



United States  
Department of  
Agriculture

Economic  
Research  
Service

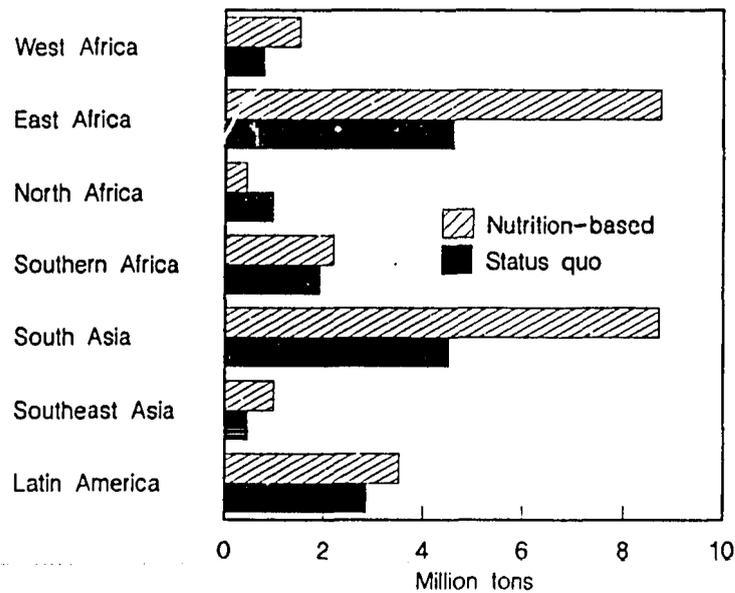
November 1990  
GFA 1

PW-1  
695-3

# Global Food Assessment

## Situation and Outlook Report

Estimated Food Aid Needs, 1990/91



# **Global Food Assessment**

Situation and Outlook Report

November 1990

## Contents

	Page
Foreword . . . . .	3
Summary . . . . .	4
Aggregate Food Aid Needs and Availabilities . . . . .	5
Short-Term Outlook for Global Cereal Supplies . . . . .	9
Outlook for Cereal Food Aid Availabilities . . . . .	15
Assessment of Short-Term Cereal Aid Needs . . . . .	18
North Africa . . . . .	20
Egypt . . . . .	21
West Africa . . . . .	24
East Africa . . . . .	25
Ethiopia . . . . .	26
Sudan . . . . .	27
Southern Africa . . . . .	28
Mozambique . . . . .	29
South Asia . . . . .	31
Bangladesh . . . . .	33
India . . . . .	34
Southeast Asia . . . . .	35
Philippines . . . . .	36
Latin America . . . . .	38
Jamaica . . . . .	39
Peru . . . . .	41
Case Studies of Long-Term Cereal Food Aid Needs . . . . .	41
Long-Term Global Cereal Outlook . . . . .	43
Procedures for the Long-Term Assessments . . . . .	46
India . . . . .	46
Morocco . . . . .	51
Kenya . . . . .	55
Appendixes . . . . .	58

### Report Coordinators

Kim Hjort, Michael Kurtzig, Maurice Landes  
(202) 219-0680

### Principal Contributors

Dick Brown	Latin America short-term assessments.
Kim Hjort	Methodology, structural commercial import models, India long-term assessment.
Ricardo Krajewski	Latin America short-term assessments.
Maurice Landes	South Asia and Southeast Asia short-term assessments.
Myles Mielke	Long-term global cereals outlook.
Margaret Missiaen	West Africa short-term assessments, database development.
Daniel Pick	Vector autoregression commercial import forecasts.
Stacey Rosen	East Africa and Southern Africa short-term assessments, Kenya long-term assessment.
Linda Scott	Data coordinator, spreadsheet programming.
Shahla Shapouri	Methodology.
Mark Smith	Food aid availabilities.
Fred Surls	Short-term global cereals outlook.
Mark Wenner	North Africa short-term and Morocco long-term assessments.

### Other Contributors

Steve Blevins, Mehrdad Boroumand, Paul Johnston, Barry Krissoff, Kathy Lindert, Liana Neff, John Parker, David Skully, Tom Vollrath

Approved by the World Agricultural Outlook Board. Summary released November 20, 1990. The summary and text of Situation and Outlook reports may be accessed electronically. For details, call (202) 447-5505.

mailed to foreign addresses cost \$13.75). Make checks payable to ERS-NASS, and mail to P.O. Box 1608, Rockville, MD 20849-1608. Or call, toll free, 1-800-999-6779. You may use VISA or MasterCard, or we can bill you.

The *Global Food Assessment* is a report in the Situation and Outlook series. Single copies are available for \$11 (copies

## Foreword

This *Global Food Assessment* (GFA) report, assesses both short-term (2 years), and longer term issues affecting food aid needs. This report contains estimates for 1990/91 and 1991/92 for 55 developing countries based on USDA data as of September 12, 1990, and data from other sources. The report also includes case study analyses of factors affecting longer term needs in India, Kenya, and Morocco.

GFA is the successor to the quarterly *World Food Needs and Availabilities* (WFNA) series which was first published by the Economic Research Service over a decade ago and terminated in December 1989. GFA includes:

- The focus of the short-term aid needs assessments is on chronic needs, not emergency needs. Although GFA uses the most current data, it cannot account for crop or financial losses that may occur later in the crop year and cause additional emergency aid needs.
- Similar to WFNA, the 1990/91 and 1991/92 food aid need estimates cover 55 countries (appendix 1). Unlike WFNA, however, most estimates are provided in the form of regional aggregates. Individual country estimates are published for nine countries that are major food aid recipients: Bangladesh, Egypt, Ethiopia, India, Jamaica, Mozambique, Peru, the Philippines, and Sudan.
- Commodity coverage in both the short- and long-term assessments is limited to cereals. WFNA also covered roots and tubers, pulses, edible oils, and milk for some countries.
- As in WFNA, GFA provides alternative assessments of food aid needs based on status quo and nutritional (caloric) per capita consumption targets. However, in the GFA, status quo consumption is based on average per ca-

pita cereal consumption during the last 10 years, rather than the 4-year average method used in the WFNA. The nutrition estimates continue to be based on the United Nation's recommended minimum daily caloric intake level for each country. These levels have been recently revised and are substantially lower than the series used in WFNA (appendix 2).

- In GFA, food aid needs are estimated as the difference between the amount of cereal imports needed to reach target consumption and projections of actual commercial imports. This procedure accounts for changes in commercial food import behavior because of changes in macroeconomic and agricultural conditions. In contrast, estimates in WFNA were based on the difference between import needs and an estimate of commercial import capacity that simply maintained historical allocations of available foreign exchange to food imports.
- Unlike WFNA, GFA provides analysis of issues affecting long-term food aid needs. This edition includes case studies of long-term food aid needs for India, Kenya, and Morocco under alternative scenarios using simulation models developed at ERS.

The food aid needs estimates in this report are intended to assist financial and logistical planning by food aid donors. They do not constitute recommendations for food aid programming. There are a number of important variables in food aid programming not accounted for by these estimates. Factors that may tend to reduce feasible or desirable food assistance include infrastructural and political constraints in delivering food aid, and potential adverse effects on local markets. Factors that may tend to increase feasible or desirable food aid include pockets of severe food deficits within countries that are masked by national level statistics, or setbacks in production of important noncereal foods.

## Summary

Cereal aid needs for 55 low-income countries in 1990/91 are substantial despite the favorable outlook for supplies. East Africa and the relatively populous region of South Asia will require the most assistance, followed by Latin America and Southern Africa. The situation reflects poor harvests in Ethiopia and Sudan, good crops in most of Asia, and declining commercial cereal imports in most regions due to foreign exchange shortages.

To maintain per capita cereal consumption at the 1980-89 average for the 55 countries would take an estimated 16 million tons of food aid. However, to meet the United Nations' minimum caloric standard would require 26 million tons. Both estimates are sharply higher than the 9.3 to 10.4 million tons of aid available for 1990/91 and the estimated 9.5 million tons provided in 1989/90. These countries typically receive about 80-90 percent of global availabilities.

Global cereal food aid in 1989/90 was 11.8 million tons and is projected to decline to 11.6 million in 1990/91 because of a reduction in the European Community's assistance to Eastern Europe.

The gap between estimated needs and availabilities does not necessarily dictate an increase in global food aid. Needs may not be consistent with the amount of aid that can be delivered and effectively utilized.

Projections for 1991/92 indicate a small decline in cereal food aid needs for the 55 countries. Needs range from 15.3 to 16.0 million tons on a 1980-89 status quo basis, to about 24.0 million on the minimum nutrition level.

A decline is projected in East Africa, assuming more normal weather, while increases are likely in North Africa and Latin

America because of small production gains and weakening commercial imports.

The report also includes analysis of longer term food aid needs of India, Morocco, and Kenya under various scenarios.

India is expected to support status quo and nutrition-based needs without food aid during the 1990's. However, strengthening demand could necessitate aid, particularly in the event of severe or successive production setbacks. India's cereal stocks are likely to be low and under pressure during the decade, as balance-of-payment constraints reduce imports. Higher world cereal prices, perhaps associated with reduced subsidies in developed countries, or another oil price shock, would also tend to limit cereal import capacity.

Morocco's long-term cereal aid needs will depend on the country's ability to import commercially. Food aid needs could become significant with sharply lower output, or if a prolonged slowdown in export earnings constrains import capacity. Imports will be determined largely by external factors, including the price of oil, export demand, and export market access. In any event, Morocco will depend on cereal imports because of its limited land base, rainfed production, and rapidly growing population.

For Kenya, food aid needed to meet demand will be relatively small during the 1990's. However, the food security situation there will deteriorate if recent strong output growth cannot be sustained. Kenya will continue to be vulnerable to droughts and adverse external developments that reduce income and market demand, which would indicate a widening nutritional gap.

## Aggregate Food Aid Needs and Availabilities

Aggregate cereal food aid needs for 1990/91 for the 55 low-income countries included in this report are estimated at 16.1-17.2 million tons, according to the status quo assessment, which supports per capita cereal use at the 1980-1989 average level (table 1). The nutrition-based assessment, which supports cereal use at levels consistent with minimum caloric standards recommended by the United Nations, places 1990/91 needs at 26.1-26.8 million tons. These needs contrast sharply with the historical cereal food aid receipts of these countries—about 9.5 million tons in 1989/90—and with the estimated availability of aid in 1990/91. Total availability of cereal food aid in 1990/91 is forecast at 11.6 million tons. Since only 80-90 percent of cereal aid is typically allocated to these 55 countries, aid available to meet their needs in 1990/91 may be in the range of 9.3-10.4 million tons (table 2).

Despite the large discrepancy between estimated needs and availabilities for 1990/91, the results do not necessarily constitute a recommendation for expanded cereal food aid. The estimates provided here are intended for use with information provided by agencies involved in food aid delivery to assist in budgetary decisions. Key additional information to be considered includes logistical and economic constraints to the delivery and absorption of aid, acute needs arising from

uneven food distribution within countries, and emergency needs resulting from production shortfalls occurring after this report was completed.

These estimates were derived from methods applied consistently across all countries. As a result, they permit comparison of current aggregate and regional aid levels relative to alternative consumption benchmarks (status quo and nutrition-based).

### Use of the Status Quo and Nutrition-based Estimates

The status quo estimates indicate the amount of cereal aid needed to support recently achieved levels of per capita consumption. The nutrition-based estimates, in contrast, indicate the aid needed to support per capita cereal availability at a level consistent with minimum caloric standards. Comparison of the two measures, either in aggregate or for individual countries or regions, therefore, indicates the need to raise or lower current aid levels in order to achieve rough nutritional adequacy. Where estimated nutrition-based needs exceed status quo needs by relatively large margins, there is a need for additional aid to move closer to nutritional adequacy. In cases where nutrition-based needs are below status quo needs, some reduction in aid would still be consistent, on average, with maintaining nutritional adequacy.

Table 1. Summary of forecast cereal food aid needs

	Food aid needs							
	Production			Status quo			Nutrition-based	
	Commercial imports	Food use	With stock adjustment	Constant stocks	Food use	With stock adjustment	Constant stocks	
-----million tons-----								
North Africa								
1990/91	18.95	9.69	17.47	0.95	1.13	14.78	0.43	0.47
1991/92	19.52	8.87	17.88	2.32	2.26	15.13	0.40	0.35
West Africa								
1990/91	10.35	1.49	10.53	0.78	0.80	11.36	1.52	1.58
1991/92	10.58	1.51	10.85	0.89	0.84	11.69	1.74	1.69
East Africa								
1990/91	17.58	0.85	19.35	4.62	5.36	23.65	8.75	9.49
1991/92	20.34	0.87	20.00	3.32	3.43	24.45	7.24	7.65
Southern Africa								
1990/91	8.08	0.56	8.63	1.93	2.19	8.93	2.21	2.48
1991/92	8.77	0.66	8.88	2.21	1.72	9.18	2.53	2.02
South Asia								
1990/91	204.57	1.57	173.91	4.52	4.28	180.58	8.71	8.40
1991/92	206.91	1.89	177.82	4.29	4.22	184.59	7.85	7.82
Southeast Asia								
1990/91	56.62	4.22	50.22	0.46	0.66	49.04	0.98	0.95
1991/92	58.62	4.38	51.22	0.07	0.00	50.03	0.93	0.80
Latin America								
1990/91	6.88	1.92	7.30	2.88	2.81	7.89	3.52	3.45
1991/92	7.09	1.56	7.46	2.94	2.85	8.07	3.58	3.52
Total (55 countries)								
1990/91	323.02	20.31	287.41	16.14	17.23	296.23	26.12	26.82
1991/92	331.84	19.74	294.10	16.03	15.32	303.13	24.24	23.85

Table 2. Historical cereal food aid receipts and projected needs for 1990/91 and 1991/92

Region	1985/86	1986/87	1987/88	1988/89	1989/90 1/	1990/91		1991/92	
						SQ	NB	SQ	NB
-----1,000 tons-----									
North Africa	2,021	2,985	2,400	1,948	1,916	951	426	2,321	396
Egypt	1,799	1,977	1,646	1,427	1,467	75	0	1,575	0
West Africa	564	679	542	569	521	784	1,521	891	1,735
East Africa	1,971	1,662	2,013	1,366	2,032	4,620	8,749	3,315	7,236
Ethiopia	770	514	1,052	448	1,240	1,481	4,737	1,272	4,643
Sudan	690	725	410	410	320	2,091	1,572	1,051	517
Southern Africa	609	665	968	1,085	1,411	1,925	2,208	2,215	2,526
Mozambique	362	244	506	506	725	418	683	425	696
South Asia	2,386	2,586	2,839	2,365	1,717	4,521	8,711	4,286	7,845
Bangladesh	1,203	1,589	1,397	1,161	948	2,447	7,343	1,515	6,550
India	254	212	223	308	260	0	0	0	0
Southeast Asia	248	804	861	304	97	457	977	66	927
Philippines	181	349	477	135	15	0	681	0	737
Latin America	1,436	1,699	2,095	1,452	1,788	2,879	3,516	2,937	3,578
Jamaica	203	333	208	365	302	338	306	342	310
Peru	180	237	395	146	200	1,021	1,282	836	1,102
Total (55 countries)	9,235	11,080	11,718	9,089	9,482	16,137	26,108	16,030	24,243
Total Food Aid Contributions	10,949	12,599	13,503	10,196	11,800	NA	NA	NA	NA
Share to 35 countries (%)	84.3	87.9	86.8	89.1	80.4	NA	NA	NA	NA

1/ Estimated.

Notes: SQ = Status quo; NB = Nutrition-based; projected 1990/91 and 1991/92 needs with stock

However, care must be taken in relying on the nutrition-based estimates as a basis for determining aid allocations, particularly when they are significantly higher than the status quo assessments. Because the nutrition-based estimates are derived from a consumption target, rather than historical achievement, they may exceed what is logistically feasible or economically desirable. On the other hand, status quo needs, by definition, tend to support levels of cereal availability that have been absorbed by a nation's economy and infrastructure in the past. However, in some cases, primarily when large production shortfalls boost import and aid needs well above historical maximums, even status quo needs may be too large to be feasible.

#### Analyzing Assessed Needs for 1990/91

Tables 1 and 2 summarize assessed needs for 1990/91. For most regions and countries, nutrition-based needs exceed status quo needs, with relatively large differences seen in East Africa and South Asia. Nutrition-based needs are smaller than status quo needs in North Africa, and also in three of the individual countries analyzed—Egypt, Sudan, and Jamaica. These results, along with the pattern of actual aid receipts in 1989/90, are summarized in the charts in figure 1. These charts indicate that the distribution of aid receipts in 1989/90 is very similar to the pattern of status quo needs assessed for 1990/91. However, the distribution of the 1990/91 nutrition-based assessments indicates relatively more need in some re-

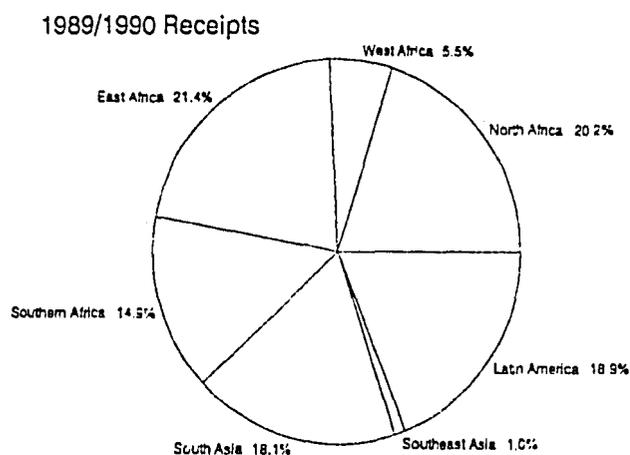
gions, particularly East Africa and South Asia, and relatively less need in others, principally North Africa.

Because of disparities in the population size across the seven regions, the relative intensity of needs can be best judged in per capita terms. Figure 2 compares assessed 1990/91 needs and 1989/90 actual receipts in per capita terms, and suggests other ways that aid allocations might be adjusted. In several regions, particularly South and Southeast Asia, per capita status quo and nutrition-based assessed needs are both relatively low, suggesting less of an urgency for food aid. Similarly, in North Africa, per capita nutrition-based needs are small relative to both 1990/91 status quo needs and 1989/90 receipts.

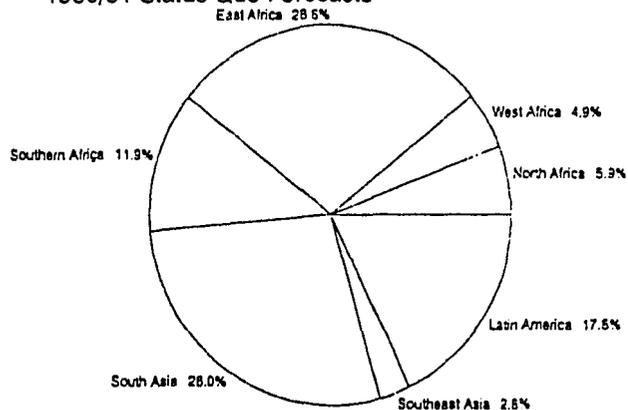
In several other regions, 1990/91 per capita nutrition-based needs are high relative to both status quo needs and 1989/90 receipts. This is particularly true in West Africa and East Africa where review and analysis of country needs and availabilities suggest the need for additional allocations, if feasible. In Southern Africa and Latin America, per capita status quo and nutrition-based needs exceed 1989/90 receipts, but the smaller disparities among measures provides a relatively weak basis for adjusting allocations.

Table 3 provides an example of how the status quo and nutrition-based estimates can be used jointly to adjust food aid budgeting priorities. The example is based on the premise that, in

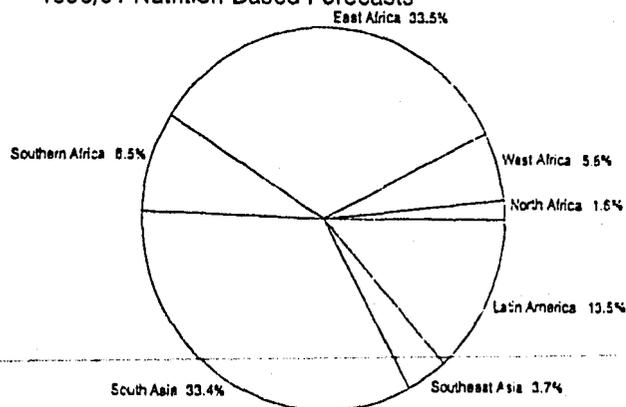
**Figure 1**  
**Regional Shares of Food Aid Receipts in 1989/90 and Projected Shares in 1990/91**



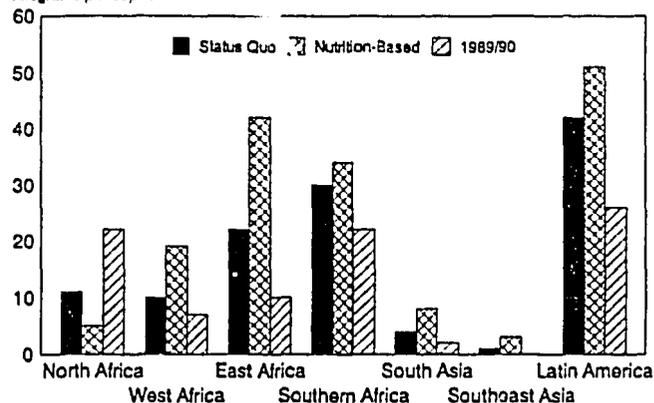
1990/91 Status Quo Forecasts



1990/91 Nutrition-Based Forecasts



**Figure 2**  
**Estimated Per Capita Food Aid Needs 1990/91**  
 Kilograms per capita



the context of scarce supplies of aid, no recipient be allocated aid in excess of nutritional needs. To make this adjustment, each country's status quo needs are constrained to be no greater than nutrition-based needs, and new regional totals are calculated. The results are shown in column 5 of table 3, and it can be seen that the new 55-country total is 12.8 million tons—somewhat closer to estimated availabilities.

However, as can be seen in column 6, this procedure results in some countries/regions obtaining a significantly larger share of their minimum nutritional needs than others. On the basis of this information, combined with the relative levels of per capita needs, further adjustments in allocations might be made. For example, this approach supports a relatively high share of nutrition-based needs in North Africa, Southern Africa, and Latin America, suggesting a basis for reducing allocations in those regions. On the other hand, a low share of nutrition-based needs is met in other regions, suggesting a possible basis for boosting. The results suggest that there may be a particular need for higher allocations in East and West Africa, if programming is feasible. There would appear to be less demand for higher allocations in South and Southeast Asia because of relatively low per capita needs.

**Projected Needs for 1991/92**

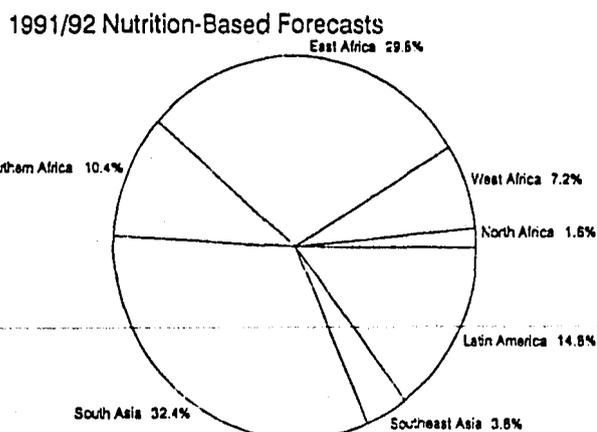
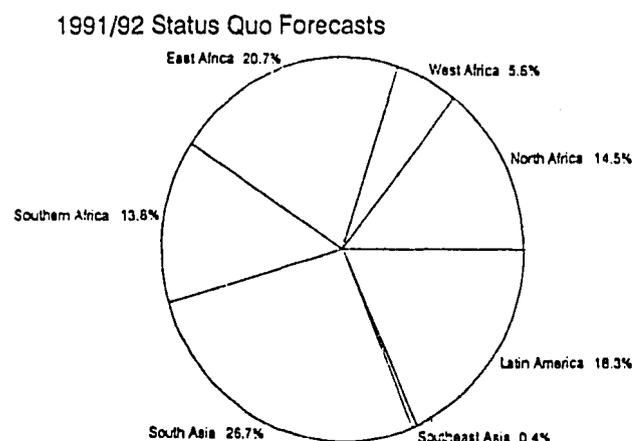
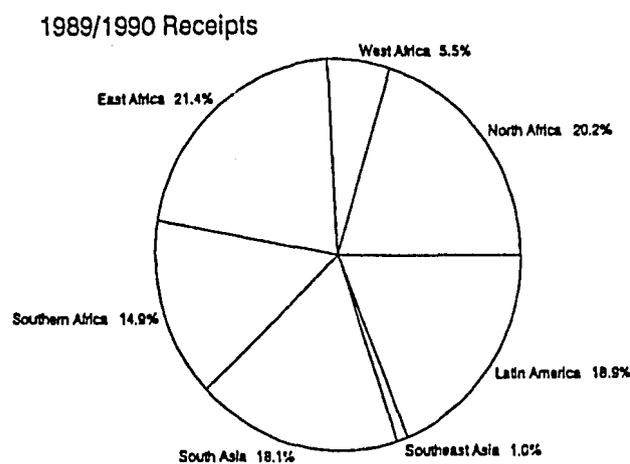
The projections of needs for 1991/92 are also summarized in tables 1 and 2. The projections indicate a small decline in nonemergency aid needs by the 55 countries covered in the report. Declines in status quo and nutrition-based needs are projected in three of seven regions, but the most significant decline is in East Africa. Larger status quo needs are projected in North Africa and Latin America, with the largest percentage increase in North Africa. However, the 1991/92 projections are based on important assumptions regarding weather, policy, and macroeconomic events, and do not account for potential emergency needs. Because of the volatility of these variables, actual needs for individual countries or regions could be significantly higher or lower than these projections.

Table 3. Status quo needs constrained by nutrition-based needs by region: 1990/91

Region	Food aid needs				Status quo needs constrained by nutrition-based needs	
	Status quo		Nutrition-based		Total 1/	% of NB
	Total	Per capita	Total	Per capita		
	-1,000 tons-	-kgs-	-1,000 tons-	-kgs-	-1,000 tons-	-percent-
North Africa	951	11	426	5	425	100
East Africa	4,621	22	8,748	42	4,102	47
West Africa	785	10	1,522	19	578	38
Southern Africa	1,926	29	2,209	33	1,773	80
South Asia	4,522	4	8,710	8	3,247	37
Southeast Asia	457	1	977	3	0	0
Latin America	2,879	41	3,516	50	2,713	77
55 Countries	16,141	8	26,108	13	12,839	49

1/ Regional totals are aggregated from individual country results.

Figure 3  
Regional Shares of Food Aid Receipts in 1989/90 and Projected Shares in 1991/92



The 1991/92 projections show many of the same patterns as the 1990/91 estimates. Comparisons suggest many similar adjustments to align assessed needs with availabilities. As was the case in the 1990/91 assessments, projected status quo needs are high relative to nutrition-based needs in North Africa, and in Egypt, Sudan, and Jamaica.

The charts in figure 3 contrast the needs by region for 1991/92 with 1989/90 receipts. They indicate relatively small projected 1991/92 nutrition-based needs in North Africa relative to the status quo and 1989/90 receipts. As was the case in the 1990/91 estimates, projected nutrition-based needs tend to be large relative to the status quo and 1989/90 receipts in all regions except North Africa and Southern Africa.

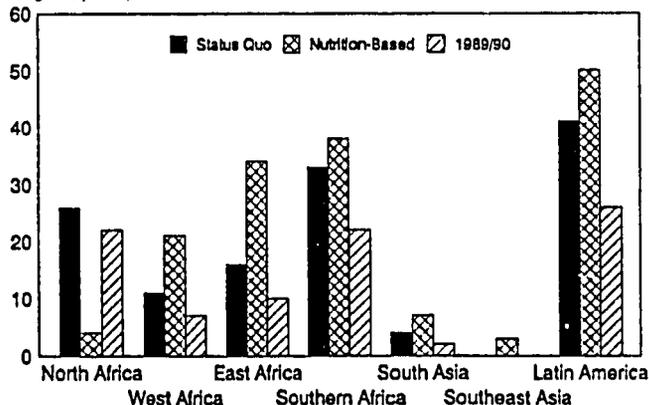
The comparison of projected 1991/92 per capita needs in figure 4 indicates that per capita needs remain relatively small in South Asia and Southeast Asia, and that the large gaps between per capita nutrition-based needs and the status quo persist in West Africa, East Africa, and North Africa. When projected 1991/92 needs are evaluated in the way shown in table 3, the result is a substantially lower adjusted total needs

Table 4. Status quo needs constrained by nutrition-based needs by region: 1991/92

Region	Food aid needs				Status quo needs constrained by nutrition-based needs	
	Status quo		Nutrition-based		Total 1/	% of NB
	Total	Per capita	Total	Per capita		
	-1,000 tons-	-kgs-	-1,000 tons-	-kgs-	-1,000 tons-	-percent-
North Africa	2,322	26	396	4	396	100
East Africa	3,314	15	7,235	34	2,780	38
West Africa	890	11	1,736	21	657	38
Southern Africa	2,214	33	2,526	38	2,067	82
South Asia	4,285	4	7,846	7	2,229	28
Southeast Asia	66	0	927	3	0	0
Latin America	2,937	42	3,578	51	2,757	77
55 Countries	16,027	8	24,244	12	10,886	45

1/ Regional totals are aggregated from individual country results.

Figure 4  
Estimated Per Capita Food Aid Needs 1991/92  
Kilograms per capita



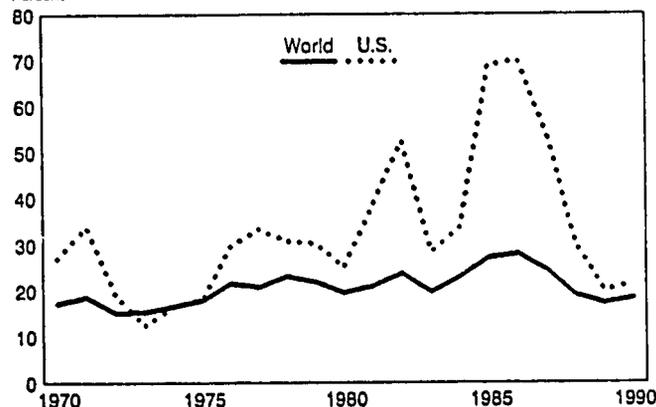
estimate than in 1990/91. When 1991/92 status quo needs by country are constrained by nutrition-based needs, the new 55-country total of 10.9 million tons is about 15 percent below the 1990/91 result (table 4).

### Short-Term Outlook for Global Cereal Supplies

The world will harvest a record cereal crop in 1990/91, a gain of nearly 5 percent from last year (table 5). The developed and centrally planned economies account for the largest increases, but output in the developing economies is up nearly 3 percent. World grain stocks will begin to build after 3 years of decline (figure 5). Larger crops and accumulating stocks are bringing sharply lower world market prices for wheat and some decline in rice and coarse grain prices. With larger harvests, world cereal trade is down in 1990/91.

Over the past 5 years, world cereal stocks have varied dramatically. They reached a record in 1986/87, and real prices were the lowest of the post-World War II period (figure 6). Low

Figure 5  
Stock-Use Ratios: Total Grains 1970-1990  
Percent



prices and government policies then began to cut cereal area and production in some major exporters. In the United States, acreage set-asides for wheat and coarse grains reached the maximum allowed by the Food Security Act of 1985 and stocks began to fall in 1987/88. What would likely have been a gradual stock drawdown turned into a sharp decline in 1988/89 and 1989/90 because of severe drought, particularly in North America, and poor weather in other countries. These 2 years saw world stocks drop nearly one-third. With stock-to-use ratios falling to the lowest levels in nearly two decades, grain prices surged (table 6).

In 1990/91, increased cereal production and stocks are the result of higher prices, good weather, and low U.S. set-aside requirements. But, on a global basis, the stock recovery has been limited and the 1990/91 stock-to-use ratio is forecast to be the second lowest in the last 15 years. Consequently, reserves are smaller than they were at the time of the 1988 drought. World grain market supplies are not as tight as the global stock-to-use figure would indicate, however, since there has been a significant recovery of exporter stocks, particularly of wheat.

Table 5. Total cereals: World production, consumption, net imports, and ending stocks 1/

Region/country	Production				Consumption			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	542.9	468.3	553.6	589.2	456.2	425.1	439.4	454.0
United States	278.5	204.2	282.0	309.9	216.5	186.8	203.2	216.9
Canada	51.5	35.7	47.8	56.6	28.1	24.6	24.8	25.9
EC-12	155.1	64.1	161.8	158.8	138.3	140.8	138.1	137.9
Other Western Europe	14.8	5.2	16.7	18.2	15.1	15.2	15.2	15.5
South Africa	11.0	16.6	12.1	11.2	10.7	11.4	11.3	11.3
Japan	10.9	10.5	10.8	10.8	38.4	37.6	37.8	36.7
Australia	20.1	21.4	21.7	22.8	8.1	7.6	8.0	8.6
New Zealand	1.0	0.8	0.7	0.9	1.0	1.0	1.0	1.0
Centrally Planned Countries	606.0	588.0	622.7	655.2	655.3	652.5	668.4	677.4
China	303.4	298.0	311.5	326.1	317.9	318.3	320.6	325.7
Eastern Europe	103.9	106.2	112.4	105.5	111.1	110.5	114.7	106.5
Soviet Union	198.7	183.8	198.8	223.7	226.2	223.7	233.1	245.2
Developing Countries	442.2	485.9	479.6	493.3	529.8	557.7	565.5	576.8
Mexico	18.6	17.2	18.5	18.7	23.5	24.0	25.3	27.4
Central America/Caribbean	4.5	4.7	4.8	4.8	9.5	9.8	10.1	10.4
Brazil	39.6	40.0	34.0	35.9	39.1	41.6	41.8	41.6
Argentina	22.1	16.0	18.5	21.8	11.5	9.2	9.2	9.5
Other South America	13.6	13.9	13.3	12.9	20.2	18.7	17.6	17.9
North Africa	17.4	18.7	20.0	20.8	35.5	37.3	38.7	40.2
Middle East	41.6	48.2	36.3	42.1	65.1	66.5	66.4	63.6
Sub-Saharan Africa	42.6	52.9	49.1	46.4	52.7	57.4	55.6	54.4
India	124.9	148.6	155.2	159.3	133.3	148.3	152.9	158.3
Other Asia	135.9	145.3	150.3	150.6	158.7	164.0	167.2	172.7
World Total	1,610.2	1,562.5	1,676.9	1,758.4	1,664.9	1,658.0	1,697.0	1,734.5
	----- million tons -----				----- million tons -----			
Region/country	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	-131.2	-131.0	-140.9	-119.1	227.4	137.9	113.0	129.4
United States	-97.5	-99.5	-103.3	-89.1	169.4	86.1	61.1	65.6
Canada	-27.6	-17.0	-21.0	-22.4	13.5	9.7	10.9	18.8
EC-12	-18.2	-25.5	-25.4	-18.0	29.5	27.6	26.1	29.2
Other Western Europe	0.0	-0.1	-1.1	-2.1	3.9	4.0	4.4	4.8
South Africa	-0.6	-2.4	-3.1	-0.9	1.1	1.5	1.4	1.0
Japan	27.7	26.5	26.9	26.0	6.0	5.5	5.3	5.2
Australia	-15.0	-13.2	-14.1	-12.6	3.6	3.4	3.6	4.6
New Zealand	0.0	0.2	0.2	0.1	0.3	0.2	0.2	0.2
Centrally Planned Countries	47.6	52.9	50.4	35.0	115.6	105.0	110.3	122.2
China	11.0	12.0	10.6	7.0	67.8	59.6	61.0	68.3
Eastern Europe	4.9	3.0	3.4	0.6	8.5	7.7	9.0	8.6
Soviet Union	31.7	38.0	36.5	27.4	39.3	37.8	40.3	45.3
Developing Countries	77.5	77.4	83.8	79.2	64.1	68.7	68.3	63.9
Mexico	4.7	6.7	8.8	8.0	1.2	1.0	2.9	2.2
Central America/Caribbean	5.0	5.1	5.3	5.4	0.7	0.8	0.7	0.7
Brazil	2.2	1.3	2.3	4.6	6.9	6.9	2.4	1.4
Argentina	-9.3	-7.1	-10.6	-11.8	1.4	1.5	0.7	1.2
Other South America	6.8	4.7	4.0	4.8	2.3	2.2	1.8	1.8
North Africa	18.2	18.5	18.0	19.3	2.5	2.6	2.4	2.3
Middle East	21.6	20.0	27.7	19.8	13.5	14.3	11.4	9.7
Sub-Saharan Africa	7.1	6.4	6.5	6.6	3.8	5.8	5.7	4.4
India	0.7	2.2	-0.2	-0.7	17.3	19.9	22.0	22.2
Other Asia	21.1	18.9	21.1	22.3	14.4	13.6	18.3	18.2
World Total	-5.2	-1.1	-7.6	-5.7	407.1	311.6	291.6	315.5

1/ World totals include some countries not included in above regions. Data and forecasts as of November 1990

2/ Negative numbers indicate net exports.

Table 6. Selected world cereal prices

Marketing year	Wheat 1/	Rice 2/	Corn 3/
	\$/ton		
1985/86	132	213	101
1986/87	110	208	74
1987/88	120	284	95
1988/89	165	306	116
1989/90	164	286	112
1990/91 4/	115-130	220-270	103-122

1/ #2, HRW, f.o.b. U.S. Gulf ports (June/May avg.).

2/ 5% broken, f.o.b. Bangkok, Thailand (Aug./July

avg.).

3/ #1, yellow, f.o.b. U.S. Gulf ports (Sept./Aug.

avg.).

4/ 1990/91 figures are estimated ranges.

It is premature to forecast world production and price prospects for 1991/92. The first USDA projections will be released in May 1991. World grain area is currently 3 percent below that of a decade ago. Assuming no significant area change and that yields follow a 10-year trend, production would rise by about 2 percent. A trend gain in consumption would be somewhat larger, and further stock accumulation would be minimal.

### World Wheat Stocks Improve and Prices Fall

World wheat output in 1990/91 is up 10 percent to a record, the largest 1-year increase since 1978/79. World production in 1990/91 is forecast to exceed use significantly for the first time since 1986/87. Developed and centrally planned countries lead the increases (table 7). Crops in the major exporter countries—Argentina, Australia, Canada, the EC, and the United States—increased by 17 percent, led by very large gains in the United States and Canada. The EC and Argentina had their best crops since 1984, and Australian output also rose.

On the other hand, good wheat crops are restraining import demand. China's crop was a record, and that of the USSR is the largest in more than a decade. Developing country production also gained by more than 3 percent. These good crops have cut world import demand. At the same time, an improved Turkish crop and the embargo on sales to Iraq, normally a 3-million ton market, limited developing country imports despite gains in a number of specific markets. World trade in 1990/91, excluding intra-EC trade, is only expected to equal the 97-million-ton total of 1989/90. Trade would have declined, but import demand for feed wheat increased because of the large wheat crop in the EC and falling wheat prices, which have become competitive with coarse grains for feeding. Feed wheat imports by both South Korea and the USSR are expected to be up this year.

Large exporter supplies and stagnant world demand have driven wheat prices lower (figure 6). USDA forecasts indicate that average domestic U.S. wheat prices in 1990/91 will be off 23 to 31 percent from 1989/90, which would put U.S. prices at the 1987/88 level. Effective export prices are down even more because of larger exporter subsidies. In the United States, average bonuses under the Export Enhancement Program (EEP) have been rising in recent months, spurred by growing EC export restitutions.

For the world as a whole, this year's record crop is forecast to boost stocks 20 percent from the very low level of the last 2 years (figure 7). The recovery is most noticeable in the major exporters, whose stocks are up 59 percent to 59 million tons. This is still 29 percent below the peak registered in 1986/87, and the stock-to-use ratio for the major exporters is still below the average for the last 10 years.

Acreage decisions for the 1991/92 U.S. wheat crop are not bound by the provisions of the 1985 U.S. farm bill. However, the Secretary of Agriculture has tentatively set a 15-percent acreage set-aside for 1991/92, pending passage of the new farm bill. This compares with 5 percent for 1990/91 and suggests, with average weather, a reduction in U.S. wheat production.

Figure 6  
Farm Price Trend: Wheat  
Nominal, real, and real trend prices  
Dollars per ton

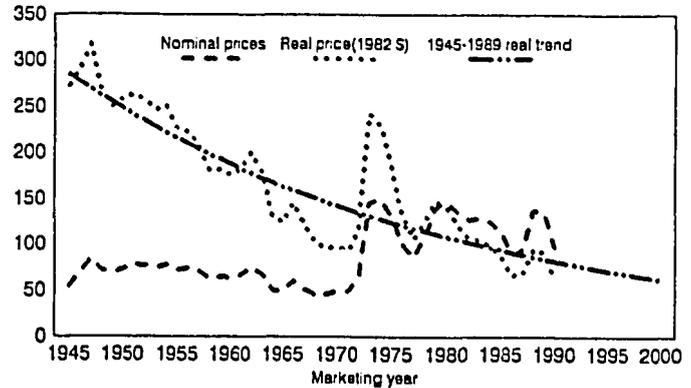


Figure 7  
Stock-Use Ratios: Wheat 1970-1990  
Percent

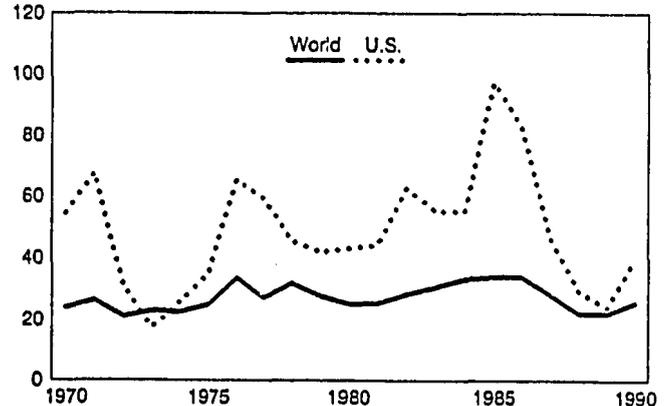


Figure 8  
Stock-Use Ratios: Rice 1970-1990  
Percent

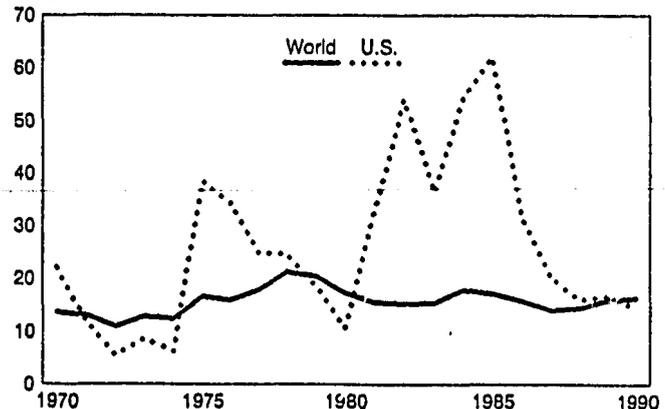


Table 7. Wheat: World production, consumption, net imports, and ending stocks 1/

Region/country	Production				Consumption			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	175.4	162.7	179.9	210.2	112.1	107.5	106.0	116.8
United States	57.4	49.3	55.4	74.7	29.6	26.5	27.0	34.9
Canada	26.0	16.0	24.3	31.0	7.9	5.8	5.5	5.7
EC-12	71.4	74.7	78.5	81.0	58.2	59.4	57.9	60.4
Other Western Europe	4.0	3.8	4.4	5.0	3.6	3.9	3.8	3.7
South Africa	3.1	3.5	2.0	1.9	2.7	2.5	2.3	2.4
Japan	0.9	1.0	1.0	1.0	6.2	6.1	6.1	6.1
Australia	12.4	14.1	14.1	15.5	3.5	2.8	3.1	3.3
New Zealand	0.3	0.2	0.2	0.2	0.4	0.4	0.4	0.3
Centrally Planned Countries	209.0	214.6	227.3	248.4	245.8	247.9	251.6	264.6
China	85.8	85.4	90.8	96.0	102.8	104.4	104.5	106.1
Eastern Europe	39.9	44.8	44.2	44.4	41.5	43.0	43.8	42.5
Soviet Union	83.3	84.4	92.3	108.0	101.5	100.4	103.3	116.0
Developing Countries	116.5	121.6	127.8	133.1	168.1	171.8	173.6	179.0
Mexico	3.7	3.2	4.0	3.5	4.3	4.2	4.2	4.2
Central America/Caribbean	0.0	0.1	0.0	0.0	2.8	2.7	2.8	2.9
Brazil	6.1	5.8	5.6	3.8	7.1	7.8	7.3	7.6
Argentina	8.8	8.4	10.2	12.0	4.5	4.7	4.6	4.7
Other South America	2.6	2.8	2.9	2.5	6.7	6.3	5.9	6.1
North Africa	7.6	7.8	8.5	9.6	20.9	22.4	22.5	23.9
Middle East	25.9	28.9	22.4	26.5	35.6	35.8	37.5	35.2
Sub-Saharan Africa	1.5	1.9	2.0	2.0	6.5	6.1	6.2	6.4
India	44.3	46.2	54.0	54.0	49.8	51.2	52.6	54.4
Other Asia	16.7	17.4	19.1	19.9	31.5	32.1	31.6	35.1
World Total	502.3	500.3	536.4	593.2	530.2	531.5	536.2	566.7
	----- million tons -----				----- million tons -----			
Region/country	Net Imports 2/				Ending Stocks			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	-88.6	-75.2	-75.5	-69.8	64.4	42.7	41.2	64.2
United States	-43.0	-36.8	-32.9	-28.5	34.3	19.1	14.6	25.7
Canada	-23.6	-13.5	-17.0	-18.0	7.3	5.0	6.5	13.8
EC-12	-14.6	-18.5	-19.2	-17.1	15.7	12.1	13.3	16.8
Other Western Europe	-0.4	-0.1	-0.5	-1.2	2.0	1.8	1.9	2.0
South Africa	-0.2	-0.7	-0.4	0.4	0.6	0.5	0.4	0.3
Japan	5.3	5.0	5.0	5.0	1.6	1.5	1.5	1.4
Australia	-12.2	-10.8	-10.9	-10.5	2.8	2.6	2.9	4.1
New Zealand	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Centrally Planned Countries	37.3	29.4	25.3	21.1	55.5	51.8	52.9	57.9
China	15.0	15.5	13.0	11.5	25.7	22.3	21.6	23.0
Eastern Europe	1.3	-1.1	-1.3	-2.4	2.8	3.5	2.8	2.4
Soviet Union	21.0	15.0	13.5	12.0	27.0	26.0	28.5	32.5
Developing Countries	46.5	44.8	46.0	43.8	28.7	22.9	23.5	22.0
Mexico	0.7	0.9	0.1	0.7	0.5	0.4	0.3	0.3
Central America/Caribbean	2.8	2.7	2.8	2.8	0.3	0.3	0.3	0.3
Brazil	2.0	0.8	1.5	3.3	1.0	0.1	0.2	0.1
Argentina	-3.8	-3.5	-6.0	-6.8	0.8	0.5	0.1	0.5
Other South America	4.0	3.3	2.8	3.4	1.1	0.8	0.7	0.7
North Africa	13.6	14.3	13.9	14.6	1.7	1.4	1.4	1.6
Middle East	9.2	6.5	14.2	7.6	7.9	7.5	6.6	5.5
Sub-Saharan Africa	4.7	4.3	4.3	4.4	0.4	0.5	0.6	0.7
India	-0.1	1.9	0.1	-0.4	10.0	7.0	8.5	7.8
Other Asia	14.2	14.3	13.1	15.0	4.9	4.3	4.8	4.6
World Total	-4.0	-0.2	-3.4	-4.0	148.5	117.4	117.6	144.0

1/ World totals include some countries not included in above regions. Data and forecasts as of November 1990  
2/ Negative numbers indicate net exports.

Table 8. Rice: World production, consumption, net imports, and ending stocks 1/

Region/country	Production				Consumption			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	15.6	16.1	16.5	16.3	14.6	14.5	14.4	14.6
United States	4.1	5.2	5.1	4.9	2.6	2.6	2.7	2.9
Canada	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2
EC-12	1.3	1.3	1.3	1.5	1.5	1.5	1.5	1.6
Other Western Europe	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2
South Africa	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3
Japan	9.7	9.0	9.4	9.4	9.8	9.5	9.4	9.4
Australia	0.5	0.6	0.6	0.5	0.1	0.2	0.2	0.1
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Centrally Planned Countries	123.7	120.4	128.0	129.3	126.0	124.9	125.7	127.7
China	121.7	118.4	126.1	127.4	123.3	122.1	123.3	125.0
Eastern Europe	0.2	0.2	0.2	0.2	0.6	0.5	0.5	0.5
Soviet Union	1.7	1.9	1.7	1.7	2.1	2.3	2.0	2.2
Developing Countries	161.0	179.4	180.5	184.4	165.2	174.4	180.8	185.8
Mexico	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4
Central America/Caribbean	1.0	1.1	1.2	1.1	1.6	1.7	1.7	1.7
Brazil	8.0	7.5	5.4	6.7	7.1	7.4	7.5	7.6
Argentina	0.2	0.3	0.2	0.3	0.1	0.2	0.2	0.2
Other South America	3.2	3.4	3.1	3.0	3.1	3.1	2.9	3.1
North Africa	1.6	1.4	1.7	1.7	1.6	1.5	1.7	1.8
Middle East	1.2	1.3	1.3	1.3	3.7	4.2	4.2	4.2
Sub-Saharan Africa	4.5	4.7	4.8	4.8	6.8	6.9	7.1	7.1
India	56.9	70.7	70.0	73.0	59.3	65.8	69.1	71.7
Other Asia	97.7	103.7	108.0	107.3	94.9	96.5	99.5	101.3
World Total	314.0	330.8	340.5	345.2	319.8	328.8	334.6	342.6
	----- million tons -----				----- million tons -----			
Region/country	Net Imports 2/				Ending Stocks			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
Developed countries	-1.8	-2.4	-1.8	-1.9	3.7	3.1	3.1	2.9
United States	-2.1	-2.8	-2.1	-2.2	1.0	0.9	0.9	0.8
Canada	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
EC-12	0.3	0.3	0.2	0.1	0.4	0.4	0.4	0.4
Other Western Europe	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0
South Africa	0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.0
Japan	0.0	0.0	0.0	0.0	1.9	1.5	1.4	1.5
Australia	-0.4	-0.4	-0.5	-0.5	0.4	0.3	0.4	0.3
New Zealand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Centrally Planned Countries	0.3	1.8	0.6	1.0	22.5	19.9	22.7	25.2
China	-0.4	1.1	-0.1	0.1	22.5	19.9	22.7	25.2
Eastern Europe	0.3	0.3	0.3	0.4	0.0	0.0	0.0	0.0
Soviet Union	0.3	0.5	0.3	0.5	0.0	0.0	0.0	0.0
Developing Countries	0.8	1.1	2.9	1.9	19.3	24.6	27.6	27.9
Mexico	0.0	0.2	0.1	0.2	0.0	0.1	0.1	0.1
Central America/Caribbean	0.5	0.5	0.5	0.5	0.1	0.1	0.1	0.1
Brazil	0.0	0.2	0.4	0.3	3.1	3.4	1.6	0.9
Argentina	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
Other South America	-0.3	-0.2	-0.0	0.2	0.5	0.5	0.5	0.4
North Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle East	2.4	3.1	2.9	2.8	0.4	0.5	0.5	0.4
Sub-Saharan Africa	2.1	2.3	2.3	2.4	0.6	0.6	0.6	0.6
India	0.5	0.1	-0.3	-0.3	7.0	12.0	12.6	13.6
Other Asia	-4.7	-6.6	-4.9	-5.9	7.4	7.3	11.5	11.6
World Total	-0.9	-1.0	-0.4	-1.0	45.6	47.6	53.4	56.0

1/ World totals include some countries not included in above regions. Data and forecasts as of November 1990

2/ Negative numbers indicate net exports.

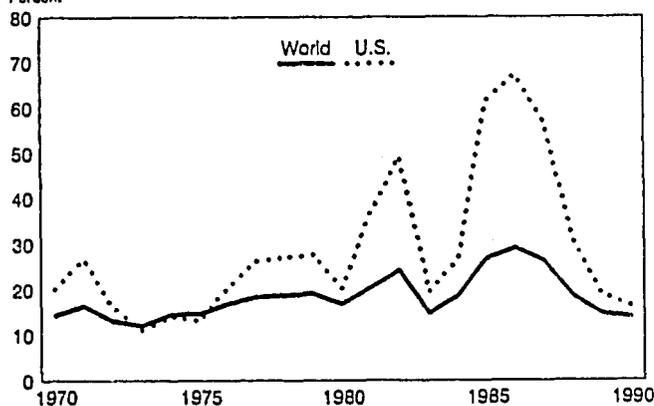
Table 9. Coarse grain: World production, consumption, net imports, ending stocks 1/

Region/country	Production				Consumption			
	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	351.8	289.6	357.1	362.6	329.5	303.1	318.9	322.6
United States	217.0	149.7	221.5	230.4	184.4	157.6	173.5	179.2
Canada	25.5	19.7	23.5	25.6	20.1	18.6	19.2	20.1
EC-12	82.4	88.1	82.0	76.3	78.6	79.8	78.6	75.9
Other Western Europe	10.8	11.4	12.4	13.2	11.3	11.2	11.2	11.6
South Africa	7.9	13.0	10.0	9.3	7.7	8.6	8.6	8.6
Japan	0.4	0.4	0.4	0.4	22.5	22.0	22.3	21.3
Australia	7.2	6.7	6.9	6.8	4.5	4.6	4.8	5.2
New Zealand	0.7	0.6	0.5	0.7	0.5	0.6	0.6	0.7
Centrally Planned Countries	273.3	252.9	267.5	277.5	283.5	279.7	291.1	285.1
China	95.8	94.2	94.6	102.7	91.8	91.9	92.9	94.6
Eastern Europe	63.8	61.3	68.0	60.9	69.1	66.9	70.4	63.5
Soviet Union	113.7	97.5	104.8	114.0	122.6	121.0	127.8	127.0
Developing Countries	164.7	184.8	171.4	175.8	196.5	211.6	211.2	212.0
Mexico	14.5	13.8	14.1	15.0	18.7	19.4	20.7	22.7
Central America/Caribbean	3.4	3.5	3.6	3.7	5.1	5.4	5.6	5.8
Brazil	25.5	26.7	23.1	25.4	24.9	26.4	27.0	26.4
Argentina	13.1	7.3	8.1	9.5	6.9	4.3	4.4	4.6
Other South America	7.7	7.8	7.4	7.3	10.4	9.3	8.8	8.6
North Africa	8.2	9.4	9.8	9.4	12.9	13.4	14.4	14.5
Middle East	14.5	18.1	12.6	14.3	25.8	26.5	24.7	24.1
Sub-Saharan Africa	36.6	46.4	42.4	39.6	39.5	44.4	42.4	40.8
India	23.8	31.7	31.2	32.3	24.2	31.3	31.3	32.3
Other Asia	21.5	24.2	23.2	23.4	32.3	35.4	36.1	36.4
World Total	793.9	731.4	800.0	820.0	814.9	797.7	826.1	825.1
	----- million tons -----				----- million tons -----			
Region/country	1987/88	1988/89	1989/90	1990/91	1987/88	1988/89	1989/90	1990/91
	----- million tons -----				----- million tons -----			
Developed countries	-40.8	-53.4	-63.6	-47.4	159.3	92.1	68.7	62.3
United States	-52.4	-59.8	-68.4	-58.4	134.1	66.2	45.7	39.1
Canada	-4.1	-3.6	-4.2	-4.6	6.2	4.7	4.4	5.0
EC-12	-3.8	-7.3	-6.4	-1.0	13.4	15.2	12.4	12.0
Other Western Europe	0.2	-0.2	-0.8	-1.2	1.9	2.1	2.4	2.8
South Africa	-0.6	-2.0	-3.0	-1.5	0.5	0.9	1.0	0.7
Japan	22.4	21.5	21.8	20.9	2.6	2.5	2.4	2.4
Australia	-2.5	-1.9	-2.7	-1.6	0.4	0.5	0.3	0.2
New Zealand	-0.1	-0.0	0.0	-0.0	0.2	0.1	0.1	0.1
Centrally Planned Countries	10.1	21.7	24.6	13.0	37.6	33.3	34.7	39.1
China	-3.6	-4.6	-2.4	-4.6	19.6	17.4	16.7	20.2
Eastern Europe	3.3	3.8	4.3	2.7	5.7	4.2	6.2	6.2
Soviet Union	10.4	22.5	22.7	14.9	12.3	11.8	11.8	12.8
Developing Countries	30.2	31.5	35.0	33.5	16.1	21.2	17.2	14.1
Mexico	4.0	5.5	8.6	7.1	0.6	0.5	2.4	1.8
Central America/Caribbean	1.7	1.9	2.0	2.1	0.3	0.3	0.2	0.2
Brazil	0.2	0.3	0.4	1.0	2.7	3.4	0.6	0.4
Argentina	-5.3	-3.5	-4.6	-4.9	0.6	1.0	0.6	0.6
Other South America	3.1	1.6	1.3	1.3	0.7	0.8	0.6	0.6
North Africa	4.6	4.1	4.0	4.7	0.8	1.2	1.0	0.6
Middle East	10.1	10.4	10.6	9.4	5.2	6.4	4.3	3.9
Sub-Saharan Africa	0.2	-0.1	-0.1	-0.2	2.9	4.7	4.5	3.1
India	0.3	0.2	0.0	0.0	0.3	0.9	0.9	0.8
Other Asia	11.5	11.2	12.9	13.2	2.1	2.1	2.0	2.0
World Total	-0.3	-0.0	-3.8	-0.7	213.0	146.7	120.6	115.4

1/ World totals include some countries not included in above regions. Data and forecasts as of November 1990

2/ Negative numbers indicate net exports.

Figure 9  
Stock-Use Ratios: Coarse Grains 1970-1990  
Percent



In other exporting countries, no major area changes are likely in 1991/92, although there could be some small declines outside the EC because of lower prices. Normal weather conditions would therefore mean another year of large crops, with the United States providing most of the supply adjustment. An added factor in the 1991/92 outlook is the presence of a united Germany in the EC, which is likely to add to the EC's exportable surplus.

#### Rice Production a Record

World rice output hit a second consecutive record in 1990/91, although the gain is forecast to be small (table 8). With consumption growing at its 10-year trend rate of about 2 percent, production will be about equal to consumption and world stocks will show little growth. U.S. stocks are expected to show a small gain. Unlike wheat and coarse grains, however, the U.S. holds a very small share of the world's rice stocks.

On world markets, import demand in calendar 1991 (marketing year 1990/91) is projected up from 1990, but down from the record 15.1 million tons traded in 1989. In that year, Asian import demand rose sharply because of poor weather and stock drawdowns after the poor 1987 monsoon. Imports by Bangladesh, China, India, and Indonesia surged that year.

The configuration of rice exporters has changed in the last several years. Shipments from Thailand, the world's leading exporter, are expected to fall below 4 million tons in 1990, before recovering somewhat in 1991. China, once a major exporter, is now a small net importer. In 1989, Vietnam unexpectedly emerged as the third-largest exporter and has held that position since. Limited intelligence about government policies and prospects for production and consumption for both China and Vietnam adds considerable uncertainty to forecasts of the world rice market over the next several years. World rice stocks and stock-to-use ratios have recovered somewhat from the lows of 1987 and 1988 (figure 8). This recovery and the drop in world import demand have both contributed to falling rice prices during the past year.

#### Coarse Grains Output Up, But Supplies Still Tight

The 1990/91 world coarse grain harvest is sharply higher, with foreign output forecast at a record (table 9). With no growth expected in global consumption, production will nearly match consumption for the first time in 4 years. Stocks are forecast to decline slightly, and the world stock-to-use ratio will be 14 percent, also down slightly from 1989/90 (figure 9). However, prices are not expected to change significantly, with higher production in many countries and large global supplies of wheat.

World coarse grain trade in 1990/91 is forecast at 92 million tons, down 9 percent, as larger harvests are anticipated in key importing countries. In addition, high world prices of coarse grains compared with wheat are leading to increased feed use of wheat and declining coarse grain use. Most of the corn, barley, and sorghum traded internationally is intended for animal feed.

The United States normally supplies about two-thirds of world coarse grain trade. Over the last 10 years, it has held an average of more than half of world coarse grain stocks and over 80 percent of stocks held by major exporters. Changes in U.S. stocks have accounted for most of the swing in world stocks in recent years. In 1989/90, despite a good crop, U.S. production fell far short of consumption and stocks fell by 30 percent. For 1990/91, larger planted area and record yields are expected to result in the largest U.S. crop since 1986/87. However, even with exports down, forecast use exceeds output, stocks show a further decline, and the U.S. stock-to-use ratio remains relatively low (figure 9).

#### Outlook for Cereal Food Aid Availabilities

According to Food and Agriculture Organization (FAO) estimates, cereal aid from all donors during 1989/90 (July/June) rose about 16 percent to 11.8 million tons (table 10). This was the sixth consecutive year that cereal aid exceeded the 1974 World Food Conference target of 10 million tons. Tighter supplies and higher prices in world cereal markets in 1989/90 would ordinarily have reduced aggregate cereal food aid. However, several donors provided additional funds to meet needs in Eastern Europe. Hence, while the volume of food aid shipments to low-income, food-deficit countries rose by less than 200,000 tons, the total volume of cereal aid increased by about 1.6 million tons.

Given the favorable outlook for world wheat supplies in 1990/91, and anticipated lower prices, food aid availabilities are likely to remain above the World Food Conference target. Aid in 1990/91 will depend on changes in food aid funding and commodity prices. Food aid volume could fall despite declining commodity prices if food aid budgets are reduced by some donors. Based on analysis of developments in major food aid donor countries, including the United States, Canada, the European Community (EC), Australia,

Table 10. Volume of cereal food aid contributions by donor 1/

Country	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90 2/	1990/91 2/
	-----1,000 tons 3/-----								
Argentina	33	30	51	44	24	26	21	35	30
Australia	349	460	466	345	368	355	353	320	330
Canada	843	817	943	1,216	1,240	1,062	1,170	900	900
European Community 4/	1,596	1,917	2,505	1,614	1,903	2,564	2,127	3,300	2,250
Finland	28	40	20	5	41	3	25	35	20
Japan	517	445	295	450	529	561	441	450	450
Norway	36	17	45	31	46	52	32	30	40
Sweden	87	83	88	69	74	115	132	80	85
Switzerland	29	30	39	22	58	70	64	40	50
United States	5,375	5,655	7,536	6,675	7,861	7,946	5,286	6,200	7,000
Others	345	355	522	478	455	749	545	410	445
Total	9,238	9,849	12,510	10,949	12,599	13,503	10,196	11,800	11,600

1/July/June Years

2/ 1990/91 and 1991/92 figures are estimates.

3/ To express cereal food aid in grain equivalent, wheat, rice, and coarse grains are counted on a one-to-one basis; for grain products, appropriate conversion factors are used to determine the grain equivalent.

4/ Aid from individual members and Community actions. Ten member countries, prior to accession of Spain and Portugal.

Sources: FAO and ERS estimates.

and Japan, cereal food aid availabilities are projected to fall to about 11.6 million tons in 1990/91 (table 10).

#### *Trends in Sources and Direction of Food Aid*

The major donors of cereal food aid, which accounts for the bulk of total world food aid, are the United States, the EC, Canada, Japan, and Australia. The U.S. share in 1989/90 was 53 percent, the second lowest since 1974/75, because of growth in donations from other sources. The EC, with a 28-percent share in 1989/90, is the chief donor that has increased its food aid. With a supplemental aid package for Eastern Europe in 1989/90, EC food aid was up about 55 percent compared with 1988/89. Donations by Canada and Australia fell in 1989/90, while those of Japan were unchanged.

The value of all food aid donated by countries in the Organization for Economic Cooperation and Development (OECD) was up 25 percent to a record \$3.6 billion in 1988, the last year for which data are available. Increases by the United States, the EC, and to a lesser extent Canada, were mainly responsible. The portion of food aid provided as grants continued its upward trend by rising to a peak of more than 80 percent. The share of food assistance provided through multilateral channels remained at 21 percent. Food aid's share of total official development assistance rose slightly to about 8 percent.

Pledges of food aid to Sub-Saharan Africa for 1989/90 amounted to almost 3.6 million tons, based on information available in August 1990. Of this, 15 percent, the same as last year, was pledged through triangular transactions or local purchases. Through triangular transactions, donors provide aid commodities from third country sources. Local purchases are those in which donors obtain commodities in one part of the recipient country for distribution in another part of the country.

Contributions to the International Emergency Food Reserve, administered by the World Food Program, have fallen from earlier levels. The 1989 contributions of 391,000 tons of cereals and about 34,000 tons of noncereals fell short of the 500,000-ton goal. As of May 1990, less than 160,000 tons of cereals and 7,000 tons of noncereals have been contributed for 1990.

#### *U.S. Food Aid Likely to Rise*

U.S. food aid allocations continue to exceed volumes agreed to by members of the Food Aid Convention (FAC). All together, the members of the FAC pledge to provide a minimum of about 7.5 million tons of cereal aid annually, with a U.S. share of 4.5 million tons. Total U.S. cereal food aid allocations are estimated by FAO at 6.2 million tons in 1989/90, and may rise in 1990/91.

Food aid under the P.L. 480 program for fiscal 1990 (October 1989/September 1990) was budgeted at nearly \$1.5 billion, essentially the same as in fiscal 1989. Of this, about \$815 million was programmed under Titles I/III and the balance under Title II. This provided about 5.9 million tons, slightly more than in fiscal 1989. As of July 1990, wheat and wheat products accounted for approximately 60 percent of the volume of P.L. 480 food aid, with feed grains comprising about another 20 percent. Vegetable oils and rice accounted for 5-10 percent each, with other commodities accounting for lesser amounts. Slightly less than half of the value of program allocations were to countries in Asia and the Near East, while African countries received about one-third. Latin American nations received approximately 20 percent, and Eastern European countries were allocated about 5 percent.

U.S. food aid provided under authority of Section 416(b) of the amended Agricultural Act of 1949 increased in fiscal 1990. Under this program, surplus CCC stocks are provided

through channels similar to P.L. 480 Title II. For fiscal year 1990, about 1.7 million tons of commodities, mostly corn and sorghum, were allocated. This was up sharply from fiscal 1989, when about 800,000 tons of commodities, also mainly corn and sorghum, were allocated.

For fiscal 1991, Congress has approved a P.L. 480 program of about \$1.6 billion, with \$880 million for Title I/III and \$696 million for Title II. This funding is estimated to provide about 6.5 million tons of commodities, although changes in commodity prices and shipping costs will affect this estimate. The Secretary of Agriculture made available for fiscal 1991 2.3 million tons of agricultural commodities, mainly corn and sorghum for programming under section 416(b).

#### ***EC Increases Food Aid to Eastern Europe in 1989/90***

According to FAO estimates, the EC shipped a record 3.3 million tons of cereal food aid in 1989/90, primarily because of large supplemental shipments to Eastern Europe. This was up sharply from 1988/89 EC shipments of 2.1 million tons, and approximately double its FAC pledge of 1.7 million tons. It also exceeds total EC pledges of 2.5 million tons during the 1984/85 African famine. Current forecasts indicate that, with smaller allocations to Eastern Europe, total EC cereal food aid will decline.

In March, the EC Commission announced a regular food aid program for 1990 much the same for cereal as in 1989. About 1.4 million tons of cereals are to be available, the same as under its regular 1989 program. Approximately 94,000 tons of milk powder are programmed, the same as last year, although butter oil availabilities decline by almost 30 percent.

The vegetable oil allocation (including olive oil) is up by 25 percent to 50,000 tons, while the sugar allocation increased about the same percentage to 18,000 tons. For other products, a maximum of ECU 40 million (about US\$48 million) is available, compared to last year's maximum of ECU 55 million (about US\$60 million). All food aid is provided in grant form.

A 1989 supplemental program included substantial quantities of additional food aid to Eastern Europe. In July 1989, 1.1 million tons of grains were allocated to Poland (800,000 tons of bread wheat, 200,000 tons of barley, and 100,000 tons of corn). Beef, olive oil, and citrus were also delivered. In February 1990, a further 300,000 tons of wheat were allocated, with deliveries completed in July. For Romania, an additional 125,000 tons each of corn and rye were provided, in addition to beef, butter, and olive oil. The EC has yet to announce additional food aid allocations for Eastern Europe for 1990/91.

As of August 1990, the EC pledged almost 1.1 million tons of food aid to Sub-Saharan African countries. Main recipients are Ethiopia, Mozambique, and Malawi. Approximately 30 percent of the total is pledged through triangular transactions and local purchases.

#### ***Canada's Aid Lower in 1989/90 and 1990/91***

The FAO estimates that Canadian cereal aid shipments in 1989/90 totaled 900,000 tons, down from 1988/89, but exceeding Canada's FAC pledge of 600,000 tons. The 1990/91 (April/March) food aid budget of nearly C\$365 million (nearly US\$310 million) is roughly the same as 1989/90. Multilateral aid is programmed at C\$155 million (about US\$130 million) with the remainder going for bilateral assistance and aid through nongovernmental organizations. Total cereal food aid is estimated to remain near 900,000 tons in 1990/91, with Bangladesh, Afghan refugees in Pakistan, and Mozambique the top recipients.

Most Canadian cereal aid usually goes to Asian countries, followed by African and Latin American nations. All food aid is provided as grants. As of August, Canada pledged more than 180,000 tons of cereal aid to Sub-Saharan countries, with Mozambique, Ethiopia, and Ghana being major destinations. More than 10 percent of the total donations were pledged in the form of triangular transactions.

#### ***Japan Maintains Constant Aid Levels***

Japan provided 450,000 tons of cereal aid in 1989/90, according to FAO estimates, roughly the same as in 1988/89. Japan has recently been the fourth largest food aid donor, also consistently exceeding its FAC pledge of 300,000 tons.

Of the major donors, Japan alone provides all of its cereal aid through triangular transactions. Japanese wheat and flour donations are purchased in the United States for delivery to the intended recipients. Rice is purchased from Asian exporters and corn has been purchased from Zimbabwe. Japan has pledged about 100,000 tons of cereal aid to Sub-Saharan countries, with Sudan, Tanzania, and Guinea the top recipients.

#### ***Australian Aid Down Slightly***

According to FAO estimates, Australian cereal aid shipments for 1989/90 were down about 10 percent from 1988/89. Under the FAC, Australia has agreed to provide a minimum of 300,000 tons of cereal aid. The volume decline in 1989/90 stemmed from a constant funding level of about A\$117 million (almost US\$90 million) and higher cereal prices. In the 1989/90 program, food aid provided through bilateral programs was reduced by about 15 percent to A\$46 million (US\$35 million), while emergency/relief programs were increased about 35 percent to A\$27 million (US\$20 million). Funding for food aid provided multilaterally through the World Food Program was unchanged at A\$44 million (US\$33 million). All Australian food aid is in the form of grants. As of August, Australia pledged 46,000 tons of cereals to Sub-Saharan countries, of which a little more than half was in the form of triangular transactions and local purchases. Mozambique alone accounts for more than half of the total.

## Assessment of Short-Term Cereal Aid Needs

This chapter assesses food aid needs to meet cereal consumption requirements for 55 low-income countries for 1990/91 and 1991/92. Cereals typically account for more than 50 percent of all calories consumed (appendix 2) in low-income countries, and the bulk of all international food aid. The coverage accounts for most countries that are significant food aid recipients or have per capita incomes below \$790.

The methodology employed to assess needs involves calculating the gap between target consumption and the availability of cereals for food use. Target consumption is derived from two alternative objective measures of per capita food use. Food availability depends on production, commercial imports, and nonfood use allowances. The following provides a brief summary of the methods used. For a more detailed discussion of methodology, see appendix 3.

### Food Use Targets

Needs are assessed against two alternative food use targets. The first target—termed *status quo*—is derived from each country's historic rate of food consumption. It allows a country to stabilize per capita consumption at recent levels. The second target—termed *nutrition-based*—is derived from internationally recognized minimum caloric requirements. It is estimated as the amount of cereals needed to satisfy cereal's share of each country's minimum caloric needs (see box).

Two food use targets are used because it is difficult to define a single most appropriate target. The *status quo* measure embodies a "safety net" criteria by supporting food use at re-

cently achieved levels, but does not permit assessment of relative levels of well-being across countries. The nutrition-based target assists comparisons of relative well-being. When *status quo* needs exceed nutrition-based needs, there is an indication of relatively high standards of well-being and less urgency in supporting food use through aid. And, when *status quo* needs are below nutrition-based needs, there is an indication of more urgency to support consumption with food aid, if it can be effectively absorbed by the local economy. It should be noted, however, that all assessments are based on national aggregate data and may mask acute needs resulting from uneven food distribution within countries.

### Food Availability

The availability of cereals for human consumption is calculated based on estimates of production, nonfood use, beginning and ending stocks, and commercial imports. Production is based on official USDA forecasts for 1990/91 and ERS projections for 1991/92, assuming normal weather. Nonfood use includes exports, feed, waste, seed, and processing. Depending on trends in historical data, these items are projected using either 10-year or 3-year per capita averages.

### Stocks

Two alternative estimates of ending stocks are employed in computing food aid needs. The first allows for stock adjustments by using USDA forecasts of actual ending stocks for 1990/91. For 1991/92, stocks are adjusted upward if projected production is on or above trend, and downward if production is below trend. This approach attempts to incorporate stockbuilding behavior that would reduce year-to-year variability in aid needs resulting from supply shocks. The second stock alternative simply holds 1990/91 and 1991/92

### The Status Quo Food Use Target

The concept of a *status quo* food use target is deceptively simple. The objective in using a *status quo* measure is to support average consumption in the near future near that of the past. The problem is how to determine an appropriate measure of past consumption. In a country where per capita consumption is increasing, a long-term average will be below per capita consumption in the most recent years. In this case, a trend or short-term average will yield a target closer to recent levels. However, a *status quo* target close to recent per capita consumption is not necessarily appropriate. If per capita consumption is declining because production can not keep up with population growth and/or imports are declining, a *status quo* target higher than in recent years may be more appropriate.

In view of these issues, the *status quo* targets in this report are based on a simple 10-year (1980/81-1989/90) average of per capita consumption. A long-term average will equally discount above- and below-trend per capita consumption, providing a standard against which all countries are evaluated. In cases where the use of the 10-year average may affect assessed *status quo* needs in an undesirable way, the issue is raised in the summary for that country or region.

This method is different from that used in the *World Food Needs and Availabilities* series. In that report, the *status quo* target was the average per capita consumption in the most recent 4 years that was within one standard deviation from the mean.

## Guide to the Short-Run Assessment Tables

### *Tables Entitled "[Region/Country] Summary"*

**Production.** Historical data to 1989/90, and 1990/91-1991/92 forecasts.

**Commercial imports.** Historical data to 1989/90 (if available), and 1990/91-1991/92 forecasts.

**Food aid receipts.** Historical data to 1989/90 (if available).

**Exports; feed; other.** Historical data to 1989/90, and 1990/91-1991/92 targets.

**Ending stocks.** Historical data to 1989/90, official USDA estimates for 1990/91, and with assumed adjustment in 1991/92.

**Availability net of food aid.** Cereals available for human consumption before food aid. This is the sum of production, beginning stocks, and commercial imports less the sum of exports, feed, other use, and ending stocks. Historical data to 1989/90 (if available), and forecasts for 1990/91-1991/92.

**Food use; per capita food use.** Historical data to 1989/90, with status quo and nutrition-based targets for 1990/91-1991/92.

**Population.** Historical data to 1989/90, and 1990/91-1991/92 forecasts.

**Constant stocks.** 1990/91-1991/92 forecasts based on status quo and nutrition-based targets, including the assumed adjustments in stocks. In the country tables, this is calculated as target food use less availability net of food aid. If availability exceeds target food use, food aid needs are set equal to zero. In regional tables, this entry is the sum of individual country needs, and may not equal target food use less availability net of food aid.

**Food aid need without stock adjustment.** 1990/91-1991/92 forecasts based on status quo and nutrition-

based targets with stocks held constant at the level of 1989/90 ending stocks.

### *Tables Entitled: "Historical and projected macroeconomic indicators: [Country]"*

These tables are applicable only to those countries where a structural model is used to project commercial imports.

**Gross domestic product; per capita gross domestic product.** Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**Exports of goods and services.** Exports of goods, factor services, and non-factor services. Historical data to 1988, 1989 forecasts, and 1990-1991 forecasts.

**Net long-term loans.** Long-term loan disbursements less principal and interest payments. Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**Worker remittances.** Net worker remittances from abroad. Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**Net official grants.** Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**Other net inflows.** Includes net current transfers except workers' remittances, net long-term capital except net long-term loans, and net other capital. Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**Total net inflows.** The sum of exports of goods and services, net long term loans, workers' remittances, net official grants, and other net inflows.

**Total net outflows.** Imports of goods, factor services, and nonfactor services, excluding long-term interest payments. Historical data to 1988, 1989 estimates, and 1990-1991 forecasts.

**End of year reserves.** Historical data to 1989, and 1990-1991 forecasts.

### The Nutrition-Based Food Use Target

The food use targets used to determine nutrition-based cereal needs are derived from the minimum daily caloric intake standards recommended by the United Nations. These country-specific caloric requirements are based on numerous variables, including the age and sex distribution of the population and the physical size of the people. Caloric requirements also vary with assumed physical activity levels. The caloric requirements used in this assessment are those necessary to sustain life with minimum food gathering activity. They are comparable to the activity level of a refugee—they do not allow for play, work, or any activity other than food gathering. In addition, the caloric requirements used in this report are regional averages, rather than country specific. This strict definition is different from that used in the *World Food Needs and Availabilities* series which used country specific caloric requirements and also included a 10-percent allowance for activity. The current caloric requirements are compared to those used in the WFNA series in appendix 2.

ending stocks constant at the 1989/90 level. These estimates may tend to support relatively high stocks in some countries, while maintaining low stocks in others.

#### Commercial Imports

Forecasts of commercial cereal imports for 1990/91 and 1991/92 are based on one of three alternative approaches. The first approach, used for eight key food aid recipients (Bangladesh, Egypt, India, Jamaica, Kenya, Morocco, Peru, and the Philippines), derives import forecasts from econometrically estimated structural models of each country's commercial cereal import behavior. These models account for such variables as expected domestic production, expected food aid shipments, expected cereal import prices, and measures of the ability to pay for cereal imports. The general form of these models and the procedures used are described in appendix 3.

Because structural models require considerable data for estimation and validation, it was not practical to develop them for all 55 countries. In many of these countries, available data are limited and of questionable quality. Therefore, commercial cereal import forecasts for the bulk of the remaining countries (44) are based on vector autoregression models. These models simply project commercial imports based on historical movements in commercial imports, production, and the ability to pay, without accounting for expected future developments. The procedures used for these forecasts are also described in appendix 3.

For three countries (Afghanistan, Nicaragua, and Vietnam), the availability of data was so limited that neither of these approaches was feasible. For these countries, forecast commercial cereal imports are assumed equal to the recent 3-year average.

### North Africa

Total cereal production in the region (including Egypt, Morocco, and Tunisia) was a record 18.2 million tons in 1989/90, and is forecast to rise 4 percent to nearly 19 million tons in 1990/91. The upward trend is the result of larger cereal harvests in Egypt, the region's major producer. After a record harvest in 1988/89, Moroccan cereal production slipped 7 percent in 1989/90 and is forecast to fall another 16 percent in 1990/91 because of poor weather. Tunisia's 1989/90 cereal production rebounded from the 1988/89 drought, and a further increase is forecast for 1990/91, but harvests remain well below achievements of the early and mid-1980's. The region's cereal imports fell about 5 percent in 1989/90, as Morocco reduced large stocks and Tunisia responded to a larger crop. At the end of 1989/90, cereal stocks were at comfortable levels in all three countries.

Food security in Egypt, Morocco, and Tunisia is heavily dependent on their ability to import cereals. Each country has a limited arable land base and fast population growth, resulting in high import dependency. In Morocco and Tunisia, cereal production is highly vulnerable to erratic rainfall. All three countries are faced with policy trade offs between promotion of cereal crops for domestic consumption, and promotion of high-value export crops that earn foreign exchange—and enhance commercial grain import capacity.

During the 1980's, faced with weakening external balances and rising debt, all three countries adopted structural economic reforms aimed at strengthening their balance of payments. Morocco and Tunisia initiated reforms earlier and at a quicker pace than Egypt. As a result, although trade deficits in Morocco and Tunisia remain large, they now face less severe foreign exchange constraints than Egypt. In 1990/91, the region's commercial imports of cereals are forecast at 9.7 million tons, up from 9.5 million in 1988/89 and an estimated 8.9 million in 1989/90. The increase is the result of larger expected purchases by Tunisia and Morocco, which offset declining commercial imports by Egypt. Projections for 1991/92 suggest a decline in commercial cereal imports in the region, primarily because of a further decline in Egypt's import capacity.

Status quo cereal food aid needs for the region in 1990/91 are forecast at 1.0-1.1 million tons, somewhat below historical receipts but consistent with the declining trend of recent years (table 11). Forecast needs in Morocco and Egypt are well below recent average receipts. In the case of Morocco,

Table 11. North Africa regional summary

	Supply			Nonfood use			Food availability and use				Food aid needs		
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	12,968	7,696	2,084	134	3,448	2,686	3,090	14,479	16,563	69	240	----	----
1981/82	10,733	8,423	2,530	32	3,709	2,470	3,369	12,666	15,196	71	214	----	----
1982/83	13,832	6,852	2,111	27	5,771	2,782	2,496	12,976	15,088	73	207	----	----
1983/84	12,330	9,469	2,377	54	6,291	2,875	1,834	13,241	15,618	75	209	----	----
1984/85	12,537	9,531	2,661	16	7,860	2,979	1,037	12,011	14,671	76	192	----	----
1985/86	14,588	9,366	2,021	92	8,002	2,940	1,269	12,689	14,709	78	188	----	----
1986/87	16,813	8,208	2,985	105	8,603	3,269	2,073	12,239	15,224	80	189	----	----
1987/88	14,989	8,623	2,400	168	8,613	3,045	2,225	11,634	14,034	82	170	----	----
1988/89	17,429	9,482	1,948	300	9,616	3,353	2,506	13,361	15,309	84	181	----	----
1989/90	18,206	NA	NA	100	9,913	3,456	2,201	NA	15,877	86	184	----	----
Status quo requirement forecasts													
1990/91	18,953	9,686	----	85	8,817	3,395	2,022	16,520	17,471	88	198	951	1,130
1991/92	19,523	8,873	----	87	9,026	3,474	2,221	15,610	17,884	91	198	2,321	2,261
Nutrition requirement forecasts													
1990/91	18,953	9,686	----	85	8,817	3,395	2,022	16,520	14,782	88	167	426	467
1991/92	19,523	8,873	----	87	9,026	3,474	2,221	15,610	15,129	91	167	396	349

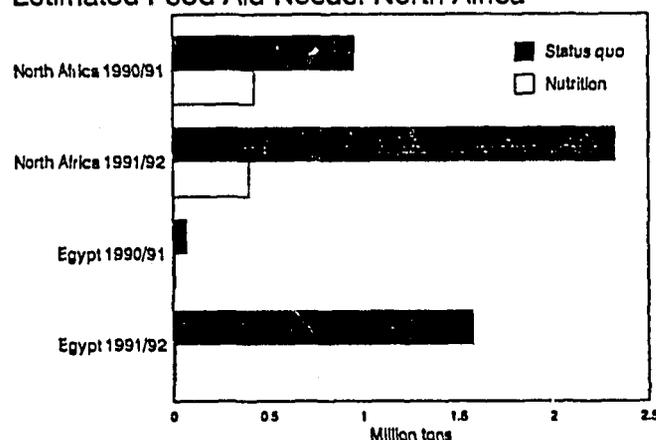
NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Figure 10

## Estimated Food Aid Needs: North Africa\*



\*All estimates include stock adjustments

the results stem from improving commercial import capacity and, in Egypt, from improved domestic production. Tunisia's status quo needs are forecast to increase because cereal harvests are expected to remain well below the record. Nutrition-based aid needs in the region are forecast at under 500,000 tons in 1990/91, with Tunisia accounting for all of the total. The results indicate that average per capita cereal use exceeds minimum nutritional requirements in all three countries.

The projections for 1991/92, assuming normal weather, indicate an increase in status quo cereal aid needs to about 2.3 million tons. Egypt accounts for all of the increase, based on the expectation of a smaller harvest and declining commercial import capacity. Status quo needs for Morocco and Tunisia are

projected to decline. In contrast to the status quo measure, the region's nutrition-based needs are projected to fall to under 400,000 tons in 1991/92, with Tunisia, again, the only country having positive nutrition-based needs.

## Egypt

Cereal production increased to a record 10.2 million tons in 1989/90, and is forecast to expand to 12 million tons in 1990/91. Production gains are being driven primarily by hikes in producer prices and planted area, and by the adoption of high yielding varieties. Wheat output rose 25 percent to 4 million tons in 1990/91. Corn production is forecast to rise 19 percent, and rice output by 4 percent, but sorghum and barley production are expected to show little change (table 12).

Weather has been a negligible factor in recent gains in cereal production, because Egyptian agriculture is mostly irrigated. More significant factors have been changes in incentives and cropping patterns caused by agricultural policies and the effectiveness of the marketing/distribution system. Because of the limited arable land base, traditional cereals compete for land with cash and forage crops, such as cotton and berseem clover. In the last 3 years, high prices for cereals relative to cotton has led to a shift away from cotton. With a "food first" policy seeming to gain favor, cereal production is expected to shift to cotton and berseem land over the next few years. Cotton, however, remains an important foreign exchange earner, accounting for 13 percent of export receipts, and there is likely to be an upper limit on cereal area.

Table 12. Egypt summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions	-kg-	---1,000 tons---			
1980/81	7,367	4,726	1,865	134	1,931	1,430	2,187	8,733	10,598	42	253	---	---
1981/82	7,423	5,187	1,957	22	2,448	1,457	2,509	8,361	10,318	43	238	---	---
1982/83	7,716	4,749	1,816	21	4,255	1,522	1,915	7,261	9,077	45	204	---	---
1983/84	7,882	6,498	1,783	50	4,708	1,694	1,490	8,353	10,136	46	222	---	---
1984/85	7,795	6,373	1,951	16	6,237	1,747	570	7,088	9,039	47	192	---	---
1985/86	7,850	6,462	1,799	92	5,750	1,650	340	7,051	8,849	48	184	---	---
1986/87	8,435	6,103	1,977	105	6,230	1,706	220	6,616	8,594	49	174	---	---
1987/88	8,807	5,895	1,646	108	5,849	1,592	920	6,453	8,099	51	160	---	---
1988/89	9,244	6,883	1,427	100	6,773	1,788	920	7,466	8,893	52	171	---	---
1989/90	10,220	NA	NA	100	6,939	1,882	883	NA	9,546	53	179	---	---
Status quo requirement forecasts													
1990/91	11,981	6,487	---	85	5,768	1,891	883	10,723	10,799	55	197	75	75
1991/92	11,531	5,907	---	87	5,910	1,938	895	9,490	11,065	56	197	1,575	1,562
Nutrition requirement forecasts													
1990/91	11,981	6,487	---	85	5,768	1,891	883	10,723	8,698	55	159	0	0
1991/92	11,531	5,907	---	87	5,910	1,938	895	9,490	8,912	56	159	0	0

NA = Not available.

---- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Table 13. Historical and projected macroeconomic indicators: Egypt

Year	Gross domestic product	Per capita gross domestic product	Balance of payments							End of year reserves
			Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows	Total net outflows 1/	
	bil. 1980 l.c.u.	1980 \$	-----bil. 1980 \$-----							
Historical										
1980	15.50	546	7.09	1.69	2.70	0.10	-0.29	11.28	10.82	0.59
1981	17.13	549	8.36	1.56	2.91	0.28	-0.46	12.66	12.97	1.05
1982	18.87	588	9.11	2.40	2.09	0.43	0.20	14.22	14.20	0.73
1983	20.29	616	9.56	1.45	3.41	0.73	-0.59	14.57	14.49	0.75
1984	21.56	638	10.43	1.00	4.29	0.83	0.43	16.98	17.01	0.83
1985	23.00	663	10.83	1.13	3.88	1.30	1.84	18.98	18.90	0.80
1986	23.62	663	9.34	-0.38	3.17	1.37	3.47	16.98	16.98	0.88
1987	24.21	663	8.14	0.55	2.87	1.06	2.13	14.76	14.25	0.88
1988	24.98	667	7.94	0.12	2.96	0.86	0.61	12.48	12.77	1.39
1989 2/	25.26	657	NA	NA	NA	NA	NA	10.70	10.76	1.10
Projected										
1990	25.66	652	NA	NA	NA	NA	NA	9.23	9.18	1.15
1991	26.32	652	NA	NA	NA	NA	NA	8.05	7.95	1.26

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary

Throughout the 1980's, Egypt's economy has been burdened with budget and trade deficits, large foreign debt obligations, sluggish growth, mounting inflation, and resource distortions resulting from price and administrative controls. Since 1984, Egypt has incurred yearly balance of trade deficits in the range of \$2-4 billion, creating annual financing gaps of \$1.4-4.3 billion (table 13). The gap has been filled by foreign borrowings and official transfers, but the size of the external debt—\$46 billion in 1989—and debt service—33 percent of GDP in 1989—have become onerous. Since 1987, debt re-scheduling has been essential, and investor confidence and foreign aid have waned, as the international community awaits the results of reforms. Liberalization attempts are underway, but economic performance, especially in non-agricultural sectors and trade balances, have not improved significantly.

Commercial imports of cereals are forecast to fall to about 6.5 million tons in 1990/91, compared with 6.8 million in 1988/89 and an estimated 6.7 million in 1989/90. The forecast decline in commercial imports stems in part from larger harvests, but primarily from the scarcity of foreign exchange and the outlook for a sharp devaluation of the Egyptian pound, that will make imports more expensive. Devaluation is viewed by donors and many policymakers as a necessary step to restore balance of payments solvency. These same factors are projected to result in a further decline in commercial cereal imports to about 5.9 million tons in 1991/92. The continuation of the current Middle East crises, namely the Iraqi invasion of Kuwait, would have mixed consequences for

Egypt's economy and these estimates of commercial cereal imports (see box).

In order to maintain status quo consumption, cereal food aid needs are forecast at 75,000 tons in 1990/91, well below the 1.4-2.0 million tons of aid received annually during the 1980's. The decline in forecast needs is driven primarily by gains in domestic production and occurs despite weakening commercial import capacity. Nutrition-based cereal aid needs are forecast to be zero, indicating that current levels of per capita cereal use are above what is required to attain the minimum recommended daily caloric intake. The 10-year average of per capita cereal consumption is 197 kgs, more than 20 percent higher than the 159 kgs needed to meet minimum caloric requirements. The gap between current use and nutritional requirements reflects Egypt's extensive, but costly, food subsidy system that covers 95 percent of the population and the most essential items in the diet.

Projections for 1991/92 indicate that Egypt's status quo cereal aid needs will rise to 1.6 million tons, while nutrition-based needs remain at zero. The increase in status quo needs results from projected declines in both cereal production and commercial imports. The decline in cereal production is based on the assumption that some cereal area will be returned to cash and forage crops. Actual status quo needs could be significantly lower if the "food first" policy is sustained and cereal production continues to expand.

### Implications of the Gulf Crisis for Egypt's Food Aid Needs

The Iraq-Kuwait crisis creates conflicts for Egypt's food security and aid needs. A continuation of the Gulf crisis will lead to somewhat higher food aid needs than are estimated here. Additional food will be needed to feed returning workers and their families fleeing from Iraq and Kuwait. An estimated 1.3 million Egyptians lived and worked in the two countries prior to the invasion. Since August 2, 350,000 workers have left Iraq. By the end of 1991, some 900,000 Egyptians may be repatriated, if the crisis persists.

Egypt will lose foreign exchange from worker remittances, tourism, and Suez Canal tolls, which are already down. Egyptian officials claim remittances will be down \$1.1 billion from the yearly average of \$3.5 billion. Increased petroleum export earnings will partially offset these losses. However, the additional oil revenues will not completely replace lost revenues because Egypt is a small oil producer and prospects for increased output are limited in the short run.

Egypt's balance of payments pressures and food import constraints are likely to be eased somewhat by actions of the donor community. In response to Egypt's strong diplomatic and military stance against Iraq, Saudi Arabia, the United States, Japan, and the European Community have pledged significant foreign assistance in 1990/91 (\$6.6-7.1 billion). Furthermore, the United States has canceled interest payments of \$660 million on outstanding military debt for 1990/91, and has forgiven the entire \$7.1 billion debt. These funds, coupled with reduced debt service obligations, will also help offset foreign exchange losses.

Overall, it is likely that Egypt's capacity to import food would be roughly unchanged by a prolonged Iraq-Kuwait crisis, and may even be enhanced if significant donor concessions are forthcoming. However, meeting the needs of returning workers would boost status quo cereal aid needs to about 235,000 tons in 1990/91 and 1.7 million in 1991/92.

## West Africa

The 15 countries included in this region (Benin, Burkina Faso, Cape Verde, Chad, Ghana, Gambia, Guinea-Bissau, Guinea, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone and Togo) represent a broad range of economic conditions. They include the reforming countries, such as Ghana, which are receiving strong international support, to Liberia where the civil war threatens a significant portion of the population. Economic growth in 1989 in many countries benefited from good agricultural harvests. These gains, however, were offset by declines in world prices for some of their primary exports. In 1989, coffee and cocoa prices fell sharply, while prices of cotton and peanut oil increased.

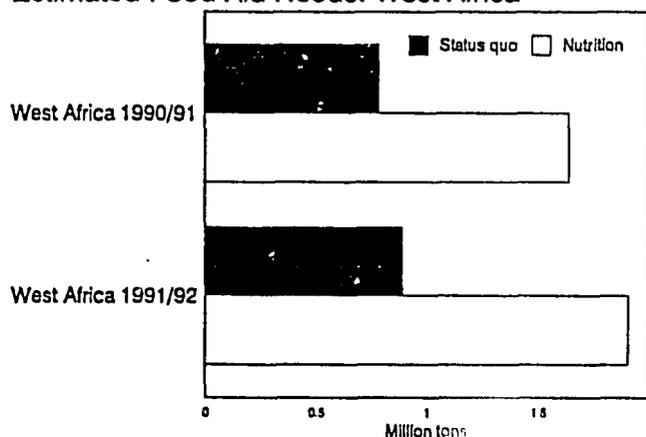
Total 1989 merchandise exports are estimated at \$5 billion, up slightly from 1988. The largest gain was in Guinea, with small increases in several other countries, including Liberia, Mauritania, and Senegal. Guinea's exports increased by 24 percent, primarily because of a substantial rise in export prices of mining products, and in the volume of nonmining exports. Ghana continued to be the largest exporter in the region, even though export earnings declined from \$880 million in 1988 to \$830 million in 1989. Earning shortfalls were especially noticeable in Benin, which suffered from a crackdown on smuggling by Nigerian authorities.

The region's imports grew at a rapid rate, reaching \$6.2 billion, up a third during the last 5 years. However, only during the last 2 years have imports exceeded the level reached in the early 1980's, even in nominal terms. Ghana is also the region's largest importer, with purchases surpassing \$1 billion in 1989. The country's merchandise imports have increased rapidly in recent years reflecting the expansion in project-related imports financed with external assistance. Other countries experiencing strong import growth in 1989 were Liberia and Niger. Imports fell significantly in Guinea, Mali, and Senegal. The overall trade deficit rose from \$1.16 billion in 1988 to \$1.24 billion in 1989.

The mid-September estimates of 1990 crop production are tentative, since the harvest will not be completed until the end of the year. Rainfall through most of the season was near normal for both the coastal and Sahelian countries. The rainy season began late in some Sahelian regions, thus some rainfall was needed into October to guarantee average yields. In the coastal countries, dry conditions in July caused some crop damage. Early season drought was most severe in Gambia and northern Senegal; however, substantial rains in late August and early September gave a boost to grain crops during the critical heading stage of development. Yields are still expected to be below average due to inadequate precipitation in July.

Following good 1989 harvests in most West African countries, grain stocks at the beginning of the 1990/91 season will be adequate. Niger, the only country in the region to suffer a

Figure 11  
Estimated Food Aid Needs: West Africa\*



\*All estimates include stock adjustments

major production shortfall in 1989, will deplete most of its stocks before the 1990 harvest. Food aid is being used to meet emergency needs. A good harvest will be important for stock rebuilding in Niger. In Cape Verde, the outlook for the 1990 harvest is unfavorable, and food aid will again be vital in meeting food needs. On average, domestic production contributes less than 10 percent of Cape Verde's food supplies.

The food security situation in Liberia is serious. Civil war has driven almost 500,000 people into neighboring countries and disrupted agricultural activities throughout the country. Meeting the food aid needs of the Liberians remaining in country, as well as those of the refugees in Guinea, Ivory Coast, and Sierra Leone, will be difficult. The security situation improved in Monrovia following the August arrival of the West African Peace Keeping Force. Food and medical supplies are expected to begin arriving in response to an appeal for assistance. A critical situation exists in the countryside where food stocks are exhausted, and people remain cut off from food distribution channels. Because of the likelihood of reduced harvests and commercial food import capacity, more than 100,000 tons of food aid may be needed in 1990/91 to reach status quo consumption, with nutrition-based needs estimated near 180,000 tons.

Overall, the region's status quo aid needs are estimated at about 800,000 tons in 1990/91, substantially above recent receipts (table 14). Senegal, Liberia, Sierra Leone, and Mauritania account for most of the region's assessed needs, as well as most of the increase from past receipts. The region's nutrition-based needs are estimated at 1.5 million tons in 1990/91. The sharp discrepancy with status quo needs indicates the relatively low levels of average caloric intake in the region. Guinea, Sierra Leone, Liberia, Burkina, and Chad account for the bulk of nutrition-based needs.

Projections for 1991/92, assuming normal weather, indicate an increase in cereal aid needs, primarily because of small projected gains in production. Status quo needs are projected at roughly 850,000-900,000 tons, while nutrition-based needs are projected at 1.7 million tons.

Table 14.--West Africa regional summary

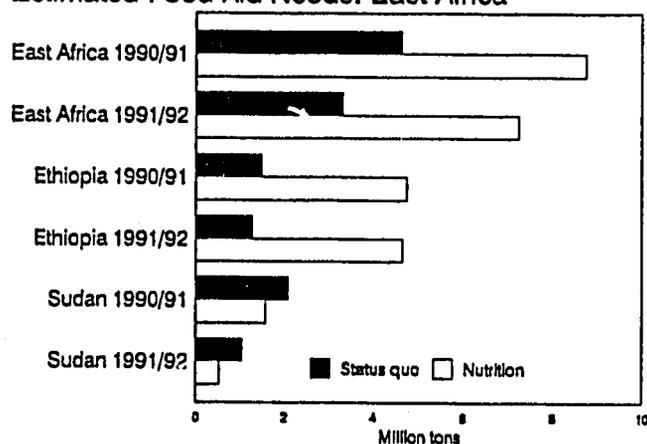
	Supply			Nonfood use			Food availability and use				Food aid needs		
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	7,253	1,060	660	0	69	1,427	124	6,913	7,573	60	127	----	----
1981/82	7,696	1,233	644	0	59	1,477	131	7,386	8,030	61	132	----	----
1982/83	7,286	1,304	824	0	59	1,447	166	7,049	7,873	63	126	----	----
1983/84	7,130	1,378	1,247	0	31	1,492	200	6,951	8,198	65	127	----	----
1984/85	6,947	1,283	1,157	17	56	1,364	290	6,703	7,860	67	118	----	----
1985/86	9,518	1,394	564	10	144	1,852	325	8,871	9,435	69	137	----	----
1986/87	9,830	1,273	679	20	177	1,824	258	9,149	9,828	71	139	----	----
1987/88	9,363	1,690	542	0	171	1,749	255	9,137	9,679	73	133	----	----
1988/89	11,369	1,750	569	0	185	2,110	232	10,847	11,416	75	152	----	----
1989/90	10,614	1,699	521	20	285	1,949	291	10,000	10,521	77	136	----	----
Status quo requirement forecasts													
1990/91	10,345	1,493	----	8	141	1,780	231	9,970	10,528	80	132	784	798
1991/92	10,577	1,509	----	8	146	1,834	280	10,050	10,845	82	132	891	842
Nutrition requirement forecasts													
1990/91	10,345	1,493	----	8	141	1,780	231	9,970	11,355	80	143	1,521	1,578
1991/92	10,577	1,509	----	8	146	1,834	280	10,050	11,693	82	143	1,735	1,686

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Figure 12

## Estimated Food Aid Needs: East Africa\*



\*All estimates include stock adjustments

## East Africa

The East Africa region is comprised of Burundi, Central Africa Republic (CAR), Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, Uganda, and Zaire. Cereal production in 1990/91 is estimated at 17.6 million tons, down about 7 percent from last year. Ethiopia and Sudan account for almost half of the region's total production, and output in Sudan is estimated to fall more than 30 percent in 1990/91. Commercial imports are expected to total about 850,000 tons. Status quo food aid needs are estimated at 4.6-5.4 million tons, up significantly from actual receipts in recent years, due to the food deficit situations in Ethiopia and Sudan. About 45 percent of assessed status quo needs are in Sudan, and about 30 percent are in Ethiopia.

Import payments have risen steadily in recent years, totaling \$9.2 billion in 1989. Kenya, Sudan, and Zaire account for most of this rise. Kenya and Zaire are the largest importers in the region, with payments in each country equal to approximately \$2 billion. The rise in Kenya in 1989 was driven by the higher cost of oil imports and the leasing of two aircraft by Kenya Airways. Zaire increased its volume of imported goods and services.

Exports by the region in 1989 totaled \$5.4 billion, primarily coffee, with every country except Somalia and Sudan obtaining some foreign exchange from the crop. Burundi, Ethiopia, Rwanda, and Uganda are dependent on coffee for more than 70 percent of their total earnings. However, with the suspension of the International Coffee Agreement and the subsequent 40-percent drop in international prices since early 1989, this heavy dependence on one commodity will mean lower earnings and constrained economic growth.

The region's trade deficit totaled \$3.8 billion in 1989. Kenya's deficit reached \$1 billion, while Tanzania's was \$800 million, and Ethiopia and Sudan were each in the \$600-million range. The region's debt burden is one of the largest impediments to economic growth. Debt service remained steady in the late 1980's, but jumped to \$1.75 billion in 1989, primarily due to the increase in Zaire. The debt service ratio for the region was 32.5 percent. Ethiopia and Kenya appear to be in a critical situation with 1989 ratios equal to 70.6 and 61.4 percent, respectively.

Table 15. East Africa regional summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-		---1,000 tons---	
1980/81	14,443	835	1,340	260	160	2,351	878	12,343	13,683	150	91	----	----
1981/82	16,962	812	1,353	388	202	2,536	2,298	13,228	14,581	154	94	----	----
1982/83	16,360	622	1,464	357	200	2,661	1,882	14,180	15,644	159	98	----	----
1983/84	15,623	447	2,026	207	190	2,671	1,007	13,877	15,903	164	97	----	----
1984/85	13,508	707	2,602	0	245	2,215	668	12,095	14,696	170	87	----	----
1985/86	18,950	1,067	1,971	355	297	2,635	2,390	15,007	16,978	175	97	----	----
1986/87	19,748	919	1,662	1,065	315	2,876	2,980	15,821	17,483	181	97	----	----
1987/88	16,475	1,079	2,013	700	335	2,959	1,676	14,865	16,877	187	90	----	----
1988/89	21,880	858	1,366	915	325	3,159	2,899	17,116	18,482	193	96	----	----
1989/90	18,977	772	2,032	470	307	3,054	2,754	16,063	18,095	200	91	----	----
Status quo requirement forecasts													
1990/91	17,575	854	----	534	545	3,187	2,011	14,905	19,347	206	94	4,620	5,363
1991/92	20,341	866	----	551	562	3,293	1,599	17,211	19,999	213	94	3,315	3,429
Nutrition requirement forecasts													
1990/91	17,575	854	----	534	545	3,187	2,011	14,905	23,653	206	115	8,749	9,492
1991/92	20,341	866	----	551	562	3,293	1,599	17,213	24,449	213	115	7,236	7,648

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

In contrast to the status quo estimate, the region's total nutrition-based cereal aid needs are estimated at 8.7-9.5 million tons in 1990/91 (table 15). The large gap between the two estimates indicates that average diets in the region provide substantially less than the minimum recommended calories. Ethiopia, followed by Sudan, Tanzania, Zaire, and Uganda have the largest absolute nutrition-based needs, and the most severe per capita shortfalls are in Somalia, Ethiopia, Burundi, and Sudan.

Projections for 1991/92, based on the assumption of normal weather (and therefore larger production) and trend financial developments, indicate that cereal food aid needs will decline. Status quo needs are projected to total 3.3-3.4 million tons, while nutrition-based needs total 7.2-7.6 million tons.

### Ethiopia

With a per capita income near \$130, Ethiopia is one of the world's poorest nations. The economy is driven by the agricultural sector which accounts for 40 percent of GDP and 90 percent of export earnings. Consequently, when there is a drought, the economy tends to stagnate or decline, as was the case in 1984/85, 1987/88, and 1989/90. Ethiopia is dependent on coffee for more than 70 percent of its export earnings. With the suspension of the International Coffee Agreement, and a 40-percent decline in the price of coffee, Ethiopia is sure to experience a significant drop in earnings. In October 1989, the Government eliminated the Ethiopia Coffee Marketing Corporation's export monopoly and allowed free auctioning. The Corporation competes with domestic and foreign private coffee exporters.

About 60 percent of Ethiopia's agricultural output is handled by private traders and service cooperatives. The remainder is handled by the Agricultural Marketing Cooperative (AMC). Between 1979 and 1987, private trader activities, particularly the movement of grain between deficit and surplus areas, were restricted. However, as of January 1988, the distribution system was liberalized. Farmgate prices were raised. The government eliminated restrictions on inter-regional grain trade and began licensing merchants to operate in the main producing regions. Farmers are now allowed to sell grain that is in excess of their quota on the open market or to merchants.

In March 1990, President Mengistu announced extensive reforms aimed at liberalizing the economy, such as rebuilding a market economy, decontrolling food production, and forcing competition for the AMC with private traders. By April, consumer cereal prices had fallen 30-60 percent. State control on the production and sale of agricultural goods was lifted. The reforms allow peasant farmers to sell their produce on the free market. In addition, road block inspections outside the capital were reduced.

The food deficit situation in north Ethiopia is expected to worsen because of the poor early outlook for the meher, main season, crops to be harvested in November. Dry conditions in several areas in May and June have led to stress and wilting of long-cycle crops, especially corn. In a few areas, replowing and replanting with lower yielding short-cycle crops, such as teff and pulses, have been necessary. Consistent and abundant rainfall in July and August needed to assure an adequate harvest, did not materialize.

In Eritrea, Tigray, and northern Wollo, rains were 2 to 3 weeks late, making it impossible to sow long-cycle crops such as corn and sorghum. With the lack of rain in August, it is unlikely that there was sufficient time for the development of shorter cycle crops. Given these conditions, widespread crop failures can be expected in these regions.

In Gojam, Illubabor, and Wollega, late rains delayed plantings by one month. In eastern Gondar, crops and draught animals are in poor condition. Even if rains which began in mid-July continued through September, the harvest is expected to be below normal. In the highland areas of Arssi, Bale, Gamo Gofa, Hararghe, and Sidamo, crops are in good condition and area planted is estimated to have increased 15 to 20 percent above last year in response to the newly implemented agricultural reforms.

Cereal output for 1990/91 is estimated at 4.6 million tons, slightly higher than last year. Status quo food aid needs are forecast at 1.5 million tons, somewhat higher than recent receipts—largely because of the outlook for weak commercial import capacity (table 16). Nutrition-based needs are forecast to be sharply higher at 4.7 million tons, and indicate that status quo per capita consumption supports only 62 percent of the recommended minimum caloric intake. A major international relief effort has prevented a widespread famine in Eritrea, Tigray, and northern Wollo regions, which were severely affected by last year's drought. The efficient delivery of food aid however, depends on the reopening of the port of Massawa which has been closed since February when Eritrean forces took control.

## Sudan

Sudan, Africa's largest country, and one of the world's poorest, has faced major economic difficulties for many years. Over the past decade, the economy has registered little growth, with per capita income and consumption levels stagnating. The country has also experienced increasing food security problems and currently faces its third famine in 6 years. Seasonal rains have failed or have been late, and plantings have been limited by the continuing civil war. The chances of a new famine are growing more and more certain, possibly as extensive as the drought of 1984/85 which affected an estimated third of Sudan's population. The impending famine is more serious than the one 3 years ago because the rains failed in the north where the major cities are located.

Sudan's economic growth has been restrained by the failure to implement economic restructuring, a shortage of hard currency, and the enormous cost of the ongoing civil war. The current government, which came to power in July 1989, promised to control budget deficits, restructure public enterprises, remove subsidies on principal consumer goods, and negotiate a reform package with the IMF. Few of these goals have been accomplished.

The government restricts imports and is increasing control on exports. For example, sesame exports, which were handled by the private sector, are now handled by a government-owned corporation. Cotton output remains undervalued because of an overvalued exchange rate. The costs of the civil war exacerbates the deficit situation and makes Sudan a less desirable place for investment. In real terms, Sudan's GDP has stagnated since the early 1980's.

Table 16. Ethiopia summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----									-millions-		---1,000 tons---	
1980/81	4,247	20	190	2	0	704	0	3,561	3,751	39	97	---	---
1981/82	4,240	0	278	0	0	714	0	3,526	3,804	39	97	---	---
1982/83	5,277	44	301	0	0	888	0	4,432	4,733	40	118	---	---
1983/84	4,567	2	750	0	0	841	0	3,729	4,479	41	109	---	---
1984/85	3,520	49	667	0	0	480	0	3,058	3,757	42	89	---	---
1985/86	4,060	203	770	0	0	527	0	3,737	4,507	43	104	---	---
1986/87	5,115	95	514	0	0	580	0	4,631	5,144	45	115	---	---
1987/88	4,100	104	1,052	0	0	831	0	3,374	4,426	46	96	---	---
1988/89	5,540	0	448	0	0	946	0	4,594	5,042	48	105	---	---
1989/90	4,390	0	1,240	0	0	890	0	3,500	4,740	50	95	---	---
-----Status quo requirement forecasts-----													
1990/91	4,648	45	---	0	0	883	0	3,810	5,291	52	102	1,481	1,481
1991/92	5,069	51	---	0	0	914	0	4,205	5,478	53	102	1,272	1,272
-----Nutrition requirement forecasts-----													
1990/91	4,648	45	---	0	0	883	0	3,810	8,547	52	165	4,737	4,737
1991/92	5,069	51	---	0	0	914	0	4,205	8,848	53	165	4,643	4,643

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Table 17. Sudan summary

	Supply			Nonfood use			Food availability and use				Food aid needs			
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks	
	-----1,000 tons-----								-millions-		-kg-		---1,000 tons---	
1980/81	2,786	101	194	258	0	175	436	2,496	2,690	19	142	---	---	
1981/82	3,931	107	330	388	0	183	1,434	2,470	2,800	19	144	---	---	
1982/83	2,426	1	450	280	0	188	961	2,432	2,883	20	143	---	---	
1983/84	2,299	7	654	100	0	208	429	2,530	3,183	21	153	---	---	
1984/85	1,364	48	1,100	0	0	189	14	1,637	2,738	21	127	---	---	
1985/86	4,227	0	690	205	0	170	1,349	2,517	3,207	22	143	---	---	
1986/87	3,849	14	725	750	0	255	1,554	2,653	3,378	23	146	---	---	
1987/88	1,648	293	410	600	0	189	224	2,482	2,891	24	123	---	---	
1988/89	5,137	199	410	700	0	240	1,350	3,270	3,680	24	154	---	---	
1989/90	2,917	140	320	100	0	231	860	3,216	3,536	24	145	---	---	
Status quo requirement forecasts														
1990/91	2,010	102	---	382	240	495	395	1,460	3,551	25	142	2,091	2,556	
1991/92	3,519	79	---	393	247	509	243	2,602	3,653	26	142	1,051	1,204	
Nutrition requirement forecasts														
1990/91	2,010	102	---	382	240	495	395	1,460	3,032	25	121	1,572	2,037	
1991/92	3,519	79	---	393	247	509	243	2,602	3,119	26	121	517	670	

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Following last year's poor harvest of 2.9 million tons, cereal stocks are at minimum levels. This, combined with a poor outlook for this year's sorghum and millet crops, has caused local prices to rise rapidly. Food shortages continue to be serious in Darfur and Kordofan where stocks are being rapidly depleted. On most markets, grain prices continue to rise, making it impossible for vulnerable sectors of the population to obtain their minimum food requirements. Emergency relief will be required for those affected by the war in the south but the government is obstructing food distribution in the rebel held areas, as well as restricting movements by international donor organizations.

In most regions, plantings were delayed by late rains. The effects of the weather have been exacerbated by the lack of fuel, spare parts, fertilizer, and seed, as well as the disrupting effects of the civil war. Little rain has fallen in the traditionally deficit areas of northern Darfur and northern Kordofan, where most of the millet crop is grown. Precipitation in Gedaref, a surplus region, has been below normal and consequently, plantings have been delayed. In Juba, rains were delayed, but began by August which allowed for replanting of crops. On the other hand, in the southwestern part of the country, the weather has been favorable.

Under current conditions, total cereal production for 1990/91 is estimated at 2.0 million tons, with sorghum at 1.5 million and millet at 200,000 tons (table 17). Status quo food aid needs are estimated at 2.1-2.6 million tons in 1990/91, sharply higher than recent aid deliveries. Nutrition-based needs are forecast to be somewhat lower, in the range of 1.6-2.0 million tons, suggesting that recent levels of per capita

cereal use have provided more than the minimum recommended caloric intake.

Both status quo and nutrition-based needs are projected to fall in 1991/92, assuming a rebound in production after consecutive poor harvests. Status quo needs are projected at 1.1-1.2 million tons, and nutrition-based needs at 500,000-700,000 tons.

### Southern Africa

The southern African region is comprised of Angola, Lesotho, Madagascar, Malawi, Mozambique, Swaziland, Zambia, and Zimbabwe. Cereal output for the region in 1990/91 is estimated at 8.1 million tons, 6 percent below last year's harvest (table 18). Increases in production occurred in Lesotho, Madagascar, Mozambique, and Zimbabwe. The only significant decline was in Zambia, where the weather was dry and area reduced. Commercial imports are estimated at about 560,000 tons, with Angola accounting for more than 40 percent.

Total status quo cereal food aid needs are forecast at 1.9-2.2 million tons, significantly higher than recent aid receipts. Mozambique accounts for about one-fifth of total assessed needs. However, Angola, Malawi, Swaziland, Zambia, and Zimbabwe accounted for the bulk of the increase over historical receipts—in most cases because of smaller harvests. Food aid needs to meet minimum nutritional requirements are forecast to be slightly higher, at 2.2-2.5 million tons. The relatively small differential between the two assessments indicates that average diets in the region are near the

Table 18. Southern Africa regional summary

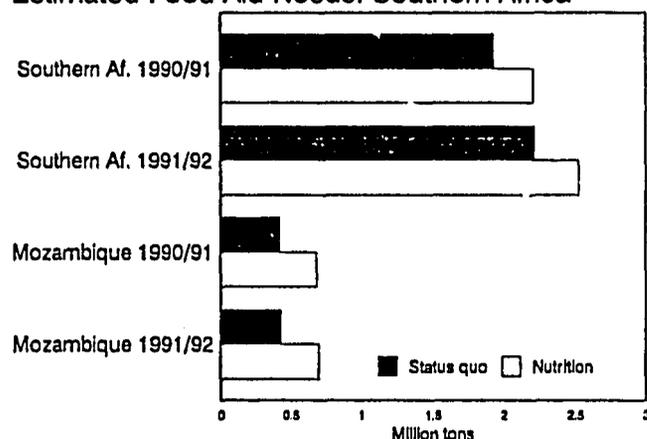
	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-	-kg-	---1,000 tons---			
1980/81	8,152	1,268	370	107	380	1,134	1,364	6,808	7,178	48	148	----	----
1981/82	7,331	949	447	318	400	1,124	1,202	6,600	7,048	50	141	----	----
1982/83	6,126	850	537	527	327	1,007	554	5,763	6,300	51	123	----	----
1983/84	6,685	736	628	357	331	945	905	5,437	6,065	53	115	----	----
1984/85	8,311	927	886	131	380	1,098	1,900	6,634	7,520	54	138	----	----
1985/86	8,394	797	609	363	416	1,207	2,329	6,776	7,385	56	132	----	----
1986/87	6,917	355	665	515	419	1,092	1,505	6,070	6,735	58	116	----	----
1987/88	7,729	447	968	398	432	1,151	1,471	6,229	7,197	59	121	----	----
1988/89	8,474	437	1,085	447	424	1,230	1,506	6,775	7,860	61	129	----	----
1989/90	8,561	563	1,411	200	473	1,346	1,308	7,302	8,713	63	138	----	----
Status quo requirement forecasts													
1990/91	8,077	559	----	411	551	1,230	1,032	6,709	8,634	65	133	1,925	2,190
1991/92	8,771	657	----	424	568	1,276	1,541	6,663	8,878	67	133	2,215	1,717
Nutrition requirement forecasts													
1990/91	8,077	559	----	411	551	1,230	1,032	6,720	8,928	65	137	2,208	2,484
1991/92	8,771	657	----	424	568	1,276	1,541	6,652	9,178	67	137	2,526	2,017

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Figure 13

Estimated Food Aid Needs: Southern Africa\*



\*All estimates include stock adjustments

nutritional standard in the region, with Lesotho and Mozambique having the widest nutritional gaps.

For the region, nominal GDP (in US dollars) expanded very little in the late 1980's, so that in real terms, most countries experienced falling income levels. In addition, with population growth averaging 3 percent, per capita incomes also fell. Income growth has been constrained by low commodity prices for exports and large debt service obligations. Export earnings for the southern region neared \$6 billion in 1989, with Angola the largest exporter, at \$1.7 billion, followed closely by Zambia and Zimbabwe. Angola, an oil exporter, and Zambia, a copper exporter, benefitted from higher world prices for these commodities in 1989. After declining for several years in the mid-1980's, import payments are on the rise

again, totaling an estimated \$6 billion in 1989, fueled primarily by Zambia's imports for the metal sector, as well as fertilizer and petroleum imports.

For the region, debt service obligations totaled almost \$1 billion, about 15 percent of exports. However, for a number of countries, debt servicing is an enormous burden on the economy. For example, in Madagascar, the debt service ratio was more than 50 percent. In Lesotho, Mozambique, and Zimbabwe, this ratio was between 30 and 40 percent.

Assuming normal weather and larger harvests, the region's aggregate food aid needs are projected to decline somewhat in 1991/92. Status quo needs are projected at 1.7-2.2 million tons, and nutrition-based needs at 2.2-2.5 million tons.

**Mozambique**

The Government of Mozambique remains steadfastly committed to its Program for Economic Rehabilitation (PRE), launched in January 1987 as a response to the decline in production and income that took place in the early 1980's. During this period, marketed crop output and factory utilization dropped sharply, real GDP fell by a fourth, and exports declined 75 percent. Bank credit was extended to cover mounting budget deficits and extensive parallel markets emerged. By 1986, the parallel market exchange rate was approaching 40 times the official rate in national currency terms. Underlying this situation was the widespread destruction and dislocation in much of the countryside brought on by an insurgency that targeted infrastructure and the rural population.

Although the security problem remains difficult, government officials have addressed the economic causes and consequences of the situation by improving production and income levels and laying the basis for sustained recovery and growth once the security situation stabilizes. The reforms introduced under the PRE sought to eliminate pervasive distortions in resource allocation by greatly enhancing the role of market forces, moving rapidly toward a realistic exchange rate, reforming enterprise organization and management, labor markets, the banking system and agriculture, and tightening fiscal and monetary policies.

Major devaluations brought the official exchange rate from 39 meticaïcs per dollar in January 1987 to 800 by mid-1990. Fixed prices were increased by several times to adjust for costs, the scope of the fixed-price regime was reduced from 40 commodity groups to 28, and profit controls on other prices were eased. At the same time, steps were taken to regulate relations with external creditors, and substantial increases in concessional assistance were obtained, to alleviate food shortages and other hardships, as well as to support recovery and rehabilitation.

As a result, a visible economic upturn began with real GDP growth averaging 4 percent from 1987 to 1989, led by small-scale agriculture and manufacturing. Although parallel market prices reportedly stabilized or eased, the release of suppressed inflation in official markets led to a doubling of domestic prices during 1987. The rate of increase fell to 55 percent in 1988 and 35 percent in 1989. Consumer prices for rationed staples were raised sharply in 1989 to cut subsidies, and agricultural producer prices were increased. A system

of minimum prices was introduced for nine crops in lieu of multilevel fixed prices, to enhance quality differentiation and marketing flexibility while protecting incentives.

The 1990 grain harvest is estimated at 601,000 tons, up 6 percent from last year and 30 percent from 1987. Food crops benefitted from generally favorable weather and improved security in some areas during the growing season. The food crop marketing agency, AGRICOM, increased its purchases by 18 percent to 80,000 tons of grain including corn, rice, and sorghum. It has raised its corn producer price by 15 percent and reduced the consumer subsidy by raising official retail prices 27 percent. The major surplus coarse grain producing provinces are Cabo Delgado, Manica and Nampula, which accounted for 70 percent of marketed production in 1989. Road transportation remains dangerous and slow, and localized food deficits have proved difficult to correct even if surpluses are available within the same province. Cassava production also increased in 1990.

Although grain output increased in 1990/91, domestic supplies will meet only about 60 percent of status quo cereal consumption requirements—resulting in status quo cereal aid needs of about 420,000 tons (table 19). Nutrition-based needs are estimated to be higher, at about 680,000 tons, and indicate that status quo use supports only about 78 percent of the recommended minimum caloric intake. The current situation indicates that there are acute food shortages that may support emergency supplies above the status quo assessment. Shortages resulting from last year's poor crop have been exacerbated by a shortfall in deliveries of food aid. Internal food distribution difficulties persist and several areas are only accessible by air.

Table 19. Mozambique summary

	Supply			Nonfood use			Food availability and use				Food aid needs		
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----									-millions-	-kg-	---1,000 tons---	
1980/81	454	214	155	0	0	69	10	603	757	12	63	---	---
1981/82	483	171	149	0	0	67	14	584	732	12	59	---	---
1982/83	568	97	210	0	0	73	14	592	802	13	63	---	---
1983/84	518	0	274	0	0	66	17	449	723	13	55	---	---
1984/85	544	51	379	0	0	77	15	520	899	13	67	---	---
1985/86	584	38	362	0	0	78	15	544	906	14	66	---	---
1986/87	593	0	244	0	0	66	15	527	771	14	55	---	---
1987/88	465	1	506	0	0	82	10	389	895	14	64	---	---
1988/89	525	21	506	0	0	88	5	462	968	14	69	---	---
1989/90	568	25	725	0	0	110	5	483	1,208	14	85	---	---
Status quo requirement forecasts													
1990/91	601	44	---	0	0	123	5	522	940	15	65	418	418
1991/92	602	57	---	0	0	125	5	533	959	15	65	425	425
Nutrition requirement forecasts													
1990/91	601	44	---	0	0	123	5	522	1,205	15	83	683	683
1991/92	602	57	---	0	0	125	5	533	1,230	15	83	696	696

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Widespread starvation has so far been averted, but nutritional status is deteriorating. More than 4 million people are suffering from the emergency situation, including 2 million displaced persons—of which only 1.5 million are accessible. Emergency food aid needs are estimated at 200,000 tons of cereals, above the status quo assessment.

### South Asia

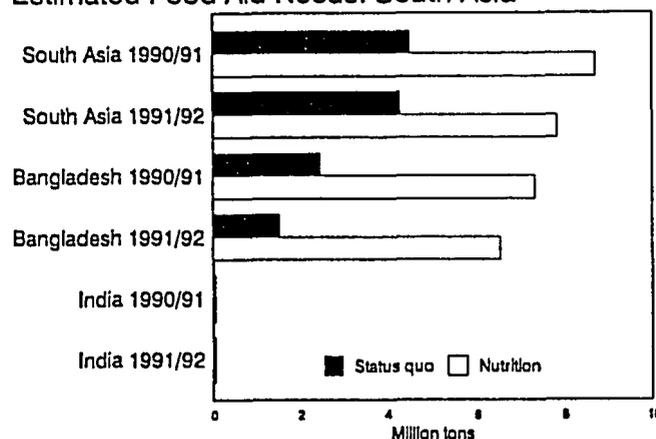
Most South Asian countries had record or near-record harvests during 1989/90, leading to reduced cereal import requirements and increased stocks. Total cereal production in the region in 1989/90 was a record 203 million tons, with food grain stocks rising to 27.7 million tons, near the 1986/87 record. While most countries in the region entered 1990/91 with improved food grain supplies, food security remained fragile in several countries. Farm output in Bangladesh and Sri Lanka recovered from consecutive years of poor weather in 1987 and 1988 that reduced per capita consumption and increased import requirements. In Nepal, improved 1989/90 harvests masked a downtrend in per capita food production and consumption. The food security situation in Afghanistan remains difficult to assess because of poor data. Finally, all countries in the region enter 1990/91 with very weak balance of payments positions that significantly limit their capacity to import food commercially.

Larger food grain harvests are expected in most South Asian countries in 1990/91. Gains are expected to be smaller than in 1989/90, when good weather followed poor crops the previous year and resulted in relatively large percentage increases. Total cereal production is forecast at 204.6 million tons, up about 1 percent from 1989/90. The largest gains are expected in India, Pakistan, and Sri Lanka because of a good 1990 monsoon. A smaller harvest is anticipated in Nepal because of the large gain in production achieved in 1989/90. Opening food grain stocks are above those of recent years throughout the region—particularly in India—indicating increased ability to meet any production shortfalls with stocks on hand.

All countries in the region have experienced widening domestic budget and balance of payments deficits in recent years. Most have been attempting to implement structural adjustment measures to reduce these deficits. Most countries have made some progress in trimming domestic budget deficits. However, an important side effect has been reduced public development outlays that may weaken future growth. Recent improvements in export performance have been offset in the balance of payments by increases in imports associated with modest liberalization of import regimes and, particularly, by a slowdown in worker remittances. Debt service ratios are rising in most countries in the region, and foreign exchange reserves are relatively low, particularly in Pakistan, India, and Sri Lanka.

Figure 14

### Estimated Food Aid Needs: South Asia\*



\*All estimates include stock adjustments

Remittances from workers employed in the Middle East became a key source of foreign exchange for all South Asian countries in the 1980's, but these are now declining as a result of slower economic growth in the Middle East. Should the current crises in the Middle East escalate, or otherwise continue for an extended period, it is likely that the outlook for the region's balance of payments will be affected by both higher oil import costs and declining remittances.

Forecasts of commercial food grain import behavior during 1990/91 and 1991/92 generally reflect the tight foreign exchange position prevalent in the region, as well as the outlook for improved domestic supplies. Commercial imports are forecast to remain below recent levels in Bangladesh, India, Sri Lanka, and Pakistan. Commercial imports by Afghanistan and Nepal, both countries with very limited capacity to earn foreign exchange, are expected to remain negligible.

Aggregate status quo food aid needs in South Asia are estimated at 4.3-4.5 million tons in 1990/91, well above actual food aid inflows during recent years (table 20). Bangladesh accounts for the bulk of assessed needs, as well as most of the increase from historical levels—primarily because of sharply lower commercial imports. Assessed status quo needs are also relatively large in Nepal and Afghanistan, where the reliability of available data is questionable. India is estimated to have no status quo food aid needs in 1990/91, and those in Pakistan and Sri Lanka are in line with historical receipts.

Nutrition-based cereal aid needs are estimated at 8.4-8.7 million tons in 1990/91, with Bangladesh accounting for the bulk. India, Afghanistan, and Pakistan are estimated to have no nutrition-based needs because of good harvests, ample stocks, and adequate commercial imports. Nutrition-based needs estimates exceed status quo estimates in Bangladesh, Nepal, and Sri Lanka, indicating gaps between 10-year average per capita consumption and minimum recommended caloric targets.

Table 20. South Asia regional summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	153,166	1,166	1,787	2,196	2,128	17,936	14,854	134,657	136,401	907	150	----	----
1981/82	160,950	2,829	1,998	1,667	2,216	18,743	15,522	140,484	142,452	928	154	----	----
1982/83	152,689	3,751	2,398	1,502	2,177	16,204	15,986	136,093	138,451	949	146	----	----
1983/84	179,345	5,399	2,395	1,676	2,427	20,348	24,254	152,026	154,345	971	159	----	----
1984/85	176,394	3,108	2,542	1,206	2,376	20,359	27,557	152,258	154,717	994	156	----	----
1985/86	175,745	1,803	2,386	1,957	2,872	20,145	28,920	151,211	153,519	1,016	151	----	----
1986/87	179,356	943	2,586	2,155	2,894	20,593	30,892	152,686	155,164	1,039	149	----	----
1987/88	167,297	3,109	2,839	1,699	2,820	18,593	21,869	156,316	159,066	1,063	150	----	----
1988/89	192,081	6,611	2,365	1,212	3,800	22,583	24,600	168,366	170,625	1,087	157	----	----
1989/90	202,990	NA	NA	1,420	3,335	23,390	27,725	NA	177,013	1,111	159	----	----
Status quo requirement forecasts													
1990/91	204,573	1,571	----	1,970	3,465	22,462	26,371	179,575	173,909	1,135	153	4,521	4,279
1991/92	206,910	1,887	----	2,015	3,535	22,920	28,314	178,358	177,818	1,160	153	4,286	4,223
Nutrition requirement forecasts													
1990/91	204,573	1,571	----	1,970	3,465	22,462	26,371	179,601	180,575	1,135	159	8,711	8,395
1991/92	206,910	1,887	----	2,015	3,535	22,920	28,314	178,384	184,588	1,160	159	7,845	7,824

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Table 21. Bangladesh summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	15,065	343	737	0	108	1,699	1,252	13,136	13,873	88	158	---	---
1981/82	14,614	253	1,006	20	96	1,786	615	13,601	14,607	91	161	---	---
1982/83	15,334	568	1,252	0	7	1,857	626	14,026	15,279	93	163	---	---
1983/84	15,709	894	1,163	0	7	1,906	800	14,516	15,679	96	163	---	---
1984/85	16,121	1,088	1,500	0	6	2,026	1,017	14,960	16,460	99	166	---	---
1985/86	16,179	0	1,203	0	6	1,877	976	14,337	15,540	102	152	---	---
1986/87	16,523	172	1,589	0	0	1,996	744	14,932	16,520	106	157	---	---
1987/88	16,515	1,629	1,397	0	0	2,058	1,285	15,545	16,942	109	156	---	---
1988/89	16,632	1,339	1,161	0	0	2,092	1,108	16,056	17,217	112	154	---	---
1989/90	18,540	NA	NA	0	0	2,172	1,256	NA	17,873	115	155	---	---
Status quo requirement forecasts													
1990/91	18,547	472	---	0	0	2,297	1,556	16,423	18,870	118	159	2,447	2,147
1991/92	18,907	1,357	---	0	0	2,361	1,571	17,888	19,403	122	159	1,515	1,500
Nutrition requirement forecasts													
1990/91	18,547	472	---	0	0	2,297	1,556	16,423	23,766	118	201	7,343	7,043
1991/92	18,907	1,357	---	0	0	2,361	1,571	17,888	24,437	122	201	6,550	6,535

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Table 22. Historical and projected macroeconomic indicators: Bangladesh

Year	Gross domestic product	Per capita gross domestic product	Balance of payments							End of year reserves
			Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows	Total net outflows 1/	
	bil. 1980 l.c.u.	1980 \$	-----bil. 1980 \$-----							
<b>Historical</b>										
1980	197.98	145	0.98	0.10	0.10	0.10	0.59	2.42	2.58	0.46
1981	211.35	151	0.97	0.10	0.11	0.10	0.57	2.53	2.69	0.30
1982	213.10	147	0.92	0.10	0.12	0.10	0.73	3.03	2.97	0.14
1983	220.81	148	0.98	0.09	0.13	0.09	0.77	3.15	2.78	0.19
1984	230.07	150	1.18	0.09	0.15	0.10	0.76	2.65	2.79	0.56
1985	238.52	150	1.39	0.09	0.17	0.11	0.80	3.29	3.33	0.42
1986	249.68	153	1.32	0.08	0.19	0.09	1.18	3.35	3.23	0.38
1987	259.45	154	1.51	0.09	0.21	0.10	0.74	3.74	3.29	0.50
1988	264.07	152	1.57	0.10	0.23	0.11	0.84	3.49	3.37	0.96
1989 2/	275.28	154	NA	NA	NA	NA	NA	3.53	3.41	1.07
<b>Projected</b>										
1990	286.95	157	NA	NA	NA	NA	NA	3.57	3.44	1.19
1991	299.12	159	NA	NA	NA	NA	NA	3.60	3.47	1.33

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary.

Food aid need projections for 1991/92 are based on trend assessments of cereal production and projections of commercial food grain imports. The status quo assessments indicate that cereal aid needs will remain in the range of 4.2-4.3 million tons, with Bangladesh and Afghanistan again accounting for most needs. Projected 1991/92 status quo needs decline or remain roughly constant in all countries in the region. The nutrition-based projections indicate a decline in needs for all countries in 1991/92 to 7.8 million tons.

### Bangladesh

Food grain production rebounded to a record 18.5 million tons in 1989/90, following poor weather in 1987/88 and 1988/89 (table 21). The rice crop is estimated at 17.7 million tons, up sharply from 1988/89 and the previous record. The large outturn stemmed from good weather, sharply reduced incidence of flooding compared with the last few years, improved availability of fertilizer, and further increases in irrigated area. Harvests of wheat and coarse grain were also up in 1989/90, although wheat output remained below the peak harvests of the mid-1980's because of continued competition for irrigated land with rice, sugarcane, and other crops. With larger harvests, food grain imports were reduced to about 1.6 million tons. Government stocks increased to 1.3 million tons, consistent with the plan to build food security stocks to 1.3-1.6 million tons.

With normal rainfall for the remainder of the season and minimal flooding, food grain production is expected to rise in 1990/91, but growth is unlikely to match the recovery of 1989/90. The 1990/91 rice crop is reported to have been affected by excess moisture and the projection is for only a marginal increase in total food grain production.

Bangladesh's chronic budget and balance of payments deficits continue to hamper growth in incomes and imports. Monetary, fiscal, and trade policy in recent years has sought to conform with the parameters of donor-supported structural adjustment programs and an impending World Bank Enhanced Structural Adjustment Program. The focus has been on liberalizing industrial and trade policy, improving domestic resource mobilization, and reforming the financial sector. To hold the domestic deficit within the limits of these programs, development outlays have been held below target, with likely adverse impacts for future growth. While export performance has strengthened, there have been offsetting factors, including increases in imports, reduced commodity and food assistance, and weakening worker remittances. A particular problem has been the decline in remittances, Bangladesh's single largest source of foreign exchange.

Economic and balance of payment factors will reduce Bangladesh's commercial cereal imports in 1990/91. Key factors are the relatively low level of foreign exchange reserves, the expectation that further depreciation of the taka will increase import costs, and reduced inflationary pressure following the large record harvest in 1989/90 (table 22). Consistent with trend macroeconomic projections and the cyclical pattern of historical commercial import behavior, commercial cereal imports are projected to rise in 1991/92. Bangladesh's financial outlook is sensitive to factors that affect its limited foreign exchange reserves. A further loss of remittances or a sharp rise in oil import costs caused by the crisis in the Middle East could significantly reduce commercial import capacity.

Cereal food aid needs for 1990/91 are estimated at 2.1-2.4 million tons, based on the status quo cereal consumption target.

Table 23. India summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	113,934	70	435	970	2,020	14,081	12,200	99,883	100,275	689	146	---	---
1981/82	120,949	1,730	338	729	2,120	14,733	12,700	104,597	104,904	704	149	---	---
1982/83	112,446	2,341	282	303	2,170	12,150	12,800	100,064	100,306	720	139	---	---
1983/84	136,831	3,826	371	265	2,420	16,116	20,300	114,356	114,651	736	156	---	---
1984/85	135,261	489	304	271	2,370	15,984	23,900	113,525	113,746	751	151	---	---
1985/86	133,690	0	254	660	2,460	15,895	24,600	113,975	114,151	768	149	---	---
1986/87	134,041	1	212	855	2,460	16,154	25,450	113,723	113,828	784	145	---	---
1987/88	124,940	895	223	700	2,379	14,092	17,320	116,794	116,928	800	146	---	---
1988/89	148,581	2,573	308	420	3,250	17,950	19,910	126,944	127,146	817	156	---	---
1989/90	155,216	NA	NA	420	2,870	18,517	21,850	NA	131,644	833	158	---	---
Status quo requirement forecasts													
1990/91	156,750	0	---	688	2,949	17,469	20,280	137,214	127,026	850	149	0	0
1991/92	157,760	0	---	702	3,006	17,811	22,187	134,335	129,509	866	149	0	0
Nutrition requirement forecasts													
1990/91	156,750	0	---	688	2,949	17,469	20,280	137,214	131,048	850	154	0	0
1991/92	157,760	0	---	702	3,006	17,811	22,187	134,335	133,609	866	154	0	0

NA = Not available.

Nutrition-based cereal aid needs are estimated to be substantially higher at 7.0-7.3 million tons. Estimated status quo and nutrition-based aid needs for 1990/91 are both above recent levels of aid receipts. The key factors leading to larger assessed needs are relatively low levels of current per capita consumption relative to both the 10-year average and the nutritional target, and possible reduced commercial purchases. The large difference between the status quo and nutrition-based assessments reflects the wide gap between existing levels of per capita cereal consumption and those needed to reach the minimum caloric standard.

Cereal food aid needs are projected to decline in 1991/92. This assessment is based on gains in production, assuming normal rainfall, and an increase in commercial cereal imports. Poor weather, a significant erosion of commercial imports because of a prolonged crisis in the Middle East, or other developments, could sharply alter actual food aid needs in 1991/92.

### India

Total 1989/90 grain production was a record 155 million tons, including 70 million tons of rice, 54 million of wheat, and 31 million of coarse grains (table 23). With a second consecutive good crop, India's food security position improved substantially during 1989/90. Pressure on open market consumer prices eased, and government stocks of wheat and rice, which had been at precariously low levels for several years, increased sharply. Public wheat and rice stocks grew from 13.6 million in June 1989 to about 20.3 million—near the official target—by June 1990. Commercial cereal imports were limited to about 500,000 tons of rice imported during 1989 from Vietnam and Thailand.

The outlook for 1990/91 is for another record or near-record food grain crop. Rainfall during the 1990 monsoon was near normal over most of the country, higher support prices and government procurement have sustained producer incentives, and supplies of fertilizer, seeds, and other inputs are reported to be favorable. Total cereal production is forecast at 157 million tons, including about 72 million of rice and 54 million of wheat. With this harvest outlook, the government anticipates a further increase in stocks. No commercial cereal imports are projected in 1990 or 1991 because of the combination of ample stocks and a weak balance of payments position. The government reportedly is seeking export markets for up to 2 million tons of surplus wheat stocks.

While the domestic cereal supply situation remains comfortable, the balance of payments aspect of India's food security position is increasingly precarious. Export performance has improved recently, but the current account deficit remains large and reserves have fallen sharply. Imports are rising, partially in response to liberalization measures, worker remittances have been declining, government deficits have been persistently large, and debt service payments have increased as a result of increased borrowing and hardening terms. Although these trends have been present since the mid-1980's, the balance of payments problem became acute by mid-1990, when foreign reserves dropped below 2 month's import coverage (table 24).

Adverse financial developments have tended to constrain India's commercial food imports during the late 1980's, and will likely continue to constrain imports over the next several years. A prolonged crisis in the Middle East would

Table 24. Historical and projected macroeconomic indicators: India

Year	Balance of payments									
	Gross domestic product	Per capita gross domestic product	Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows	Total net outflows 1/	End of year reserves
	bil. 1980 l.c.u.	1980 \$				bil. 1980 \$				
Historical										
1980	1,358	250	12.3	1.0	2.8	0.6	-1.6	15.1	17.6	6.9
1981	1,448	261	11.9	1.1	2.2	0.5	-1.1	14.7	17.1	4.5
1982	1,506	265	12.3	1.4	2.6	0.4	0.9	17.6	17.6	4.5
1983	1,636	282	13.7	1.3	2.7	0.4	1.8	19.8	19.1	5.3
1984	1,692	285	14.7	2.1	2.7	0.5	1.4	21.3	20.4	6.3
1985	1,803	298	14.5	1.7	2.4	0.4	4.3	23.3	22.5	7.0
1986	1,887	305	15.8	2.2	2.5	0.4	2.7	23.7	23.6	7.1
1987	1,970	312	16.7	2.4	2.7	0.4	1.5	23.7	24.4	6.5
1988	2,167	336	18.0	2.3	2.7	0.3	1.2	24.6	26.4	4.7
1989 2/	2,262	344	NA	NA	NA	NA	NA	25.9	27.2	3.4
Projected										
1990	2,377	354	NA	NA	NA	NA	NA	26.8	27.4	2.8
1991	2,513	367	NA	NA	NA	NA	NA	28.0	27.8	2.9

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary.

likely lead to further deterioration in the balance of payments. Higher prices for petroleum, India's major import, and declining remittances from workers in the Middle East, a major source of foreign exchange, would place significant additional pressure on foreign exchange reserves.

With the outlook for good 1990/91 harvests, the estimates indicate no imports or food aid needs to meet either status quo or nutrition-based consumption targets in 1990/91. In addition, with normal weather, no imports or food aid needs are projected for 1991/92. Food security stocks have now been rebuilt and should be adequate to compensate for any moderate production shortfall in 1990/91 or 1991/92. However, with foreign reserves very low, major or consecutive production shortfalls could lead to significant food aid needs.

### Southeast Asia

Cereal production in the region is estimated at a record 56.6 million tons in 1989/90, up more than 3 percent from the previous year. Record rice harvests in Indonesia and Vietnam resulting from good weather and sustained producer incentives more than offset a relatively small weather-driven setback in the Philippines. Despite the larger harvest and increased rice exports by Indonesia and Vietnam, the region's imports of cereals were up sharply. The Philippines' cereal imports surged to a record as the government imported more rice and wheat to meet strengthening demand, curb inflation, and maintain food security stocks. In Indonesia, larger imports of wheat were needed to meet rising demand. Vietnam's rice exports maintained their strong growth, rising more than 25 percent to a record of about 1.9 million tons.

The outlook for 1990/91 is for the region's cereal output to remain near the 1989/90 record. A record cereal outturn is forecast for the Philippines because of improved weather, but somewhat smaller rice harvests are expected in Indonesia and Vietnam because of less-than-optimal weather. At present, the setbacks are expected to be small, amounting to less than 1 percent in Indonesia, and 2-3 percent in Vietnam. Consequently, impacts on cereal imports and rice exports are likely to be small. With normal weather and current policies to promote rice production in each country, the region's cereal production is expected to increase in 1991/92. The projections indicate more than a 3-percent increase in total production, with the largest gains in Indonesia and the Philippines.

The region's three economies present a mixed financial outlook. Indonesia's economy and balance of payments are on a strong foundation, with solid growth in incomes and export earnings, relatively small domestic and external deficits, and a manageable foreign debt. Indonesia's commercial cereal imports are projected to remain near recent levels. In the Philippines, while the balance of payments remains weak, burdened by debt, and dependent on aid, export performance has strengthened markedly since 1987. With the recovery in export earnings, as well as rising demand and inflationary pressures, commercial cereal imports are expected to increase substantially from the depressed levels of the recent past. Data on Vietnam's current financial condition are not available. It is assumed that rice export earnings will allow Vietnam to at least maintain commercial imports at recently observed levels.

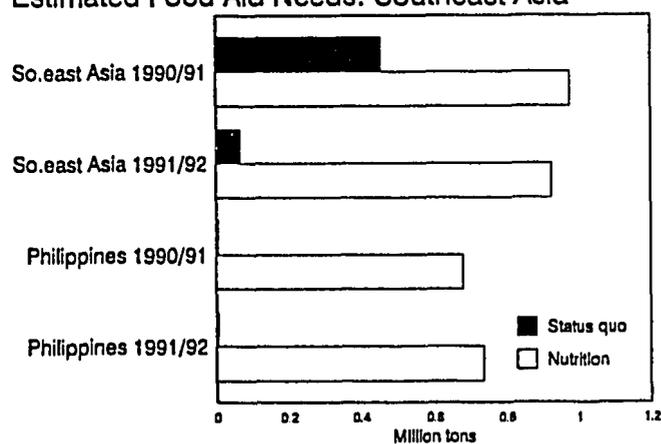
Table 25. Southeast Asia regional summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-	-kg-	---1,000 tons---			
1980/81	40,298	4,743	617	213	2,259	3,471	3,808	38,181	38,160	259	147	----	----
1981/82	43,987	3,830	205	87	2,406	3,689	4,354	41,089	40,610	265	153	----	----
1982/83	43,860	3,851	231	157	2,546	3,742	3,656	41,964	41,449	271	153	----	----
1983/84	47,552	4,294	521	181	2,540	4,045	3,425	45,310	45,042	278	162	----	----
1984/85	50,616	3,898	358	254	2,640	4,081	4,620	46,344	45,885	284	162	----	----
1985/86	51,554	3,314	248	567	2,881	4,133	4,808	47,100	46,500	290	160	----	----
1986/87	52,314	2,544	804	508	3,627	4,440	3,636	47,454	47,421	297	160	----	----
1987/88	52,384	2,868	861	304	3,790	4,364	3,443	46,987	47,049	303	155	----	----
1988/89	54,756	3,226	304	1,740	4,050	4,511	2,612	48,511	48,052	310	155	----	----
1989/90	56,600	NA	NA	2,354	4,400	4,534	3,707	NA	48,042	316	152	----	----
Status quo requirement forecasts													
1990/91	56,615	4,223	----	1,677	4,315	4,553	3,530	50,470	50,223	322	156	457	659
1991/92	58,620	4,383	----	1,712	4,408	4,645	3,820	51,947	51,218	329	156	66	0
Nutrition requirement forecasts													
1990/91	56,615	4,223	----	1,677	4,315	4,553	3,530	50,470	49,043	322	152	977	952
1991/92	58,620	4,383	----	1,712	4,408	4,645	3,820	51,947	50,027	329	152	927	804

NA = Not available.

--- = Not applicable.

Figure 15  
Estimated Food Aid Needs: Southeast Asia\*



\*All estimates include stock adjustments

Southeast Asia's status quo food aid needs are estimated at 450,000-660,000 tons in 1990/91, roughly consistent with recent food aid receipts (table 25). Indonesia accounts for all of 1990/91 estimated status quo needs, reflecting the high level of per capita rice use achieved in recent years. No needs are estimated for the Philippines because of the expected recovery in commercial imports. Regional nutrition-based needs for 1990/91 are estimated to be higher, at nearly 1 million tons. In contrast to the status quo assessment, the Philippines and Vietnam account for all of the nutrition-based needs, reflecting the relatively poor nutritional status of those populations relative to Indonesia.

Projections based on normal weather indicate a decline in the region's food aid needs in 1991/92. Status quo needs, again

confined to Indonesia, are projected at less than 70,000 tons. Nutrition-based needs, again limited to the Philippines and Vietnam, are projected at 800,000-925,000 tons. The food aid need estimates for countries in the region would have a mixed response to significantly higher oil prices associated with a prolonged crisis in the Middle East. Food aid needs in Indonesia, an oil exporter, would tend to decline, while needs in the oil importing countries of the Philippines and Vietnam would tend to rise.

#### Philippines

Food grain production fell in 1989/90, as dry weather affected area and yields of rice and corn (table 26). Harvests of rice, the major food grain, and corn are both estimated to be down about 3 percent from 1988/89 records. In the case of rice, the setback came despite favorable price incentives and input supplies, and reversed the recent trend of increased production. In the case of corn, the production decline stemmed from both poor weather and the recent trend for corn area to be shifted to rice and sugarcane. The smaller food grain harvest, together with rising demand and government concern with double-digit inflation, led to a large increase in food grain imports in 1989/90. Food grain imports surged 40 percent to a record 2.1 million tons, including a record 675,000 tons of rice. The large imports moderated open market consumer prices and maintained food security stocks near recent levels.

With normal weather and the maintenance of relatively strong producer incentives, larger harvests of rice and corn are estimated in 1990/91. Total food grain output is forecast at 10.8 million tons, up more than 4 percent, with rice output rebounding to about 6.2 million tons and corn to 4.6 million,

Table 26. Philippines summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	8,125	1,148	85	179	1,674	931	1,775	6,594	6,678	51	131	---	---
1981/82	8,562	1,081	54	3	1,775	972	1,768	6,899	6,953	52	133	---	---
1982/83	8,147	1,282	49	11	1,846	971	1,551	6,819	6,868	54	128	---	---
1983/84	8,424	1,027	54	30	1,640	990	1,152	7,190	7,243	55	131	---	---
1984/85	8,763	1,420	68	9	1,640	982	1,283	7,421	7,488	57	132	---	---
1985/86	9,856	1,010	181	0	1,752	1,120	1,713	7,564	7,745	58	133	---	---
1986/87	9,844	646	349	111	2,107	1,068	1,571	7,345	7,695	60	129	---	---
1987/88	10,037	842	477	0	2,290	1,147	1,486	7,527	8,004	61	131	---	---
1988/89	10,511	1,361	135	15	2,350	1,213	1,380	8,401	8,536	63	136	---	---
1989/90	10,370	NA	NA	0	2,500	1,242	1,305	NA	8,653	64	134	---	---
Status quo requirement forecasts													
1990/91	10,840	2,226	---	0	2,413	1,221	1,330	9,407	8,712	66	132	0	0
1991/92	11,052	2,395	---	0	2,473	1,252	1,453	9,599	8,927	68	132	0	0
Nutrition requirement forecasts													
1990/91	10,840	2,226	---	0	2,413	1,221	1,330	9,407	10,088	66	153	681	656
1991/92	11,052	2,395	---	0	2,473	1,252	1,453	9,599	10,336	68	153	737	614

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

both records. Despite improved domestic supplies, food grain import needs are likely to remain large because of rising incomes and a desire to moderate continued strong inflationary pressure. Historically, food grain imports have tended to rise in response to inflation. To assure adequate supplies, food grain stocks are expected to be maintained at about 1.3 million tons.

The performance of the Philippines' economy improved substantially during the late 1980's, with annual growth in real GDP averaging about 6 percent during 1987-90. The balance of payments remains under pressure from a large trade deficit and an external debt amounting to about 62 percent of GDP. However, merchandise export performance improved sharply during 1987-90, achieving average annual growth of about 16 percent (table 27). The recovery of exports has allowed import growth to recover to meet strengthening domestic demand, and slowed the accumulation of new debt.

Export gains have provided the basis for a substantial recovery in the Philippines' capacity to import commercially. The current outlook for 1991 and 1992 is that, aided by further depreciation of the peso, export growth will continue to out-

pace imports and boost foreign reserves. However, reserves are likely to remain below target, and the capacity to import the goods necessary to sustain real growth remains heavily dependent on aid inflows. With the current account deficit sensitive to changes in the oil price and inward remittances, a prolonged crisis in the Middle East could have a significant adverse impact on reserves and commercial food imports.

With the outlook for increased food grain production and strengthened capacity to import commercially, no food aid needs are anticipated for 1990/91, according to the status quo assessment. Nutrition-based needs are estimated at roughly 700,000 tons, indicating that average levels of per capita consumption supply less than the recommended minimum amount of calories. Projections for 1991/92 indicate that there will continue to be no status quo food aid needs. The food aid need estimates for both 1990/91 and 1991/92 are particularly sensitive to the financial and balance of payments forecasts, including expected export earnings, aid inflows, and rates of inflation. Adverse developments in the balance of payments, including higher oil prices or reduced aid commitments, could increase assessed food aid needs.

Table 27. Historical and projected macroeconomic indicators: Philippines

Year	Gross domestic product	Per capita gross domestic product	Balance of payments							Total net outflows	End of year reserves
			Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows			
	bil. 1980 l.c.u.	1980 \$	-----bil. 1980 \$-----								
<b>Historical</b>											
1980	264.70	693	8.00	0.74	0.21	0.15	0.79	9.88	9.77	2.74	
1981	274.86	700	8.27	0.65	0.24	0.18	-0.24	9.10	9.96	2.85	
1982	282.85	702	8.11	0.60	0.24	0.17	0.70	9.82	10.91	1.99	
1983	286.00	690	8.55	0.85	0.19	0.25	0.99	10.84	10.95	0.90	
1984	267.92	630	8.66	0.08	0.06	0.29	0.22	9.31	9.44	0.79	
1985	255.96	586	8.69	0.08	0.12	0.23	-1.00	8.12	8.09	0.65	
1986	259.50	578	10.15	-0.86	0.19	0.24	-0.17	9.55	8.19	0.67	
1987	272.20	591	9.40	-1.52	0.22	0.20	-0.35	7.94	8.98	2.03	
1988	289.93	614	10.61	-1.56	0.39	0.29	0.46	10.17	10.17	0.99	
1989 2/	307.32	634	NA	NA	NA	NA	NA	11.11	10.39	1.00	
<b>Projected</b>											
1990	322.08	649	NA	NA	NA	NA	NA	11.62	10.79	1.83	
1991	342.04	672	NA	NA	NA	NA	NA	11.76	11.27	2.33	

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary.

## Latin America

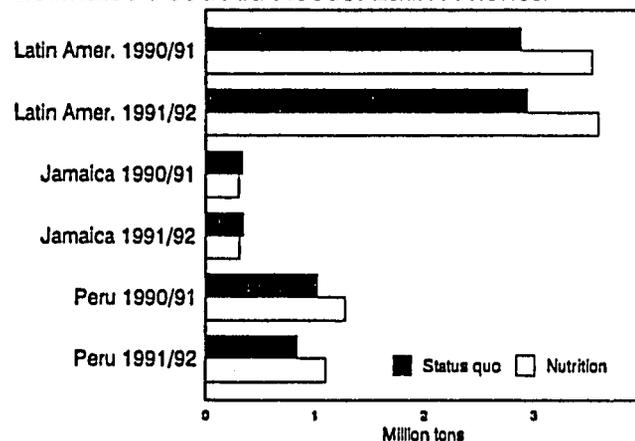
Latin American countries included in the short-term food aid needs assessment are: Bolivia, Peru, the Dominican Republic, Jamaica, Haiti, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. Most had larger food grain harvests in 1989/90 but still substantially below records established in the mid-1980's. Only Guatemala experienced a large setback in production in 1989/90. As a result of generally larger harvests, food grain import requirements declined, or remained roughly constant in most countries (table 28). While larger imports by Guatemala and Bolivia led to a small increase in estimated total cereal imports in the region in 1989/90, total imports remained below the 4.5-4.6 million tons reached during 1986/87-1987/88. Cereal stock levels remained near recent holdings at the end of 1989/90, except in El Salvador, Guatemala, and Nicaragua, where they were low.

Overall, food grain production in these Latin American countries is expected to increase modestly in 1990/91. Harvests are forecast near 1989/90 levels, except in Bolivia and Guatemala. In Bolivia, output is likely to be down nearly 10 percent because of bad weather, while grain production in Guatemala is expected to rebound to a record. Cereal production in Peru is currently forecast to decline significantly from 1989/90, due to persistent dry weather.

The balance of payments positions of nearly all of the Latin American countries analyzed have been weakened by sluggish export earnings and rising debt. Nearly all experienced a decline in their ability to import food and other items on commercial terms, leading to an increase in the share of cereal im-

Figure 18

### Estimated Food Aid Needs: Latin America\*



\*All estimates include stock adjustments

ports met through food aid. Because nearly all of these countries rely on imports for a large share of consumption needs, declining capacity to import food commercially represents a major threat to food security. In Peru, Bolivia, and Nicaragua, falling incomes and high inflation further threaten household food security.

Commercial imports of cereals by these countries are forecast to continue to decline in 1990/91 and 1991/92. Large trade deficits and debt obligations are expected to persist, although modest gains in export earnings are likely to benefit some countries. Total commercial cereal imports are forecast at about 1.9 million tons in 1990/91, compared with an estimated 2.3 million in 1989/90 and 2.6 million in 1988/89. A further

Table 28. Latin America regional summary

	Supply			Nonfood use				Food availability and use				Food aid needs			
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks		
	-----1,000 tons-----												-millions-	-kg-	---1,000 tons---
1980/81	5,220	3,071	523	49	1,990	674	983	5,488	6,011	57	106	----	----		
1981/82	5,757	2,661	646	64	2,281	705	976	5,375	6,021	58	104	----	----		
1982/83	5,513	2,238	1,212	21	2,357	703	945	4,701	5,913	59	101	----	----		
1983/84	5,451	2,538	1,203	41	2,354	711	979	4,849	6,052	60	101	----	----		
1984/85	6,456	1,933	1,222	79	2,347	730	1,190	5,022	6,245	62	101	----	----		
1985/86	6,205	1,929	1,436	146	2,378	718	1,036	5,046	6,482	63	103	----	----		
1986/87	6,018	2,842	1,699	58	2,754	516	1,119	5,149	6,848	65	106	----	----		
1987/88	6,536	2,488	2,095	10	2,982	865	1,214	5,072	7,167	66	108	----	----		
1988/89	6,592	2,570	1,452	25	3,172	829	1,104	5,246	6,669	68	98	----	----		
1989/90	6,786	NA	NA	12	3,089	839	1,093	NA	6,911	69	100	----	----		
Status quo requirement forecasts															
1990/91	6,549	1,923	----	46	3,071	869	1,162	4,418	7,297	71	103	2,879	2,810		
1991/92	7,093	1,563	----	47	3,138	858	1,219	4,526	7,462	72	103	2,937	2,849		
Nutrition requirement forecasts															
1990/91	6,549	1,923	----	46	3,071	869	1,162	4,418	7,889	71	111	3,516	3,447		
1991/92	7,093	1,563	----	47	3,138	858	1,219	4,556	8,067	72	111	3,578	3,521		

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see "Methodology").

decline in commercial imports to about 1.6 million tons is projected for 1991/92. Commercial imports are expected to fall in all countries, except Guatemala and El Salvador. Particularly sharp declines compared with recent average performance are indicated in the Dominican Republic, Haiti, and Peru.

Actual commercial imports and aid needs will depend heavily on financial developments in each country, including changes in the prices of primary imports and exports. A sharp, sustained hike in world prices of oil, a major import of each of these countries, would likely increase food aid needs.

Forecasts in the 10 countries indicate that between 2.8 and 2.9 million tons of cereal food aid will be needed in 1990/91 to maintain status quo consumption. Each country has some estimated status quo needs, with Peru accounting for, by far, the largest share, followed by Jamaica and Bolivia. Total nutrition-based cereal aid needs are estimated at 3.4-3.5 million tons in 1990/91. Most countries have positive nutrition-based needs, and Peru and Bolivia together account for about half of the total. In Costa Rica, Jamaica, and Nicaragua, nutrition-based needs are substantially smaller than status quo needs, indicating that current average consumption exceeds minimum caloric requirements. However, the assessment for Nicaragua likely underestimates actual needs because cereals account for a relatively small part of the diet, and supplies of livestock products are likely deteriorating. In five

countries, Bolivia, Dominican Republic, El Salvador, Haiti, Honduras, and Peru, status quo consumption is substantially below the nutritional standard.

The 1991/92 projections indicate that food aid needs will rise slightly, primarily because of declining commercial imports. Status quo food aid requirements are projected at 2.8-2.9 million tons, with nutrition-based needs reaching 3.5-3.6 million. The pattern of projected needs remains similar to 1990/91, with Peru and Bolivia accounting for the largest shares, and relatively high nutrition-based needs in Bolivia, Dominican Republic, El Salvador, Haiti, Honduras, and Peru. These projections are based on numerous assumptions, including normal weather and no major political or macroeconomic shocks. Droughts, which are not uncommon in the Andean region, could inflate projected needs.

#### Jamaica

Jamaica, with a population of nearly 2.5 million, has a relatively large land base in relation to its population, but very little land is suitable for extensive cereal production. Consequently, nearly all food and feed grains are imported, and per capita wheat, corn, and rice imports are among the highest in the Western Hemisphere. Overall, imported food accounts

Table 29. Jamaica summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-		-kg-	---1,000 tons---		
1980/81	9	346	37	0	140	23	29	164	201	2	90	---	---
1981/82	7	299	83	0	151	24	33	127	210	2	93	---	---
1982/83	6	271	127	0	162	25	37	86	212	2	92	---	---
1983/84	8	366	54	0	160	27	27	197	251	2	108	---	---
1984/85	6	156	225	0	115	23	27	24	249	2	106	---	---
1985/86	8	194	203	0	83	26	28	92	294	2	124	---	---
1986/87	17	84	333	0	137	28	25	-61	272	2	114	---	---
1987/88	17	202	208	0	133	27	20	64	272	2	113	---	---
1988/89	7	65	365	0	126	27	23	-83	276	2	114	---	---
1989/90	7	NA	NA	0	126	27	24	NA	279	2	115	---	---
Status quo requirement forecasts													
1990/91	7	87	---	0	145	27	29	-82	256	2	105	338	333
1991/92	9	75	---	0	146	27	25	-85	258	2	105	342	347
Nutrition requirement forecasts													
1990/91	7	87	---	0	145	27	29	-82	224	2	92	306	301
1991/92	9	75	---	0	146	27	25	-85	225	2	92	310	315

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see Appendix 3: "Methodology").

Table 30. Historical and projected macroeconomic indicators: Jamaica

Year	Gross domestic product	Per capita gross domestic product	Balance of payments							Total net outflows 1/	End of Year reserves
			Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows			
	bil. 1980 l.c.u.	1980 \$	-----bil. 1980 \$-----								
Historical											
1980	4.75	1196	1.42	0.13	0.05	0.01	-0.03	1.58	1.56	0.05	
1981	4.87	1210	1.45	0.18	0.06	0.00	0.08	1.76	1.79	0.06	
1982	4.91	1198	1.42	0.31	0.08	0.02	0.05	1.88	1.85	0.08	
1983	5.02	1214	1.42	0.14	0.04	0.01	0.08	1.70	1.74	0.04	
1984	4.97	1189	1.46	0.09	0.03	0.04	0.16	1.78	1.74	0.03	
1985	4.73	1121	1.41	0.01	0.10	0.08	0.23	1.83	1.76	0.10	
1986	4.83	1136	1.65	-0.26	0.06	0.04	0.05	1.55	1.62	0.06	
1987	5.09	1189	1.75	-0.09	0.06	0.08	0.08	1.87	1.80	0.06	
1988	5.12	1190	1.68	0.20	0.06	0.07	-0.15	1.85	1.90	0.06	
1989 2/	5.08	1175	NA	NA	NA	NA	NA	NA	NA	0.14	
Projected											
1990	5.16	1186	NA	NA	NA	NA	NA	NA	NA	NA	
1991	5.24	1197	NA	NA	NA	NA	NA	NA	NA	NA	

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary.

for roughly 40 percent of daily caloric intake (table 29). Food aid needs are determined primarily by the country's ability to finance commercial imports.

The Jamaican economy has been extremely fragile for nearly two decades and has become very dependent on food aid and other financial assistance (table 30). After a 10-year experiment with socialism in the 1970's failed, a series of natural and economic setbacks in the early 1980's delayed the economic recovery envisioned by the newly elected government in 1980. Key problems were a series of hurricanes that devastated infrastructure, and soft world prices for Jamaica's major exports—sugar and bauxite. The economy gained momentum in 1990, fueled by improving earnings from exports and tourism. However, escalating prices of oil are threatening the recovery.

Jamaica's balance of payments difficulties during the 1980's have been associated with a decline in commercial cereal imports, with food aid accounting for an increasing share of cereal imports. Despite the outlook for modest gains in exports, commercial cereal imports are forecast to remain constrained, particularly if food aid remains available at recent levels. Commercial cereal imports are forecast at about 90,000 tons in 1990/91, and 75,000 tons in 1991/92.

Jamaica's status quo cereal aid needs are estimated at 330,000-340,000 tons in 1990/91. Nutrition-based needs are lower at 300,000-310,000 tons, indicating that status quo consumption is slightly above minimum nutritional requirements recommended determined by the United Nations. Projections for 1991/92 suggest a small increase in both status quo and nutrition-based needs, but are highly sensitive to financial assumptions.

#### **Peru**

After 3 years of weak growth, total agricultural output fell in 1989. The poor performance of the farm sector reflects declining consumer purchasing power, reduced producer incentives, and shortages of farm inputs. The poultry and livestock sectors accounted for most of the decline, while production of cereals, primarily corn, was up slightly. As a result of falling demand and a deteriorating balance of payments, cereal imports and per capita consumption were off significantly in 1988/89 and 1989/90. Entering 1990/91, cereal stocks remain at near-normal levels, but food security is fragile because of the outlook for continued weak consumer purchasing power and commercial import capacity.

Little improvement in cereal production is expected in 1990/91 (table 31). Drought has affected plantings and yields of crops in the highlands, as well as the availability of irrigation water in coastal areas. Corn production is forecast to rise, but other crops, particularly rice and potatoes, are expected to be affected by the drought. Although total cereal production is estimated to be up, the drought may reduce harvests below

current estimates. Continued shortages of credit and fertilizer, as well as declines in real producer prices, are also likely to hamper cereal production over the next several years.

Peru's new administration is attempting a dramatic macroeconomic adjustment process in an effort to provide financial stability and restore growth in the face of an overwhelming foreign debt (1990 debt service ratio of 60 percent). The reforms come in the wake of consecutive years of deep recession and hyperinflation. Policy measures include rigid fiscal austerity and price reforms to dampen inflation, as well as devaluation of the inti and other trade controls aimed at generating trade and current account surpluses to repay debt.

Peru's commercial cereal imports are expected to decline during 1990/91 and 1991/92. Key factors are high debt service and the outlook for sharp depreciation of the inti and continued weak growth in both effective demand and export earnings (table 32). It is estimated that commercial cereal imports will fall to about 1 million tons in 1990/91 and under 900,000 tons in 1991/92, substantially below average purchases during the 1980's. These estimates could be further reduced by an increase in petroleum import costs.

Status quo cereal food aid needs are estimated at 1 million tons in 1990/91, sharply higher than recent food aid receipts. The increase is driven by declining per capita production and falling commercial imports. Nutrition-based needs are estimated to be substantially higher at 1.2-1.3 million tons, indicating a significant gap between average per capita cereal consumption and the amount needed to reach minimum recommended caloric intake levels.

Assuming more normal weather, cereal production is projected to rise significantly in 1991/92. Despite a moderate recovery in domestic supplies, cereal food aid needs are projected to rise, primarily because of a further decline in commercial imports. Status quo needs are projected in the range of 800,000-840,000 tons, while nutrition-based needs are assessed at about 1.1 million tons.

#### **Case Studies of Long-Term Cereal Food Aid Needs**

The approach necessary for long-run assessments of food aid needs differs from the short-run. In the short-run, the supply of cereals cannot change appreciably because factors of production such as land and labor are relatively immobile. Similarly, on the demand side, income growth and the capacity to export, feed, or process cereals is limited by investment decisions in the past. Therefore, significant changes in supply or per capita use are unlikely in the short-run. In the long-run, however, significant changes in the structure of a market can occur because of changes in domestic economic and agricultural policy, technological development, and changes in international economic conditions and prices. Therefore, the long-run assessments are conducted using economic models

Table 31. Peru summary

	Supply			Nonfood use				Food availability and use				Food aid needs	
	Production	Commercial imports	Food aid receipts	Exports	Feed	Other	Ending stocks	Avail. net of food aid	Food use 1/	Population	Per cap. food use 1/	With stock adj.	Constant stocks
	-----1,000 tons-----							-millions-	-kg-	---1,000 tons---			
1980/81	1,000	1,522	116	1	501	240	268	1,730	1,846	17	107	---	---
1981/82	1,370	1,480	76	1	560	267	318	1,972	2,048	18	115	---	---
1982/83	1,370	1,432	111	1	655	268	346	1,850	1,961	18	108	---	---
1983/84	1,198	1,358	207	1	575	260	304	1,762	1,969	19	105	---	---
1984/85	1,632	1,012	216	1	539	264	379	1,765	1,981	19	103	---	---
1985/86	1,422	1,078	180	52	573	250	249	1,755	1,935	20	99	---	---
1986/87	1,473	1,605	237	2	792	306	279	1,948	2,185	20	109	---	---
1987/88	1,867	1,601	395	0	944	344	435	2,023	2,419	21	118	---	---
1988/89	1,887	1,177	146	2	1,057	309	309	1,822	1,968	21	94	---	---
1989/90	1,937	NA	NA	2	815	288	320	NA	2,002	21	93	---	---
Status quo requirement forecasts													
1990/91	1,608	1,040	---	4	981	324	370	1,289	2,310	22	105	1,021	971
1991/92	2,005	876	---	4	1,002	331	392	1,522	2,358	22	105	836	815
Nutrition requirement forecasts													
1990/91	1,608	1,040	---	4	981	324	370	1,289	2,570	22	117	1,282	1,232
1991/92	2,005	876	---	4	1,002	331	392	1,522	2,624	22	117	1,102	1,080

NA = Not available.

--- = Not applicable.

1/ 1990/91 and 1991/92 entries are targets (see "Methodology").

Table 32. Historical and projected macroeconomic indicators: Peru

Year	Gross domestic product	Per capita gross domestic product	Balance of payments							
			Exports of goods and services	Net long term loans	Workers' remittances	Net official grants	Other net inflows	Total net inflows	Total net outflows 1/	End of year reserves
	bil. 1980 l.c.u.	1980 \$	-----bil. 1980 \$-----							
Historical										
1980	5.97	1195	4.83	-0.31	0.00	0.15	0.02	4.69	4.41	1.70
1981	6.24	1216	4.22	-0.38	0.00	0.16	0.66	4.66	5.44	1.98
1982	6.25	1187	4.37	0.74	0.00	0.17	0.42	5.70	5.49	1.20
1983	5.48	1015	4.10	0.86	0.00	0.23	-0.46	4.73	4.68	1.41
1984	5.74	1037	4.32	0.61	0.00	0.17	-0.64	4.47	4.15	1.46
1985	5.88	1037	4.29	-0.28	0.00	0.15	-0.13	4.02	3.78	1.77
1986	6.44	1110	3.36	-0.08	0.00	0.15	0.21	3.64	4.29	2.01
1987	6.94	1169	3.39	0.17	0.00	0.17	0.24	3.96	4.73	1.36
1988	6.33	1043	3.16	-1.47	0.00	0.13	1.77	3.60	3.76	0.60
1989 2/	5.62	907	NA	NA	NA	NA	NA	4.60	3.44	0.43
Projected										
1990	5.67	896	NA	NA	NA	NA	NA	4.70	4.07	1.06
1991	5.85	906	NA	NA	NA	NA	NA	4.80	3.14	2.72

Note: l.c.u. = local currency units. NA = not available.

1/ Includes imports of goods, non-factor, and factor services, net of long term interest payments.

2/ Preliminary.

that incorporate expected changes in policies, structure, and domestic and world prices.

The long-run modeling framework uses structural relationships to project domestic prices and supply and demand quantities, based on an assumed set of world commodity prices and macroeconomic conditions. The degree to which changes in world prices and economic conditions affect developments in each country varies, depending on the prevailing domestic and trade policies. However, it is important that the assessments be conducted in the context of a realistic and consistent set of assumptions regarding expected changes in domestic and global macroeconomic conditions, economic and agricultural policy, and commodity prices.

### Long-Term Global Cereals Outlook

Each of the long-run assessments is consistent with expected world macroeconomic conditions, policies, and cereal supply and demand scenarios described below. For each country analyzed, a continuation of current agricultural and trade policies is assumed in the initial, or "base," scenario. Each of the case studies includes several alternative scenarios that analyze the impacts on food aid needs of changes in selected assumptions.

#### Income and Population Growth

Prospects for cereal supply, demand, and trade—globally and for individual low-income countries—are heavily dependent on expected changes in income and population. Global economic growth is expected to be moderate during the 1990's, with growth in real GDP averaging 3.2 percent annually

Table 33. Global real income and population growth rates

Region	1970's	1980's	1990's 1/
	Percent		
World			
Real GDP	3.6	3.1	3.2
Population	1.9	1.8	1.7
Developed market economies			
Real GDP	3.1	2.9	2.8
Population	0.8	0.5	0.4
Developing economies			
Real GDP	5.3	2.8	4.3
Population	2.4	2.6	2.2
Newly industrialized economies			
Real GDP	8.9	8.3	6.4
Population	1.9	1.5	1.2
Centrally planned economies			
Real GDP	3.4	2.3	3.6
Population	1.6	0.9	0.9

1/ Projected.

Sources: Census Bureau, U.S. Department of Commerce (1989); WEFA Group, World Economic Outlook (July 1989).

ally (table 33). Growth in the developing economies (DE's) is projected to average 4.3 percent annually. For many countries, these growth rates are stronger than in the 1980's, particularly in developing countries that have been acutely affected by the combination of slowed export growth and burdensome foreign debt. This outlook assumes a partial resolution of the debt crisis that slowed economic growth in the 1980's (4, 5, 6, 7).

More rapid economic growth is expected during the second half of the 1990's. The major reason is that the debt burden is not likely to be reduced to a level compatible with stronger investment and growth until the mid-1990's. Asian developing countries, including the newly industrializing countries (NIC's) and a number of low- and middle-income Asian countries, are expected to continue to show relatively strong growth relative to their counterparts in other regions. Growth in this region will continue to benefit from relatively low debt, good natural resource endowments, and expansionary policies.

Latin American countries also have somewhat stronger growth prospects in the 1990's, under the assumption that modest debt reduction and stronger global demand for the region's exports will ease financial constraints. Income growth in oil exporting countries, who have accounted for a large share of growth in global cereal demand, is expected to rise moderately, based on the assumption of a slow increase in real oil prices during the 1990's. Debt and poor infrastructure are expected to result in little, if any, improvement in economic performance in Sub-Saharan Africa.

Population growth in developing countries, while continuing to decline gradually from rates observed in the 1970's and 1980's, will be more than five times that of developed countries. Rising population, combined with higher income growth, will result in increasing demand for cereals in developing countries, compared with developed countries.

#### Cereal Production

Growth in cereal production during the 1990's is projected to recover from the slowdown of the 1980's (table 34 and figure 17). Projected growth rates for wheat and rice are below the rates of the 1980's, but coarse grains are expected to double from the growth in the 1980's. The developing economies and the centrally planned economies (CPE's)<sup>1</sup> are expected to provide most of the increase in grain production over the next decade (table 35). Argentina, India, Thailand, and the Eastern European countries are expected to expand production. The production growth rates in the developed market economies (DME's) and the newly industrialized countries (NIC's)<sup>2</sup> are expected to be relatively low compared with other economic regions.

<sup>1</sup>The CPE's include the Soviet Union, China, and Eastern Europe.

<sup>2</sup>Includes South Korea, Taiwan, Singapore, and Hong Kong.

Table 34. Total cereals: Global growth rates by commodity 1/

	1970's	1980's	1990's
	Percent		
<b>Area</b>			
Total cereals	0.9	-0.6	0.1
Coarse grain	0.7	-0.7	0.2
Wheat	1.2	-0.9	-0.1
Rice	1.0	0.1	0.1
<b>Yield</b>			
Total cereals	2.0	2.0	1.5
Coarse grain	2.1	1.4	1.3
Wheat	2.0	2.7	1.8
Rice	1.6	2.2	1.7
<b>Production</b>			
Total cereals	2.9	1.4	1.6
Coarse grain	2.9	0.7	1.5
Wheat	3.3	1.8	1.7
Rice	2.6	2.3	1.7
<b>Consumption</b>			
Total cereals	2.6	1.7	1.7
Coarse grain	2.6	1.2	1.5
Wheat	2.8	2.3	1.8
Rice	2.4	2.1	1.8
<b>Feed use</b>			
Total cereals	2.4	1.7	1.6
Coarse grain	2.6	1.6	1.7
Wheat	1.4	2.1	1.0
<b>Imports</b>			
Total cereals	6.2	0.0	1.8
Coarse grain	8.4	-0.7	1.5
Wheat	4.1	0.7	2.0
Rice	4.5	0.3	2.1

1/ Annual compound growth rates over period.

Table 35. Total cereals: Summary of growth rates by region 1/

	1970's	1980's	1990's
	Percent		
<b>World</b>			
Production	2.9	1.4	1.6
Consumption	2.6	1.7	1.7
Imports	6.2	-0.1	1.8
<b>Developed market economies</b>			
Production	3.2	-0.4	1.1
Consumption	0.8	0.9	1.0
Imports	2.7	1.9	0.4
<b>Developing economies</b>			
Production	2.8	2.0	2.2
Consumption	3.4	2.5	2.5
Imports	8.6	2.6	3.6
<b>Newly industrialized economies</b>			
Production	2.2	1.2	0.2
Consumption	4.9	3.3	1.9
Imports	7.4	3.5	2.6
<b>Centrally planned economies</b>			
Production	2.8	2.3	1.6
Consumption	3.4	1.7	1.4
Imports	9.9	-1.8	-0.2

1/ Annual compound growth rates over period.

Figure 17  
Global Grain Production

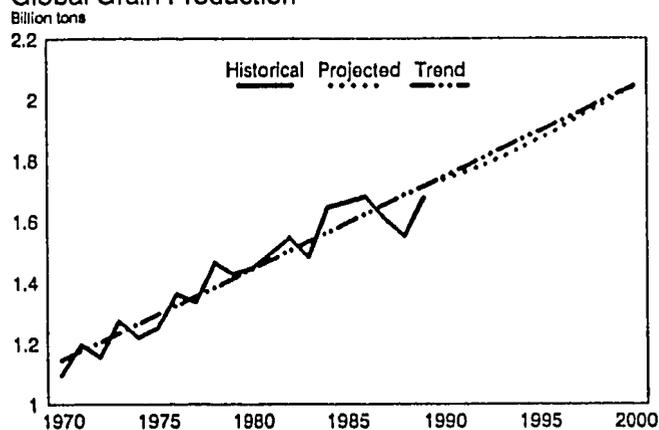


Figure 18  
Global Grain Consumption

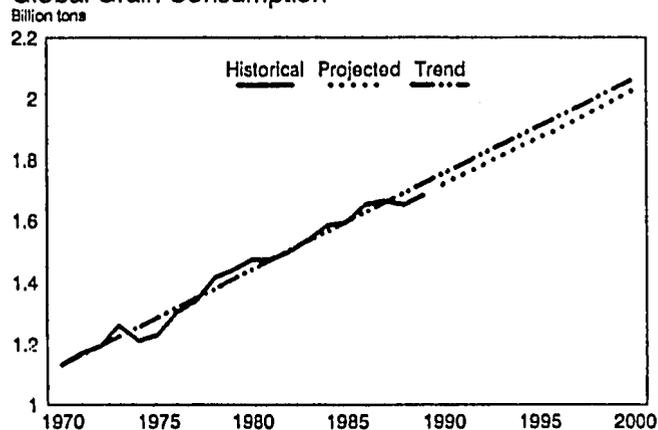


Figure 19  
Share of Increase in Global Grain Consumption by Region, 1990-2000

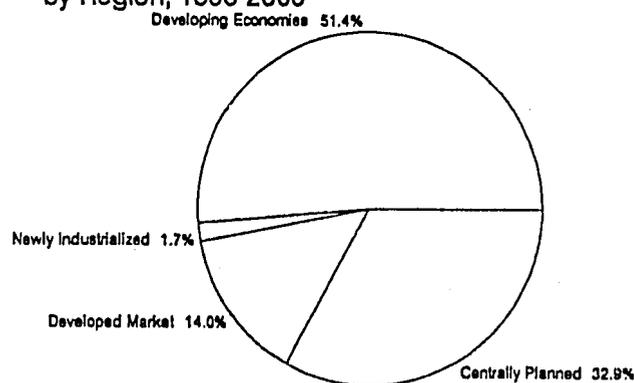


Figure 20

### Global Grain Imports

Million tons

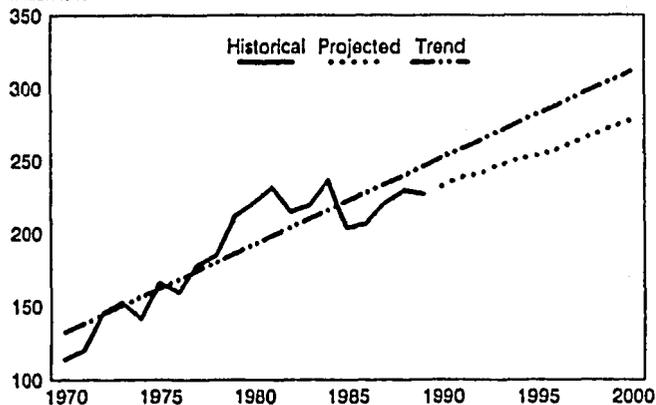
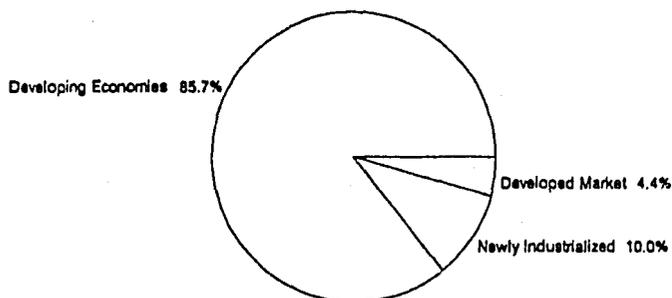


Figure 21

### Share of Increase in Global Grain Imports by Region, 1990-2000\*



\*Percentages do not reflect imports of Centrally Planned Economies which decline over the projection period.

Virtually no change is expected in harvested cereal area during the 1990's. While expected growth in coarse grain area is very small, it reverses the decline of the 1980's (table 34). Projections of growth in grain area are positive for the developing countries as a region, and negative for the other economic regions.

Projected yield growth is also generally less than that of the last two decades (table 34). Annual compound growth rates for wheat and rice yields are the highest, up 1.8 and 1.7 percent, respectively. The greatest increase in yields is expected in the developing economies and CPE's, although the growth rates are projected to be lower than during the 1980's. In the NIC's, yield growth is projected to drop sharply, primarily because of a slowdown in technological advances (4, 5).

#### Global Cereal Demand

Annual growth in cereal consumption during the 1990's is projected to remain near that of the 1980's, but sharply lower than in the 1970's (table 34 and figure 18). Nearly all of the increase in demand is expected to occur in the developing economies and the CPE's, with relatively small gains in the DME's and NIC's (figure 19).

Globally, food use is expected to continue to account for the bulk of increased cereal demand. This will also be the case in developing countries, where food accounts for about 80 percent of cereal use, although feed demand is projected to grow more rapidly than food demand. Growth in feed demand in developing economies reflects, in part, increased feeding of coarse grains as low-income consumers increase consumption of livestock products (1, 4).

In per capita terms, global cereal use is expected to change little between 1990 and 2000. Per capita gains in wheat demand are projected to be offset by declines in coarse grains. In developing economies, however, per capita cereal use is expected to rise, driven primarily by more feed use. These results are indicative of the potential for the expansion of cereal use in developing economies, where total per capita use remains roughly half that of other economic regions.

#### Global Cereal Trade

Global cereal import demand is expected to strengthen during the 1990's, after declining during the 1980's (figure 20). Wheat, the primary food grain, is expected to account for more than half of the increase in total cereal trade. The developing economies are projected to account for the bulk of the increase in cereal imports during the 1990's (figure 21). The CPE's and the DME's are projected to account for relatively small shares of the increased trade. These results imply a growing dependency on cereal imports to meet domestic demand in the developing economies. Overall, cereal self-sufficiency in developing economies falls from 86 percent in 1990 to 84 percent in 2000, with coarse grain self-sufficiency declining from 82 to 78 percent.

#### World Cereal Prices and Exporter Supplies

The projections reflect a continuation of the long-term downward trend in real cereal prices during the 1990's. Import demand strengthens, partially in response to lower prices. Cereal exporting countries, particularly the United States and the EC, are expected to be able to produce adequate supplies to meet the increases in world import demand. Moderate gains in cereal production are based mostly on improved yields, while area growth is dampened by lower prices.

#### Key Uncertainties in the Outlook

GATT trade reform could significantly affect this long-term scenario. Progressive reduction of trade-distorting subsidies among the DME's would likely result in higher world cereal prices (6, 7). Significantly higher world prices would affect domestic cereal prices, import costs, or both. Agricultural trade reforms by DME's would also likely reduce the availability of export subsidies and concessional credits for developing country importers, further increasing import costs (4, 5). In the longer term, however, countries participating in the reforms may increase economic efficiency and growth, with efficient cereal producers boosting production and reducing net imports.

With most of the gains in cereal imports in the 1990's expected to occur in the developing economies, the outlook is sensitive to adverse developments in their balance of payments that would affect cereal import behavior. In addition to loss of cereal import subsidies, possible adverse factors would include changes in foreign aid, or in prices for key merchandise exports or imports. In the light of the current crisis in the Middle East, there is potential for a more sustained rise in oil prices than the base assumptions would imply. During the 1970's and 1980's, agricultural imports tended to be particularly sensitive to oil prices—with developing oil exporters boosting farm imports, and oil importers slowing or reducing imports.

### **Procedures for the Long-Term Assessments**

In the long-run assessments for India, Kenya, and Morocco, the supply and use variables are projected from econometrically estimated structural relationships specific to each country. Production, exports, feed use, other non-food use, and stocks are allowed to vary depending on market conditions and price incentives. Food aid needs are defined as the gap between the demand for cereals and the availability of cereals, including commercial imports, to satisfy that demand. Commercial imports are projected using the same structural relationship used in the short-run assessments. The general form of the models used in the long-run assessments is described in more detail in appendix 3.

### **Status Quo, Nutrition-Based, and Market Demand**

The models compute three alternative estimates of food demand, corresponding to three alternative assessments of food aid need. Status quo food demand is the quantity of cereals required to maintain per capita consumption at the rate attained during the 1980s. Nutrition-based consumption is the quantity required to meet minimum per capita daily caloric requirements. These demand measures are the same as those employed in the short-run assessments. In addition, market demand is estimated and used to calculate a third measure of food aid need. Market demand is projected with econometrically estimated functions which relate changes in demand for each cereal to changes in income, its price, and the prices of substitute foods.

### **Base and Alternative Scenarios**

Each case study includes projections and analysis of a base scenario, followed by alternative scenarios. The base scenario represents projected developments in the cereal economy, given the global assumptions and expected trends in domestic policies, technology, etc. The alternative scenarios test the sensitivity of the projections to changes in base scenario assumptions. In each case study, the alternative scenarios attempt to capture the effects of shifts in key uncertainties in that country's outlook.

## **India**

India's long-run food security depends on its capacity to produce or import cereals to meet demand. India's productive capacity and ability to import cereals commercially are sufficient to meet food needs under "normal" conditions. However, poor weather, shifts in agricultural policy, and world macroeconomic shocks could increase India's long run food aid needs.

### **Agricultural Development Issues**

Agricultural policy in India has focused on investments in agricultural and rural infrastructure as the primary stimulus to production. A high domestic savings rate has enabled large investment in irrigation projects. Irrigated area has increased by about 38 percent since 1970, contributing to increases in cropped area and yields. About 85 percent of all wheat area is irrigated. However, a large proportion of rice and almost all coarse grains are still produced on nonirrigated acreage, and drought continues to affect production. Expansion in irrigated area is likely to remain a high investment priority, although rising costs are expected to slow the pace of expansion over the next 10 years.

*Price policy.* Other production incentives include access to subsidized inputs, including fertilizers and high-yielding seeds, and farm credit and active extension programs. The government also sets the price at which it buys foodgrains which establishes minimum market prices for wheat, rice, and coarse grains. Despite these measures, domestic farm prices of cereals are generally below world market prices, and the net effect is to tax cereal producers.

The major underlying goal of India's food policy is to maintain affordable consumer prices. Consumer subsidies are implemented by controls on foreign trade that generally keep domestic prices below world prices, and by the provision of cereals at subsidized prices through the public distribution system (PDS). The PDS operates along side the open market. At harvest time, the government competes with other buyers in the open market, buying cereals at procurement prices. When supplies of cereals are short, or rising demand increases open market prices, producer incentives to sell to the government are reduced. At the same time, more subsidized cereals are demanded from, and allocated to, the PDS to stabilize prices.

The government imports cereals when government stocks, or projected stocks, are insufficient to meet PDS offtake and maintain the desired level of price stability. When domestic supplies are good, increased procurement and less PDS offtake lead to the accumulation of buffer stocks.

*Balance of payments.* In recent years, it appears that balance of payments concerns have resulted in smaller-than-expected imports of cereals and edible oils, and somewhat higher domestic prices. India's balance of payments position is currently very weak, with international reserves falling to less than 2 month's import coverage in mid-1990. The drop in reserves has been due to several factors. First, faster growth in real GDP during the 1980's increased aggregate import demand. Second, India began to liberalize import policies in the early 1980's, especially for capital goods and raw materials used in export sectors. These two factors led to significant growth in aggregate import expenditures. While export earnings have increased, they have not kept pace with imports.

Additional problems have been a slowdown in remittances and rising debt service. Growth in remittances from oil field and other workers abroad stagnated in the late 1980's as economic activity in the Middle East slowed. Debt service obligations increased sharply in the late 1980's because of repayment of an IMF loan, as well as an increase in commercial debt obligations. With continued growth in income, and a lag before import liberalization produces stronger growth in exports, reserves will likely remain under pressure through the mid-1990s.

*Economic growth.* Real income growth averaged 5.9 percent in the 1980's, considerably higher than the average of 3.5 percent achieved during 1960-1979. More rapid growth in the 1980's was due primarily to strong performances in the industrial and service sectors, and the "drought-proofing" of the economy. Drought-proofing has occurred as agriculture's share of GDP declines and output becomes less susceptible to weather related shocks. Maintenance of relatively strong income growth, particularly during years of poor harvests, is likely to have an important impact on cereal demand and imports. Throughout the 1960's and 1970's, setbacks in cereal production were accompanied by a decline in income that eased pressure on prices and import needs.

The issues identified above that will most directly affect long-run food security include weather induced production shocks coupled with sustained high income growth, agricultural policy changes that reduce producer taxation, and balance of payments concerns. In addition to a base scenario projection of food aid needs, each of these issues will be examined to determine their impact on food aid needs over the next decade.

### **The Model**

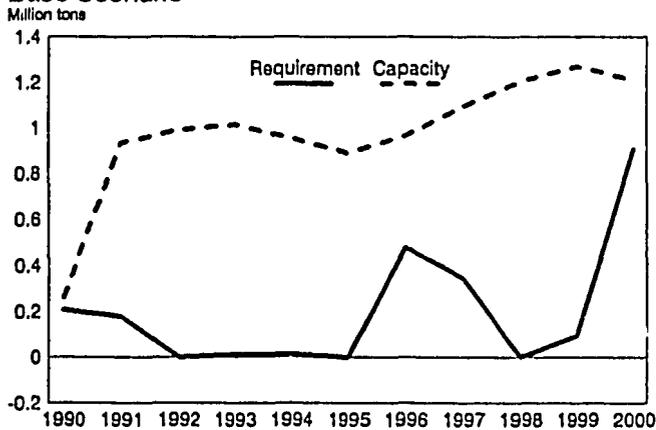
The model for India is of the general form described above, and in appendix 3. Unique features of the India model include the following:

- Commodity coverage is wheat, rice, and coarse grains, plus cross-commodity relationships with cotton, sugar, and oilseeds.
- Domestic prices are determined by lagged world prices, domestic policies, and domestic supply and demand conditions.
- Area harvested is a function of the expected gross returns from the crop and competing crops, and expansion in irrigated area.
- Yields are a function of expected technological progress and relative input costs.
- Market demand is determined by changes in income, own price, and prices of substitutes. Response to income is assumed to decline as consumer incomes and preferences lead to gradual diversification of the diet.
- Stocks are assumed to remain within the minimum and maximum levels defined by current buffer stock policy. Stock surpluses are exported and deficits are covered with imports.<sup>3</sup>
- Commercial cereal import capacity is projected from an econometrically estimated function that relates imports to government stocks, lagged production, expected food aid receipts, the price of imported cereals relative to the price of all imported goods, and the change in foreign exchange reserves.

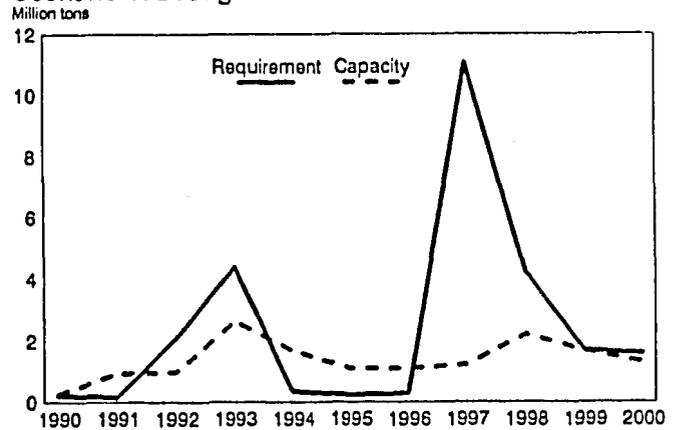
<sup>3</sup> Although the government did not adhere to this policy in 1988 and 1989, for the purposes of this analysis it is assumed that the government will return to that policy.

**Figure 22**  
**India: Import Requirements vs. Commercial Import Capacity--Market Demand 1990-2000**

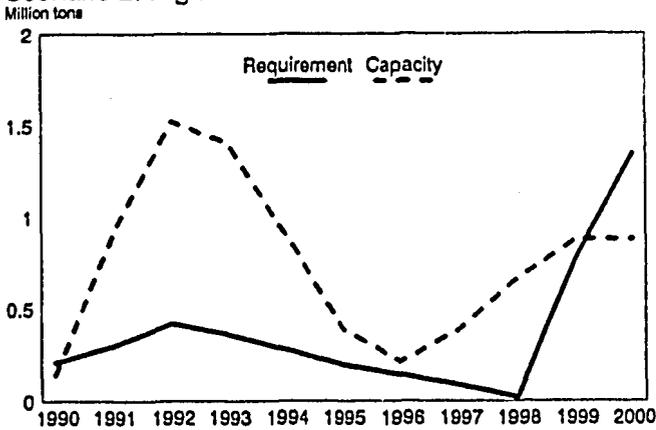
**Base Scenario**



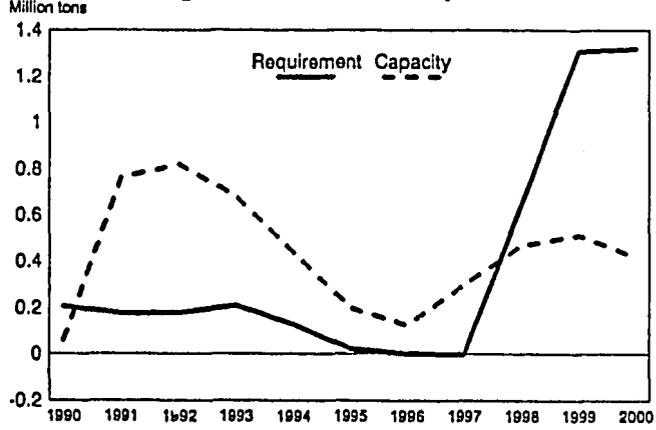
**Scenario 1: Drought**



**Scenario 2: Higher World Oil Prices**



**Scenario 3: Higher World Commodity Prices**



**The Base Scenario**

Assuming a continuation of the current focus of agricultural policy, production of cereals is projected to increase by 2.2 percent annually between 1990 and 2000, compared to about 3 percent in the 1980's. Slower growth in production is due to slower expansion in irrigated area, higher projected input costs relative to output prices, and a slower rate of technological change relative to the two past decades.

In the base scenario, status quo and nutrition-based demand rise by 1.8 percent per year, equal to the average rate of growth in population. Since production growth exceeds demand growth, status quo and nutrition-based food demand are met. Status quo demand yields a surplus of cereals (i.e., import requirements are negative) equivalent to 5-10 percent of the annual status quo needs throughout the 1990's. Nutrition-based demand results in surpluses equal to 2-7 percent of annual needs.

Projected market demand is higher than both status quo and nutrition-based needs. With real GDP growth assumed to average 5.8 percent annually over the projection period, market food demand for cereals is estimated to grow by 2.2 percent per year, matching the growth in production. The projected increase in food demand is about .5 percent per year slower than in the 1980's. This is a result of slightly slower income and population growth, substitution of other foods for cereals as income increases, and strengthening real domestic cereal prices. Market demand for nonfood uses is projected to increase 2.3 percent per year primarily because of increased feed demand. With total market demand growing slightly faster than production, stocks decline during the projection period.

With market demand, import requirements are small and positive in most years during the projection period (figure 22). Commercial import capacity is more than sufficient to satisfy

import requirements. Therefore, food aid needs are zero under all three food demand projections in the base scenario.

It is important to note that only a slight increase in the projected growth rate of market demand would result in positive food aid needs. Historically, the primary determinant of food demand in India is income. For example, when per capita incomes rise 10 percent, food demand for wheat is estimated to increase 4.2 percent. If the response to income changes is a little stronger—i.e., demand for wheat increases 4.7 percent for each 10-percent increase in per capita income—food aid would be needed to fill the gap between supply and market demand. In this example, food aid needs would become positive by 1995, peak at nearly 2 million tons in 1998, and then decline as producers begin to respond to higher domestic prices.

### **Scenario 1: Drought**

The first scenario assumes that India's monsoon is very poor in 2 of the next 10 years—consistent with the historical incidence of monsoon failures. Poor monsoons decrease area harvested, but are primarily felt through yield reductions. Therefore, rice yields are assumed to fall 10 percent in 1992/93 and 1997/98, but return to base scenario levels in subsequent years. Coarse grain yields, which are considerably lower than rice yields, are assumed to fall 5 percent. Wheat yields, which are higher than those for rice or coarse grains, are reduced 5 percent. In the past, production shortfalls have led to declines in income but, because of the drought-proofing of the economy, this relationship has been declining. For the purposes of this scenario, no change in GDP growth is associated with the production shocks.

Overall growth in cereal production is a little slower than the 2.2-percent rate in the base scenario. Production rebounds sharply in the year following each drought because producer prices rise significantly. Stocks decline dramatically because of the reduced supplies, falling to the assumed minimum buffer stock level by 1997. Even with production declines, status quo demand can be met from domestic supplies, but the surplus drops sharply in 1993 and 1997 compared with the base scenario. With nutrition-based demand, import requirements and food aid needs are positive only by the second shock in 1997, with a food aid need of about .3 million tons.

In contrast, the market demand outcome results in significant import requirements and aid needs. Growth in market demand slows in response to higher domestic prices but, because income growth is not affected by the production shocks, the decline in demand growth is limited. The production shocks and drawdown in stocks result in positive import requirements throughout the projection period, peaking in the shock years.

Commercial imports, which vary inversely with stocks and lagged production, increase in the years following a drought. Higher commercial import capacity yields no food aid needs

in 5 of 10 years. However, capacity is not sufficient to meet import needs in the other years, with aid needs peaking at 2 million tons in 1993 and 10 million in 1997. While actual stockbuilding and import behavior likely would result in spreading peak needs over several years, import needs still exceed commercial import capacity.

### **Scenario 2: Higher World Oil Prices**

The next scenario assumes that higher world oil prices will prevail in the short and long run. The nominal price of oil is assumed to average \$30 per barrel in 1990, rise to \$40 per barrel in 1991, and increase at the base scenario rate of 8 percent annually thereafter. Higher oil prices will affect world and domestic income and inflation, farm input prices, aggregate imports, and foreign exchange receipts. These will in turn affect supply, demand, and commercial import capacity.

Higher oil prices raise production costs, especially fertilizer prices, resulting in lower input use, and slightly slower growth in yields and production than in the base scenario. Market demand growth is also slightly slower than the base scenario, primarily because higher oil prices are expected to reduce income growth. There is less pressure on stocks than in the base scenario, with weaker market demand resulting in exportable surpluses of wheat in some years. In contrast, rice imports are needed at the end of the projection period, because rice demand is less susceptible to changes in income and prices.

Higher oil prices generally reduce commercial import capacity relative to the base scenario. There is an initial sharp decline in reserves and a 45-percent drop in import capacity in response to the oil price hike (figure 22). In the longer term, rising remittances from workers outside the country tend to boost inflows and reserves, but are offset by increasing import expenditures. Overall, declining foreign exchange reserves and higher cereal stocks decrease commercial import capacity to less than one-third of the base scenario level.

Even with higher oil prices, status quo and nutrition-based import requirements remain negative, resulting in no food aid needs. With market demand, however, import requirements exceed commercial import capacity in 2 of 10 years. However, as in scenario 3, projected aid needs are in the form of rice, which might be met by substituting projected surpluses of wheat.

### **Scenario 3: Higher World Commodity Prices**

This scenario assumes that world commodity prices are higher than assumed in the base scenario. Higher prices could result from stronger global demand, or from reforms in developed country trade policies under the GATT. In the model, higher world prices exert upward pressure on domestic procurement and open market prices of cereals, increasing producer incentives. In addition, since PDS sale prices are indexed to increases in procurement prices, consumer prices also rise.

In this scenario, world wheat prices are assumed to be 15 percent higher over the entire projection period, coarse grain prices 12.5 percent higher, rice prices 10 percent higher, and other commodity prices 4 percent higher. Domestic producer prices for wheat subsequently average about 3.7 percent higher over the projection period while rice producer prices rise 4 percent. Domestic coarse grain prices have historically been unrelated to world prices, and are assumed not to change from the base scenario.

Producers are projected to respond to the higher prices by increasing average annual production growth to 2.3 percent, .1 percent higher than in the base scenario. Consumers respond to higher domestic prices by curtailing consumption, reducing demand growth to 2.1 percent annually, or .1 percent less than in the base scenario.

Production gains are largest in the first half of the projection period, and stocks accumulate. In the late 1990's, domestic prices rise more slowly, production growth slows, and stocks gradually decline. Wheat supply and demand tend to be more responsive to the higher prices than rice. As a result, the scenario generates an exportable wheat surplus of 2-4 million tons between 1997 and 2000, but a rice import requirement of about 1.3 million tons by 2000.

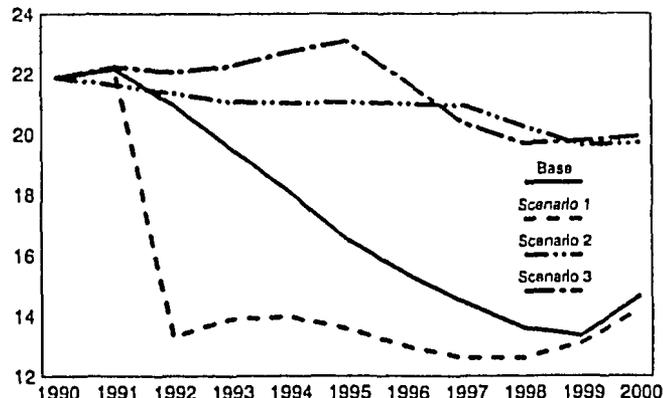
Higher world prices, increased production, and larger stocks reduce projected commercial import capacity by about two-thirds from the base scenario. Even with lower commercial import capacity, status quo and nutrition-based food aid needs remain at zero. In the market demand case, food aid needs range from .2 to .9 million tons in 1998-2000. As in the past, however, it is likely that the government would resolve the projected imbalance between wheat and rice by substituting wheat for rice in its allocations to the PDS, rather than resorting to trade.

### Conclusions

Under a wide range of conditions over the next decade, India should be able to meet status quo and nutrition-based needs without food aid. In the case of market demand, commercial import capacity is also sufficient to meet import requirements in the base scenario. Under the assumptions of the base scenario, market demand is sustained at a level about 5 percent higher than that needed to satisfy minimum nutritional requirements, without food aid needs. However, if consumer response to income changes is only slightly stronger than expected, food aid needs could be significant.

In contrast to the base scenario, satisfaction of market demand generates some food aid needs in each of the three alternative scenarios. Under the scenario of higher world commodity prices, food aid will be needed between 1997 and 2000. While aid needs of the level projected might be eliminated by substituting surplus wheat for rice, the result is potentially sig-

Figure 23  
India: Cereal Ending Stocks  
Million tons



nificant. The scenario reveals that the assumed higher world cereal prices tend to create shortages in the domestic rice market, because domestic rice production and consumption are less sensitive to price changes than wheat. And, because of India's size, the import volume could be large relative to the size of global rice trade.

The droughts in scenario 1 result in the largest aid needs to satisfy market demand. Aid needs peak at nearly 2 million tons after the first drought, when stocks are relatively high, and at nearly 10 million tons after the second drought, because stocks remain relatively low (figure 23).

While import capacity is higher than in the other scenarios, and actual imports would likely be spread over more than one year, import capacity is still insufficient to meet larger import requirements. These results suggest that "drought-proofing" may have an important impact on India's cereal import needs, and domestic cereal prices could rise sharply without adequate commercial import capacity or food aid. Higher cereal prices adversely affect the welfare of India's multitude of low-income consumers, while diversion of scarce foreign exchange from imports of investment goods taxes future growth.

In the higher world oil price scenario, meeting market demand results in a small increase in food aid needs compared with the base scenario. Despite the small net impact, it is significant that higher oil prices dampen production, market demand, and commercial import capacity. It is also significant that, as in scenario 3, the wheat and rice sectors respond differently to rising world prices, leading to shortages of rice and surpluses of wheat.

The results indicate that, while India probably could support status quo and nutrition-based needs without food aid, satisfaction of market demand could necessitate significant aid needs in some scenarios. All scenarios indicate that India's cereal stocks would be relatively low and under pressure during the 1990's. As in the last few years, the acute balance of

payments problems may lead policymakers to continue minimizing the use of imports to build stocks and rely on the slower process of building from domestic surpluses. With stocks at relatively low levels, there is the increased likelihood of food aid needs in the event of unforeseen shocks to production or commercial import capacity. While policymakers can choose whether to allow food prices to rise, or divert foreign exchange to food imports, these decisions will affect future growth.

## **Morocco**

Morocco is a net cereal importer, and depended on imports for an average 22 percent of total consumption needs between 1985 and 1989. The balance of payments is currently under pressure, burdened by a high debt service ratio of more than 40 percent. Foreign exchange inflows depend heavily on phosphate exports, and world phosphate prices fluctuate wildly. Cereal import dependence and limited ability to finance commercial cereal imports create a potential threat to food security.

When cereal production falls due to poor weather, or when foreign exchange is tight, Morocco must compress non-food imports, reduce domestic stocks, and/or seek additional food aid to meet consumption needs. Reducing imports of intermediate goods throttles economic growth and disrupts investment planning. Reliance on food aid shipments generates political and social risks. In poor harvest years, policymakers fear civil unrest and lobby intensely for international assistance. Currently, there is concern about the potential impact on food security if cereal exporters agree to reduce subsidies under a GATT accord, and about competition from East European countries for food aid.

This assessment analyzes the food security implications of alternative cereal production and consumption projections to the year 2000. Five scenarios are evaluated: 1) the base, 2) drought, 3) higher world oil prices, 4) higher world commodity prices, and 5) industrial country recession. The scenarios are designed to test the sensitivity of Morocco's aid needs to alternative external shocks. Each scenario includes projections of cereal supply, demand, and commercial import capacity, driven by projected international grain prices, foreign exchange inflows, international reserves, and local income. Food aid needs are calculated for each scenario using three alternative measures of demand: status quo, nutrition-based, and market demand.

### **Key Economic Issues, Trends, and Policies**

Three issues define the Moroccan economic reality, and likely will shape economic and political developments over the coming decade. These issues are the need to: 1) continue the structural adjustment program begun in the 1980's, 2) address land tenure and agrarian dualism so as to broaden the distribution of benefits and mobilize the traditional rainfed agricultural sector, and 3) generate capital to finance the adjustment program and alleviate the attendant social costs.

In 1983, Morocco began a period of macroeconomic stabilization and policy reform in response to severe balance of payments problems and loss of international creditworthiness. The program sought to restore productive efficiency and export competitiveness. Its principal elements were trade liberalization, namely a drastic reduction in tariffs and import licensing requirements, currency devaluation, aggressive export promotion of vegetables, fruits, textiles, and light manufactures, privatization of public enterprises, and sectoral reforms in agriculture and education. Progress has been significant. By 1986-88, the economy was growing more than 7 percent a year, inflation was controlled, the public deficit was reduced to 4 percent of GDP, and the tourist industry was expanding.

*Agricultural policy.* Moroccan farm policy vacillates, alternating between export promotion and the strengthening of the traditional agricultural sector. The need to generate foreign exchange, scarce public monies for investment, and the political clout of the rural elite tend to reinforce historical patterns, wherein the export subsector is favored. However, the fundamental policy objective appears to be maintenance of per capita consumption levels, while laying the foundation for sustained economic growth.

Key challenges in farm policy in the 1990's will be to maintain civil tranquility as consumer subsidies are reduced, and to revitalize the rainfed agricultural sector. By the end of 1990, existing blanket consumer subsidies for all income classes are to be replaced with subsidy programs targeted to the most vulnerable groups (school children and lactating mothers). Government producer prices are expected to continue to rise, while input subsidies for fertilizer are phased out. Credit subsidies are to continue, but lack of secure land title and excessive fragmentation of parcels represent major obstacles in the rainfed and pastoral subsectors.

Close to 80 percent of the rural population depends on rainfed cultivation, but historically public investments have focused on nine large irrigation projects that primarily produce industrial and export crops. Cereal and livestock producers have benefitted little from public investments in irrigation, research, roads, and credit institutions. If cereal import dependence is to be cut and urban migration checked, the traditional rainfed sector will likely need more emphasis in the coming decade.

*Balance of payments.* To sustain economic growth, Morocco will need debt relief, new loans, and access to industrialized country markets for its high-valued export products. External debt is more than \$20 billion, 30 percent owed to commercial lenders, and results in burdensome debt service obligations. While, the trade deficit has narrowed, it is still large and creates a substantial financing gap. Currently, authorities have good relations with international donor institutions and commercial lenders, and debt relief is being negotiated under the Brady Plan. Growth in export earnings remains heavily dependent on access to, and growth in, the EC market.

### *The Model*

The general form of the model used in the analysis is described in appendix 3. Key characteristics of the Morocco model are:

- Three major grains—wheat, corn, and barley—are included. They account for 98 percent of cereal area. Wheat is the dietary staple, while corn and barley are the principal feed grains.
- Crop area is a function of expected returns of the crop and its major competing crop.
- Yield is a function of the ratio of free market to government producer prices and the price of fertilizer.
- Stocks depend on production, consumption, and commercial imports.
- Market feed demand depends on income, domestic free market prices, and border prices of the grain.
- Market food demand is a function of a cereal's own price (government) and domestic GDP (3).
- Commercial cereal imports are a function of production trend, production variability, lagged food aid assistance, border prices, and GDP.

The model's equations account for the effects of the dual market structures for wheat and barley, by using both government and free market prices in supply and demand relationships. For these cereals, free market prices greatly exceed government prices, with half or more of commercialization occurring in the free market. In bad years, free market prices soar and better reflect supply and demand conditions, while government guaranteed prices support cereal production during bumper harvests.

### *Base Scenario*

Annual growth in GDP is assumed to average 4.4 percent, implying sustained implementation of, and benefits from, the current structural adjustment program. If the reform program meets with popular resistance or domestic resources are not mobilized as rapidly as foreseen, the growth rate would be lower—perhaps around 3.8 percent. Annual population growth is assumed to slow to 1.8 percent by 2000. This also implies rescheduling of most commercial debt and continued support from bilateral and multilateral sources. It is assumed that yields will not be affected by abnormal weather, or by large increases in fertilizer prices. Most new irrigated land is expected to go into horticultural and sugar production, and not wheat. This assumption implies a drop in average wheat yields as area increases consist primarily of marginal rainfed land.

The base scenario indicates a widening food gap, but one that can be met with commercial imports (figure 24). Production rises 8 percent and market demand rises 20 percent over the projection period. Status quo and nutrition-based demand are projected below market demand. No nutrition-based food aid needs are projected, while status quo and market demand generate aid needs in only one year under the base scenario (figure 25). Individual commodities show different trends. Production, consumption, and imports of wheat and corn rise steadily throughout the projection period. In contrast, barley production declines steadily, demand increases, and imports increase even more.

In the base scenario, growth in commercial import capacity is projected to be more than adequate to meet all levels of demand. Increases in commercial cereal import capacity are being driven largely by gains in national income and the projected decline in real world cereal prices. On the other hand, gains in production and reduced variability in production tend to reduce allocations of foreign exchange for commercial imports. Lagged food aid receipts also proved an important indicator of commercial import behavior, with larger receipts leading to smaller commercial imports. In the base scenario, future food aid receipts are projected based on the long term trend—which indicates roughly constant receipts from Morocco's major donors, France and the United States

### *Scenario 1: Drought*

In this scenario, it was assumed that there will be 2 crop years of bad weather during the 1990's, that will reduce yields. The spacing and severity of drought years are based on the pattern of the 1980's. In the model, the 1994 and 1998 wheat and corn yields were reduced by 30 and 17 percent, respectively, and the 1993 and 1996 barley yields were lowered by 37 percent.

Both commercial imports and food aid needs rise significantly in this scenario. Total cereal production is below the base scenario by 14 percent in 1993, 17 percent in 1994, 12 percent in 1996, and 18 percent in 1998. The production declines result in sharply higher import requirements under status quo, nutrition-based, and market demand. Commercial imports respond to the shocks, rising 10 percent above the base scenario in 1993, 12 percent in 1994, 7 percent in 1996, and 9 percent in 1997. Nutrition-based food aid needs remain at zero in all but one year, but become relatively large when measured against status quo and market demand.

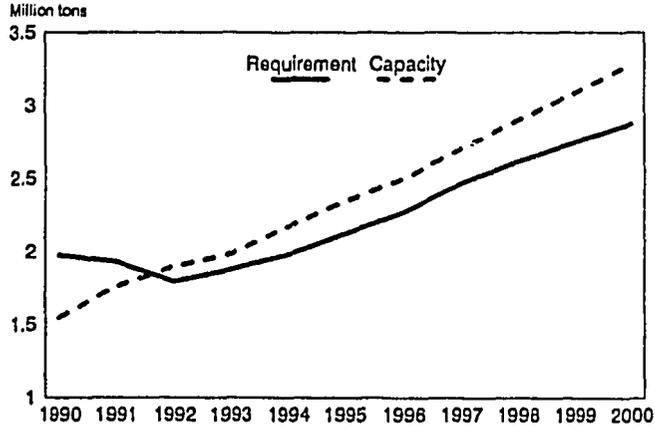
### *Scenario 2: Higher World Oil Prices*

In this scenario, the real price of oil was raised sharply to approximate the impact of a prolonged oil price shock, such as might result from a continued stalemate in the Iraq-Kuwait crisis. The nominal price of oil is assumed to average \$30 per barrel in 1990 and \$40 per barrel in 1991, rising at the base scenario rate of 8 percent annually thereafter. In real terms, the price is 108 percent above the base scenario in

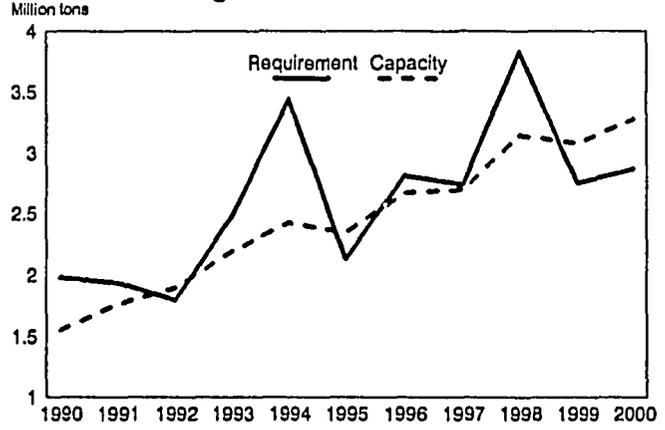
Figure 24

# Morocco: Import Requirements vs. Commercial Import Capacity-- Market Demand 1990-2000

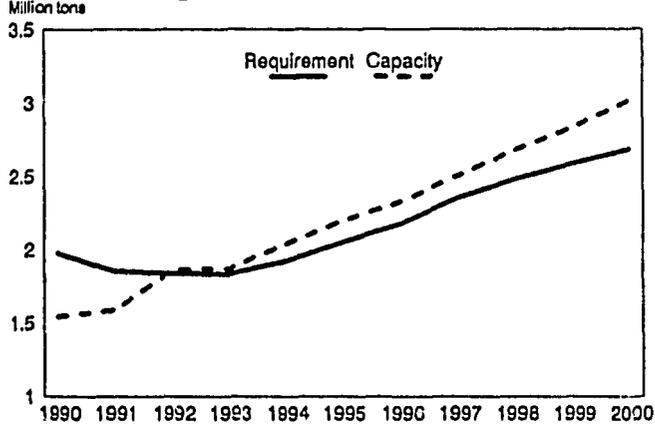
Base Scenario



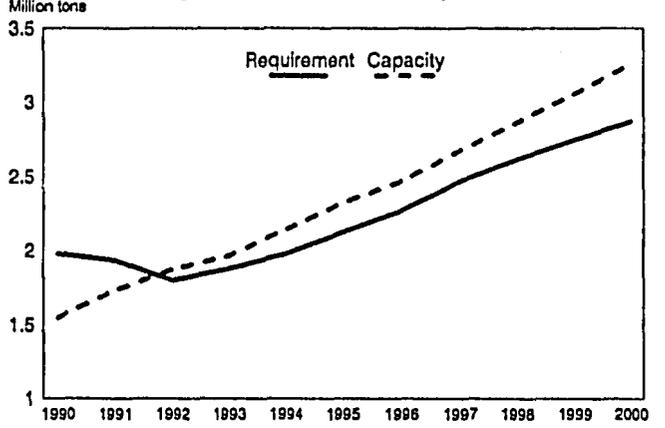
Scenario 1: Drought



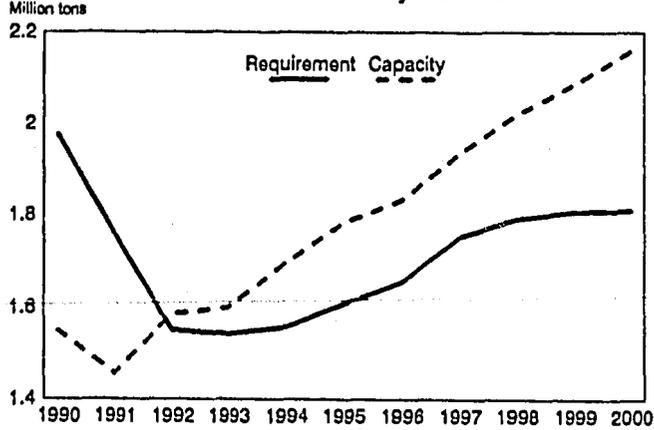
Scenario 2: Higher World Oil Prices



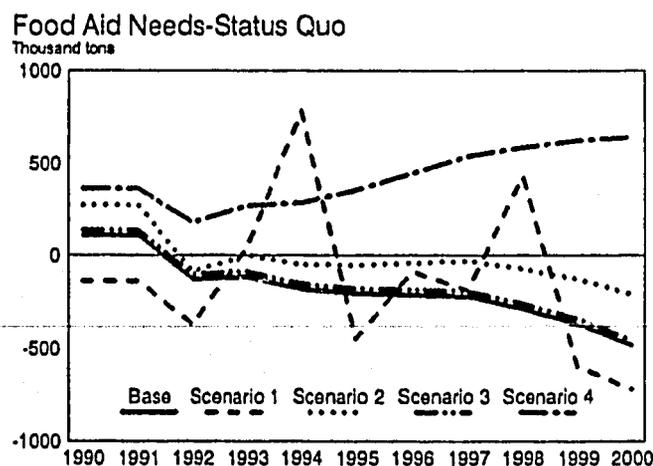
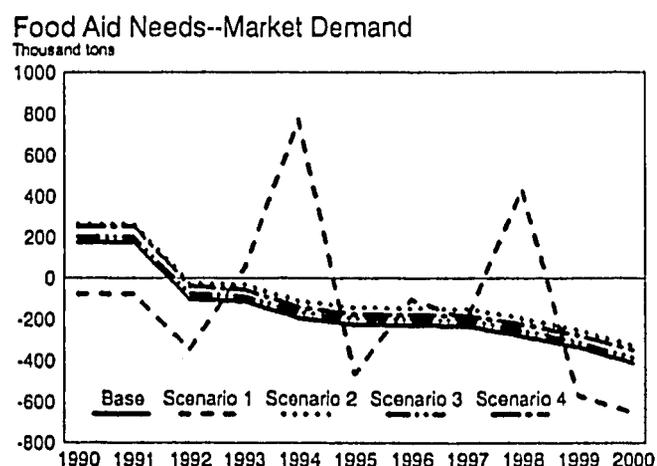
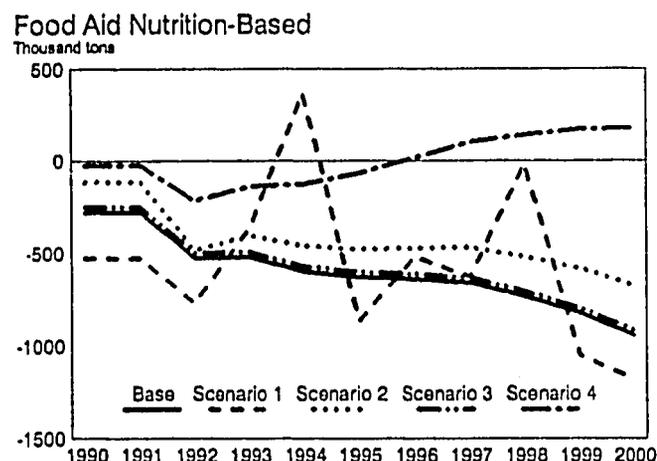
Scenario 3: Higher World Commodity Prices



Scenario 4: Industrialized Country Recession



**Figure 25**  
**Morocco: Food Aid Needs**  
**Base and Alternative**  
**Scenarios**



1991, tapering off to 50 percent higher by 2000. In the model, the impact of higher oil prices will be reflected in changes in world and domestic income growth and foreign exchange receipts.

The impact of this scenario on food aid needs was small and temporary. Market demand for cereals expands about 19 percent during the projection period, about 1 percent less than the base scenario. Commercial cereal import capacity is reduced an average of 6 percent from the base scenario, with a relatively large 10 percent reduction in 1991. The net effect is to increase market demand and status quo aid needs in 1991 and, for the remaining years, to reduce the excess supplies (make aid needs less negative) from the base scenario.

The relatively small impacts of the oil price shock can be attributed to the countervailing influences of oil prices on foreign exchange receipts and national income. Higher current prices of oil depress national income due to increased energy costs, while higher lagged prices tend to increase income due to higher remittances from Moroccan workers in Gulf states. As a result, the net impact of the shock on domestic GDP and the balance of payments was relatively small after 1991, and import capacity was not severely impaired.

**Scenario 3: Higher World Commodity Prices**

In this scenario world wheat prices were raised 15 percent from the base scenario, and corn and barley prices, 13 percent. Such a price increase might accompany an agreement by developed country exporters to reduce subsidies. Historically, there has been little or no relationship between domestic and world prices, so this scenario does not alter domestic production and consumption. The sole impact of higher global grain prices, in the model, is through their effect on commercial cereal import capacity.

Higher world commodity prices had a negligible impact on Morocco's food needs. The average reduction in commercial imports from the base scenario is about 1 percent, and changes in the pattern of food aid needs were insignificant. The results indicate that commercial imports are inelastic with respect to world prices and suggest that, when prices rise, imports of other noncereals may be crowded out.

**Scenario 4: Industrialized Country Recession**

In this scenario, it is assumed that GDP growth in the developed countries during the 1990's averages 2 percent, compared with 3 percent in the base scenario. In the model, the effects of slower developed country growth are reflected in reduced export earnings and, subsequently, in lower commercial import capacity and income growth.

The results indicate that commercial cereal imports are highly sensitive to growth in developed country markets. Commercial cereal imports are down an average of 22 percent from the base scenario. The declines are more pronounced in the late

1990's, implying that the longer the slower growth persists, the more adverse the effects on import capacity. Market cereal demand also falls below the base scenario as domestic GDP growth is reduced. Market food demand averages about 7 percent lower than the base scenario.

The net result is positive status quo food aid needs that rise throughout the projection period to about 640,000 tons by 2000. Under the nutrition-based assessment, cereal aid needs become positive by the mid-1990's. Under the market demand assessment, however, food aid needs are virtually unchanged from the base scenario, as the decline in effective consumer demand roughly matches the decline in import capacity. These results indicate a significant erosion of effective demand and dietary status in this scenario.

### **Conclusions**

The exercise suggests that Morocco's food security, while relatively strong under the base scenario assumption, can be adversely affected by poor weather, or by constraints on the country's ability to earn foreign exchange. Poor weather led to food aid needs under all three assessments. In the face of a prolonged slowdown in export earnings, effective demand fell below both the status quo and the nutritional standard, suggesting a sharp deterioration in food security and rising food aid needs.

Internal agricultural policies were assumed to be favorable to producers in all scenarios, yet production gains were limited. Rising producer prices stimulated increased output, but a limited arable land base, limited rainfed production, and fast population growth resulted in continued cereal import dependence. Capacity to pay for imports is determined largely by factors beyond the control of Moroccan policymakers—including the price of oil, export demand, export market access, capital availability, exchange rates, and worker remittances. The results suggest that, even when rational policy reforms are adopted and stimulate growth, improvement in food security can be limited because of agronomic constraints and, particularly, by balance of payments developments beyond the control of policymakers.

### **Kenya**

The Kenyan economy expanded approximately 5 percent per year in real terms during the late 1980's. However, due to annual population growth of nearly 4 percent, growth in per capita incomes remained slow. The economy is vulnerable to external developments, particularly those that affect world coffee prices, fuel prices, and tourism earnings. The most serious long term problems facing the Kenyan economy stem from rapid population growth. These include feeding, housing, educating, and employing a rapidly growing population. More than half the population is under the age of 15 and, in 1988, it was estimated that the work force grew more than 7 percent.

### **Agricultural Development Issues**

The agricultural sector plays a vital role in Kenya's economy, contributing 30 percent of GDP, employing 75 percent of the work force, and accounting for 60 percent of foreign exchange earnings. The Sixth National Development Plan (1989-93) contains programs to restructure agricultural production, marketing, and research. Included is the scaling back of grain and milk marketing boards, and continued liberalization and privatization of grain marketing.

To encourage agricultural production, the government has increased producer prices, emphasized prompt payments to producers, and improved availability of farm inputs. In marketing, it has begun restructuring the Cotton Board and the National Cereals and Produce Board (NCPB). The goal is to restrict the Cotton Board to advisory and regulatory roles, as opposed to the marketing role it now has, and to limit the role of the NCPB to management of strategic grain stocks. The reforms aim to reduce the inefficiency of crop marketing, and to reduce government costs.

Liberalization of the grain marketing system, which began in 1986, continues. In early 1990, the government decontrolled fertilizer prices, and the principal supplier, Kenya Grain Growers' Cooperative Union (KGGCU), responded by lowering its prices 20 percent. There is now more active participation of cooperatives and private traders in corn markets. In the wheat sector, however, the NCPB and the Kenya Grain Growers' Cooperative Union (KGGCU) continue to handle purchases.

*Cereal production potential.* Corn is the staple food of the Kenyan diet, providing nearly half of protein and calorie intake. While total consumption has grown rapidly, per capita use is dropping because of high population growth and changing tastes and preferences in the urban areas. For the third consecutive year, Kenya will have an excellent corn harvest in 1990/91, reaching 2.8 million tons. The introduction of three new, higher yielding varieties is expected to raise future corn production, perhaps creating exportable surpluses. Exports were about 250,000 tons in 1989/90, some through corn/wheat swap agreements with donors who needed corn for relief programs.

Kenya is unlikely to achieve wheat self-sufficiency because of land constraints. However, output is expected to rise as higher producer prices lead to small gains in area, and increased use of improved production technology that will increase yields. Wheat demand and imports are likely to expand in response to urbanization and increased demand for fast prepared foods. Recently, however, the government has limited wheat imports in an effort to conserve foreign exchange expenditures and reduce smuggling.

Recent good cereal crops can be attributed to improved price incentives, good weather, and an adequate supply of fertilizers

and other inputs. Increased input availability can be attributed to the rising number of outlets and distributors. However, land constraints remain a basic impediment to raising production because only 20 percent of total land area is arable. In addition, land productivity is being affected by increased competition for land that has caused reduced fallow periods and higher erosion.

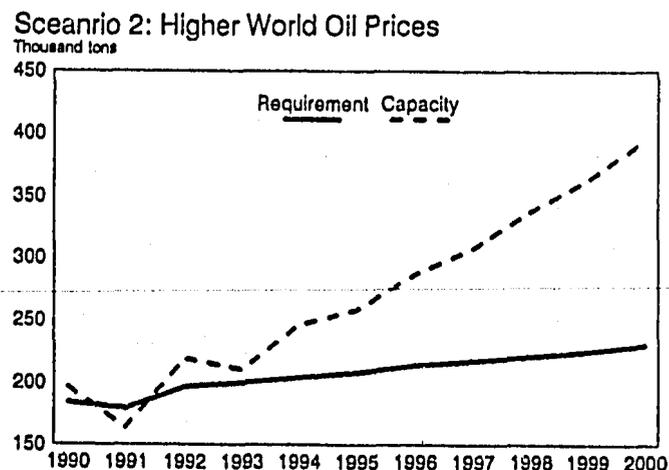
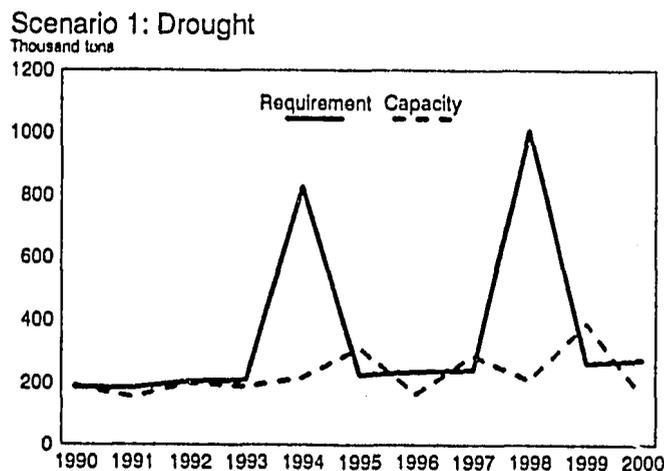
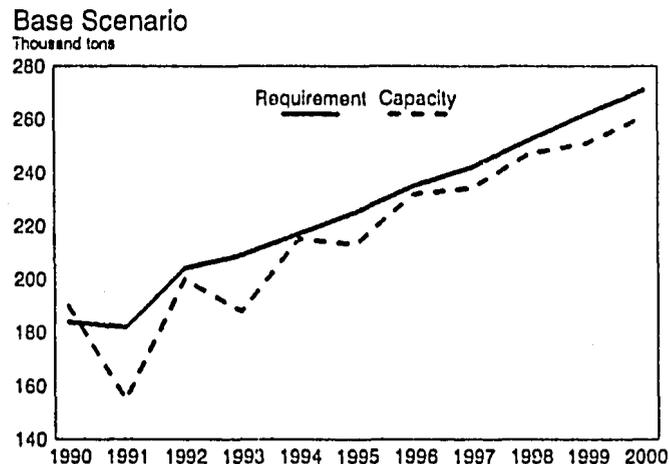
**Foreign exchange constraints.** Agricultural products, mostly coffee, account for 60 percent of export earnings. As a result, the availability of foreign exchange for imports of food is particularly sensitive to changes in world coffee prices, as well as changes in prices for other essential imports. In mid-1989, following the suspension of the International Coffee Agreement (ICA) and the removal of export quotas, world coffee prices collapsed. Initially, Kenya managed to offset lower prices by expanding export volume. However, stocks are now depleted and it is unlikely that Kenya will be able to maintain these high earnings as low prices persist. The outlook for Kenyan coffee production is poor, with high production costs, low prices, and liquidity problems leading to reduced input use and neglected trees.

#### The Model

To analyze food aid needs under varying conditions, projections are made under several scenarios: base, drought, and higher oil prices. In each scenario, the relationships for determining cereal availability, use, and commercial imports are the same. The model and procedures used are of the same general form described in appendix 3. Key features of the Kenya model are:

- Commodity coverage is corn, wheat, sorghum, millet, and rice.
- Corn and wheat are functions of area in the previous year and producer price. For other crops, area is based on trend.
- Yields are based on trends, considering expected technological advances and use of new varieties.
- Market wheat demand is a function of income and expected food aid. Corn demand is a function of income and lagged consumption and income. Demand for other cereals is based on trend.
- Income is a function of the world oil price, foreign exchange receipts, and lagged income.
- Commercial cereal imports are related to lagged cereal production, domestic prices, foreign exchange reserves, and lagged commercial imports.

**Figure 26**  
**Kenya: Import Requirements vs. Commercial Import Capacity--Market Demand 1990-2000**



### The Base Scenario

In the base scenario, total cereal production expands nearly 4 percent annually, from 3.4 million tons in 1990 to nearly 4.9 million in 2000. Net domestic food availability rises 3.4 percent annually, reaching 4.2 million tons. Status quo and nutrition-based demand grow at the same rate as population, reaching nearly 4.7 million tons and 4.9 million tons, respectively. Commercial cereal imports are projected to rise from a base of about 190,000 tons in 1990 to 260,000 tons by 2000, an annual growth rate of 3.2 percent (figure 26).

The resulting status quo aid needs range from 428,000 tons to 483,000 tons annually during the projection period. Nutrition-based requirements result in higher cereal aid needs of about 600,000 tons annually. These needs are significantly higher than current food aid receipts, which averaged about 100,000 tons annually in the late 1980's. These results suggest that, with the population growth rate averaging 3.5-4.0 percent, per capita cereal availabilities will fall below recent levels and minimum nutritional requirements, unless additional foreign exchange is allocated to cereal imports.

The market demand results tell a somewhat different story, and suggest that status quo and nutrition-based demand may overestimate projected aid needs. The market demand results account for the expectation of a continued decline in the direct food use of corn, and of a gradual decline in the role of cereals in the diet. As a result, the market demand outcome indicates slower growth in cereal demand than the status quo or nutrition-based assessments, and substantially smaller food aid needs. However, relatively slow growth in market demand also reflects continued sluggish gains in per capita incomes.

### Scenario 1: Drought

In this scenario, it is assumed that there will be droughts in 1994 and 1998, roughly consistent with historical incidence. In both cases, yields of wheat, corn, and rice are reduced 20 percent, while those of sorghum and millet are reduced 10 percent. Yields are assumed to return to their base scenario levels in the years following the droughts. In the model, the impacts of these shocks are felt on current production, and on commercial import behavior.

The simulated droughts cause production to drop nearly 20 percent in 1994 and 1998, but the response of commercial import capacity is relatively small. Status quo and nutrition-based food aid needs increase two- to three-fold in the years of crop failures. Based on market demand, needs also become sharply higher during the droughts, reaching about 600,000 tons in 1994 and 800,000 tons in 1998.

### Scenario 2: Higher World Oil Prices

In this scenario, the nominal world oil price rises from \$30 per barrel in 1990 to \$40 in 1991, and then increases at the base scenario rate of 8 percent annually through 2000. Such a price hike could accompany a prolonged stalemate in the Iraq-Kuwait crisis. However, the scenario also indicates the possible impacts on Kenya's cereal import capacity from a shock to its balance of payments and overall economy.

The higher oil price reduced the average annual growth in real domestic GDP about 1 percentage point from the base scenario, slowing growth in market demand. Growth in food demand falls to 2.3 percent a year, compared with 4 percent in the base scenario. In addition, higher world oil prices lead to higher domestic inflation, rising import costs, and reduced foreign reserves. However, based on historical behavior, higher inflation causes a larger share of foreign exchange to go for food imports. Commercial cereal imports average 5 percent above the base scenario in the early 1990's, and 10 percent higher by the late 1990's.

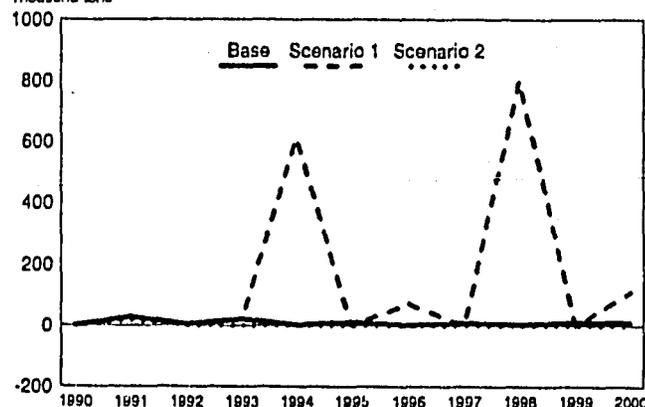
The net impact of the oil price hike is that status quo and nutrition-based cereal aid needs are slightly below the base scenario because more foreign exchange is allocated to food imports. Aid needs based on market demand become negative, but this result is driven by sharply lower levels of per capita consumption than in the base scenario.

### Conclusions

The base scenario results suggest that under normal conditions, and assuming that increased consumption of other foods offsets the projected decline in cereal use, that food aid needs are relatively small (figure 27). However, the widening status quo and nutrition-based deficits that are projected in the base scenario may still indicate a deteriorating food security situation. First, growth in per capita incomes is projected to remain weak, raising the question of whether incomes and resources will be sufficient to supplement diets with noncereal foods. Second, the base scenario assumes cereal production will continue to increase 4 percent a year during the 1990's, a rate that may be difficult to achieve.

Figure 27

Kenya: Food Aid Needs--Market Demand  
Thousand tons



The analysis also indicates that droughts, which have been common in East Africa, can continue to create cereal import needs that swamp commercial import capacity. However, to some extent the peak needs estimated here can be reduced by adjusting stocks and spreading import needs across several years. The analysis also indicates the vulnerability of the food economy to adverse external developments. The decline in effective demand suggested by the high oil price scenario led to a significant decline in market cereal consumption, implying a widening nutritional gap. And, although commercial cereal imports actually increased in that scenario, the increase was at the cost of other imports.

## References

1. Hanrahan, Charles E., Francis S. Urban, and J. Larry Deaton. *Longrun Changes in World Food Supply and Demand*, Staff Report No. AGES 840111. U.S. Dept. Agr., Econ. Res. Serv., Jan. 1984.
2. Hjort, Kim, and Pierre van Peteghem, *The CPPA Model Builder: Structure and Operation of Version 1.2*, unpublished manuscript, U.S. Dept. Agr., Econ. Res. Serv., February 1990.
3. Larakhi, Karim. "Ending Food Subsidies: Nutritional, Welfare, and Budgetary Effects," *The World Bank Economic Review*, vol.3, no. 3 1990, pp 395-408.
4. Mielke, Myles J., and Peter A. Riley. "Foreign Coarse Grains: Prospects and Issues for the Nineties," *Feed: Situation and Outlook Report*, FDS-315, August 1990, pp 18-23.
5. Schwartz, Sara, and Fredric S. Surls. "World Wheat Trade: Prospects and Issues for the Nineties," *Wheat: Situation and Outlook Report*, WS-290, August 1990, pp 29-35.
6. U.S. Dept. Agr., *World Agriculture: Forces for Change in the 1990's*. Situation and Outlook Special Issue No. WAS-59, Econ. Res. Serv., June 1990.

7. U.S. Dept. Agr., *Developing Economies: Agriculture and Trade*, Situation and Outlook Report No. RS-90-5, Econ. Res. Serv., July 1990.

## Appendix 1: Country Coverage List

<b>North Africa</b>		
Egypt*	Morocco	Tunisia
<b>West Africa</b>		
Benin	Ghana	Mauritania
Burkina Faso	Guinea	Niger
Cape Verde	Guinea-Bissau	Senegal
Chad	Liberia	Sierra Leone
Gambia	Mali	Togo
<b>East Africa</b>		
Burundi	Rwanda	Tanzania
Central African Rep.	Somalia	Uganda
Ethiopia*	Sudan*	Zaire
Kenya		
<b>Southern Africa</b>		
Angola	Malawi	Zambia
Lesotho	Mozambique*	Zimbabwe
Madagascar	Swaziland	
<b>South Asia</b>		
Afghanistan	India*	Pakistan
Bangladesh*	Nepal	Sri Lanka
<b>Southeast Asia</b>		
Indonesia	Philippines*	Vietnam
<b>Latin America</b>		
Bolivia	Guatemala	Jamaica*
Costa Rica	Haiti	Nicaragua
Dominican Republic	Honduras	Peru*
El Salvador		

\* Country-specific tables and analysis provided.

**Appendix 2: Share Of Cereals In The Diet And  
Minimum Caloric Requirements**

Country	Share of cereals in diet Percent	Minimum caloric requirements	
		Current	Previous
		-- Calories/person/day --	
Afghanistan	79.4	2,039	2,440
Angola	35.0	2,090	2,350
Bangladesh	83.9	2,039	2,210
Benin	37.0	2,100	2,300
Bolivia	46.2	2,133	2,390
Burkina Faso	73.0	2,100	2,370
Burundi	34.0	2,078	2,330
Cape Verde	57.0	2,100	2,350
Central African Rep.	21.0	2,078	2,260
Chad	52.0	2,100	2,380
Costa Rica	37.3	2,024	2,240
Dominican Republic	32.3	2,024	2,260
Egypt	61.5	2,196	2,510
El Salvador	50.5	2,024	2,290
Ethiopia	69.0	2,078	2,330
Gambia	63.0	2,100	2,380
Ghana	27.0	2,100	2,300
Guatemala	57.2	2,024	2,190
Guinea	52.0	2,100	2,310
Guinea-Bissau	64.0	2,100	2,310
Haiti	40.0	2,025	2,260
Honduras	53.2	2,024	2,260
India	59.4	2,039	2,210
Indonesia	66.4	1,989	2,160
Jamaica	34.4	2,025	2,240
Kenya	56.0	2,078	2,320
Lesotho	75.0	2,090	2,280
Liberia	48.0	2,100	2,310
Madagascar	60.0	2,090	2,270
Malawi	70.0	2,090	2,320
Mali	75.0	2,100	2,350
Mauritania	54.0	2,100	2,310
Morocco	65.2	2,196	2,420
Mozambique	33.0	2,090	2,340
Nepal	81.5	2,039	2,200
Nicaragua	43.0	2,024	2,250
Niger	70.0	2,100	2,350
Pakistan	59.3	2,039	2,310
Peru	46.7	2,133	2,350
Philippines	62.2	1,989	2,260
Rwanda	25.0	2,078	2,320
Senegal	61.0	2,100	2,380
Sierra Leone	57.0	2,100	2,300
Somalia	45.0	2,078	2,310
Sri Lanka	58.3	2,039	2,220
Sudan	51.0	2,078	2,350
Swaziland	55.0	2,090	2,350
Tanzania	60.0	2,078	2,320
Togo	40.0	2,100	2,300
Tunisia	57.3	2,196	2,390
Uganda	35.0	2,078	2,330
Vietnam	71.5	1,989	2,160
Zaire	15.0	2,078	2,220
Zambia	70.0	2,090	2,310
Zimbabwe	66.0	2,090	2,390

## Appendix 3: Methodology

Food aid needs are defined as the gap between target consumption and the availability of cereals for food use. Target consumption is derived from alternative objective measures of per capita food consumption. Availability of cereals for food use depends on production, imports, and non-food use allowances.

The first step in assessing food aid needs is to project the availability of cereals for human consumption. This is decomposed into two parts—supply of cereals and allowance for non-food use of cereals. Supply is defined as production plus stocks plus commercial imports:

$$\text{Supply} = \text{production} + \text{beginning stocks} + \text{commercial imports} \quad (1)$$

Non-food use includes exports, feed use, other non-food uses such as waste, seed use, and processing, and stock accumulation:

$$\text{Non-food use} = \text{exports} + \text{feed use} + \text{other non-food use} + \text{ending stocks} \quad (2)$$

The quantity of cereals available for food use is equal to supply less non-food use:

$$\text{Food availability} = \text{supply} - \text{non-food use} \quad (3)$$

Finally, food aid needs are computed as the gap between target food use and food availability:

$$\text{Food aid need} = \text{target food use} - \text{food availability} \quad (4)$$

### Food Use Targets

Two alternative food use targets are used to assess needs. The objective of the first target—called the *status quo*—is to support average consumption in the near future near that of the past. A 10-year average is used in an effort to equitably account for situations where per capita consumption is trending up or down, and provide a standard against which all countries are evaluated. In countries where per capita consumption is increasing, a 10-year average will tend to be below actual per capita consumption in the most recent years. In cases where per capita consumption is declining because production or import capacity can not keep up with population growth, the 10-year average will tend to be above recent levels.

The second target takes into account internationally recognized minimum caloric requirements. The nutrition-based target is the amount of cereals needed to satisfy the minimum recommended caloric intake. It is computed from minimum caloric requirements, adjusted for the share of cereals in the diet, and the nutritional content of the cereals. The minimum requirements used are derived from standards rec-

ommended by the United Nations. They are based on numerous variables such as the age and sex distribution of the population, and the physical size of the people. Caloric requirements also differ with assumed physical activity levels.

The caloric requirements used in this assessment are those necessary to sustain life with minimum food gathering activity. They are comparable to the activity level of a refugee—they do not allow for play, work, or any activity other than food gathering. In addition, the caloric requirements used are regional averages rather than country specific. This strict definition is different from that used in the *World Food Needs and Availabilities* (WFNA) series, which used country specific caloric requirements and also included a 10 percent allowance for activity. The current caloric requirements are compared to those used in the WFNA series in Appendix 2.

### Commodity Coverage

This report assesses the need for food aid to meet cereal consumption requirements. Because of data limitations, accurate estimates of the supplies of non-cereal foods such as pulses, roots and tubers, vegetable oils, and milk frequently are not available. The omission of non-cereals from this analysis may misrepresent food aid needs in those countries where cereals are a small share of the diet. However, in many low-income countries, cereals account for at least 50 percent of all calories consumed (see appendix 2). In addition, the bulk of all international food aid is provided in the form of cereals.

### Data and Procedures in the Short-Run Assessments

Historical supply and use data for 1980/81-1989/90 for most variables are official USDA data. Historical USDA import data are disaggregated into food aid and commercial imports using FAO data. Historical nonfood use data, including seed use, waste, processing use, and other use, are also from FAO. Procedures for 1990/91 and 1991/92 estimates are described below:

**Production.** Production for 1990/91 is based on official USDA estimates as of September 1990. Production in 1991/92 is projected assuming normal weather and no external world macroeconomic shocks that could affect production. However, expected trends in domestic producer incentives and policies are factored into the production projections.

**Stocks.** Two alternative targets for ending stocks are employed in computing food aid needs. The first yields food aid needs allowing for stock building or stock drawdown. The allowance for stock use or buildup is made under the assumption that stockpiling of cereals in normal production years can help reduce fluctuations in cereals availability for food use in poor production years and, therefore, help stabilize food aid needs. The second alternative holds stocks constant at the level of ending stocks in 1989/90, and permits ready assessment of needs assuming no change in stocks.

Under the first stock alternative, 1990/91 ending stocks are based on official USDA forecasts of actual stocks. For 1991/92, ending stocks are projected to change based on the level of forecast production relative to trend, and the level of 1990/91 ending stocks relative to operational maximum and minimum stocks. Operational minimums and maximums are based either on known stock targets or derived from historical behavior. If stocks are below the operational minimum, stocks are brought up to the minimum. If beginning stocks are above the operational maximum, stocks are brought down to the maximum. If beginning stocks are within the range of the minimum and maximum, stock adjustments depend on projected production. If production is near or above trend, stocks are allowed to build towards the maximum. If production is below trend, stocks are reduced towards the minimum to augment domestic supplies.

*Non-food use.* Exports, feed, and other non-food use are projected by one of two means. The first assumes that the average rate of per capita exports, feed, and other use during the past 10 years will continue. This alternative assumes that non-food use of cereals will continue at historic rates and increase in aggregate terms at the same rate as population growth. In some countries, a 10-year average per capita use rate is considerably below the rate prevailing in the most recent three years. This situation occurs most often in countries where feed use, primarily of coarse grain, is rising. In those countries, the most recent three year average per capita use rates are assumed to continue in 1990/91 and 1991/92.

#### **Commercial Cereal Import Forecasts: Structural Models**

Commercial cereal imports are projected using a structural model for eight countries: Bangladesh, Egypt, India, Jamaica, Kenya, Morocco, Peru, and the Philippines. The model assumes that commercial cereal imports depend on the expected domestic supply of cereals, expected food aid shipments, the price of imported cereals, and the ability of the country to pay for cereal imports. The impact of these variables on realized commercial imports differs. The higher the expected domestic supply, expected food aid receipts, and price of imported cereals, the lower are expected commercial imports. On the other hand, if the ability of the country to pay for cereal imports is high, imports are likely to be higher.

The structural model employed to estimate commercial imports (CM) is of the general form:

$$CM = CM(\text{expected supply, expected food aid receipts, price of imported cereals, foreign exchange availability}) \quad (1)$$

The function was estimated individually for each of the countries, employing variables which reflect the agricultural and macroeconomic policies and conditions within the country. For example, expected supply net of imports is measured by one or more of several alternatives including trend produc-

tion, lagged production (either total or per capita), projected production relative to trend production, and per capita beginning stocks of cereals. Expected food aid receipts are equal to the previous years' receipts. Expected food aid shipments are projected by applying a country's historic share of world food aid shipments to projected world food aid availabilities in 1990/91 and 1991/92.

The price of imported cereals used is the historical import-share weighted average of projected cereal prices, deflated by the aggregate import price index.<sup>4</sup> Foreign exchange availability, or the ability to pay for cereal imports, is measured by macroeconomic variables such as income growth or the balance of payments position. Foreign exchange availability (FEA) is estimated based on the following general structural relationships:

$$FEA = FEA(\text{foreign exchange receipts (FER), reserves, import prices (PM), domestic income}) \quad (2)$$

$$FER = FER(\text{export of goods and services (XGS), worker remittances (WR), official capital grants (OCG), long term loans (LTL), other inflows}) \quad (3)$$

$$XGS = XGS(\text{export prices (PX), world income, trade policies}) \quad (4)$$

$$WR = WR(\text{world oil price, world income, lagged WR}) \quad (5)$$

$$OCG = OCG(\text{world income}) \quad (6)$$

$$LTL = LTL(\text{world income, domestic income, reserves, lagged LTL}) \quad (7)$$

$$\text{Reserves} = f(\text{lagged reserves, FER, FEA}) \quad (8)$$

$$PM = PM(\text{index of industrial country export prices, lagged PM}) \quad (9)$$

$$PX = PX(\text{index of primary commodity prices, lagged PX}) \quad (10)$$

Projections of the exogenous macroeconomic variables such as world income, the world oil price, and the index of industrial country export prices employed in projecting the above variables are taken from the ERS database or other sources.

<sup>4</sup> The price projections used are for U.S. wheat and corn and for Thai rice. The projected price and macroeconomic variables employed in this report were generated by ERS.

### **Commercial Cereal Import Forecasts: Vector Autoregression Models**

The application of the vector autoregression (VAR) approach for forecasting purposes is simple. It uses little economic theory in obtaining the desired forecasts by avoiding the theoretical restrictions which are required in estimating structural models. It avoids the risk of estimating a misspecified structural model, as well as the needed distinction between exogenous and endogenous variables. Therefore, the VAR approach will generally provide us with accurate forecasts thus sidestepping the consequences of generating forecasts from structural models which may be misspecified.

In a VAR approach each variable in the system depends on its own past values and a subset of lagged values of all the other variables which we aim at forecasting. For example, with a lag length of 3, the VAR equation for commercial imports is:

$$CM_t = a_0 + a_1 CM_{t-1} + a_2 CM_{t-2} + a_3 CM_{t-3} + a_4 QP_{t-1} + a_5 QP_{t-2} + a_6 QP_{t-3} + a_7 FEA_{t-1} + a_8 FEA_{t-2} + a_9 FEA_{t-3} + \epsilon_{it}$$

Where:

$CM_{t-i}$  = commercial imports in period  $t-i$  (lagged  $i$  periods),

$QP_{t-i}$  = production,

$FEA_{t-i}$  = foreign exchange availability, measured as aggregate imports,

$\epsilon_{it}$  = error term

In this specification, the lag length ( $i$ ) has important implications for the precision of the forecasts. Too many lags will result in a loss of precision in the estimates, while too few lags will result in biased estimates because of omitted variables. Both will cause loss of precision in the forecasts.

The appropriate lag length will be determined using a likelihood ratio test (using RATS software) with a chi-square distribution of log determinants to two set of residuals. The test is:

$$(T-c) [\log \det \Sigma_1 - \log \det \Sigma_2]$$

where  $T$  is the number of observations,  $c$  is a correction factor which equals the number of variables in each unrestricted equation,  $\det$  is determinant,  $\sigma_1$  and  $\sigma_2$  are the covariance matrices of VAR with  $m$  and  $m-1$  ( $m-1$ ) lags respectively.

Up to three variables were included in the VAR analysis for each country: commercial grain imports, grain production, and the value of aggregate imports. In countries where data were not complete, gross domestic product (GDP) was sub-

stituted for total aggregate imports. In a few instances, VAR was performed on only the first two variables.

### **Commercial Cereal Import Forecasts: "No Model" Method**

Commercial imports for three countries (Afghanistan, Nicaragua, and Vietnam) are assumed equal to the average imports in the preceding 3 years. Neither a structural nor vector autoregressive model can be used for these countries because both agricultural and macroeconomic data are limited.

### **Data and Procedures in the Long-Run Assessments**

The long run assessments are made within the Country Projections and Policy Analysis (CPPA) modeling framework developed at ERS (2). The CPPA framework uses structural relationships to project domestic prices and supply and demand quantities from an assumed set of world commodity prices and macroeconomic conditions. The transmission of world prices and economic conditions into each country depends on the specification of the domestic and trade policies prevailing in the countries.

The models derive supply and demand projections for aggregate cereals from projections of the major individual cereals in each country. The supply and use variables are projected from econometrically estimated structural relationships specific to each country. Production, exports, feed use, other non-food use, food demand, and stocks are allowed to vary depending on market conditions and price incentives. Food aid needs are defined as the gap between the demand for cereals and the availability of cereals, including commercial imports, to satisfy that demand.

*Macroeconomic relationships.* Industrial country economic performance, world trade prices, and the price of oil are forecast exogenously. Domestic income, the exchange rate, and the general rate of inflation are projected based on historical linkages to world macroeconomic conditions. Balance of payments and other aggregate trade variables are projected as functions of world macroeconomic conditions.

*World and domestic prices.* World commodity prices are forecast exogenously. Domestic commodity prices are projected as functions of moving averages or lagged world prices, domestic agricultural policies, and domestic supply and demand conditions.

*Supply.* The supply of each commodity is equal to beginning stocks plus production. Beginning stocks are equal to ending stocks in the previous period. Production is the product of area harvested and yield. Area harvested is a function of such factors as expected gross returns from the crop and its competing crops, expansion in irrigated area, etc. The area harvested from all crops is constrained by the availability of land. Yields are a function of factors such as expected technological progress and relative input costs.

*Non-food demand.* Non-food demand is projected by two different means. Status quo and nutrition requirement demands for feed, seed, and waste are held at the per capita use rates that prevailed during the 1980's. Market solution projections of non-food demand are based on historic growth rates in feed and seed use rates and historic waste allowances.

*Food demand.* Food demand is measured three ways. Status quo food demand is the quantity of cereals required to maintain per capita consumption at the rate attained during the 1980's. Nutrition-based consumption is the quantity required to meet minimum per capita daily caloric requirements.

These demand measures are the same as those employed in the short-run assessments. Market demand is projected with econometrically estimated functions which relate changes in demand for each cereal to changes in such variables as income, its price, and the prices of alternative foods. In some cases, response to income changes is assumed to decline over the projection period as consumer incomes and preferences lead to gradual diversification of the diet.

*Stocks, exports, and imports.* Stocks are assumed to remain within the minimum and maximum levels defined by current

buffer stock policy. In cases where stock policy is not explicit, an appropriate range of stocks is assumed, based on historical behavior. In cases where stocks are projected to exceed the maximum, the surplus is exported. If stocks are projected to fall below the minimum, imports are assumed. If imports are needed, cereals are purchased commercially up to the limit of estimated aggregate commercial import capacity. Commercial imports are projected using the same structural relationship used in the short-run assessments. The model specification used to project commercial imports differs somewhat by country.

*Food aid needs.* Food aid needs are equal to the difference between aggregate cereal import requirements and aggregate commercial import capacity. The import requirement is defined as total demand (i.e., food use plus non-food use plus exports) less the supply of cereals (production less stock accumulation). If import requirements exceed commercial import capacity, food aid needs are positive. If import capacity exceeds import requirements, there is a surplus of cereals and food aid needs are equal to zero.

## List of Tables

	Page
1. Summary of forecast cereal food aid needs . . . . .	5
2. Historical cereal food aid receipts and projected needs for 1990/91 and 1991/92 . . . . .	6
3. Status quo needs constrained by nutrition-based needs by region: 1990/91 . . . . .	8
4. Status quo needs constrained by nutrition-based needs by region: 1991/92 . . . . .	9
5. Total Cereals: World production, consumption, net imports, and ending stocks, 1987/88 to 1990/91. . . . .	10
6. Selected world cereal prices, 1985/86 to 1990/91 . . . . .	10
7. Wheat: World production, consumption, net imports, and ending stocks, 1987/88 to 1990/91. . . . .	12
8. Rice: World production, consumption, net imports, and ending stocks, 1987/88 to 1990/91. . . . .	13
9. Coarse grain: World production, consumption, net imports, and ending stocks, 1987/88 to 1990/91. . . . .	14
10. Volume of cereal food aid contributions by donor . . . . .	16
11. North Africa regional summary . . . . .	21
12. Egypt summary . . . . .	22
13. Historical and projected macroeconomic indicators: Egypt . . . . .	22
14. West Africa regional summary . . . . .	25
15. East Africa regional summary . . . . .	26
16. Ethiopia summary . . . . .	27
17. Sudan summary . . . . .	28
18. Southern Africa regional summary . . . . .	29
19. Mozambique summary . . . . .	30
20. South Asia regional summary . . . . .	32
21. Bangladesh summary . . . . .	32
22. Historical and projected macroeconomic indicators: Bangladesh . . . . .	33
23. India summary . . . . .	34
24. Historical and projected macroeconomic indicators: India . . . . .	35
25. Southeast Asia regional summary . . . . .	36
26. Philippines summary . . . . .	37
27. Historical and projected macroeconomic indicators: Philippines . . . . .	38
28. Latin America regional summary . . . . .	39
29. Jamaica summary . . . . .	40
30. Historical and projected macroeconomic indicators: Jamaica . . . . .	40
31. Peru summary . . . . .	42
32. Historical and projected macroeconomic indicators: Peru . . . . .	42
33. Global real income and population growth rates . . . . .	43
34. Total cereals: Global growth rates by commodity . . . . .	44
35. Total cereals: Summary of growth rates by region . . . . .	44

## ERRATA

PAGE 6 Notes for table 2 should read: SQ = Status quo; NB = Nutrition-based; Projected 1990/91 and 1991/92 needs with stock adjustment.

PAGE 19 Entry labelled "Constant stocks" should be labelled "Food aid need with stock adjustment."

Entry labelled "Food aid need without stock adjustment" should be labelled "Food aid need with constant stocks."

65

## List of Figures

Page

1. Regional shares of food aid receipts in 1989/90 and projected shares in 1990/91 . . . . .	7
2. Estimated per capita food aid needs, 1990/91 . . . . .	7
3. Regional shares of food aid receipts in 1989/90 and projected shares in 1991/92 . . . . .	8
4. Estimated per capita food aid needs, 1991/92 . . . . .	9
5. Total Cereals: Stock-to-Use Ratio, 1970/71-1990/91 . . . . .	9
6. Wheat prices, nominal, real, and trend real, 1945-1990 . . . . .	.11
7. Wheat: Stock-to-Use Ratio, 1970/71-1990/91 . . . . .	.11
8. Rice: Stock-to-Use Ratio, 1970/71-1990/91 . . . . .	.11
9. Coarse grains: Stock-to-Use Ratio, 1970/71-1990/91 . . . . .	.15
10. Estimated food aid needs: North Africa . . . . .	.21
11. Estimated food aid needs: West Africa . . . . .	.24
12. Estimated food aid needs: East Africa . . . . .	.25
13. Estimated food aid needs: Southern Africa . . . . .	.29
14. Estimated food aid needs: South Asia . . . . .	.31
15. Estimated food aid needs: Southeast Asia . . . . .	.36
16. Estimated food aid needs: Latin America . . . . .	.38
17. Global grain production . . . . .	.44
18. Global grain consumption . . . . .	.44
19. Share of increase in global grain consumption by region, 1990-2000 . . . . .	.44
20. Global grain imports . . . . .	.45
21. Share of increase in global grain imports by region, 1990-2000 . . . . .	.45
22. India: Import requirements vs. commercial import capacity—market demand, 1990-2000 . . . . .	.48
23. India: Cereal ending stocks . . . . .	.50
24. Morocco: Import requirements vs. commercial import capacity—market demand, 1990-2000 . . . . .	.53
25. Morocco: Food aid needs, base and alternative scenarios . . . . .	.54
26. Kenya: Import requirements vs. commercial import capacity—market demand, 1990-2000 . . . . .	.56
27. Kenya: Food aid needs—market demand, 1990-2000 . . . . .	.57

-66-