1 June 1981

THE ACCELERATING FOOD CRISIS: THE NEED FOR URGENT POLITICAL ACTION

Grain Supply and Demand

The Brandt Commission reports that "Eight hundred millions are estimated to be destitute in the Third World today". From statistics (Appendix I Table 1) cited by FAO, the International Food Policy Research Institute (IFPRI) and other generally reliable sources, between 1976-77 and 1980-81 world cereal production appeared to increase by about 5% while world population expanded by 9.5%. Over the same period (Appendix I Table 2) cereal imports in all developing countries increased by 66% and in the low income LDCs the proportion of these imports provided by food aid decreased by more than 30% (Appendix I Table 3). During the same four year period (Appendix I Table 4), cereal stocks expressed as a proportion of total world cereal consumption decreased by 22%; the forecast world cereal stock for 1981 of 213 million tonnes being roughly the same as the stock held in 1974, the year when the World Food Congress was convened to emphasize the impending world food crisis. Over the same period cereal export prices and ocean freight rates have increased significantly (Appendix I Table 5).

For the next decade and beyond, prospects for a minimally adequate diet among the world's poorest countries appear grim indeed. These low income, food deficient nations in which the average per capita GNP in 1973 was less than $300 (U.S.) include among them almost two-thirds of the total population of the developing market economies (DMEs). Their food deficit is projected to rise from 12 million tonnes in 1975 to more than 80 million tonnes by 1990.

Assuming a desirable target of bringing the entire population of the DMEs to a satisfactory standard of energy intake, without reducing the consumption of their higher income groups who now consume above minimum standards, the total DME deficit by 1990 would be of the order of 143 million tonnes; about 90% of the deficit required to reach minimum energy requirements would be found in the lowest income countries. In these low income DMEs it is forecast that the food grain deficit in 1990 will be six to seven times the 1975 deficit (Appendix II Table 1 and Fig. 1).

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Asian countries will likely account for more than 40% of the projected deficit, North Africa and the Middle East for about 25%, sub-Saharan Africa for 20%, and Latin America slightly over 10%. The total world deficit, particularly in cereal grains could be exacerbated by an increased rate of demand for imported grains from the wealthier DMEs including the OPEC nations, from the eastern USSR bloc, and from the People's Republic of China; by a deteriorating food land resource base; and by various unanticipated adverse climatic and political restraints upon food production.

One may anticipate a significant decline in world cereal stocks in the immediate future. It is forecast that by the end of the current season, the global carryover of cereals will fall to about 213 million tonnes, that is 35 million tonnes (15%) below the opening level. The forecast decline of 31 million tonnes in coarse grain stocks will likely be the largest ever recorded in a single season. If the predictions are realized, world carryover stocks of cereals will be equivalent to barely 14% of estimated global consumption, very close to the low carryover levels that existed in 1974. Carryover stocks of wheat into the 1981-82 season are forecast to fall by 9 million tonnes over the previous year, 9 million tonnes being roughly the total quantity of cereals provided in food aid programs.

The cereal import requirements of the 73 low-income countries eligible for concessional food aid assistance are forecast at nearly 42 million tonnes compared with 37 million tonnes imported in 1979-80. Of the total 1980-81 cereal imports, 57% is required in Asian countries, 24% in Africa, 17% in the Near East and 2% in Latin America. The import cereal needs of the drought stricken countries of sub-Saharan Africa are nearly 50% higher in 80-81 than in 79-80.

Malnutrition

The above statistics present only a rough estimate of probable insufficiencies in dietary energy requirements; they say little about widespread incidences of malnutrition. Though for the poorest, malnutrition will mean a condition close to starvation, for many

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others malnutrition will reflect a diet that is inadequate to sustain full potential physical and mental capacity and development. Malnutrition impairs the capacity for work output and lowers resistance to infection, which in turn increases food nutrient demand to repair damage caused by disease. Malnutrition and chronic infection impair learning ability which further reduces the capacity for effective work. Consequently, malnutrition begins a vicious circle which can be broken only by provision of an adequate diet.

It is virtually impossible to assess the extent of malnutrition throughout the developing world since gross statistical assessment of food production, combined with doubtfully reliable estimates of population, provide at best a crude average of available food per capita. These averages, themselves uncertain, provide little indication of extreme variations that occur between years and seasons, among regions, among nations in a region, among communities within a nation, among families within a community, or even among members of the same family. Little that is precise and reliable is known of nutritional losses between harvest and consumption, or of the many political, social and economic forces that constrain production, distribution, and consumption of indigenous food supplies. Relatively few countries appear to have created mechanisms by which to plan and monitor the production and fair distribution of food supplies and essential nutrients. There appears ample evidence to indicate a significant correlation between income and diet; the poorest diets, quantitatively and qualitatively, are found among people with lowest incomes.

In some countries where total food grain production has increased significantly, there are indications that the nutritional balance in crop production has deteriorated. In India where rice and wheat production have noticeably increased over the past two decades, the principal sources of vegetable protein, food legumes and oilseeds, appear to be declining. The 1979-80 Indian legume harvest was 4 million tonnes below that of 1978-79 and 2 million tonnes lower

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than the average for any year since 1951. Oilseed imports into India increased from about $9 million in 1975 to $55 million in 1978.

Bangladesh, one of the poorest of all countries, needs to import about $96 million worth of oilseeds in 1980-81.

The reasons for declining legume and oilseeds production include: (a) lower support prices and (b) lower yields (weight of harvested grain/hectare) in comparison with cereals. The first requires political action; the second calls for a greater investment in legume and oilseed research.

Fossil Fuels versus Agriculture

Since the overwhelming majority of populations in developing countries are rural people, and since it is the rural sector that provides all of the food and a high proportion of the GNP, it would seem logical to give highest priority to agricultural research and development (including forestry, aquatic resources and related systems of preservation, processing and distribution), upon which all rural improvement depends. Unfortunately, most governments of developed countries, and many if not most of the less developed, appear to give more attention to the cost and supply of non-renewable fossil fuels than to agricultural efficiency. The privileged minorities throughout the world appear more concerned with the appetites of their automobiles than with the nutritional needs of the poverty stricken majority.

The comparative neglect of agriculture and rural development is evident among a number of countries that have struck oil. Data from the 1979 UN Statistical Yearbook show that in the OPEC countries, as national income rose on average by 286% in the period 1973 to 1978, agricultural production increased, on average, by only 187.5% and agricultural imports by 332.7% (Appendix III). For example, Nigeria's income has risen 296%, their agricultural production by 218%, and their agricultural imports by 549% over the same period.

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It seems evident therefore that increased income from petroleum is used to finance food imports rather than as investment for indigenous agriculture.

Loss of Arable Land

Production of food surplus over national requirement may be expected to decline among countries of North America and Europe if their governments persist in assigning higher priority to industrial growth than to agricultural production; if they permit large areas of their best arable land to be devastated by urban growth and by the proliferation of highways and industrial complexes. Almost the world over, conservation of arable land, bodies of inland and coastal waters and natural forests appear to be of minimal concern to those responsible for the formulation and implementation of national policy.

Projections by the U.S. Global 2000 study team suggest that the world's arable area of roughly 1477 million hectares in the early 1970s will level off by 2000 AD at 1539 million hectares, an increase of only 4%. On a per capita basis, the world's arable area in 1971 to 1975 was 0.32 hectares per person and is projected to decline by 2000 AD to 0.25 hectares per person (Appendix IV Tables 1 and 2). This ratio is composed of 0.46 hectares per person in the industrialized capitalist countries, 0.26 hectares per person in the centrally planned economies and 0.19 hectares per person in the less developed countries.

These figures conceal the loss of much of the best and most accessible land, and the increasingly costly and risky development of marginal lands and forested areas for agriculture. In Canada, for example, between 1971 and 1976 irretrievable losses to urbanization of improved and prime agricultural lands amounted to some 74,000 hectares, most of which occurred in the most fertile and climatically favoured areas - the Montreal triangle, Southern Ontario and the Fraser River Valley. Environment Canada has calculated that, in Ontario, if present trends continue, there will be no prime agricultural land left in less than 40 years. Most of Canada's remaining potential arable lands are

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located at higher latitudes where poorer soils, shorter growing seasons and higher transportation costs to market militate against agricultural economic efficiency.

In the United States, USDA figures indicate that 2.51 million hectares of prime cropland were converted to urban and related uses between 1967 and 1975. Between 1960 and 1970 West Germany and France lost 0.25% and 0.18% per year respectively of their agricultural land. The U.K., it is reported, loses close to 30,000 hectares of arable land annually to urban sprawl.

Such problems are not confined to developed countries. The city of Cairo is pressing inexorably onto the best lands of the Nile Delta, productive lands being lost to urban development almost as fast as new hectares are irrigated from the Aswan Dam. Many cities of the Third World are growing in population at rates of 5 to 8% yearly. It is forecast that the world's population will shift from 39% urban in 1975 to 50% urban by 2000 AD. It appears that throughout the world, areas considered best suited to urban growth are usually the most productive agricultural lands.

Other Land Losses

In addition to the outright removal from production of much of the arable land resource, the world's food production capability is being seriously impaired by reduction in quality of the lands remaining. Expansion of deserts can be expected to reduce drastically the production capacity of up to 15 million square kilometers of grazing land by the year 2000, through the combined effects of statistically predictable periods of drought and increased grazing pressure. Most of these losses will probably occur in sub-Saharan Africa and in Asia.

Irrigated lands are being lost at a world rate of 0.06% per year by waterlogging, and increased salinity and alkalinity. Irrigated lands are generally the most productive,but even if one assumes average productivity, this level of loss by the year 2000 represents the food supply for more than 9 million people.

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Soil erosion resulting from deforestation of watersheds has been of dramatic proportions in many developing countries. Less obvious, but equally damaging to the planet's capacity to feed its people, is the general erosion of agricultural soils, which in the USA amounts to an average of about 22 tonnes of topsoil per hectare per year. USDA estimates of the sustainable loss rate vary from 2½ to 12 tonnes per hectare, depending on soil depth. Maize, grown on about 7½% of world cultivated land is relatively poor at holding soil. The USA, the world's largest maize producer, is faced with a particular hazard if maize acreage is expanded to provide ethanol for automobile fuel.

Nearly half of mankind lives in or adjacent to upland watersheds where the extent of damage to soil productivity has been well documented. Flooding in the Indus River system of Pakistan has been far higher in the past 25 years than during the previous 60. Increased flooding, partly attributable to the denuding of catchment areas, has led to silting of dams and irrigation canals. Flood damage below the deforested Himalayan catchment areas has affected an area averaging 6 million hectares at a cost of U.S. $250 million a year.

To prevent the loss of productive lands alluded to above requires strong political action and some present sacrifice. The U.S. Global 2000 report states: "Throughout the world, the fate of soil systems depends on societies' willingness to pay the short-run resource and economic costs to preserve soils for long-run benefits. Whether the soils of the world will deteriorate further or be reclaimed will depend in large part on the ability and willingness of governments to make politically difficult policy changes. Assuming no policy change - the standard assumption underlying all of the Global 2000 Study projections - significant deteriorations in soils can be anticipated virtually everywhere, including in the U.S.A. Assuming that energy, water and capital are available, it will be possible for a time to compensate for some of the deterioration by increasing the use of yield-enhancing inputs (fertilizers, irrigation, pesticides, herbicides, etc.) but the projected increases in energy (and chemical fertilizer) costs will make this approach to offsetting soil losses

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ever more expensive. Without major policy changes, soil deterioration could significantly interfere with achieving projected food production levels."

Forestry and Rural Energy Supply

The energy needs of the Third World are as diverse as the countries themselves. But at the most general level there are two distinct elements: those associated with (a) the rise in oil prices and (b) the supply of such traditional rural fuels as wood, crop residues and animal dung.

The oil price rises largely affect the modern industrial sectors and exacerbate the problems of underdevelopment associated with foreign exchange balances, international indebtedness and the resources available for development. The direct effects on oil-consuming industries and transportation systems are essentially similar in nature in both developing and industrialized countries.

For most of the world's poor people, rural energy supply is more critical than industrial requirements since upwards of 1.5 billion people, or 37% of the world's population, depend almost entirely on fuel wood for cooking and heating. Over 90% of total wood used in the developing countries is for fuel, compared with less than 10% in industrialized countries.

Forest cover has decreased from 25% to 20% of the earth's surface over the past 20 years and will probably decline to about 15% by the year 2020.

World production of about 80 cu m per capita of commercially valuable trees will likely decrease to less than 40 cu m per capita by the end of the century (Appendix V Table 2). A brief account of the effects of deforestation in developing countries is given in Appendix V.

SOME ACTIONS NEEDED

Nationally and internationally the highest of all priorities needs to be given to improved agricultural production and food distribution. This calls for a substantial increase in investment, by both developed and less developed countries, in agricultural research, development and training in the developing countries. Through pricing and land conservation policies, together with research in cooperation with farmers, greater production and more uniform distribution of staple food crops is essential if massive human suffering is to be avoided.

While support for international and regional food and agricultural research and training programs needs to continue, much greater emphasis needs to be given to management and technical competence in national agricultural research and development programs throughout developing countries. A greater effort is clearly necessary to persuade government and political leaders throughout the world of the relatively high rates of economic and social return that derive from investment in agricultural research and development; of the need for increased agricultural productivity among all food producing nations; that empty stomachs cause more human misery and conflict than empty gasoline tanks.

Both the Pearson Commission in 1969 and the Brandt Commission in 1980 pointed out that more than 95% of the world's research is carried out in economically developed countries and recommended that these developed countries could and should integrate more of their scientific and technical competence with research and development in developing countries. With encouragement from the International Commission on the Application of Science to Agriculture, Forestry and Aquaculture (CASAFA), sponsored by the International Council of Scientific Unions (ICSU), a number of developed and developing countries are creating national committees composed of scientists of many disciplines for the purpose of stimulating scientific cooperation in agricultural and related sciences for the benefit of the Third World countries. What is urgently needed is a small Secretariat in Paris in cooperation with ICSU to coordinate the

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activities of the various national committees through the international commission CASAFA (Appendix VI).

Though the desirable objective is for all developing countries to become self sufficient in their basic subsistence food needs, such a goal is far from realization and even the most optimistic forecasts predict over the next 20 years a growing demand for imported food grains on both commercial and concessional terms. It is therefore essential from both humanitarian considerations and the point of view of commercial self interest, that the major grain producers continue to expand their capacity to generate surpluses. Simultaneously, multilateral and bilateral assistance agencies could provide incentives to developing countries which demonstrate a capability to produce grains surplus to their needs. These incentives could take the form of agreements to purchase and distribute various quantities of grain grown in excess of national need. The new government of Zimbabwe has demonstrated the stimulus to increased cereal production of a guaranteed pre-planting price for maize. It is clearly more efficient and desirable for a country such as Zimbabwe to produce surpluses with which to feed its immediate neighbours than for the food deficient countries of Africa to rely entirely upon suppliers located many thousands of miles away. It is evident that all of the surpluses which Zimbabwe or any other LDC can generate over the next 20 years will be needed in addition to what is produced by the established international grain traders.

Given the projections for market deficits in the DMEs, one could predict that these may well increase as a share of total world production. This will place increasing demand pressure on cereal markets, making them "strong" markets for the surplus or export production of the industrial countries. Therefore, providing development assistance to the DMEs to increase there own long-term cereal production does not threaten a loss of cereal markets to the exporting nations. If the world's cereal stocks fall significantly relative to consumption (as is evident this year) then any single disaster such as widespread drought or floods could result in dramatic price increases. The conclusion

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from the above is that by providing increasing scientific and technical assistance to the DMEs to increase their staple food production, then both the humanitarian goal of providing an improved diet to the world's hungry and the pragmatic goal of world market and price stability are more likely to be attained.

Successful research in international agricultural research centres has brought about sizeable increases in on-farm yields and total production of wheat, rice and maize in many countries. Up to the present, no comparable on-farm improvements in other important cereals, such as sorghum and the millets, or in food legumes and oilseeds appear to have occurred. Though some research stations in Asia and Africa report higher yielding cultivars of sorghum and some legumes, on-farm yields remain dismally low.

Furthermore, investment in and results from post-production systems research to improve the distribution and to reduce post-harvest losses of all food crops falls far short of research to increase crop production.

In summary, the melancholy state of food and agriculture debated during the 1974 World Food Congress has neither disappeared nor diminished. In fact, it is of more serious dimensions, mainly because governments of developed and developing countries alike have devoted more energy to debate and political posture than to honest and dedicated effort to feed the hungry.

The most pressing issue in the North South dialogue is not how to feed automobiles but how to feed people. Whether one considers the malnourished rural or urban poor it is from rural agricultural improvement that they must be fed.

Consequently, the highest priorities for all nations should be to encourage and support agricultural research and development; to arrest the depredation of agricultural and afforested land and of productive waters; to establish more efficient systems of food preservation and distribution; to restore agriculture, forestry, fisheries and all those who are employed therein to a level of dignity and recognition commensurate with their supreme importance

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to the welfare of mankind; for the leaders of all nations to recognize that one man's hunger is every man's hunger.

Joseph H. Hulse
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APPENDIX I

TABLE I

WORLD CEREAL PRODUCTION

	1976/77	1980/81 ESTIM.	CHANGE 1980/81 FROM 1976/77
	(MILLION TONNES)		(PERCENTAGE)
RICE (MILLED)	233	268	+ 15
WHEAT	425	446	+ 5
COARSE GRAINS	712	722	+ 1.5
ALL CEREALS	1 370	1 436	+ 5
DEVELOPING COUNTRIES	595	648	+ 9
LOW-INCOME COUNTRIES	(453)	(506)	(+ 12)
DEVELOPED COUNTRIES	775	788	(+2)

SOURCE: FOOD OUTLOOK MARCH 24, 1981

APPENDIX I

TABLE 2

WORLD CEREAL IMPORTS

	1976/77	1980/81 ESTIM.	CHANGE 1980/81 FROM 1976/77
	(MILLION TONNES)		(PERCENTAGE)
RICE (MILLED)	9	12.	+33
WHEAT	62	92	+48
COARSE GRAINS	80	99	+24
ALL CEREALS	150	203	+35
DEVELOPING COUNTRIES	58	96	+66
LOW INCOME COUNTRIES	(27)	(41)	(+52)
DEVELOPING COUNTRIES	92	107	+16
	(MILLION US$)		
VALUE OF COMMERCIAL CEREAL IMPORTS OF LOW-INCOME COUNTRIES	3 700	9 000	+143

SOURCE: FOOD OUTLOOK MARCH 25, 1981

APPENDIX 1

TABLE 3

FOOD AID IN CEREALS

	1976/77	1980/81 ESTIM.	CHANGE 1980/81 FROM 1976/77
	(MILLION TONNES)		(PERCENTAGE)
LOW-INCOME COUNTRIES	7.1	7.3	+3
OTHERS	2.0	1.9	−5
TOTAL FOOD AID	9.1	9.2	+1
	(PERCENT)		
PROPORTION OF CEREAL IMPORTS OF LOW-INCOME COUNTRIES COVERED BY FOOD AID	26	18	−31

SOURCE: FOOD OUTLOOK MARCH 24, 1981

APPENDIX I

TABLE 4

WORLD CEREAL STOCKS

	1976/77	1980/81 ESTIM.	CHANGE 1980/81 FROM 1976/77
	(MILLION TONNES)		(PERCENTAGE)
RICE (MILLED)	37	44	+19
WHEAT	114	91	-20
COARSE GRAINS	92	78	-15
ALL CEREALS	243	213	-12
DEVELOPING COUNTRIES	98	96	-2
LOW-INCOME COUNTRIES	(75)	(76)	(+1)
DEVELOPED COUNTRIES	145	117	-19
STOCKS AS % OF WORLD CEREAL CONSUMPTION	(PERCENT) 18	14	-22

SOURCE: FOOD OUTLOOK MARCH 24, 1981

APPENDIX I

TABLE 5

EXPORT PRICES AND OCEAN FREIGHT RATES

	1976/77	1980/81 ESTIM.	CHANGE 1980/81 FROM 1976/77
EXPORT PRICES	(US$/TONNE)		(PERCENTAGE)
RICE (THAI, 5%)	257	456	+77
WHEAT (US. NO. 1 HARD WINTER)	111	182	+64
MAIZE (U.S. NO. 2 YELLOW)	108	143	+32
OCEAN FREIGHT RATES			
FROM U.S. GULF TO EGYPT	16.66	40.53	+143

SOURCE: FOOD OUTLOOK MARCH 24, 1981

APPENDIX II

TABLE 1

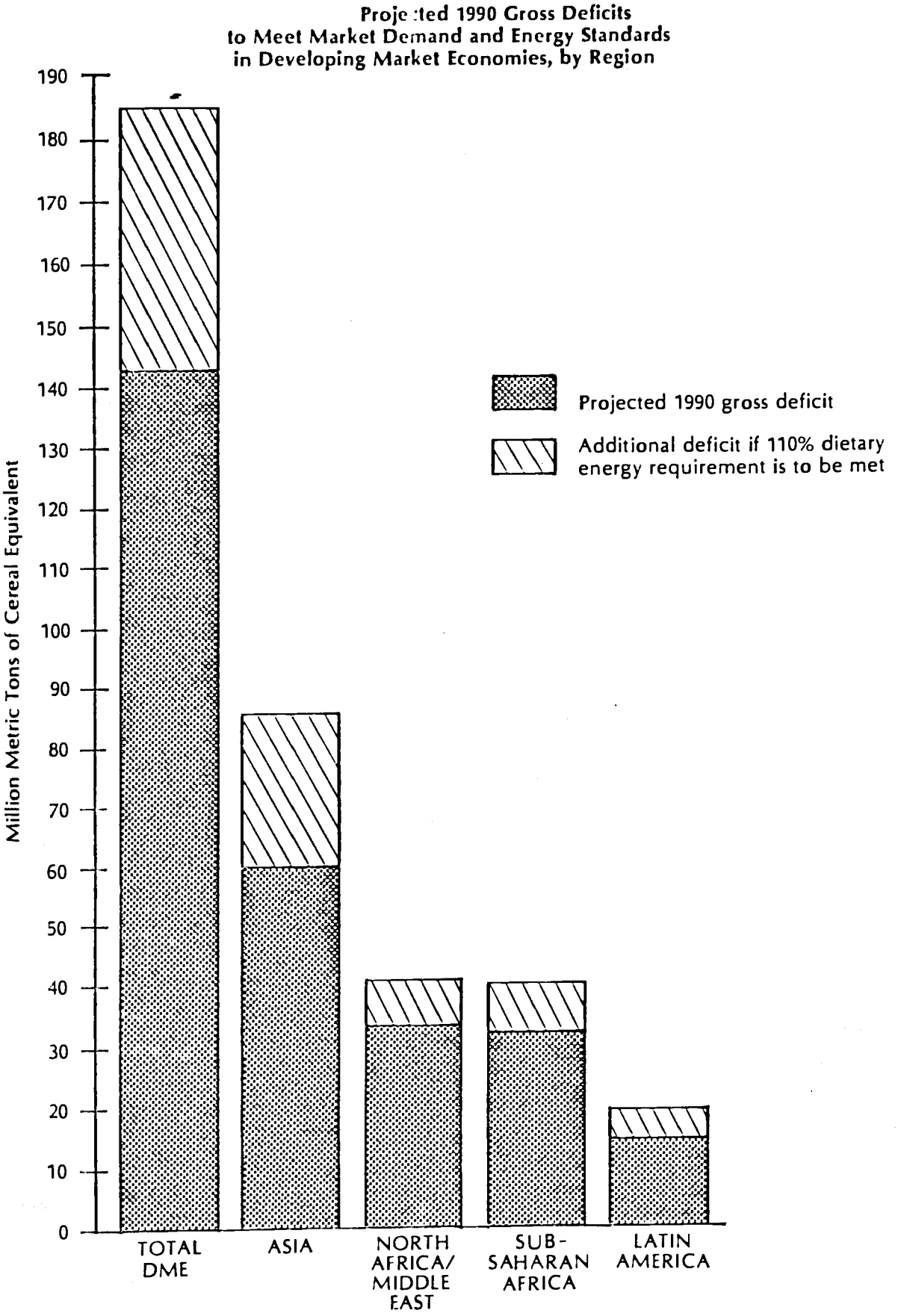
PROJECTED 1990 TOTAL DEFICITS FOR MEETING MARKET DEMAND AND ENERGY REQUIREMENTS IN DME

(MILLION METRIC TONNES, CEREAL EQUIVALENT)

	PROJECTED MARKET DEFICIT		TOTAL TO MEET MARKET DEMAND AND ENERGY REQUIREMENT	
	LOW INCOME GROWTH	HIGH INCOME GROWTH	LOW INCOME GROWTH	HIGH INCOME GROWTH
REGION				
ASIA	49.6	60.3	80.8	85.2
NORTH AFRICA MIDDLE EAST	30.0	34.1	38.0	41.1
SUB-SAHARA AFRICA	27.4	32.1	36.7	40.3
LATIN AMERICA	14.1	16.6	16.7	18.9
TOTAL DME	121.1	143.1	172.2	185.4

APPENDIX II

FIGURE 1



APPENDIX III

OPEC COUNTRIES

TABLE 1

NATIONAL INCOME, AGRICULTURAL PRODUCTION AND IMPORTS

COUNTRY/YEARS		% increase in National Income	% increase in Agric. Prod.	% increase in Agric. Imports
ALGERIA	(1973 - 77)	254 %	173 %	318 %
ECUADOR	(1973 - 78)	327 %	250 %	286 %
GABON	(1973 - 78)	366 %	186 %	295 %
INDONESIA	(1973 - 78)	321 %	250 %	210 %
IRAN	(1976 - 78)	152 %	102 %	213 %
IRAQ	(1973 - 75)	260 %	157 %	344 %
KUWAIT	(1975 - 78)	124 %	0	153 %
LIBYA	(1973 - 78)	284 %	200 %	180 %
NIGERIA	(1973 - 77)	296 %	218 %	549 %
QATAR	(1973 - 78)	NA	NA	671 %
SAUDI ARABIA	(1973 - 77)	275 %	181 %	361 %
UNITED ARAB EMIRATES	(1973 - 78)	536 %	301 %	400 %
VENEZUELA	(1973 - 78)	245 %	232 %	345 %

APPENDIX III

TABLE 2

OPEC COUNTRIES

AGRICULTURAL IMPORTS

(US $ Millions)

	1973	1974	1975	1976	1977	1978	1979
Ecuador	.043	.073	.082	.102	.116	.123	
Gabon	.020	.034	.063	.056	.062	.059	
Algeria	.383	.823	1.329	.974	1.220	1.314	
Indonesia	.585	.622	.629	.904	1.106	1.233	
Iran	.429	1.270	1.996	1.154	1.626	2.465	
Iraq	.225	.704	.776	.591	.755	.862	
Kuwait	.209	.276	.408	.475	.574	.629	
Libya	.323	.475	.609	.469	.578	.582	
Nigeria	.233	.322	.572	.767	1.225	1.564	
Qatar	.037	.061	.057	.083	.088	.102	
Saudi Arabia	.429	.561	.615	.995	1.552	1.924	
United Arab Emirates	.085	.202	.250	.282	.321	.340	
Venezuela	.387	.536	.719	.892	1.235	1.336	

Source: FAO Trade Yearbook (1980)

APPENDIX III
TABLE 3

NIGERIA:

NIGERIA
INCOME AND AGRICULTURAL PRODUCTION

Year	National Income (Million Naira)	Agricultural Production as % of National Income
1979		
1978		
1977	30,755	24%
1976	26,071	25%
1975	20,597	28%
1974	17,709	27%
1973	10,361	33%

Sources: - UN Yearbook of National Account Statistics (1979)

- Quarterly Economic Review (1980 Supplement)

APPENDIX IV

TABLE 1

ARABLE AREA, ACTUAL AND PROJECTED (TREND)

	1951-55	1961-65	1971-75	PROJECTED 1985	PROJECTED 2000
			MILLIONS OF HECTARES		
INDUSTRIALIZED COUNTRIES	361.2	371.8	400.3	392.2	399.1
CENTRALLY PLANNED COUNTRIES	384.3	404.5	414.5	417.5	420.0
LESS DEVELOPED COUNTRIES	529.2	607.1	662.0	706.0	723.5
WORLD	1,274.7	1,383.4	1,476.8	1,513.7	1,538.6

NOTE: ARABLE AREA INCLUDES LAND UNDER TEMPORARY CROPS (DOUBLE-CROPPED AREAS ARE COUNTED ONLY ONCE), TEMPORARY MEADOWS FOR MOWING OR PASTURE, LAND UNDER MARKET AND KITCHEN GARDENS (INCLUDING CULTIVATION UNDER GLASS), AND LAND TEMPORARILY FALLOW OR LYING IDLE.

SOURCE: US GLOBAL 2000 REPORT, USDA DATA

APPENDIX IV

TABLE 2

ARABLE AREA PER CAPITA, ACTUAL AND PROJECTED (TREND)

	1951-55	1961-65	1971-75	PROJECTED 1985	PROJECTED 2000
	ARABLE HECTARES PER CAPITA				
INDUSTRIALIZED COUNTRIES	.61	.56	.55	.50	.46
CENTRALLY PLANNED COUNTRIES	.45	.39	.35	.30	.26
LESS DEVELOPED COUNTRIES	.45	.40	.35	.27	.19
WORLD	.48	.44	.39	.32	.25

NOTE; ARABLE AREA INCLUDES LAND UNDER TEMPORARY CROPS (DOUBLE-CROPPED AREAS ARE COUNTED ONLY ONCE), TEMPORARY MEADOWS FOR MOWING OR PASTURE, LAND UNDER MARKET AND KITCHEN GARDENS (INCLUDING CULTIVATION UNDER GLASS), AND LAND TEMPORARILY FALLOW OR LYING IDLE.

SOURCE: US GLOBAL 2000 REPORT, USDA DATA

FOREST RESOURCES

In the less developed countries (LDCs), where most of the deforestation will occur, people will forgo the increased use of paper and other industrial wood products that might have been expected to follow increased GNP, and the effect on welfare will be negative but bearable. But industrial wood products are much less important in LDCs than charcoal and fuelwood used for cooking and heating, and poles used for framing structures for shelter. Prices and absolute scarcity will put fuelwood and charcoal out of economic reach of not only the subsistance sector but also much of the market sector of the LDC populations. Ten years ago it seemed that increased use of bottled gas and kerosene would constrain the rising consumption of wood for residential fuel, but the five-fold petroleum price increases have thrown most of the demand back to wood and other biomass.

The negative consequences of this high degree of dependence on wood fuel give cause for major concern. For example, fuelwood harvesting and conversion of forest land to agriculture have together caused a reduction in the world's forest area by some 500 million hectares in the decade 1963-73. The world's tropical forests are being consumed at the rate of some 10-15 million hectares a year and could disappear within 60 years unless forestry protection and reforestation programs are undertaken on a massive scale. Concentrated fuelwood collection close to rural and population centres particularly on the steep hillsides of catchment areas has contributed to soil erosion, flash flooding,

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drying up of perennial streams and disruption of agricultural production in many of the developing countries. As natural fuelwood supplies have become exhausted, people have been forced to burn increasing quantities of dried dung and agricultural crop residues which should more logically be used for improving soil structure and fertility. On a global scale, the amount of dung currently being burned is estimated at something over 400 million tons a year, equivalent to about 20 million tons of foregone foodgrain production. Few surveys are yet available on this subject but it seems likely that more than 500 million people are almost wholly dependent on dung or crop residues for their fuel requirements. As a result of forest resource over-cutting, people in the rural areas are spending more and more time and labor on fuel collection, time which could be more beneficially employed on improving crop and animal husbandry, irrigation and soil conservation works and so on. In Central Tanzania, for example, it now requires 250-300 man days of work to provide the annual fuelwood requirements of a household of 5 persons.

The rising cost of fuelwood as supplies become scarce, puts a strain on family budgets and adversely affects the diet of the rural poor. It has been estimated that at current fuelwood prices, the need to purchase fuel would absorb 35-40 per cent of the income of rural people living in the Andean Sierra or Sahel zones. In parts of West Africa, which are acutely short of wood fuel, people have been reduced from two cooked meals a day to one. In wood poor areas in the hills of Haiti and Nepal, scarcity of wood has

influenced crops more in favor of those which are edible raw or with little cooking and hence this affects diet, and possibly, in some respects, nutritional levels. Research aimed at development of fast growing species suitable for production of fuelwood, and shortening the rotations of forest trees, could make a significant contribution to closing the 'energy gap'. If such research led to only a 10 per cent increase in yields between now and the turn of the century, the investment savings would be something in the order of US $5 billion. In practice, yield increases of up to 25 per cent have been achieved for some tree species as a result of past research.

APPENDIX V

TABLE 1

ESTIMATES OF WORLD FOREST RESOURCES, 1978 AND 2000

	CLOSED FOREST (MILLIONS OF HECTARES)		GROWING STOCK (BILLIONS CU M OVERBARK)	
	1978	2000	1978	2000
INDUSTRIALIZED COUNTRIES	1,464	1,457	156	149
LDCS	1,099	660	171	104
TOTAL	2,563	2,117	327	253

U.S. GLOBAL 2000 REPORT

APPENDIX V

TABLE 2

WORLD COMMERCIAL TIMBER RESOURCES, 1978 AND 2000

	GROWING STOCK PER CAPITA (CU M BIOMASS)	
	1978	2000
INDUSTRIALIZED COUNTRIES	142	114
LDCS	57	21
GLOBAL	76	40

U.S. GLOBAL 2000 REPORT

APPENDIX V

TABLE 3

FOREST RESOURCES PER CAPITA

BY GEOGRAPHIC REGION, MID-1970s

	CLOSED FOREST AREA (HA/CAP)	OPEN WOODLAND AREA (HA/CAP)	GROWING STOCK (M^3/CAP)
NORTH AMERICA	2.0	0.7	179
CENTRAL AMERICA	0.5	0.02	50
SOUTH AMERICA	2.4	0.7	428
AFRICA	0.4	1.3	92
EUROPE	0.3	0.1	27
U.S.S.R.	3.0	0.4	310
ASIA	0.2	0.3	17
PACIFIC	3.6	4.8	390
WORLD	0.7	0.3	80
MORE INDUSTRIAL	1.3	0.4	128
LESS INDUSTRIAL	0.4	0.3	61

SOURCE: U.S. GLOBAL 2000 REPORT

APPENDIX VI

- THE INTEGRATION OF RELEVANT RESEARCH IN DEVELOPED AND DEVELOPING COUNTRIES THROUGH THE ICSU COMMISSION ON THE APPLICATION OF SCIENCE TO AGRICULTURE, FORESTRY AND AQUACULTURE

The ICSU international Commission on the Application of Science to Agriculture, Forestry and Aquaculture (CASAFA) is composed of a group of senior scientists from developed and developing countries representative of national academies and national research councils and various international scientific unions with representation from FAO and UNESCO. The primary objective of CASAFA is to focus attention on opportunities through scientific research to increase agricultural output (including aquaculture, forestry and their related post-production systems) in developing countries through cooperation between scientists and institutions of advanced science and technology in both developed and developing countries. It is believed that among the national and scientific union members of ICSU there exists a research capacity and expertise as yet virtually untapped by present structures of bilateral and multilateral assistance. It is the purpose of CASAFA to develop two complementary networks; the first among ICSU's members, particularly the international scientific unions wherein resides an immense resource of scientific knowledge and experience which if appropriately directed could be brought to bear upon the successful solution of many problems in developing countries. The second and complementary network would gather information from developing countries and research institutions within those countries concerning major obstacles

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to increased agricultural production which could be overcome by specialized research undertaken by various of ICSU's members. Several countries are poised to establish national committees to cooperate with CASAFA and there is now an urgent need to establish in Paris, close to ICSU, a small scientific Secretariat to bring together, to rationalize and to match the research needs of the developing countries with the available capacities of the scientifically more developed nations. Money of the order of about $100,000 per year, is urgently needed to provide the Secretariat in Paris. The operations of all the other participating countries and agencies would be financed from their own resources.

SOURCES

The data and information provided was gleaned from many sources including various reports by IFPRI and FAO, and the following:

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