that there is enough to go around—even if the world's food production were distributed equitably and used efficiently. At our present land/person ratio of one acre of arable land per individual, we are reaching the limit of the earth's capacity. But this fact makes it even more imperative that we stop wasting precious time in a confused diagnosis of the problem of hunger. Hunger is not a result of current population pressures. Both rapid population growth and hunger are the reflection of the failure of a political and economic system. Neither can be solved without overall improvement in: 1) health care to reduce infant mortality and the resulting need for many births; 2) education to make fertility control understandable and widen life-goals beyond the family; 3) communication to make society-wide purposes realistic; 4) employment opportunity for both men and women to increase personal security; and 5) basic agricultural development and concomitant land income redistribution to give the ma-

jority a real stake in economic development. Thus, to label population growth as a cause of world hunger and to single it out for direct attack is a tragic illusion. The only way both can be solved is through political and economic change—the alleviation of world poverty.

While the commitment of a political and economic system to this basic development for the poor would seem to be an internal matter over which Americans have no control, we do, in fact, play a part. In 1973 the United States allotted $9.5 billion to military assistance to 64 countries. Twenty-five of these recipient nations are governed by the military or allow no opposition to the government. In many of these twenty-five the poor majority are actually worse off than they were a decade ago. This same American money could be going, for example, to reimburse landlords in land redistribution programs where inequitable and inefficient land-holding patterns stand as a major obstacle to agricultural development.

But being realistic, the truth is that no matter how just the economic system, no matter how committed the political system to the welfare of the masses, something else is needed for agricultural development: money. Foreign exchange is crucial if tractors, fertilizers, irrigation equipment and materials for agricultural research laboratories are to be purchased. For the poor world even to acquire the necessary foreign exchange for these modest goals would mean a significant redistribution of world economic power.

However, unilateral American monetary decisions, such as the recent dollar devaluations, have been made with no thought to their impact on the economies of the poor countries. Losses suffered in the dollar component of the reserves of the poor countries by the first devaluation alone amounted to nearly one billion dollars. Where possible, the United States has tried to block the poor countries from recouping these losses through increases in the prices of their agricultural commodities. And, in current negotiations to reform the international monetary system, the United States is attempting to prevent the proposed new reserve unit, Special Drawing Rights, from being used to help the foreign exchange position of the poor world.

Our record in commercial relations with the poor world is no better than our monetary record. To increase its foreign exchange earnings, the poor world would have to be allowed to increase the export of those agricultural commodities in which they have a comparative advantage. However, at least one-half of the primary exports from the poor countries are not given free access to markets in the rich countries. Even more important, poor countries would have to be allowed to process more of their own commodities because higher profits can be made in the processing for export than in the export of raw materials. Here again the poor countries are at a disadvantage because our tariffs increase with the level of processing.

So our contribution to the world food problem includes not only our support of a highly imbalanced world economic system that converts adequacy into scarcity but, in addition, our military, monetary and commercial impact on the poor world.

The recent climatic changes which resulted in increased demand for our agricultural surplus might inadvertently have been a first step out of this pattern by at least helping us see how wasteful and unnecessary our current diet is. More ominously, it might reinforce a false sense of scarcity and cause us to want to insulate ourselves further from the demands of those in greater need (witness the virtual elimination of the food available to relief agencies and the brief embargo on our soy export!).

It would be a tragedy indeed if the current world food crisis were taken to confirm the false notion that the problem of world hunger is now rooted in a contest between all mankind and the vagaries of nature. The reality of the situation is that world hunger is a life and death contest between the hungry majority of humanity and a scarcity-producing economic system sustained by the rich minority.

The Ecology of Malnutrition

Jacques M. May, MD, and Hoyt Lemons, PhD

Food shortages and increased population are two major issues today. The severe consequences of improper nutrition affect both the growth of man and the orderly development of societies. The relationship between food supply, nutrition, geography, and tradition is discussed in a series of volumes describing "the ecology of malnutrition," sponsored by the US Army Research Office. Examples are drawn from Africa, Asia, and Latin America. A blueprint for food and nutrition programs emphasizes the interdependence of health, agriculture, industry, education, and research in combating malnutrition.

The attention of the world is focusing more and more on the problems created by the widening gap between food resources and population growth. In October 1966, the Food and Agriculture Organization of the United Nations' reported that "World food production failed to rise in 1965-1966, but population increased by about 70 million persons." (*The State of Food and Agriculture*, released in 1968, sounded a much more hopeful note.) Thus, worldwide per capita food production fell by about 2% and in the developing regions of Africa, Latin America, and the Far East, per capita production dropped by 4% to 5%. In South Korea, between 1958 and 1962, food crops increased by only 10% while the population grew by 14%. In the Philippines, the ratio was 12% increase in food crops to 13% growth in population. In Egypt, the ratios were 1% vs 11% and in Colombia 7% vs 9%. In Senegal, food production increased only 9% between 1948 and 1965 while the population grew by 57%.

The less-developed countries having a reasonable margin of food security, like Thailand and Turkey, are few. Others, like India and Pakistan, are fighting a seesaw battle from year to year to match population and food crop increases. Without corrective measures, the general situation cannot but become worse since the two terms of the equation, if left to themselves, will develop independently. Food increases, being correlated with many variables that set a limit to development, will of necessity remain more static than population increases which grow inexorably along a geometric progression.[2]

The Office of Research and Development of the US Army foresaw the possibility of such a world food gap as early as 1955. It was clear to US Army officials that food inadequacies were likely to become a prime cause for unrest and insurgency. Therefore, it was important to identify those countries and areas of the world where food gaps already existed or where a precarious balance between surfeit and famine obtained, and to ascertain the underlying causes of food inadequacies. It was also important to know where food surpluses could be expected to exist as well as the characteristics of those surpluses.

Food inadequacies affect the individual, gravely disturbing his normal growth and development, and through the individual, they affect his society.

Food and the Individual

The problem of food supply and distribution is not limited to a quantitative factor. The qualitative factors are just as important. Most important is dietary protein shortage that is almost universal among the lesser-developed countries. Proteins are essential for growth and for maintenance and repair of vital tissues in the body. Some of these vital nutrients cannot be synthetized by the human system and have to be provided by the diet. Protein deficiencies result in a number of deleterious conditions, depending upon the age of the child at the time he is deprived. In the infant, these deficiencies result in stunted growth and in various degrees of mental retardation which are irreversible and cannot be compensated for by an improved diet at a later age. It has been estimated that the total number of malnourished children in the world between the ages of one and six years reached 269 million in 1966, 276 million in 1967, and probably 329 million in 1968.

From the Center of Chronic Disease Control, US Public Health Service, Bethesda, Md (Dr. May), and the Geophysical Sciences Branch, Environmental Sciences Division, Office of the Chief of Research and Development, US Department of the Army, Washington, DC (Dr. Lemons).

The views expressed herein are those of the authors and do not necessarily reflect the views of the US Public Health Service or the US Department of the Army.

Reprint requests to 9000 Rockville Pike, Bethesda, Md 20014 (Dr. May).

The most severe clinical forms of protein deficiency in young children are kwashiorkor and marasmus which may cause death or result in serious weakening of the individual and predispose him to primary carcinoma of the liver in the adolescent age. Further, protein deficiencies result in weakened resistance to communicable disease and, combined with other deficiencies, result in an apathetic, indifferent adult.

Vitamin deficiencies are no less important. Vitamin A deficiency prevents the formation of rhodopsin in the retina, a substance that is essential for vision in dim light. Ulteriorly, alteration of other parts of the eye structure result in xerophthalmia and eventually in keratomalacia and total blindness. Vitamin A deficiency is prevalent in Asia, the Middle East, Latin America, and elsewhere. Children with these symptoms have higher death rates than those equally malnourished who do not happen to have this type of deficiency. This demonstrates the importance of vitamin A not only in regard to vision but in regard to the general development as well.

Vitamin B_1 deficiency causes beriberi and is prevalent wherever polished rice is eaten, as in Burma, Thailand, the Philippines, and Vietnam.

Niacin deficiency causes pellagra with its periods of dementia and its permanent consequence of mental impairment. This disease occurs in Egypt, Yugoslavia, and Latin American countries where corn is the mainstay or the only food in the diet.

Mineral deficiencies are responsible for many crippling defects. For instance, the lack of calcium, whose absorption requires adequate vitamin D supply, causes bone deformities (rickets); the lack of iodine causes goiter, often associated with cretinism; and the lack of iron is an important factor in certain types of anemias which are themselves widely associated with severe intestinal parasitism (hookworms) and with protein and caloric malnutrition. Fluoride deficiency is widespread and results in tooth decay and osteoporosis. These deficiencies have complex interrelationships.

Diet must be adequately balanced for tissue damage to be avoided. Absorption of proteins without a carbohydrate base will result in the proteins being channeled into energy production rather than being used for the growth and repair of tissues.

Food and the Society.—The clinical effects of malnutrition on the individual combine and create serious social and political consequences. Where health and social services exist for the treatment of disease and support of incapacitated persons, heavy burdens are placed on the public welfare sector, diverting scarce resources from development projects. Where such services are unavailable or too limited to be effective, the burden falls on families already pressed for the means of survival. In any case, a developing country's most precious resource, its labor force, is seriously diminished and limited. Whether a nation's economy is based on agriculture or industry, the key to long-range growth lies in the development of a skilled or semiskilled corps of workers, capable of learning new methods and applying new techniques in order to increase productivity. Where infant malnutrition may have severely limited the cognitive faculties of millions of people, where deficiency diseases and inadequate caloric intake limit productivity of other millions, adopting new and sometimes sophisticated techniques and increasing output will be difficult to achieve.

Furthermore, widespread malnutrition creates a climate of uncertainty, instability, and even civil strife. When food supplies are inadequate, the masses become susceptible to demagoguery. Social dislocations occur as scores of rural peasants, some leaving their families behind, migrate to the already overcrowded cities in hope of finding work which will enable them to buy the food they would not grow at home. These unskilled rural workers contribute to the ranks of the unemployed and add to the growing number of slum and shantytown dwellers. As a result, the conditions in which they exist are usually worse than those they left behind. In the slums they become tinder for the flame of revolt.

Food Geography.—The need has clearly existed to assemble in a factual inventory the quantitative and qualitative aspects of food resources in lesser developed countries—countries with some surpluses as well as the more predominant deficiencies.

Under the auspices of the American Geographical Society and with the financial support of the Office of the Chief of Research and Development of the US Army, maps of food resources and diets throughout the world were published in the early 1950's.[5] These graphically illustrated the distribution and kinds of nutritional scarcities throughout the world. Since then, the nonmapable data which had been collected at that time has been updated annually and has been presented and discussed in a series of books as "the ecology of malnutrition."

In 1958 the Office of the Chief of Research and Development of the US Army initiated through its Quartermaster Research and Engineering Center at Natick, Mass, a long-range program of food inventories in a number of critical areas—critical because of their underdevelopment, which hindered the creation and distribution of adequate resources, or critical because of politicomilitary interests and concerns for maintenance of peace and order. It has been the policy of the US Army to publish the reports resulting from these inventory studies.

Six books have now been published and more are to come.[6] The first dealt with most countries of Asia, the Near East, and Egypt. It demonstrated that the countries can be divided into two major groups—the "Use Nots" and the "Have Nots." The "Use Nots" are such countries as Vietnam, Cambodia, and Thailand, that have adequate resources for their present populations but, because of traditional factors, cultural traits, distribution, and other problems, do not use them to the best of their

possible efficiency. The "Have Nots" are countries like India and Pakistan where most land resources have already been used and where the future depends on increased yields, themselves contingent upon a capital investment that these countries are not likely to be able to afford.

The second and fourth volumes dealt with the countries of eastern, central, and southeastern Europe.[5,6] In this region, it is of some fascination to see, in the communist countries, the standard of living being kept low as a result of the development of heavy industry. In order to procure the raw material and the machinery needed for such development, these countries export valuable proteins and import grains, that is, carbohydrates, of much lesser nutritive value, thus lowering to a considerable degree the standard of living of the people. In Greece, by contrast, where the economy is still poor, but based, to a large degree, on the private initiative of the capitalistic system, the average diet in all classes is better balanced than it is in the communist countries. This results in spite of the following: low average farm income, high seasonal unemployment, strip system of land tenure, exposure to floods, poor soil, limited diversification of crops and limited use of farm machinery, inadequate credit systems, high rates of interest on bank loans, inadequate transportation facilities, and poor housing.

The third and fifth books[7,8] deal with nine countries of central Africa and five countries of north Africa. The sixth discusses the problems of food and population in the French-speaking republics of West Africa and Madagascar.[9]

Problems in Food Production in Tropical Africa.—In Africa, problems of food and nutrition are conditioned by a unique combination of factors that does not exist in other parts of the world. Geography and history have shaped an African type of relationship between food resources and population growth. Among dominating factors conditioning diets are water resources, land tenure, technology (especially fertilizer and use of mechanical equipment), population growth and migration to the city, and many others. In Africa application of western cultures to solve local problems encounters more difficulties than elsewhere.

Water resources range from scarce in the Sahelian Sub-Sahara zone to overabundance in the equatorial region. There, large rivers, the Congo, the Niger, and the Volta, provide problems of floods during the rainy season and problems of irrigation during the dry season.

Systems of land tenure vary widely from the now declining feudalism of Rwanda and Burundi to the tribal systems of central and west Africa. The Africans have, for centuries, walked the breadth and length of the continent, ruled only by the tacit understanding between the tribes and their chiefs. "The land of Africa belongs to a large family, most of which are yet to be born, some of which are dead, and a few of which are presently living." As a result of these customs, there is no incentive to improve and develop one's land.

Fertilizer is unavailable because of the lack of animals wherever the tsetse fly abounds. Wherever animal husbandry occurs, the soil is made still poorer by overgrazing, which results in early destruction of the best grasses and their replacement by annual grass of poor nutritive value. Herdsmen are migrants and nomadic. Divorced from agriculture, their mobility prevents the collection and use of manure by the farmer. The most commonly used fertilizers are ashes of bushes burned before crops are sown; hence, the endless migrations of families and tribes from one area to another when the land is exhausted. It is evident how such a system conflicts with the imported western tradition of improvement and deveopment. However, it was adequate as long as land was available. It becomes less satisfactory when the fallow period becomes shorter. In the eyes of the ultracompetitive western culture, the system has many disadvantages: it excludes the idea of personal property; removes any desire to work harder to improve one's lot; and because of the transitory nature of occupancy, keeps the standards of housing and living low.

The use of mechanization in African agriculture is fraught with difficulties. Its history is one of multiple failures and few successes. In well-selected areas with rich soil and availability of resources for fertilization and maintenance, repair, and replacement of equipment, mechanized agriculture certainly has a future. However, as a method to weave western technology into the fabric of African ecology, it is premature. Its cost, the rapid rate of depreciation of the machines, the scarcity of skilled labor, the lack of technicians, and the shallowness, lightness, and erosion of the soil should discourage its general use. Examples are many where the powerful blades of mechanical plows have quickly buried the few inches of surface humus under the deep-seated stones that they were turning up. In addition, the introduction of machines where a large surplus of manual labor is available may promptly result in a disruption of the social equilibrium. Further, the abundance produced by machines is not understood by the African; an important trait of African psychology is that, contrary to western man, the African wishes to produce no more than he needs. Surplus production for money is no part of his outlook on life. Given a better seed, he will rejoice, not because it will give him a better yeild, but because he will get the same result while working on a smaller plot. Surpluses are not particularly appreciated. First, they do not keep under the harsh African climate; second, because of their very abundance, they are not in demand and fetch low prices at distant markets requiring long portages away from home. Thus, when food is abundant, it is better to gorge oneself than to carry it away for little or no profit. And then, even if money can be made out of the food, what can be done with the money?

As a result of the public health systems of the colonial powers, the rate of growth of the population has been steadily increasing in past decades. Chad has probably been growing at a rate of 2.5% a year while the two Congos, Gabon, and the Central African Republic, have grown at a more reduced rate of 1.8% to 2%. Rwanda and Burundi, however, are among the fastest growing countries of Africa with a possible ratio of 3% annually. Unless considerable economic improvement takes place, unemployment, malnutrition, and social unrest are to be expected. An indication of things to come is found in the cities of Leopoldville, Brazzaville, and even Bangui. There, an overgrowth of petty traders and government officials, a distressing pool of unemployed men, separated from their tribes and women, whose meager resources do not meet the cost of living, create an ever-growing danger and threaten orderly development. Urban diets have lost their tribal character and workers try to round up enough money to feed on white bread, canned food, and imported spirits.

In summary, the problems encountered in Africa illustrate the difficulty, if not the impossibility, of leapfrogging, as it were, a medieval type of civilization into the 20th century. The fact that some amount of telescoping in time is possible is not doubted but it may have to be a very small amount. Although the machines of modern technology are in existence, the physical, cultural, and social factors that prevent their use are also present and it will take some fresh thinking and careful experimentation before we know how long it will take for these machines to create a new culture in central Africa.

Problems in Food Production in India.—In Asia and especially in India, the picture of undernutrition and malnutrition is arrived at by different routes.

Water is unreliable and seasonal, and the Ford Commission of 1959 recommended for India a plan for better water management as one of the most important activities in the pursuit of adequate food production. Where irrigation is possible, two or three crops could be expected on existing land, and arid land could be made productive. Unfortunately, the usual resource of diverting normal flow into canals is practically exhausted and the building and maintenance of dams is a very costly operation.

Finally, the problem of agricultural credit is, in India, of a magnitude consistent with the enormous size of the country. Private moneylenders, the largest source of credit, exact a high rate of interest and take the crop as security—with all attendant damage to nutrition. The banking institutions are limited in their loaning capabilities by the lack of securities available.

The land tenure system is, of course, very different from what it is in Africa but is not conducive in India to increased productivity. Small holdings are uneconomical and many a Hindu farmer cannot support his family on his five-acre plot. Considerable problems have arisen and are still arising from the difficult transition between old and new: tenancy acts, efforts for the elimination of the intermediaries between landlords and tenants, recent regulations, ceilings on holdings, cooperatives, and the Bhoodan movement, all these circumstances influence in a limiting way the development of food production and the improvement of food distribution.

The problem of fertilizers is, however, similar to what it is all over the world. The cost is too high for poor farmers, and cheaper methods, such as composting, night soil treating, and green manuring, require continuous education of the masses for which there is not enough personnel.

Malnutrition in Tropical Latin America.—Turning to Latin America, another set of problems impedes the increase in food production and adequate distribution and consumption of satisfactory diets. It is the purpose of the authors to pursue—given time and facilities—the study of the problems arising from the land-people equation in Latin America.

Conclusions and Recommendations.—Having made an inventory of the many interrelated factors that result in malnutrition, two examples of which we have stated, based on tropical Africa and India, it behooves us to suggest the remedies which could be applied to the ill, and the steps that could be taken to avoid the grave consequences of the situation. These steps all fit into the concept of development. There cannot be a watertight separation between civic action programs and developmental programs; both must be interrelated and each must multiply the benefits of the other. Unfortunately, it often happens that civic action workers (often military men) have their first encounter with development technicians only in the field, when both are already pursuing separate goals. Instead, a common doctrine is needed out of which programs and projects will be born with the dual purpose of preventing unrest and broadening the economy at the same time through the development of food resources.

By exposing the complexity of food problems and their cure, the studies alluded to have made clear the need for cooperation between US Government, United Nations, and foreign government agencies, working on this crucial challenge of our times. The problem of combating malnutrition requires the coordination of health, agriculture, industry, education, and community development programs not only of the United States, but of the entire world. The kinds of activities which should be strengthened or initiated as the case may be, in order to combat malnutrition may be divided into those five categories, but it must be emphasized that in order to obtain the common goal, those responsible for each area must work closely with their counterparts.

1. *Health* programs should include projects aimed at the following:

Education for Mothers.—Mothers should be

taught more effective use of available food resources to better nourish children. This will require strongly directed extension programming at both rural and urban levels with related augmentation of resources in home economics and public health nutrition.

Maternal and Child Health Centers.—There must be support for maternal and child health centers where effective nutrition education is provided and where nutritious supplemental foods can be distributed in order to promote commercial marketing of locally produced products.

Utilization of Existing Health Facilities.—Utilization of existing health facilities by mothers of preschool children for the prevention of disease and for the prompt treatment of disease which inevitably will occur despite preventive measures should be encouraged.

Emphasis on Nutrition.—Emphasis on nutrition in the training of physicians, dentists, and nurses should be increased.

2. *Agricultural* programs should include projects focused on the following:

Quality and Quantity of Food: Both quality and quantity of food should be increased by emphasizing crops of greater nutritive value. Food crops high in proteins or in protein of better quality should be favored over the starchier staples.

Diversion of Land.—Diversion of the best land for industrial or export crops should be discouraged when it is carried to the point of endangering the national nutritional welfare.

Harvesting Practices.—Crop harvesting practices should be improved and crop storage and food preservation factilities expanded.

Agricultural and Food Marketing Systems.—Strengthening of agricultural and food marketing systems to raise incentives to the producer and at the same time achieve lower cost foodstuffs for the consumer must be carried out.

Agricultural Practices.—Research in crop breeding and improved agricultural practices of a type particularly relevant to the country's special problems should be fostered.

3. *Industrial* programs should include projects aimed at the following:

Expansion and Modernization.—There should be expansion and modernization of food processing, distribution, and marketing with emphasis on those enterprises, at the rural as well as the urban levels, which cater to the food needs of the largest segments of the population. Emphasis should be given to rural-centered industries through cooperatives and other approaches which permit value-upgrading of basic agricultural inputs (eg, poultry and swine production).

Promotion of Economical, Protein-Rich Foods.—The food industry should be encouraged to produce, market, and promote economical protein-rich and similar protective foods based on local resources which satisfy particularly the nutritional needs of the preschool child.

Enrichment of Processed Staples.—The significant public health benefits of enrichment of processed staples (wheat flour, cornmeal, rice, manioc flour) with vitamins and minerals and perhaps with amino acids should be emphasized.

Loan and Risk Guarantee Programs.—Food industry loan and risk guarantee programs should be expanded and liberalized as necessary to stimulate initiation and growth of food processing industries.

Tax Rebates and Tariff Waivers.—Appropriate government incentives such as tax rebates and tariff waivers must be encouraged.

Research.—Research must be fostered in food science and food technology relevant to the country's needs.

4. *Educational* programs should include projects in the following areas:

Basic Skills and Professional Competence.—The country's basic skills and professional competence in nutrition, agriculture, food science, and food technology must be augmented by identifying and strengthening "centers of excellence" with appropriate provision for training at university and institutional levels as well as at secondary and vocational training schools.

Specialized Training: A corps of well-trained men and women capable of planning, implementing, and evaluating host country health and nutrition programs is needed.

5. *Research:* Programs should also include the kind of applied research that will shed light on the problems being covered. Promising results have already been obtained: plant genetics, fish protein concentrate, cereal fortification, packaging, conditioning of surplus crops, etc.

These programs will differ with the circumstances of each country but will fall in the general framework outlined above.

References

1. *FAO Commodity Review, 1966*, Food and Agriculture Organization of the United Nations, Rome, 1966.

2. Brown, L.B.: *Man, Land and Food*, Foreign Agricultural Economic Report No. 11, US Department of Agriculture, Economic Research Service, November 1963.

3. May, J.M.: *Atlas of Diseases*, New York: American Geographical Society, 1952-1957.

4. May, J.M., and Jarcho, I.: *The Ecology of Malnutrition in the Far and Near East: Food Resources, Habits, and Deficiencies*, New York: Hafner Publishing Co., Inc., 1961.

5. May, J.M.: *The Ecology of Malnutrition in Five Countries of Eastern and Central Europe: East Germany, Poland, Yugoslavia, Albania, Greece*, New York: Hafner Publishing Co., Inc., 1963, vol 4.

6. May, J.M.: *The Ecology of Malnutrition in Central and Southeastern Europe: Austria, Hungary, Rumania, Bulgaria, Czechoslovakia*, New York: Hafner Publishing Co., Inc., 1966, vol 6.

7. May, J.M.: *The Ecology of Malnutrition in Middle Africa: Ghana, Nigeria, Republic of the Congo, Ruanda, Burundi, and the Former French Equatorial Africa*, New York: Hafner Publishing Co., Inc., 1965, vol 5.

8. May, J.M.: *The Ecology of Malnutrition in Northern Africa: Libya, Tunisia, Algeria, Morocco, Spanish Sahara and Ifni, Mauritania*, New York: Hafner Publishing Co., Inc., 1967, vol 7.

9. May, J.M., and McLellan, D.L.: *The Ecology of Malnutrition in French Speaking Countries of West Africa and Madagascar*, New York: Hafner Publishing Co., Inc., 1968, vol 8.

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THE WORLD FOOD PROBLEM

A Report of the
President's Science Advisory Committee

VOLUME I

Report of the Panel on the World Food Supply

THE WHITE HOUSE
MAY 1967

3.1 PRINCIPAL FINDINGS AND CONCLUSIONS

This report defines and directs attention to a threatening problem of the global environment in which the United States and all nations must dwell together—the declining condition of more than two-thirds of the human race.

The Panel's detailed analysis of the world food problem has led to four basic conclusions:

1. The scale, severity, and duration of the world food problem are so great that a massive, long-range, innovative effort unprecedented in human history will be required to master it.

2. The solution of the problem that will exist after about 1985 *demands* that programs of population control be initiated now. For the immediate future, the food supply is critical.

3. Food supply is directly related to agricultural development and, in turn, agricultural development and overall economic development are critically interdependent in the hungry countries.

4. A strategy for attacking the world food problem will, of necessity, encompass the entire foreign economic assistance effort of the United States in concert with other developed countries, voluntary institutions, and international organizations.

3.10 The Nature of the World Food Problem

The world's increasingly serious nutritional problem arises from the *uneven distribution* of the food supply among countries, within countries, and among families with different levels of income. Global statistical surveys, based upon total food produced per person, suggest that there is no world-wide shortage of food in terms of quantity (calories) or quality (protein) at the moment. But in the developing countries, where two-thirds of the world's population live, there is overwhelming clinical evidence of undernutrition (too few calories) and malnutrition (particularly, lack of protein) among the people. Clearly, millions of individuals are *not* receiving the amounts of food suggested by average figures.

Many South Asian and Latin American countries, for example, have average diets which are nutritionally inadequate according to minimum standards of the United Nations Food and Agriculture Organization (FAO). In these regions, surveys show that the poorest 25 percent of the people consume diets with caloric and protein contents that are only about three-fourths of the country average and fall far

below calculated nutritional requirements. It is in these low income groups that overt malnutrition is found, particularly among the most susceptible groups: infants and preschool children, pregnant women, and nursing mothers.

3.2.0 Population Growth and Food Needs

If the world population continues to increase at 1965 rates, 52 percent more calories will be required in 1985. This estimate is based on calories actually consumed and does not consider production, losses, quality, and wastage of food. If, as a result of family planning programs during 1965–85, one optimistically assumes a progressive decrease to 30 percent in the probability that a woman of given age will bear a child (fertility rate [1]), the caloric requirements will still be 43 percent higher by 1985.

These projections of *world* food requirements, however, fail to depict the plight of the developing countries. India, at her present population growth rate, will require 108 percent more calories by 1985; with a 30 percent reduction in fertility, the increased nutritional requirement will be 88 percent. The corresponding figures for Pakistan's increased caloric needs in 1985, allowing for the same reduction in fertility, are 146 percent and 118 percent, and for Brazil, 104 percent and 91 percent (Figure 3–1).

These estimates portray two of the most crucial aspects of the relationship between population growth and food needs:

1. Population and food problems center directly in the already poor, already diet-deficient countries where food production is low and population growth rates are high. In these developing nations, under the best of circumstances, food needs will at least double within the next two decades.

2. The disproportionate additional need for food in the developing countries cannot be solved by successful programs of family planning alone during the next 20 years. This mathematically demonstrable fact of demography *must not* be interpreted to indicate that population control measures are inherently ineffective or in any way secondary in importance to increasing food production. On the contrary, the Panel's estimates simply show that the impact of successful family planning is cumulative and makes itself felt in the size of the next generation.

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[1] The demographic techniques utilized by the Panel in projecting population growth are described in detail in Chapter 1, Volume II. Assumptions concerning future effectiveness of family planning were not made on the basis of an estimated reduction in *birth rate* (births per 1000 total population). Rather, a reduction in the *age-specific fertility rate* was assumed. Age-specific fertility is a more accurate reflection of success in family planning than is birth rate alone.

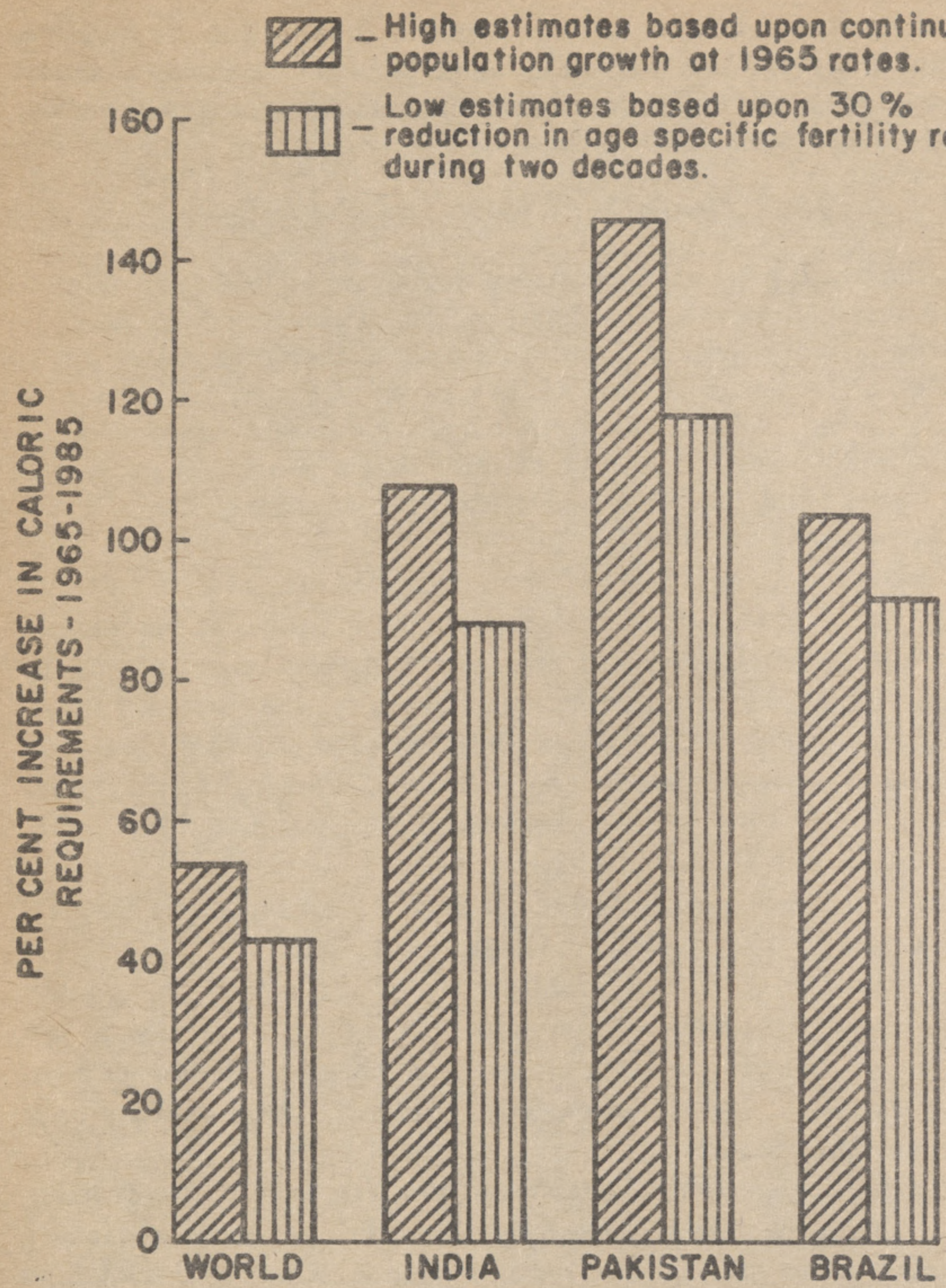


FIGURE 1–1.—Projection of caloric requirements for the world, India, Pakistan and Brazil.

For example, the difference in our high and low estimates for world population in 1985 is only 385 million (5.03 billion and 4.65 billion). The difference is greater in later decades and is 1.15 billion in the year 2000 (7.15 billion and 6.0 billion).

To avoid a continued worsening of the population-food situation during the years beyond 1985, that may even reach an economically or ecologically irreversible state of imbalance, *it is imperative to institute intensive programs of family planning now.*

The Panel is unanimous in supporting and urging, in the strongest terms, continuing and increasing emphasis upon research, technical assistance, and capital funding in family planning. Only by such continuing emphasis and effort can the outpacing of food production by population growth be avoided as a problem that might continue well into the next century. The long lag-period that necessarily precedes the main effect of programs of family planning adds to the urgency of the need for action now.

The world food problem is not a future threat. It is here now and it must be solved within the next two decades. If it is solved during this time, it will be manageable for the years thereafter.

This report, then, is addressed to the grim reality of the food shortage that will occur during the next 20 years (actually 1965/66 to 1985/86) before programs of family planning can be expected to bring about long-term amelioration of the problem by reducing world population growth.

3.3.0 Nutrition, Infant Mortality, and Family Planning

That reduction of population growth is essential to achieving a balance between food supply and food need is an obvious, easily understood, and widely appreciated fact.

There is, however, another more complex, less well-known, and crucially important relationship between nutritional needs and family planning. Surveys of the attitudes of married couples in developing countries show that the numbers of children desired are higher than in the developed nations. Furthermore, the average number of live births per woman in the developing countries is 30 percent greater than the desired number of children.

Emphasis on the desire for heirs leads to large families. Only one son may be needed for ritual or economic purposes but it is common to want two sons to insure against the death or incapacity of one. Couples must average four children to obtain two sons.

Availability and efficacy of pills, intra-uterine devices and other technical means for birth control are largely irrelevant until couples have secured the desired number of living children.

If we assume the necessary preconditions for reducing fertility rates in the developing countries are low infant and child mortality and a public awareness that mortality is low, then *we have the apparent paradox that a reduction in childhood mortality will reduce rather than raise the rate of population growth.*

In the United States, approximately 25 of every 1,000 liveborn infants fail to survive to the age of one year and most of the deaths result from prematurity or congenital defects. In the poor countries of Asia, Africa, and Latin America, published infant mortality rates

range from 100 to nearly 200 per 1,000 live births. *Much of the higher death rate is the direct or indirect result of protein-calorie malnutrition.*

Protein-calorie deficiency, in the form of a disease called *kwashiorkor*, is a great killer. Acute diarrhea can be a dangerous illness for a well-nourished American baby; in the malnourished infants of the developing countries, it has an appalling mortality. Common childhood diseases are catastrophic in protein-deficient children. In 1960, for example, the fatality rate from ordinary measles was more than 100 times greater in Chile than in the United States.

If lowered infant and child mortality is a precondition to acceptance of family planning, and the major underlying cause of excessive childhood deaths in the developing nations is malnutrition, it follows that an increase in both quantity and quality of food in these countries is essential to achieving stability of population growth.

Viewed in this light, alleviation of the world food problem must be accorded the highest priority in planning for the developing nations.

3.40 Subsistence Farming and Commercial Agriculture

In countries where, for centuries, farming has been traditionally at a *subsistence* level, intended to produce food and fiber only for family or local needs, the urgent problem of converting individual farmers to a *commercial* system in which production is primarily for markets at a distance from the farming area has been superimposed upon the other demands of modernization. The cornerstone of economic progress of any nation is the development of its natural resources and manpower. Many of the developing nations must concentrate on agricultural resources as the foundation for building self-sustaining, productive national economies. Conversely, the growth of the entire national economy will be essential in the future to increase agricultural production, which will depend critically on the farmer's ability to purchase fertilizers, tools, high-yielding seeds, pest controls, and irrigation water. To be able to purchase the required materials, farmers will need to sell a major portion of their harvests, which means that there must be increasingly prosperous customers who can buy farm products.

To persuade farmers to accept the techniques and methods of modern agriculture is a formidable and complex undertaking. Farmers in traditional subsistence economies are understandably wary of assuming new risks because they are so close to the margin of survival. If a farmer is to invest in the modern inputs of improved seeds, fertilizers, and pesticides that are essential to increasing the output of his land, these resources must be easily available to him, a system of farm credit must be established so that he can afford to purchase them, he must be instructed in the proper and economic utilization of these materials,

he must be reassured that he will be compensated for possible losses incurred in the process of innovation, and, above all, he must be shown that the potential payoff is worth the risk. Land tenure policies should not be such that his landlord will profit and he will not. Government pricing policies should not favor the consumer at the expense of the producer.

All of these factors enter into the vital matter of providing incentives to the farmer to increase production for the market. Fundamentally, it appears that many nations are under-utilizing the power of the market economy. Needed inputs for modern agricultural production are scarce, unreliable in availability, and expensive in relation to the prices of farm products. For example, a bushel of rice will pay for four times as much fertilizer in the United States as it will in Egypt and more than twice as much as it will in Thailand or India.

Both producers *and* consumers are responsive to prices and to income if governments will recognize and use the market mechanism. The Mexican government has recognized this fact in pricing policies and this is a major reason for the growing promise of the Mexican agricultural development program.

To induce farmers to change, the potential payoff must be high—not 5 to 10 percent but 50 to 100 percent. Adoption of deep wells for supplemental irrigation in West Pakistan is an example. In five years, nearly 32 thousand private "tube" wells were installed, at a cost of $1,000 to $2,500 each, on farms no larger than 25 acres in the cotton and rice regions of the former Punjab. A private investment of $50 million was made by traditional farmers without government subsidy. Why? The wells typically paid for themselves in two years. If the payoff is large enough, farmers will change.

3.5.0 The Effects of Urbanization

The enormous increase in nonfarm population in the diet-deficient countries has aggravated the food problem further by making it necessary to develop distribution systems to move more and more food into the cities from the producing areas. This requires the establishment of transportation, storage, processing, and marketing facilities on an unprecedented scale in economies which are already stretched to their limits.

The growth of large cities is a well-recognized characteristic of developed nations but it is not generally realized that the trend toward urbanization is fully as strong in the developing countries. As early as 1950, more than one-third of the world's cities with populations exceeding 100 thousand were in Asia and the exodus from rural areas has accelerated each year since.

The shift of people from farms to cities in the United States and Western Europe has resulted primarily from the reduction in rural labor requirements brought about by advances in modern agricultural technology and increased labor requirements of industry. In the developing countries population growth alone has heightened the frequency with which families leave the overcrowded, poverty-stricken countryside, hoping to find a livelihood in the city. The results in most developing nations have been growing slums and unemployment since unskilled labor is overabundant in both rural and urban areas.

3.6.0 Food Customs and Taboos

Dietary habits are established early in life and, in the highly traditional cultures of the developing countries, food selection and diet more often reflect religious and social beliefs than they do the principles of human nutrition. During the past several years, there have been many commercial programs intended to make unfamiliar new food products available to low-income groups in the developing countries. It has become abundantly clear that it is extremely difficult to change fixed food habits. Market research and feasibility studies must give proper attention both to family income and to existing habits and taboos. It has been demonstrated that dietary customs *can* be changed (e.g., people whose dietary staple has been rice have been persuaded to accept wheat as a supplement or substitute) but success in any such undertaking requires time and a carefully prepared program of consumer education. In summary, *any program to remedy malnutrition which involves changing traditional food habits is highly likely to be ineffective in the short-run and even a long-range plan must be carefully programed for the specific local situation.*

3.7.0 Meeting the Need for More Food

For the next several years, any major expansion of the world food supply will be dependent on increased production from conventional sources and upon more efficient utilization of available foodstuffs through reduction of waste and spoilage. *The vast majority of the increased production must take place within the developing countries themselves.*

3.7.1 There is No Panacea

Periodically, the news media draw attention to ongoing research on systems which offer possibilities as new sources of human food. Because there is a strong tendency to portray these as possible "solutions" to the world food problem and because the public is drawn understandably to such panaceas, this publicity undoubtedly lessens

concern about the seriousness of the food supply in the developing nations.

The Panel has examined carefully and in detail the several new processes which are under current study. "Single cell protein" derived from fermentation by yeasts or bacteria of carbohydrates, hydrocarbons, or cellulose is particularly promising. A great advantage of single-cell protein is that it can be produced independently of agriculture or climatic conditions. However, there are major unsolved problems of scale of production, processing characteristics, nutritive quality, consumer acceptance, and cost which remain to be worked out. It will be several years, *at least*, before even a decision concerning the possible usefulness of such materials in the food supply can be made.

Methods for extraction of protein directly from green leaves have been devised and deserve careful consideration and further research since the materials utilized are frequently wasted or are fed to animals. Again, many problems of nutritive quality, scale, cost, and acceptability must be solved before evaluation of the usefulness of this material will be possible.

Investigations of the processing of algae as human food have been unrewarding thus far because of the excessive cost of deriving a product that is safe for human consumption. It now appears that the usefulness of algal materials economically derived as a by-product of reclaiming sewage and other waste waters will be as a feed for livestock.

In summary, some nonconventional sources of food appear to offer great potential for the long-term but in the judgment of the Panel none of these can be expected to lessen the problem of increasing food production from conventional sources during the next two decades.

Furthermore, the magnitude of the world's food problem is so great that nonconventional sources, when and if they become available, may be needed to supplement rather than supplant modernized agriculture. The problem will be with us for so long, however, that every effort must be made now to invent new processes and develop known ones to produce novel foodstuffs. In order to provide a reasonable probability that the long-range potential of unconventional food sources may be realized within two decades, we must accelerate research on these methods now.

3.7.2 Animal Sources

There are good opportunities for improved production of livestock and increased utilization of fishery resources, including fish farming (aquiculture), in the developing countries. These deserve emphasis and exploitation because animals are capable of converting to food dif-

ferent types of by-products and forages that cannot be consumed directly by people and for the significant contribution that they can make to improving the quality of protein in diets and earning foreign exchange. A process of producing fish protein concentrate (FPC) appears to hold promise for the future although major problems of scale, technologies for different species, and consumer acceptability must be solved before its usefulness can be evaluated.

3.7.3 Agricultural Production

It is, therefore, evident that the *bulk of the increase in food supply must come from increased production of farm crops*. There are two ways in which agricultural production can be increased: by bringing more land under cultivation or by increasing yields of land under cultivation.

Until the present time, most of the increase in food production in the developing countries has been achieved by extending traditional farming methods over a larger area of cropland. Substantial opportunities remain to bring additional land under cultivation in the less densely populated areas of Latin America and of Africa, but the vast majority of arable land in Asia is already in use. While there are marginal possibilities for using small additional areas, it is clear that as the population continues to grow, the amount of cropland per person in the Asian countries will diminish progressively.

In Asia, a shift to increasing crop production by intensifying agriculture and using modern methods to improve annual yields on land under cultivation will be mandatory. Even in Latin America and Africa, the increasing cost of clearing additional land may well make it more economical in many regions to concentrate on elevating yields rather than expanding cultivated areas.

To increase yields, a major expansion of irrigation facilities will be necessary to make multiple cropping possible independent of wide variations in seasonal rainfall. It also will be necessary to develop and utilize new, high-yielding varieties of plants, to develop and utilize plants with a higher quality of protein, to increase the use of fertilizers and pesticides, and to employ improved farm machinery. Increased capital investments and increased expenditure on the part of farmers will be required to make these tools of modern agricultural technology available. These are the techniques that have been employed so successfully in the developed countries to transform farming into a *business*.

The transition from traditional farming to modern agriculture will be difficult and expensive for the hungry nations but it is absolutely essential if their food needs are to be met. There is no alternative.

3.8.0 The Need for Technical Assistance

The modernization of agriculture in the developing countries will involve capital investment, provision of inputs in the form of seeds, fertilizers, pesticides, water, and machinery, organization of distribution and marketing systems, education of agricultural specialists and extension workers, provision of production incentives for individual farmers in the form of land-reform and pricing policies, and other changes in social and economic structures.

Critical to the success of all of these measures, however, is the necessity for adaptive research needed to gain an understanding of the principles governing plant and animal production under the conditions, soils, and climates existing in the developing countries.

3.8.1 Agricultural Technology is Not Transferable

Modern scientific agriculture has been brought to flower in the temperate regions of the developed world. In the tropical climates where the bulk of the world's low-income people live, scientific agricultural efforts have been concentrated on the traditional tropical export crops: sugar, tea, coffee, cocoa, bananas, and rubber. Only recently have food crops received serious attention.

The products of technology and "know-how" cannot be transferred directly to the developing nations. **Many plant varieties transferred to different climates fail to flower or set seed if, indeed, they survive at all. Livestock may become non-productive or die. Adaptive research must be accomplished within the developing countries. A blueprint for a bicycle or a steel mill can be shipped overseas and utilized without alteration but the blueprints and architecture for a food crop must be developed overseas. There, as in the United States, new plant varieties, each better than the last, must be produced frequently to increase plant resistance to insects and disease.**

There is an urgent need to carry out this adaptive research, to establish strong indigenous institutions, and develop the manpower that will enable the poor, food-deficit nations to carry out the self-sustaining, continuing programs of research and development that are essential to modern food production.

3.8.2 The Task of Technical Assistance

Increasingly, United States foreign assistance should take the form of knowledge, technical aid, adaptive research, education, and institution building.

The scarcest and most needed resource in the developing countries is the scientific, technical, and managerial skill needed for systematic, orderly decision-making and implementation. **Through technical assistance programs, the United States should emphasize guidance,**

education, and the development of indigenous capabilities—for the long term—because the task in the developing nations has only just begun and will continue for many decades to come.

In recent years, United States programs of technical assistance have largely given way to capital assistance and the purpose and value of each has become blurred. The important distinction between these two instrumentalities of aid should be recognized and each should be employed sharply and effectively to reinforce the other in helping those developing countries that are willing to make the effort to solve the complex problems of feeding their people and improving the quality of their lives.

3.9.0 Nutritional Need and Economic Demand

The Panel's approach to the world food problem has been almost the opposite of that employed by economists. It costs money to produce food, however, and someone must pay the bill. Therefore, no matter what the physiological *need* may be, the production of food is controlled by effective market *demand*.

Economists tend to relate income and food demand in a causal fashion. The Panel, of necessity, has quite literally reversed the usual economic approach by first estimating the food shortage and setting a future goal for food production. The next step was to calculate the rate of change in income that will be required to generate the effective market demand for the targeted nutritional needs.

There are certain relationships between the demand for foodstuffs and the overall demand for goods and services in any economy. In order for "effective demand" for food to exist, the means of buying the food—purchasing power—must be available. In other words, aggregate income must grow at a rate which permits consumers to purchase the projected food requirements.

Likewise, on the production or supply side, there are relationships which link agricultural food production to overall production. The production of food crops requires manufactured inputs such as fertilizers, pesticides, and machinery which must be imported or produced domestically. If they are imported, the overall economy must generate sufficient exports or must rely on a net inflow of foreign assistance or private capital to pay for the imports. If these inputs are to be produced domestically, or paid for by industrial exports, the nonagricultural sectors must expand at rates consistent with the need of the agricultural sector. Similarly, various nonagricultural sectors are dependent on agricultural raw materials and, in some case, food products.

Because of the interdependence which exists among food need, food demand, overall income, agricultural (food) output, and total output

(GNP), *it is meaningless to consider a nation's demand and supply of foodstuffs independently from overall economic growth.*

32.1 Tentative Economic Implications

The Panel's analysis of the overall problem indicates that the required compound annual growth rates (1965/66–1985/86) for the developing countries in aggregate will be:

	Percent
Increase in food demand	4.0
Increase in food production	4.0
Increase in gross national income	5.5

The achievement of such growth rates will require massive efforts which must be more successful than history has recorded in any previous 20-year period. Now the developing countries, in aggregate, are increasing their compound annual growth rates approximately as follows:

	Percent
Increase in food demand	3.0
Increase in food production	2.7
Increase in gross national income	4.5

Only countries such as Mexico and Taiwan are achieving growth rates of the order deemed necessary.

Additional investments for acceleration of agricultural output in the developing countries as a whole have been analyzed but not verified by detailed country studies. The direct capital requirement for fertilizers, seeds, mechanization, and pesticides for a 4.0 percent growth rate in agricultural output approximates $300 million annually in the early years, increasing to almost $4 billion per year by 1985. This estimate does not include direct investments in land and water resources nor does it include the necessary direct "infrastructure" investments in power, transportation, marketing, credit, food processing, storage, and distribution. It is estimated that *to achieve a 4.0 percent annual growth rate in food demand and supply, capital investments will have to increase from the current 15 percent to 19 percent of the gross national products of the developing countries. This would be equivalent to a $12 billion increase in investment above the 1965 base. To achieve such a feat will require capital and technical involvement of developed and developing nations alike on a scale unparalleled in the peacetime history of man.*

322 A Framework for Further Study

Because of the inherent limitations of the Panel's aggregative approach which consisted essentially of estimating direct input requirements on a global scale, it is imperative that a country by country intersectorial economic analysis be undertaken. Input-output analyses should be developed so that estimates can be made of the *direct* and

indirect investment requirements needed to achieve the food targets that have been set by the Panel. Explicit attention should be given to the several institutional, policy, and technical considerations at the micro-economic level which are eclipsed in the aggregate global approach used by the Panel.

3.10.0 The Task Ahead

The Panel is convinced from its study of the world food problem that food shortages and high rates of population growth in the developing countries are not primary problems. Rather, they are manifestations of a more fundamental difficulty, *lagging economic development in the hungry countries.* We find the prospects for the future both sobering and alarming.

As we now view the situation, the United States faces two choices:

1. The first is for the United States to continue to provide technical and capital assistance and private investment to poor countries willing to make the self-help effort to achieve self-sustaining growth. Our foreign assistance program would then continue to be largely an American effort with coordinating relationships with the United Nations organizations and other international institutions. While this course might lead to some improvement over the status quo, it would not suffice to meet the food problem because, for all of its economic resources, the United States cannot possibly accomplish the immense task of alleviating the world food problem alone. *This course would be unsuccessful in halting or reversing the rapid deterioration of the population-food situation in the developing countries and the world would continue to lose ground.*

2. *The other alternative is for the United States to take the lead in mounting a global effort*, in concert with other developed nations and with international organizations, that will bring to bear the technical skills and capital resources needed to reverse the downward course of the developing countries and to restore the chance of their peoples for a better life.

We are unanimous in the belief that, at this point in history, a new long-term policy direction is indicated urgently—a policy that deals massively, directly, and effectively with this central problem of today's world.

We are unanimous, also, in the belief *that the United States must assume leadership of the free world and all of its international institutions in a coordinated, long-range development strategy for raising the economic level of the poor nations, thereby meeting the threat of hunger, increasing the volume of world trade and economic activity, and contributing to the achievement of the goal of ultimate importance, a lasting peace.*

3.10.1 Why?

In the Panel's view, the concern of this country for the hungry nations is threefold:

1. *Humanitarian*—We should help the less fortunate simply because they need help and we are able to help them. The benefits of altruism are by no means unilateral. The challenge of a difficult task and the moral uplift that comes only from doing for others are needed to temper and balance the leisure and affluence of American life. The real successes of the Peace Corps center in the fundamentally inspired, collective aim that is exemplified in the late Albert Schweitzer's dictum, "It is only giving that stimulates."

2. *Security*—Populations in the developing countries double in 18 to 27 years; 55 to 88 years are required for populations to double in the developed countires. By the year 2000, if present rates of growth continue, there will be more than four times as many people in the developing countries as are in the developed nations. To avoid a threat to the peace of the world as well as to our own national security, we cannot afford to be too little and too late with our development assistance. The expectations of the poor are demanding fulfillment. It is to be hoped that some measure of their ambitions can be realized by peaceful means.

3. *A Better Tomorrow for Us, Too*—This is a long-range goal, an economic reason for investment. An important way to expand our own economy in the future will be through further specialization and trade. As nations develop they become trading nations and through trade, both parties to a transaction benefit. Trading partners are likely to be peaceful protagonists.

3.10.2 How?

If the United States is to deal seriously and productively with international development:

1. The American public must be convinced that the efforts merit investment of their taxes and that the efforts will be effective in meeting the overall problem.

2. The American public must have confidence in the substance of the programs which are implemented and in the arm of the government which is responsible for administration of those programs.

3. Funding and programs must be placed on a long-range basis, not budgeted and funded hand-to-mouth, from year to year. Foreign economic assistance is doomed to frustration and failure if the responsible agency is forced to deal only with quick payoff projects and to show results tomorrow in order to survive the next budget cycle.

POTENTIALS FOR INCREASING FOOD PRODUCTION IN THE WESTERN HEMISPHERE

Harold F. Robinson, Ph. D.**
Atlanta, Georgia

The standard for measurement of agricultural productivity of a nation is likely to be that of the United States for at least the remainder of this century and probably for many years beyond. Thus, it is appropriate to look first at United States agriculture as we consider potentials for increasing food production in the Western Hemisphere. However, my remarks will not be limited to the United States nor to the Western Hemisphere since attention to the problem of food supply should be on a world-wide basis if our conclusions are to be meaningful.

Situation in North America

The predominant role of the United States in providing food for other nations has come within the past 30 years as shown on Table 1.[1] As recently as 30 years ago the leading grain exporting region of the world was Latin America with 9 million metric tons per year. North America and Eastern Europe, including the Soviet Union, each exported five million metric tons annually. By 1966 North America was supplying to other nations, each year, more than 60 million metric tons of grain, of which the United States produced easily three-fourths and Canada the remaining one-fourth. Most of the grain was wheat. Eastern Europe shifted from a supplier to an area requiring external assistance, importing about 14 million metric tons of grain in 1966. Latin America has been barely self-sufficient during the past 35 years. United States Secretary of Agriculture, Orville Freeman,[1] emphasized that the three major factors causing change of sources of grain for world trade were: (1) the increase in population; (2) failure of policies relating to agriculture to be effective in Communist countries; and (3) the development of sciences and their applications in agriculture in the United States.

Canada, the second most important North American country in producing and supplying grain for world trade, can substantially increase her production if the external market is available for the grain, which is principally wheat. The annual production of wheat in Canada is expected to move from about 22 to approximately 30 million tons from 1960 to 1970.

Mexico, with an agricultural revolution in progress, is expected to have an increasingly important role in supplying the grain for export markets of the world.[2] Her grain exports rose to about 11 million metric tons by 1966, which is a substantial increase from the 7 million metric tons exported in 1960. It is difficult to predict the potential productivity of Mexico, but it is safe to assume continued progress in increasing yields and the opening of new lands. However, the high rate of population growth in that

TABLE 1
WORLD GRAIN TRADE BY MAJOR GEOGRAPHIC REGIONS

Region	1934-38	1960	Estimated 1966
		(million metric tons)*	
North America	+5	+39	+60
Latin America	+9	0	+ 2
Western Europe	-24	-25	-23
Eastern Europe (Inc. USSR)	+5	0	-14
Africa	+1	-2	- 3
Asia	+2	-16	-30
Oceanic (Aust. & New Zealand)	+3	+6	+ 8

*(+ = Exporting; - = Importing)

***Vice Chancellor, University System of Georgia*

country could soon require most of the grain for domestic consumption.

Serious consequences would result if the United States were to try and meet the expanded food needs of developing nations. Examining such a procedure for closing the food gap provides an evaluation of the potential of this country in producing food. If all available land were put into production, including presently idle acres that could be cultivated, and all present and future technology utilized, production of grain in the United States might reach 74 million metric tons for export by 1984.[3] At that time, the needs of developing nations for food aid would equal or exceed this production for external markets and we could no longer meet our obligations for assistance.

These predictions are based on the assumption that populations in developing countries would increase 2.5 percent per year while the food production increased 2.6 percent annually. Diets would provide the minimum caloric levels by 1970 and some slight annual increases would be provided each year thereafter. Some have questioned the validity of the predictions. There are those who agree with William and Paul Paddock[4] that the estimates are too optimistic, arguing that the United States may not be able to fill the food gap by about 1974. Others think the situation is not likely to become so serious within the next fifteen years.

While progress in agricultural production increases during the next 15 to 20 years and we move toward the anticipated period of crisis in the world food supply, economic and industrial development in the United States will continue. A report[5] by a committee sponsored jointly by the Association of State Universities and Land Grant Colleges and the United States Department of Agriculture indicates additional domestic food requirements due to population and economic growth. The criteria used for judging economic growth as set forth in this report are given in Table 2.

The rise in the population, with equal or greater expected increase in earning power, will result in continued increase in demands at the domestic level for food and agricultural products. The increase in domestic demands coupled with the little likelihood that developing nations will have the increased economic development necessary to allow for purchase of grain on the foreign market at the level predicted as possibly needed, creates serious doubt that the United States will export 74 million metric tons of grain annually to developing countries by 1984.

Latin America

By the year 2000, Latin American countries are expected to add a total of 400 million people to the current population of about 200 million. During this period, urbanization is expected to increase at an extremely rapid rate. These factors will place a heavy burden on agriculture to meet the needs of the food deficit rising daily within many of the countries south of the United States. While food production increases have kept pace with population change until now, it is questionable that production will continue to rise at such a rate. Also, the countries of Latin America will be expected to assist the people of other lands where greater food deficits occur.

Agrucultural production has been increasing at the rate of almost 3 percent per year on the average in all of Latin America since 1960. The rate of increased food production has been equal to or slightly in excess of the population increase, thus avoiding the "Malthusian Crisis" for the immediate present. A report by Yudelman[6] for the Inter-American Development Bank indicates that a 5 percent rise per year in agricultural output is required to insure an overall growth rate of 2.5 percent. In this report, the following requirements were indicated as necessary to raise agricultural output from 3 percent to 5 percent per year.

1. Investments must rise on the average $1 - $1.5 billion, or between 60 percent and 100 percent.
2. Expenditures for fertilizer alone will need to increase by $80 million a year, or by 40 percent above the present annual levels.

TABLE 2
POPULATION, EMPLOYMENT, GROSS NATIONAL PRODUCT AND RELATED FACTORS FOR 1964 AND PROJECTIONS FOR 1980 IN THE UNITED STATES

Item	Unit	1964	1980
Population	millions	192.1	245.3
Labor Force	millions	77.0	101.4
Employment	millions	73.0	97.4
Non-agricultural	millions	68.3	94.3
Agricultural	millions	4.8	3.1
Gross National Product[1]	$billions	628.7	1150.0
Output per man[1]	$	4.35	6.73
Disposable personal income[1]	$billions	435.8	800.0
Per capita income[1]	$	2268.0	3261.0

[1] At 1964 prices

3. There will be needed a fourfold increase in agronomists with an investment of $300,000 to $500,000 to train 50,000 agriculturists.
4. The foreign exchange investment will need to move to an additional $100 to $200 million in hard currency to provide for the import of investment goods.

These rather specific requirements, if correct, will demand of the governments of Latin American countries a greater commitment to agriculture and its problems than has ever existed. A high priority will have to be given to the agricultural professions and recognition will have to be provided through much higher salaries than presently paid. Many of the policies of these governments that relate to agriculture will need to be revised in order to insure incentives to the farmers and effective competition of agriculture with other industries. All of these factors are important and must be resolved in a positive manner if the Latin American countries are to continue in the food self-sufficiency category in the classification of nations.

General Requirements for Increased Productivity

The President's Science Advisory Committee Panel on the World Food Supply (PSAC)[7] was in general agreement that the solution of the world food problem will not come from our shipping food abroad. By the end of 1966 we had shipped some 176 million metric tons of food costing nearly $16 billion to the less developed nations under concessional terms. Even with this massive program of foreign aid shipments, we were further behind in the solution of the food problem than when we began these shipments. It is emphasized that this increasing gap in the economic development, and particularly that portion related to agricultural production between the "have" and "have not" nations, will not be solved from food aid shipments. We further emphasized in the PSAC report the complications that can be caused by the food aid shipments due to dependence of the developing nations upon the exporting countries for their food supply. Reliance on external sources for food will result in governments of developing countries failing to give the necessary emphasis to programs related to food production. It is realized, however, that food aid to hungry lands will have to be continued during the period while the more meaningful programs designed to give permanent solutions to the problems are being solved and where a food crisis exists.

As we consider the potential of nations for producing food and the sources of that food, the general conclusion is reached that there is no panacea in the foreseeable future for meeting the food problems of the world. Even if we allow for as much as a tenfold increase in food from the sea, this is not expected to have a major impact on the solution to the problems. The PSAC Panel on the World Food Supply came to the same conclusion regarding food from other sources such as bacteria and algae. We did emphasize the need for continuing the research that is important in increasing the productivity of food from these unique sources.

The potential productivity of both the developed and developing nations is likely to come from the applicability of basic agricultural practices involving the increased use of fertilizers, pesticides, improved varieties of seeds, proper use of available land and water, and generally improved economic conditions of the country. The available land must be used more intensively and, wherever possible, new land brought into production. Attention must be given to such important areas as transportation to markets, processing of the food and generally conserving it for human consumption rather than allowing its destruction by the rodents and insects. Some of the factors considered of major importance in increasing the world food supply are given additional attention below.

Land - Generally speaking, the increased food productive capacity of many of the nations during the first part of this century came from bringing additional lands into cultivation. This has been particularly true in Asia, South America, and to some extent in North America and Europe. Future additional food supply in the heavily populated areas of the world, such as southeast Asia, will have to come from increasing the intensity of the use of land already under cultivation. Other nations that have relatively little additional land to bring into cultivation include Europe and the USSR. The total amount of potentially arable land, that portion which is cultivated, and the ratio of cultivated to potentially arable land are shown in Table 3.

These data, developed by the PSAC Panel on World Food Supply, indicate almost twice the amount of potentially arable land available in the world that had been shown in any previous study. While the potentially arable land represents only about one-fourth of the total land area of the world, approximately one-half of the potentially arable land is now under cultivation. Continents with great land masses still available for bringing under cultivation include Australia and New Zealand, Africa, and South America. It is emphasized that many of these lands will require a large expenditure per unit area to provide soils that will be economically productive. In some cases this will involve extensive irrigation projects, drainage systems and land clearing operations in tropical areas which were heretofore prohibitive due to the lack of machinery or cost of preparation for cultivation.

Improved Crops and Animals - Major progress can be effected in most of the developing countries with adaptive research and improvement of crops and animals that are of high quality and adapted to the environmental conditions of the country. It is expected that the major increase in food supply will come from crops rather than animals and examples of the increases possible are indicated in the following two paragraphs.

Wellhausen[8] recently reviewed the progress that has been made in increasing the wheat-producing

Table 3

Cultivated Land on Each Continent, Compared with Potentially Arable Land (From PSAC Report[7])

Continent	Area in billions of acres: Potentially Arable	Cultivated	Ratio of cultivated to potentially arable land (percent)
Africa	1.81	0.39	22
Asia*	1.55	1.28	83
Australia & New Zealand	.38	.04	2
Europe*	.43	.38	88
North America	1.15	.59	51
South America	1.68	.19	11
USSR	.88	.56	64

*Not including USSR

capacity of Mexico. In 1945, the average yield of wheat in that country was about 11 bushels per acre, and in 1964, the yield had risen to 39 bushels due to the use of new varieties and improved cultural practices. This enabled Mexico to increase the production of wheat from 350,000 tons in 1945 to 2,200,000 tons in 1964.

Improvement in maize varieties through selection, the use of variety crosses, and hybrids produced from the intercross of inbred lines provide excellent bases for progress in increasing corn production. Most of the Latin American nations have the capability of producing between 5 and 10 times the amount of corn now being grown, with the breeding programs in many countries ready to provide adapted, high-yielding varieties and hybrids. In most of the Latin American nations work with corn in the breeding programs has advanced to the stage where there are improved types capable of producing many times the yields of the unimproved varieties, which are still widely grown. Emphasis must be given to the programs that will result in the adoption of improved cultural practices and the best possible seed stocks of all food crops in order to achieve the multifold increases in production that are possible.

Fertilizers - An essential input in increasing the food production throughout the world is fertilizers, and we will probably see more emphasis on this ingredient than any of the other components required in producing food. An indication of the importance of fertilizers is provided in the estimate that 35 to 40 percent of the increased production in the United States during recent years has come from increased use of fertilizers.[7] An even greater crop response is expected in many of the developing nations where the soils are less fertile than those of this country and where very little, if any, fertilizers have been used in the past. Fertilizers alone, even though properly used, will not result in maximum available yields unless they are used as a part of a total program of improved cultural practices combined with the improved crop varieties, and with proper control of insects and diseases.

The PSAC Panel on World Food Supply indicated that the fertilizer requirements in the developing nations of the world will have to be increased from approximately 6 million metric tons presently used to 67 million metric tons, if 100 percent increase in agricultural productivity is to be achieved. The fertilizer requirements of six of the larger Latin American nations are shown in Table 4, where the fertilizer requirement is given for increasing productivity up to 100 percent.

Increasing the productive capacity of the soils of the major Latin American nations will require slightly more than 10 times the amount of fertilizers presently being used. This is not to suggest that the fertilizer requirements will be met, as there are a number of obstacles to be overcome, including the manufacture, distribution, and use of the fertilizer on the farms in these nations. The cost of the additional fertilizers needed in the developing nations to effect even the 10 percent increase in yields amounts to $2.5 billion, and to move the productive capacity of these lands to 100 percent of the present yields would require a fertilizer bill of $30.5 billion per year.

Table 4

Estimated plant nutrient requirements for varying percentage increases in food production

Country	Percentage Increases in Productivity				
	0	10	25	50	100
	(000 tons of plant nutrients)				
Argentina	10	39	137	331	1,034
Colombia	39	65	125	235	550
Mexico	248	405	714	1,309	2,975
Brazil	214	344	592	1,108	2,483
Chile	43	65	104	192	406
Peru	94	126	180	283	540
TOTAL	648	1,044	1,852	3,458	7,988

Pesticides - If improved yields are to be obtained by developing nations, the insects and diseases must be controlled on crops that are being grown under the improved cultural practices. Plant diseases are usually more of a problem on the improved varieties grown under high fertility conditions. Thus, it is of increasing importance to control pests and diseases as additional improved cultural practices are introduced into the developing nations. This requires breeding for disease and insect resistant varieties and the utilization of pesticides and insecticides to control disease where resistance has not been developed within the crops.

Power and Equipment - Due to present availability of abundant cheap labor, many of the developing nations do not consider it necessary to give attention to farm machinery in considering the essential components for increasing their agricultural productivity. However, it is likely that this input will receive increasing attention, even in those areas where it is throught that the high population may provide the power from man rather than a machine. Latin American nations represent an area of the world that is particularly important in the adaptation of mechanical power in the improvement of agriculture. It is expected that much of the equipment to be used in the expanded mechanization of Latin American agriculture will come from the United States. PSAC[7] estimated that 1,200,000 tractors will be added in Latin America in the next twenty years at a cost of approximately $4.5 billion. The total agricultural equipment to be added in Latin America during the next two decades is expected to amount to slightly over $9.6 billion, in contrast to Asia and Africa where agricultural equipment costing $19.2 and $13.0 billion, respectively, will be added during this period.

Cautious Optimism

Although the world food problem is of staggering proportions and for many areas a solution seems almost hopeless, there is reason for some optimism. The improved varieties of rice from the International Rice Research Institute in the Philippines, now being grown in some parts of southeast Asia, are resulting in considerable improvement in the yields of this most important grain crop. Optimistic reports of large grain harvests are being received from Pakistan and India due to the use of the improved wheat varieties that have been imported from Mexico. Use of these wheats, which came from the breeding programs of the Inter-American Maize and Wheat Center (headquarters near Mexico City), and favorable growing conditions combined with adoption of improved cultural practices have led to favorable harvests.

We are reminded of the potential danger of the rapid expansion of a single variety or hybrid over a large geographical area where new and different disease and insects may be encountered. Adaptive research, directed toward developing a series of strains adapted to local environments and possessing the desired quality characteristics, should be given the highest possible priority.

It is most appropriate that emphasis be given here to the need for a tropical research center and that such a center be established in the Western Hemisphere. The great increase in food that is required will likely come from the tropical regions of the world. It is that portion of the cultivatable land that does not presently yield as expected and information is not

available for increasing the productivity of the tropical regions.

Puerto Rico is a logical site for a major tropical research center which would be international in scope, operation, and service. While the United States might provide much of the required financial support, other nations would be expected to participate, providing both funds and scientific personnel. Tropical agricultural research has already advanced in Puerto Rico to the stage where excellent progress could be expected on many of the food crops within reasonably short periods. The existing network of research stations and farms of the Puerto Rican Agricultural Experiment Station might be available for use in such an international effort.

Increased production does not necessarily immediately remove the food crisis. Recently we have seen reports from India[9] that the year of "feast" has proven almost as bitter as the famine of the immediate past years. There are reports of chaos existing with the farms trying to move their wheats into the market where methods have not been developed for handling these crops and of the unscrupulous practices of the feed grain dealers in failing to provide the farmers with a reasonable price for their crops. These conditions may destroy the incentive for the farmer to try and improve the productive capacity of his farm.

The potential exists for the production of food in the Western Hemisphere that will be required to meet the present needs of the populations of nations in this area or those needs likely to occur during the remainder of this century. It should be emphasized that population control is an absolute requirement if the food productive capacity of various nations is expected to be brought into balance with the food requirements of the people. The Western Hemisphere is likely to be called upon to make major contributions through food aid as well as technical assistance to other parts of the world. Food aid from exterior nations on a long-term basis is not recommended as a solution to a country's food problems. Self-sufficiency is possible within most of the nations and emphasis is given to the improvement of the food productive capacities of the nations through the efficient use of land, the application of fertilizers and other improved cultural practices in order to achieve maximum yields with improved adaptive varieties and hybrids of grain crops. Governments will be required to give highest priority to agricultural programs and to the agricultural professions if the people of the nations are to respond with programs and personnel necessary to provide the food for the expanding populations of all of the developing nations.

As we look to the future and face the crisis expected to occur in the imbalance between food supply and population growth, we must be concerned not only with development and utilization of the sciences and technology related to production and their applications in programs having sound economic structure, but we must also insure that cooperative international efforts utilize the desirable existing agencies and organizations in Central and South America and their associated scientific competencies.

This seems especially important in the field of nutrition and in the Latin American sphere of operations. The leading nutritionists must not only be involved, but kept in key positions in order to provide required leadership for developing policies and programs governing actions to be taken and the allocation of funds to support these efforts. We should have no time for nor patience with competitive efforts of individuals or organizations whose motives may be other than solutions of the problems and serving the needs of the people of the nations we profess a desire to assist.

Let us build for the future on the best we can salvage from the past.

References

1. Freeman, Orville, L.: *Foreign Affairs Quarterly* 45:579-593, (July) 1967.
2. Urban, S.: *Summary and Evaluation of Projections of Supply of and Demand for Agricultural Products in Mexico to 1965, 1970 and 1975* USDA, Economic Research Service, (January) 1968.
3. *World War on Hunger*, Hearings before the House Committe on Agriculture, 89th Congress, 2nd Session, (February) 1966, p 192.
4. Paddock and Paddock: *Famine 1975! America's Decision: Who Will Survive*? Boston: Little, Brown & Co., 1967.
5. *A National Program of Research for Agriculture*, Report sponsored by ASULGC and USDA, (October), 1966.
6. Yudelman, M.: *Agricultural Development in Latin America: Current Status and Prospects*, Report from the Inter-American Development Bank, Oct. 1966.
7. *The World Food Problem*: Report of the President's Science Advisory Panel on the World Food Supply, Volumes I and II (May) 1967, Volume III (September) 1967.
8. Wellhausen, E. J.: "Opportunities for Crop Improvement," in *Rural Development in Tropical Latin America*, K. L. Turk and L. V. Crowden (ed). Cornell Univ., 1967.
9. Malhotra, I.: "Year of 'Feast' Proves Bitter as India's Famine," *The Atlanta Journal*, (June 18) 1968.

Running Out of Food?

Perhaps in ten years, millions of people in the poor countries are going to starve to death before our very eyes . . . We shall see them doing so upon our television sets. How soon? How many deaths? Can they be prevented? Can they be minimized? Those are the most important questions in our world today.

When that apocalyptic warning was sounded by British author C.P. Snow five years ago, it was dismissed by many food experts as unduly alarmist. At that time, miracle seeds and fertilizers were creating a global "green revolution," and there was even talk that such chronically hungry nations as India would soon become self-sufficient in food. But today that sort of optimism is no longer fashionable. World stores of grain are at their lowest level in years—only enough to last for 27 days—and there are grim signs that the current shortage is not just a temporary phenomenon but is likely to get worse.

In the coming decades, some scholars believe, food scarcity will be the normal condition of life on earth—and not only in the poor countries but in the richer ones as well. Unless present trends are somehow reversed, says biologist J. George Harrar, "millions of people in the poor areas will die of starvation. But the affluent societies [including the United States] will experience dramatically reduced standards of living at home." Even Agriculture Secretary Earl Butz, a notorious optimist on the subject of food, concedes that Americans may have to substitute vegetable for animal protein. "We have the technology," Butz told NEWSWEEK's Tom Joyce reassuringly, "to make better hamburgers out of soy beans than out of cows."

Even now, food shortages affect the entire world. In the last two years, famine has threatened India and visited widespread misery upon the sub-Sahara nations of Africa where an estimated quarter million people have died. Scarcely less shocking, half of the world's 3.7 billion people live in perpetual hunger. The industrial nations are swiftly buying up the dwindling supplies of food and driving up food prices so high that poorer countries cannot afford to pay them.

Prospects for the future are clouded by the old Malthusian specter of population growth. A year from now there will be 4 billion human beings on earth, and by the end of the century that figure is expected nearly to double to 7.2 billion. Food production is simply not growing fast enough to feed that many mouths, and it is unlikely to do so in the decades ahead. A complicating factor in the race between food and people is the burgeoning affluence in such parts of the world as Western Europe, Japan and the Soviet Union. Rising expectations in these areas have bred strong new demands on the world's food supplies. More and more people want their protein in the form of meat rather than vegetables, and this in turn has driven up the need for feed grains for the growing herds of livestock. "Affluence," argues economist Lester Brown, "is emerging as a major new claimant on world food resources."

To meet this proliferating demand for food, insists John Knowles, president of the Rockefeller Foundation, "the world's basic food crops must double in the next eighteen years." The more positive thinkers among the food experts are convinced that this can be done—basically by expanding the area of land under production and by raising the output of crops on the cultivated areas. The world has the means to do the job, they argue—*if* the underproductive countries would order their societies a little better, *if* the richer countries would pump larger amounts of capital and know-how into the less fortunate nations for the development of agriculture, *if* more irrigation and fertilizer were brought into play, *if* mankind would use its common sense.

Many students of the food crisis are far less optimistic. "We have just about run out of good land, and there are tremendous limitations on what we can do in the way of irrigation," contends Prof. Georg Borgstrom of Michigan State University. Economist Brown supports this view. "The people who talk about adding more land are not considering the price," he says. "If you are willing to pay the price, you can farm Mount Everest. But the price would be enormous."

Moreover, Brown and other experts do not expect the sea to solve the world's food problems. Huge fishing fleets have depleted many traditional fishing grounds, and the overall catch is declining. Anchovies, one of the major ingredients in animal feed, recently disappeared from the waters off Peru for two years—largely a result of over-fishing. Water pollution, too, is taking a heavy toll of fish life along the world's continental shelves. And much of the fish that is caught each year is being squandered. "Every year, Americans use tons of tuna fish in pet foods," one food expert points out. "But how much longer will we be able to afford the luxury of feeding our cats and dogs on food people could consume?"

Fertilizer, an essential element, is also becoming prohibitively expensive. Petroleum is a major source of fertilizer, and the towering price of oil thus has a direct effect on agriculture. Dr. Norman Borlaug, sometimes called the "father of the green revolution," has complained bitterly that Arab oil politics, aimed at the industrial countries, will eventually strike most heavily at the developing nations. "India," remarks Brown, "is really up the

creek. As a result of the fertilizer shortage, grain production is likely to be off 6 to 9 million metric tons."

On top of all these problems, the world's farmers have been beset by weather conditions that threaten to dislocate food patterns around the world. According to some meteorologists, these changes in climate will probably be a long-range factor. For a variety of reasons, they point out, the earth seems to be cooling off, and this cooling process is causing a southward migration of the monsoon rains. This in turn is producing a dry-weather pattern stretching from the sub-Sahara drought belt through the Middle East to India, South Asia and North China. Even the U.S. could soon be at the mercy of the weather. Some meteorologists are predicting a cyclical return to drought in the Great Plains States—possibly even dust-bowl conditions. "Even a mild drought in this tight supply situation," said one Agriculture Department official, "could be a disaster."

Over the years, the U.S. supplied a staggering $20 billion worth of food to needy countries under Public Law 480, the so-called Food for Peace program. But in recent years, the program has been allowed to wither, and with food demand rising around the world, American farmers—encouraged by the Administration—have flung themselves into the business of exporting food on a strictly cash-and-carry basis. In the fiscal year ending in June 1972, the U.S. exported $8 billion worth of farm products; last year the figure reached $12.9 billion; and when this fiscal year ends in June it is estimated that it will have zoomed to $20 billion. The U.S. now views agricultural products not as a give-away item but as a way of earning the foreign exchange needed to pay for imports, including high-priced crude oil. "Food for crude" is the shorthand for the current policy at the Department of Agriculture.

With virtually all U.S. food surpluses committed to trade, not aid, it is difficult to see how the U.S. can continue to play its old role as provider of food to the world's hungry masses. And there are many people in Washington who do not see this as such a bad thing. "The worst thing we can do for a country," says a State Department official, "is to put it on the permanent dole. That would be an excuse not to solve its own problems, especially population. Now, our thinking is that feeding the world is an international problem, maybe one for the United Nations." That view was underlined last September when Henry Kissinger asked the United Nations to call a world conference on the problems of feeding the world. "No one country can cope with this problem," said the Secretary of State.

In response, the U.N. plans to hold a World Food Conference in Rome this November. Among the major proposals certain to be made are that the less developed nations discourage population growth and that the industrial nations work together to help feed the world's poor. Indeed, Dr. A.H. Boerma, the Dutchman who heads the U.N. Food and Agriculture Organization, has proposed a "world food reserve"—roughly like that of the Biblical Joseph, who advised the Pharaohs to store up grain in good years against future famines. But so far, the suggestion has been greeted with a total lack of enthusiasm in the U.S., Canada and Australia, the only countries in the world with significant food surpluses.

Resistance to an internationally controlled food reserve is easy enough to understand. Farmers fear that such vast stores of controlled food might, at some point, be unloaded on the world market, sending prices down in a dizzying spiral. And governments do not want to give up a formidable political weapon. In the politics of international food, agriculture may very well turn out to be the United States' ace in the hole. "We are not," declares one high-level Washington official, "going to throw that away too easily."

And so, to a very large extent, the U.S., as the greatest food producer in the world, will still be in a position to determine who gets food in the decades ahead; it will almost certainly be American food and American policy that answer the questions posed by C.P. Snow. "We are going to have some big moral decisions to make," says Sen. Hubert Humphrey. "We will be faced with famine situations in Africa, Asia and other parts of the world where there are victims of rising population and bad weather. But the question, I believe, is going to come down to whether Americans will be willing to cut down on their own consumption to help those poor people."

[Excerpt from Congressional Record, Apr. 30, 1974, pp. S6601–3]

WORLD FOOD CRISIS

Senator McGovern. Mr. President, as most Americans are becoming more aware, the world is facing not only an energy crisis but a food crisis as well. For the first time in recent years, food production worldwide is falling behind population growth. In fact, it is now estimated that the world has only 27 days worth of food reserves should a serious crisis strike at any place around the globe. Only a few short years ago, when disaster struck any part of the globe, the United States, cooperating with international agencies, rushed all the food that was necessary to deal with the problem. Today, drought is spreading through the sub-Sahara area and thousands of Africans are suffering from hunger and malnutrition, even death. We know this is happening, yet we no longer have the food surpluses available to deal effectively with the problem.

We are also learning that some of the technological breakthroughs—most commonly known as the "green revolution"—we expected would provide the world with more than enough food now may not fulfill that promise. We are learning, for instance, that the so-called green revolution is heavily dependent on energy intensive agricultural products, especially on fertilizer. It so happens that fertilizer is often a derivative of petroleum and other chemicals which are now both in short supply and available only at very high prices.

The U.S. Government along with other government and international organizations such as the United Nations and the Food and Agriculture Organization recognize the dimensions of this impending crisis. Yet, we are all groping toward a solution without yet having reached an agreement upon means to deal with the problem. It may be that in the end we will not be able to avert serious hunger and malnutrition in many parts of the world but the final judgment of history will depend upon how hard we tried to do our very best to avert that crisis.

As chairman of the Select Committee on Nutrition and Human Needs and as the ranking Democrat on the Committee on Agriculture and Forestry, I am especially aware of this world food situation, in no small part because it is having a very direct and adverse effect on the nutritional status of our own people. For this reason, the Nutrition Committee is conducting an in-depth study of the problem and is attempting to develop a coordinated National Nutrition Policy. This study, in the form of hearings, will take place during the period June 19–21. We hope that in the near future the committee will be producing detailed documents providing Members of Congress with the information they need to consider the courses of action that our Government should follow.

I ask unanimous consent to print in the Record several recent articles describing both the study being conducted by the Select Committee and

the policy options that will be open to our Government and the general nature of the world food problem.

[From the New York Times, Apr. 22, 1974]

Affluence and Survival II

By Anthony Lewis

Boston, April 21.—In one short sentence recently Professor Jean Mayer of Harvard, the great nutritionist, illuminated the profound moral and political test that awaits this country on the issue of food.

"The same amount of food that is feeding 210 million Americans," he said, "would feed 1.5 billion Chinese on an average Chinese diet."

The question is: Will we, can we go on pursuing our extravagant way of life in an increasingly hungry world? It is not some remote or speculative question. Half the people in the world now go to bed hungry every night. And the looming probability is that thousands, even millions may starve in the year ahead unless they get help from outside—mainly from the United States.

That prospect is based on factors that can already be estimated with fair accuracy. For one, there is a serious worldwide fertilizer shortage, caused in part by the quadrupling in the price of oil that goes into nitrate fertilizer and in part by insufficient fertilizer plants to meet demand.

In India, the fertilizer scarcity has already hit hard, along with difficulty in pumping water because of gasoline shortages. The spring wheat crop target was 30 million tons. Recent estimates put the actual figure nearer twenty million.

In Asia generally, tertilizer supplies will be inadequate at least through this year. Crops are therefore expected to be down substantially. But the rising population inexorably pushes the need for food up 2 or 3 per cent a year. For those reasons, the experts foresee a huge food deficit in Asia this year—the largest in memory, one has said.

As a practical matter, grain to make up the shortfall in Asia would have to come in large part from the United States. Only the U.S., Canada, Australia and New Zealand are net grain exporters now, and America is by far the largest.

And so we Americans shall probably have to decide before the end of 1974: Do we avert our gaze from Asia, cut ourselves adrift from a main problem of mankind? Or do we help others survive by doing the food equivalent of turning down our thermostats?

We have no surplus now, and no grain carryover to speak of. We can probably help on the scale needed, then, only by adjusting our own eating habits.

The American diet has turned more and more toward meat; fifty pounds of beef per capita in 1950, 119 pounds in 1973. And beef is a terribly wasteful food to produce. Feeding corn to cattle in feed lots, you end up putting on the table in steaks and stews only 5 per cent of the calories that were in the corn. An American now uses 22,000 pounds of grain per year to feed himself, a Chinese 400. But of the American figure only 140 pounds are eaten directly as grain in bread and other cereal products. Of the Chinese 400, 360 are eaten as grain.

If the United States is going to play a substantial part in bridging the world food deficit, there will have to be a change in our diet. Of course we need not eat less nourishing or appetizing food; in terms of taste and real value the American diet is a well-known disaster. American food habits have been spreading, and that trend also will have to change. That leads to a longer run point about the world food situation. The general assumption has been that the growing problem of population and food could be met by spreading American agricultural methods to the less developed world, with mechanization and intensive use of commercial fertilizer and pesticides. That assumption is now under challenge.

The problem is brilliantly, fascinatingly analyzed in the current issue of Science by Professor John S. Steinhart of the University of Wisconsin and Cecil E. Steinhart. What they demonstrate is that the American food system is immensely energy-intensive. Huge amounts of energy are poured into growing crops without much labor, then even more into processing and packaging, and still more at the consumer and into auto-powered shopping, refrigeration and the like.

In "primitive" cultures, the Steinharts say, each one calorie of energy invested produces five to fifty calories of food. In industrialized food systems, it takes

five to ten calories of energy to get one in food. If all countries followed our energy-intensive pattern, the world would use 80 per cent of its annual energy just to produce food.

Barring some breakthrough in renewable energy sources, the Steinharts conclude, the choices for man "appear to be either less-intensive food production or famine for many areas of the world." As energy costs go up, even developed countries will have to find ways of using more labor and less energy in their food production.

One commodity is essential for needed change in either the immediate future or longer term, and unfortunately it is in short supply. That is leadership in Washington. We can only hope that it will appear, and work toward that end. If man does not deal with his food problem in terms of the small world he inhabits, as the Steinharts say, then "the food shortage will solve our population problem."

[From Newsweek, Apr. 1, 1974]

Running Out of Food?

(Note.—Perhaps in ten years, millions of people in the poor countries are going to starve to death before our very eyes . . . We shall see them doing so upon our television sets. How soon? How many deaths? Can they be prevented? Can they be minimized? Those are the most important questions in our world today.)

When that apocalyptic warning was sounded by British author C. P. Snow five years ago, it was dismissed by many food experts as unduly alarmist. At that time, miracle seeds and fertilizers were creating a global "green revolution," and there was even talk that such chronically hungry nations as India would soon become self-sufficient in food. But today that sort of optimism is no longer fashionable. World stores of grain are at their lowest level in years—only enough to last for 27 days—and there are grim signs that the current shortage is not just a temporary phenomenon but is likely to get worse.

In the coming decades, some scholars believe, food scarcity will be the normal condition of life on earth—and not only in the poor countries but in the richer ones as well. Unless present trends are somehow reversed, says biologist J. George Harrar, "millions of people in the poor areas will die of starvation. But the affluent societies [including the United States] will experience dramatically reduced standards of living at home." Even Agriculture Secretary Earl Butz, a notorious optimist on the subject of food, concedes that Americans may have to substitute vegetable for animal protein. "We have the technology," Butz told Newsweek's Tom Joyce reassuringly, "to make better hamburgers out of soy beans than out of cows."

Even now, food shortages affect the entire world. In the last two years, famine has threatened India and visited widespread misery upon the sub-Sahara nations of Africa where an estimated quarter million people have died. Scarcely less shocking, half of the world's 3.7 billion people live in perpetual hunger. The industrial nations are swiftly buying up the dwindling supplies of food and driving up food prices so high that poorer countries cannot afford to pay them.

Prospects for the future are clouded by the old Malthusian spector of population growth. A year from now there will be 4 billion human beings on earth, and by the end of the century that figure is expected nearly to double to 7.2 billion. Food production is simply not growing fast enough to feed that many mouths, and it is unlikely to do so in the decades ahead. A complicating factor in the race between food and people is the burgeoning affluence in such parts of the world as Western Europe, Japan and the Soviet Union. Rising expectations in these areas have bred strong new demands on the world's food supplies. More and more people want their protein in the form of meat rather than vegetables, and this in turn has driven up the need for feed grains for the growing herds of livestock. "Affluence," argues economist Lester Brown, "is emerging as a major new claimant on world food resources."

To meet this proliferating demand for food, insists John Knowles, president of the Rockefeller Foundation, "the world's basic food crops must double in the next eighteen years." The more positive thinkers among the food experts are convinced that this can be done—basically by expanding the area of land under production and by raising the output of crops on the cultivated areas. The world has the means to do the job, they argue—if the underproductive countries would

order their societies a little better, if the richer countries would pump larger amounts of capital and know-how into the less fortunate nations for the development of agriculture, if more irrigation and fertilizer were brought into play, if mankind would use its common sense.

Many students of the food crisis are far less optimistic. "We have just about run out of good land, and there are tremendous limitations on what we can do in the way of irrigation," contends Prof. Georg Borgstrom of Michigan State University. Economist Brown supports this view. "The people who talk about adding more land are not considering the price," he says. "If you are willing to pay the price, you can farm Mount Everest. But the price would be enormous."

Moreover, Brown and other experts do not expect the sea to solve the world's food problems. Huge fishing fleets have depleted many traditional fishing grounds, and the overall catch is declining. Anchovies, one of the major ingredients in animal feed, recently disappeared from the waters off Peru for two years—largely a result of over-fishing. Water pollution, too, is taking a heavy toll of fish life along the world's continental shelves. And much of the fish that is caught each year is being squandered. "Every year, Americans use tons of tuna fish in pet foods," one food expert points out. "But how much longer will we be able to afford the luxury of feeding our cats and dogs on food people could consume?"

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On top of all these problems, the world's farmers have been beset by weather conditions that threaten to dislocate food patterns around the world. According to some meteorologists, these changes in climate will probably be a long-range factor. For a variety of reasons, they point out, the earth seems to be cooling off, and this cooling process is causing a southward migration of the monsoon rains. This in turn is producing a dry-weather pattern stretching from the sub-Sahara drought belt through the Middle East to India, South Asia and North China. Even the U.S. could soon be at the mercy of the weather. Some meteorologists are predicting a cyclical return to drought in the Great Plains States—possibly even dust-bowl conditions. "Even a mild drought in this tight supply situation," said one Agriculture Department official, "could be a disaster."

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With virtually all U.S. food surpluses committed to trade, not aid, it is difficult to see how the U.S. can continue to play its old role as provider of food to the world's hungry masses. And there are many people in Washington who do not see this as such a bad thing. "The worst thing we can do for a country," says a State Department official, "is to put it on the permanent dole. That would be an excuse not to solve its own problems, especially population. Now, our thinking is that feeding the world is an international problem, maybe one for the United Nations." That view was underlined last September when Henry Kissinger asked the United Nations to call a world conference on the problems of feeding the world. "No one country can cope with this problem," said the Secretary of State.

In response, the U.N. plans to hold a World Food Conference in Rome this November. Among the major proposals certain to be made are that the less developed nations discourage population growth and that the industrial nations work together to help feed the world's poor. Indeed, Dr. A. H. Boerma, the

Dutchman who heads the U.N. Food and Agriculture Organization, has proposed a "world food reserve"—roughly like that of the Biblical Joseph, who advised the Pharaohs to store up grain in good years against future famines. But so far, the suggestion has been greeted with a total lack of enthusiasm in the U.S., Canada and Australia, the only countries in the world with significant food surpluses.

Resistance to an international controlled food reserve is easy enough to understand. Farmers fear that such vast stores of controlled food might, at some point, be unloaded on the world market, sending prices down in a dizzying spiral. And governments do not want to give up a formidable political weapon. In the politics of international food, agriculture may very well turn out to be the United States' ace in the hole. "We are not," declares one high-level Washington official, "going to throw that away too easily."

And so, to a very large extent, the U.S., as the greatest food producer in the world, will still be in a position to determine who gets food in the decades ahead; it will almost certainly be American food and American policy that answer the questions posed by C. P. Snow. "We are going to have some big moral decisions to make," says Sen. Hubert Humphrey. "We will be faced with famine situations in Africa, Asia and other parts of the world where there are victims of rising population and bad weather. But the question, I believe, is going to come down to whether Americans will be willing to cut down on their own consumption to help those poor people."

[From the Wall Street Journal, Apr. 18, 1974]

Nourishing Notions

By Alan L. Otten

Five years ago, Jean Mayer, Harvard's distinguished nutrition and health expert, was busily master-minding the White House Conference on Food, Nutrition and Health for President Nixon. As White House conferences go, it was quite successful, charting or catalyzing a variety of government programs and actions.

Today, Dr. Mayer is just as busily organizing a major nutrition study for the Senate's Select Committee on Nutrition and Human Needs. Six panels of experts, at Committee hearings on June 19, 20 and 21, will assess progress since 1969 and discuss possible new efforts to improve nutritional levels in America.

"The two conferences are very different," Dr. Mayer declares. "The aim of the White House Conference was to gain final popular acceptance of hunger and malnutrition, problems that some of us had long seen but which the country as a whole wasn't awake to. The Senate study is more to edify Congress than the public."

The difference in goals dictates a difference in size. The earlier conference was enormous; several hundred people prepared papers for 36 different panels, and more than 5,000 people met for a week to debate those ideas and hammer out final positions. Only about 75 people are working in the six panels for the coming Senate hearings. They'll evaluate current programs, the problems that remain, and options for dealing with them, and they may indicate a few favored solutions; for the most part, however, they'll leave the decisions to the Senators.

And while the 1969 meeting took place against a backdrop of general agricultural abundance and optimism, the June hearings come at a time of mounting worry about acute food shortages and even widespread famine in much of the world.

Dr. Mayer, a short, incredibly energetic man whose speech still shows a musical trace of his native France, has approached his current assignment with the same political shrewdness and organizational flair he displayed in arranging the White House assembly. He carefully balances his study panels with

representatives of farm groups and food firms, consumer spokesmen, doctors, academics. He works hard to win administration cooperation and to allay White House suspicions that the Senate inquiry is a plot to embarrass the President, contrived by Committee Chairman George McGovern, ranking Republican Charles Percy, and other Nixon critics.

"Five years later is a logical time to review what has happened since the White House Conference," he argues. "Progress in improving diet among the poor has been very good. Progress on consumer programs has been good. Progress on relating nutrition to general health has been inadequate or difficult to evaluate."

. . . viewing programs that grew out of the earlier meeting, while three are primarily exploring new areas. A review panel on nutrition among the poor will, for example, look at the tremendous growth in food stamps, school breakfasts and lunches, meals for the elderly. It will examine the impact that rising prices may have had on these programs, and the need for further help for such special groups as old folks and Indians.

A second review panel is surveying consumer developments—unit pricing, nutrition and ingredient labeling, restrictions on additives. It will consider such further steps as more precise food labeling for people with heart disease and other ailments, and the possibilities of better nutrition education in public schools.

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The tie between nutrition and health is the province of a third review panel. The White House meeting and later events made the public aware of such health threats as high-cholesterol foods, Dr. Mayer says, "but not much has been done to help them handle these problems." He hopes the experts will look at proposals for grading meat differently, getting industry to lower the cholesterol or salt content of foods, and provide more exercise facilities in cities and suburbs.

One panel breaking new ground—in "a modest but important area"—will examine how the government might obtain and dispense better nutrition information. It will, for instance, see whether there can't be far more frequent surveys, possibly every month, to track how changing food prices affect the eating habits of families in different income groups.

The final two study groups, working closely together, are tackling the "macro" concerns of food production and international trade. They'll try to come up with ideas for increasing the availability of food, particularly more nutritious food, and for determining how much food ought to be available for export. Specifically, they'll get into the controversial questions of government-held food reserves and increased government control over the export of grains and other foods.

Dr. Mayer notes one major change in these two broad areas since 1969: food manufacturers and processors appear far more willing now to accept a larger degree of government intervention, in order to insure steady supplies of major commodities at relatively stable or only slowly-rising prices.

Admittedly over-simplifying, he suggests that two opposing camps may be forming on major food issues such as grain reserves. On one side, favoring greater government involvement and control, are consumer representatives, the food companies, and the State Department (interested in showing friendship toward potentially starving Third World countries.) On the other side, farmer spokesmen, grain traders, and the Agriculture Department seek a minimum of government intervention.

U.S. food policy has long had three chief aims, Dr. Mayer points out: to insure good supplies of food to the American people at relatively low cost; to help balance our international payments; and to continue to provide a bulwark against world famine.

"These aims," he says, "have been impaired in the past year or so by a number of factors, including the disorderly way we handled our surpluses. I hope the Senate panels can suggest policies that will move us back in those directions."

[Excerpts from Congressional Record, May 9, 1974, pp. S7581–83]

A WORLD FOOD ACTION PROGRAM

Address by Senator Hubert H. Humphrey

We have been waging a battle to improve the quality of life in the developing world for 25 years. Today this battle against global poverty and disease is being lost.

As the world's military powers seek accommodation to reduce the risks of nuclear holocaust, new dangers to political and economic stability have arisen.

The threat of widespread famine is on the increase. Fertilizer shortages are growing and the affluent continue to consume a disproportionate amount of the world's food resources.

Worldwide inflation continues to take a heavy toll on the developing and the developed countries alike. This erodes political stability and depletes what little hard currency the poor nations have amassed.

The rich and poor nations are in danger of entering a new era of confrontation fueled by economic desperation. All realize that they are vulnerable to economic blackmail. This situation is causing a breakdown of the traditional rules of the game governing access to supplies and raw materials.

We are today at a crossroads of history comparable to the years following the end of the Second World War.

Today, as before, our nation faces a crisis of maintaining our growth in relative affluence while others face a crisis of sheer survival.

Today, as before, we must fashion an adequate response to the plight of a great mass of people—over one billion people in more than 30 countries who are the worst victims of the doubling and trebling of world food, fuel and fertilizer prices. These most severely affected countries might be described as a new Fourth World.

The bill the developing countries as a whole must pay in increased petroleum prices is an estimated $10 billion. Food and fertilizer price rises are expected to add an additional $5 billion.

And today, as before, the American response to these global problems must draw upon what is best in our people. We must recognize the interdependence of our security with the well-being of all mankind. And the progress of Americans can flow from the progress of others as it has with the impressive postwar improvement in Europe.

On the other hand, if the opportunity for economic progress is denied one fourth of the human race, no institutional structure, no concept of world order, no "structure of peace" can long survive.

It is imperative that our leaders recognize this essential fact of life.

President Nixon has recently submitted an expanded foreign assistance program.

At the recent U.N. General Assembly special session on raw materials and development, Secretary Kissinger announced our intention to pro-

vide emergency assistance, in a cooperative framework, to the stricken Fourth World.

Most recently, we offered an emergency proposal at the U.N. urging the creation of a $4 billion special fund to which the U.S. would contribute its "fair share." This fund would supply additional assistance to the most severely affected to enable them to buy fuel, fertilizer and other essential commodities.

Though well-intentioned, American efforts thus far lack specific financial commitments which the Fourth World expects and needs.

I have come here today to discuss a specific proposal—a proposal which I believe could prevent chaos and suffering. It will allow our nation to fulfill its humanitarian obligation to the world community.

It will respond to an urgent request of the recent U.N. session for "an emergency relief operation to provide timely relief to the most seriously affected developing countries."

It is not a program of charity, for charity is not the way to develop human potential and foster a viable world order.

It is rather, a program designed to lead the world back from the precipice of famine. It will afford millions with the opportunity to go beyond mere survival and develop the potential of their economies and their lives. It is also a program which recognizes the urgent need to develop new standards and institutions to ensure access to supplies of essential commodities to all nations, rich and poor.

Today I am proposing a World Food Action Program which involves important initiatives for the United States on four broad fronts; expanded food aid, a program of food reserves, an improved system of fertilizer distribution and production and an increased emphasis on agricultural development.

The United States is a country blessed with great industrial and military power. But this power shrinks in magnitude compared to the power of food. We are the world's breadbasket. Our natural tendency to produce food in abundance gives us today enormous power over the lives and fortunes of a majority of the world's people.

Used wisely, America's food power can be a force for enlightened and compassionate ends. Used only for narrow, short-term advantage, it becomes a precious resource squandered in the face of great human suffering.

I believe our contribution to the growing economic crisis in the Fourth World should be primarily in the form of food and the means and technology to produce it. I propose a food action plan in the hope that it will serve as a model for initiatives by other nations who can afford to be generous at a moment of growing need.

Twenty-five years ago Europe was threatened with economic and political disintegration. The United States responded strongly and generously in the face of crisis and despair. The Marshall Plan can again serve as an example of effective assistance to those in distress.

Today, when the lives and well-being of hundreds of millions in Africa, Asia, and Latin America are at stake, we can do no less. We need to respond in the same bold and generous manner.

We cannot wait for the World Food Conference in November. Time is running out for millions.

My four-point action program includes the following provisions:
First, food aid must be expanded.

At a time when world needs have reached crisis proportions, our food aid shipments have been slashed severely. And a significant part of our availabilities go for security related programs in Southeast Asia.

All nations must immediately take steps to expand their food production. But this simply is not enough. The food surplus nations must also set aside a portion of their increasingly profitable food exports for transfer to the poorest nations. And the transfer must be on terms poor nations can afford. Present world food prices are simply beyond the financial means of the poorest nations.

Specifically, I propose a 3-year emergency food aid effort. It would be aimed at the nations hardest hit by food and energy price rises and fertilizer shortages. It would include the following steps:

The United States will offer the sale of at least $1 billion worth of food annually at today's market price. Countries purchasing this food will pay the going market price of July 1, 1972 commercial terms.

The difference between today's higher prices and the July 1, 1972 price would be in the form of long-term concessional credits.

This American proposal should be conditioned on a comparable offer from other nations with a major food surplus—notably the Canadians and Australians. Their fair share of the total aid effort would be proportionate to their share of world grain exports in recent years—about 70 percent from the U.S., 20 percent from Canada and 10 percent from Australia.

I believe this new program of expanded food aid should be matched immediately by reciprocal assistance measures on the part of the oil exporting nations.

Recent oil price increases and energy shortages have already begun to decrease world food production. Therefore, a decline in oil prices will help spur world food production.

For the very poorest nations and those already suffering famine, we should expand our Public Law 480 food for peace sales program on terms softer than the proposal I have just made.

The Public Law 480 food grants for the nutritionally vulnerable and for food-for-work programs have also been cut dramatically. Approximately 20 million people have been removed from these important programs. We must move to expand this grant food aid program.

Our much diminished Public Law 480 program must be restored at least to the 1972 commodity levels.

The United States is a major contributor to the international world food program under the direction of the United Nations. This program carries out vital emergency relief and nutrition activities.

Sharp food price increases have reduced the availability of food for this international effort. Many worthwhile new projects have been abandoned. The United States, which has presently pledged to provide $140 million in food and cash in 1975–76, must increase its own pledge to at least $200 million. We must encourage other nations to increase their contributions so that the commodity level can be restored to the 1972 level.

Again, this should be looked upon as only a minimum effort to deal with an emergency.

People must understand that the severe world food crisis will not miraculously disappear even if we have the bumper harvests anticipated for this year. Last year we had record crops. Despite this fact, world food reserves are today dangerously low. They are approaching a level of supply which could last only 3 weeks.

Second, we must establish a food reserve program.

We have a moral obligation to establish a buffer against the threat of mass starvation. We simply cannot rely on ideal weather and no major crop diseases to assure a safe supply of food.

The world's leading food producer and exporter—the United States—has no national food reserve policy. We blithely assume all will work out for the best.

Grain reserves provide an important measure of stability in the world food economy. They also ensure the capability of the international community to respond when droughts or crop failures occur.

It is essential, then, that the U.S. Congress act quickly to pass the legislation I have proposed establishing a national food reserve policy.

Closely related to a reserve policy is the need to assure fair prices to farmers for their products. It is a fair price which is the incentive for production. The existence of sizable reserve stocks must not be used to deny farmers of a reasonable return on their investments and efforts.

The international community must also establish a new global food reserve system. FAO Director-General Boerma's plan for the international coordination of national food reserve policies must be given concrete form at the World Food Conference, and then implemented without delay.

Third, world fertilizer production must be expanded.

The global shortage of chemical fertilizers is already causing disastrous consequences in the developing world. This is especially true in South Asia. Not only have prices soared, but many poor countries have been unable to purchase required amounts at any price. Japan, the United States, and European nations have reduced their fertilizer exports because of their domestic needs.

Every dollar's worth of fertilizer denied a country such as India now may well force it to import $5 worth of food next winter. This is an economic loss that these nations and the world can ill afford.

The United States and other fertilizer exporting nations must take steps to ensure that critical fertilizer needs in the developing countries are met without endangering domestic agricultural production.

We must restore our fertilizer exports to reasonable levels, both through commercial channels and our aid program.

This will require expansion of fertilizer production facilities. If necessary to insure this expansion, the Government should stand ready to offer credits and tax incentives.

More fertilizer needs to be sent to developing countries this summer and fall. The industrial countries need to consult urgently on the means for doing so.

We must ask the American people to reduce the noncritical and nonfarm uses of fertilizer which now total nearly 3 million tons of nutrient—well above the anticipated fertilizer deficit in Asia this year.

A major cooperative effort is needed to increase the efficiency of production in existing developing-country nitrogen fertilizer plants.

Many are now producing at below two-thirds their capacity. Additional technical assistance and spare parts will be necessary from the United States and other industrialized nations.

It is now clear that the comparative advantage in nitrogen fertilizer production lies with those nations with abundant energy supplies. The United States and other industrial nations should assure the oil exporting nations—which are blessed with natural gas, the feedstock of nitrogen fertilizer—that we will share with them our technologies to open new supplies of fertilizer.

The World Bank could take the lead in coordinating this effort.

The battle against global hunger cannot be won without abundant supplies of fertilizer at reasonable costs.

Fourth, agricultural production in the food deficit nations must be increased.

The developing countries constitute the world's greatest reservoir of untapped food production potential. Vast increases in food production are possible in these nations. These increases can be achieved at a far lower cost in the use of energy and fertilizer than in the agriculturally advanced nations.

The realization of this potential is crucial if the world's food supply is to grow rapidly enough to meet the needs of population growth and rising affluence.

Special emphasis needs to be placed on effectively involving the world's small farmers in the effort. A generation of experience has taught us the benefit of intensively cultivated small farms. They more than hold their own in comparison with large farms in output. They also supply jobs for the growing legions of the unemployed in the developing world.

This approach to rural development contributes greatly to the motivation of smaller families that is the prerequisite of a major reduction in birth rates.

Agricultural development will not come easily.

It will require supplying farmers with education, credit, extension services, fertilizers, improved seeds, appropriate machinery, and water supplies.

It will require expanded multilateral and bilateral economic assistance programs.

It will require expanded world research efforts to discover even more productive seed varieties.

It is imperative that the U.S. Congress act quickly to approve the U.S. replenishment of funds for the International Development Association. The World Bank, under the leadership of Robert McNamara, is increasingly focusing its efforts on this area of greatest need—rural and small farm development.

Special attention in the developing countries must be given to the problems of food spoilage and waste. Poor storage, inefficient marketing practices and inadequate facilities result in massive losses of food and fiber. A special effort, perhaps led by the FAO, to reduce global food losses is vital.

At the same time, we cannot ignore the different but very real form of waste occurring in the more affluent nations. Each day, enough

uneaten food is scraped from restaurant and home dining room plates to sustain millions.

The food action program which I have outlined would begin to meet the urgent need for immediate international cooperation to avert famine.

It would also do much more. It could establish new standards by which nations deal with global resources scarcities. Many of the fundamental questions raised by these shortages are present also in the case of food.

We should use American food to set a new standard for international economic conduct. We have too much at stake to miss the opportunity to see that there are rules guaranteeing access to supplies and markets for all countries.

One of the most important components of the food action program I have outlined—expanded food aid—could be implemented in a matter of weeks.

The legislation giving the President the authority to act already exists in our Public Law 480 legislation.

Although congressional approval is not necessary, congressional consultation is imperative.

In the coming days I will introduce a world food action resolution with my colleagues. This resolution will urge the President to take immediate action in expanding our food assistance to meet the growing crisis of human suffering in the developing world.

Some have suggested that the American people will not support an expanded food aid program.

I do not believe this has to be the case. The American people have always responded generously in times of crisis. We at least need to ask them. We cannot afford to reach such a conclusion without an informed national dialog. The American public has only recently begun to hear of the world food crisis.

One frequent objection to increase government food aid is that domestic prices will tend to be pushed higher. I do not believe this to be the case. We can provide expanded food assistance in the manner I have suggested—without price increases.

This can be accomplished by limiting our sales on the commercial market. We must reserve part of our supplies for sales to the poorest countries threatened by famine on cash and credit terms that they can afford to pay. This food program—to save lives and create an environment conducive to peace—will cost less than three Trident submarines.

In the final analysis, a fundamental moral choice cannot be evaded. Can a nation whose nutritionalists proclaim obesity to be a leading health problem share its bountiful food resources with those whose very survival is at stake?

When our own life styles affect the basic well-being of others, can we avoid making the necessary minor adjustments?

A decision by Americans to eat one less hamburger a week would make some 10 million tons of grain available for food assistance.

It is also in the self-interest of the United States to take the lead in developing this program. Starvation and hunger are the breeding grounds for political instability and economic chaos.

Americans do have a stake and a vital interest in social progress. As Pope John said: "Development is the new name for peace."

The countries we would be helping provide vitally needed resources for all nations—particularly the industrialized and more affluent nations.

While I urge my country to take the lead in this effort, I would expect others to follow.

The United Nations has already set the stage for the cooperative effort in meeting the crisis of the Fourth World.

If the nations of the world confront the global food crisis head on, we shall be taking a step toward saving millions of lives in peril.

By undertaking this food action program, the human community shall be reaffirming its ability to cope with a world crisis.

If we do not take the initiative now and begin defining our future, we should not be surprised when tragic events define it for us.

[From the Washington Post, Saturday, May 11, 1974, p. 14]

A RESPONSE TO THE WORLD FOOD CRISIS

A billion people in the poorest countries face hunger and privation or worse because, in large though not exclusive part, of the oil cartel's decision last winter to quadruple the price of oil. But until now there has been no specific and implementable proposal on how to start coping with the massive human and political dislocations which the food shortages involve. The United Nations took a whack at the problem a week or so ago but proved unequal to the task. The U.S. government has made some hopeful noises but has done almost nothing. Senator Hubert Humphrey (D-Minn.), whose farm savvy, internationalist outlook and conscience qualify him uniquely, has now come along to point a feasible way.

Mr. Humphrey would have this country join at once with other grain exporters (Canada, Australia) to provide expanded food aid at easy terms to the countries in most extreme duress. Statutory authority already exists for the President to buy food from American farmers for aid but resistance is strong in the Agriculture and Treasury Departments and in the Office of Management and Budget. Secretary of State Kissinger, alert to the devastating foreign policy consequences of the appearance of indifference to mass starvation, pledged last month "a major effort to increase the quantity of food aid over the level we provided last year." In effect to provide Dr. Kissinger the political support he needs to honor that pledge, Senator Humphrey has introduced a food aid resolution in the Senate. It deserves broad bipartisan backing.

Senator Humphrey has also accepted responsibility for shaping legislation and organizing support for American participation in a world food reserve program. Such a project, which is to be tackled at the World Food Conference scheduled in Rome next November, would make food stocks regularly available to help ease threats of famine anywhere in the world. In 1972–73 the Nixon administration unwisely allowed commercial export sales to all but wipe out the reserves it had maintained, and used for relief, in earlier years. A chance to rebuild reserves may be arriving this year, since huge crops are expected and prices are falling in anticipation of them. American farmers, of course, deserve fair and stable prices. The trick is to match their legitimate economic interest with U.S. political and moral interests in helping establish a global food reserve plan.

Fertilizer is the third of the four points in the Humphrey "food action program." American fertilizer exports were quietly embargoed last fall to assure enough supplies for the expanded domestic acreage then being put under the plow. This meant frenzy and hardship to countries which had counted on American fertilizer. But something can be done: expand fertilizer production, aid poor countries to in-

crease production at existing facilities, induce the oil countries to develop new supplies from their natural gas.

Finally, the slow vital work of increasing food production in the poor countries must be intensified. One key move here is early Senate approval of new funds for the International Development Association, the World Bank branch which offers special help, especially agriculture, to the poorest of the poor. After the food shock of the last few years, can there be left a single country which does not recognize the folly of failing to exploit its own farm potential to the hilt?

Too often, proposals to ease world hunger set goals which, however justified in terms of need and suffering, are politically out of the question. But everything Mr. Humphrey suggests is, though difficult, politically within reach. In the most immediate category, expanded food aid could be arranged in a matter of weeks. That the United States has the means, moreover, is beyond debate. The three million tons of fertilizer Americans put on lawns and the like would more than cover South Asia's whole fertilizer deficit. If Americans ate one less hamburger a week, the grain "saved" would amount in a year to 10 million tons, roughly enough to feed a subsistence diet to 50 million people. It is Sen. Humphrey's conviction that the American people are prepared to respond generously to the world food crisis, if the facts about it and the political and moral choices posed by it are properly laid out before them. We are sure he is right.

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