Chapter 4
Baseline

Using the FAO 2015/30 analysis described above, this chapter examines the challenges faced by sub-Saharan Africa agriculture in fulfilling the regional demand for food and analyses the scope for meeting this challenge through expanded irrigated crop production. The chapter is in two parts. The first highlights the challenge by examining the structure of agricultural output in sub-Saharan Africa and projecting shortfalls in key crops. The second describes the current status of irrigation in sub-Saharan Africa in terms of water resources, levels of development, typical yields and yield gaps. In this report agricultural output is taken to comprise food crops, cash crops and livestock commodity groups, as defined in Annex 3.

ANALYSIS OF PROJECTED PRODUCTION AND CONSUMPTION OF AGRICULTURAL COMMODITIES IN SUB-SAHARAN AFRICA

Population growth

In 1997/99, some 10.5 percent of the world's population and 13.5 percent of the population of developing countries lived in sub-Saharan Africa (incl. South Africa). Between 1997/99 and 2030, the population of sub-Saharan Africa is projected to more than double. This compares with a 40-percent increase in the population of the world as a whole and a 41-percent increase in non-sub-Saharan Africa developing countries. By 2030, a projected 15.5 percent of the world's population will be living in sub-Saharan Africa (Table 7).

Production

Table 6 compares the base-period and projected aggregate agricultural output as defined in Chapter 3 in all developing countries and in sub-Saharan Africa with world agricultural output. The variables are indexed in percentage terms against a nominal value of 100 for the base year 1997/99 (required growth) and in terms of global achievement (regional share).

TABLE 6
Population and aggregate agricultural output for sub-Saharan Africa, developing countries and the world

	Growth (1997/99 = 100)			Regional share (World = 100)		
	1997/99	2015	2030	1997–99	2015	2030
	Developing countries 1997/99 = 100			World = 100		
Population						
World	100	122	140	100	100	100
Developing	100	127	150	77.8	81.2	83.5
Developing excluding SSA	100	124	141	67.3	68.3	68
Sub-Saharan Africa	100	150	207	10.5	12.9	15.5
Output						
World	100	131	160	100	100	100
Developing	100	141	182	60.5	65.4	68.9
Developing excluding SSA	100	142	180	54.6	59.2	61.5
Sub-Saharan Africa	100	138	203	5.9	6.2	7.4
Output per head						
World	100	107	114	100	100	100
Developing	100	111	121	78	81	83
Developing excluding SSA	100	114	127	81	87	90
Sub-Saharan Africa	100	92	98	56	48	48

Source: Annex 4.

The FAO 2015/30 analysis projects that the share of sub-Saharan Africa (excluding Republic of South Africa) in global output will increase for each of the commodity groups (food crops, cash crops and livestock) and that its share in global agricultural output will rise from 5.9 percent of the world total to 6.2 percent in 2015 and to 7.4 percent in 2030. However, the more rapid growth of population in sub-Saharan Africa will result in projected agricultural output per capita in the region falling even further behind that of the rest of the world. The FAO 2015/30 projection is that sub-Saharan Africa agricultural output per head will have fallen to as little as 48 percent of the average for the world as a whole by 2015 and will remain at 48 percent through to 2030. This contrasts with the rest of the developing world, where agricultural output per capita is projected to rise by 2030 to 90 percent of that of the world as a whole (Table 6).

Table 7 shows sub-Saharan Africa developing and developed (i.e. including Republic of South Africa), country shares in 1997/99 in world production of each commodity. sub-Saharan Africa accounted for more than half of the world's production of cassava, other roots, plantains and cocoa, and for more than 25 percent of millet, sorghum and sweet potatoes. Of these, only cocoa and sorghum are widely traded internationally (with some trade in millet between countries in the Sahel). However, sub-Saharan

TABLE 7
World production of agricultural commodities, 1997/99 baseline

	SSA (excluding Republic of South Africa)	Developing countries	Developed countries*	World	SSA	Developing countries*	Developed countries
	(1 000 tonnes)				(% share of world production)		
Wheat	4 502	280 235	316 738	596 973	0.8	46.9	53.1
Rice	11 670	561 877	25 531	587 408	2.0	95.7	4.4
Maize	34 614	268 110	333 558	601 667	5.8	44.6	55.4
Barley	1 245	24 014	115 906	139 920	0.9	17.2	82.8
Millet	13 132	26 427	1 491	27 917	47.0	94.7	5.3
Sorghum	18 537	43 831	17 304	61 135	30.3	71.7	28.3
Other cereals	2 159	8 580	60 678	69 258	3.1	12.4	87.6
Potato	5 361	123 656	175 740	299 397	1.8	41.3	58.7
Sweet potato	43 155	168 209	2 000	170 208	25.4	98.8	1.2
Cassava	90 115	164 708	0	164 708	54.7	100.0	0
Other roots	10 560	14 962	338	15 300	69.0	97.8	2.2
Plantains	22 468	30 380	0	30 380	74.0	100.0	0
Sugar	7 623	128 814	44 601	173 415	4.4	74.3	25.7
Pulses	6 992	39 320	16 783	56 102	12.5	70.1	29.9
Vegetables	20 423	405 138	145 258	550 397	3.7	73.61	26.4
Bananas	6 258	57 933	996	58 929	10.6	98.3	1.7
Citrus	6 102	72 110	29 324	101 434	6.0	71.1	28.91
Fruit	12 819	229 723	103 595	333 318	3.9	68.9	31.9
Vegetable oil & oilseeds	6 363	67 668	35 999	103 667	6.1	65.3	34.7
Cocoa	1 979	2 999	0	2 999	66.0	100.0	0
Coffee	1 242	6 452	3	6 455	19.2	99.9	0.1
Teas	574	3 691	149	3 840	14.94	96.1	3.9
Tobacco	461	5 507	1 358	6 865	6.7	80.2	19.8
Cotton	1 435	12 133	6 270	18 403	7.8	65.9	34.1
Fibres	134	4 491	147	4 637	2.9	96.8	3.2
Rubber	389	6 601	0	6 601	5.9	100.0	0
Beef	3 100	27 981	30 701	58 682	5.3	47.7	52.3
Mutton	1 427	7 360	3 466	10 825	13.2	68.0	32.0
Pigmeat	584	49 348	37 193	86 541	0.7	57.0	43.0
Poultry	1 393	31 250	30 599	61 849	2.3	50.5	49.5
Milk	18 580	219 317	342 412	561 729	3.3	39.0	61.0
Eggs	1 256	33 719	18 007	51 726	2.4	65.2	34.8

* Defined as world less developing countries.

Africa produced less than 1 percent of the world's wheat and barley, less than 2 percent of the world's rice and, despite its importance as the basic staple in most of eastern and southern Africa, only 5.75 percent of the world's maize. The generally very small percentage shares of sub-Saharan Africa in total world output mean that increases in sub-Saharan agricultural production stemming from increased irrigation are likely to have little impact on world prices, other than for crops where sub-Saharan Africa has a disproportionate share of particular markets (e.g. table grapes in South Africa). However, as mentioned in the introduction to this report, increased national output could have a significant impact on national prices and in the profitability of investment in irrigation.

Among the commodity groups, the greatest increase in the share of sub-Saharan Africa in world output is projected to be in livestock and dairy products, the share of which may rise from 3.4 percent in the base period to a projected 8.8 percent in 2030. This compares with a projected increase of 3.9–6.0 percent for different cereals and 11.5–13.3 percent in beverages and industrial crops. This suggests that demand for feed crops may be an important factor in driving the expansion of irrigation in sub-Saharan Africa.

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...This suggests that demand for feed crops may be an important factor in driving the expansion of irrigation in sub-Saharan Africa

Analysis of the FAO 2015/30 value data (the nominal value being used as a proxy for actual agricultural output as explained in Chapter 3) shows the very low nominal value of non-food crops compared with the total nominal value of all agricultural commodities (Table 8). In the base year (1997/1999), non-food crops (including tropical beverages) accounted for only an estimated 4 percent of the total nominal value of all agricultural commodities, and this is projected to remain roughly constant to 2030. In the case of sub-Saharan Africa, the share of non-food crops is substantially higher at 8.6 percent, but this is projected to fall to 6.9 percent by 2030. These very low percentages partly reflect the fact that the 2015/30 data are gross figures, which means that they include both the value of feed and of the livestock that consume it. However, even if the farmgate value of feed were to be excluded completely from the value of food commodities, it would only increase the shares of non-food commodities marginally. A more important fact masking the relative value of non-food crops is that more value tends to be added during the off-farm processing of such crops than of most food commodities.

Notwithstanding the greater relative importance of non-food crops in sub-Saharan Africa compared with the rest of the world, they are of only minor importance for sub-Saharan Africa as a whole. Food crops are vastly more important, and their importance will increase. Thus, while the impact of declines in non-food export crop prices tends to be heavily publicized internationally, it is food crop production and prices that will remain of critical importance for most sub-Saharan Africa countries and for the majority of their farmers. While non-food crops are more important in some sub-Saharan Africa countries than others, the detailed FAO 2015/30 data show that, in each sub-Saharan Africa country, the nominal value of food crop production comprises well over 50 percent of the nominal value of all agricultural production.

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Table 8 shows the importance of non-cereal staple food crops for sub-Saharan Africa. This contrasts with the rest of the world and, indeed, with developing countries as a whole, where non-cereal staples account for only some 7 percent of the value of agricultural output. The reliance on non-cereal staple crops is particularly heavy in the sub-Saharan Africa countries bordering the Gulf of Guinea and the Atlantic Ocean to the north of Namibia. These countries, together with

TABLE 8
Production values of commodity groups as a percentage of the value of agricultural production**

		Cereals	Non-cereal staple food crops*	Other food crops	Livestock & dairy	Beverages & industrial crops	All food commodities	All commodities
					(%)			
World	Base year	22.7	6.5	26.5	40.4	3.9	96.1	100.0
	2015	21.7	6.1	26.9	41.3	3.9	96.1	100.0
	2030	20.9	5.9	27.4	42.0	3.8	96.2	100.0
Developing countries	Base year	23.5	7.5	30.3	33.6	5.1	94.9	100.0
	2015	21.4	7.0	30.0	36.7	4.8	95.2	100.0
	2030	19.9	6.7	29.8	39.0	4.6	95.4	100.0
SSA	Base year	16.9	24.1	23.9	26.5	8.6	91.4	100.0
	2015	17.1	22.2	25.1	28.0	7.6	92.4	100.0
	2030	16.8	21.1	25.3	29.9	6.9	93.1	100.0
Central	Base year	8.3	41.0	25.3	17.8	7.6	92.4	100.0
	2015	8.6	39.7	26.4	18.1	7.1	92.9	100.0
	2030	8.6	38.7	26.3	20.3	6.2	93.8	100.0
Eastern	Base year	15.9	29.0	15.2	31.2	8.7	91.3	100.0
	2015	15.8	29.3	16.4	30.9	7.6	92.4	100.0
	2030	15.8	28.3	17.0	31.9	7.0	93.0	100.0
Gulf of Guinea	Base year	17.4	34.8	27.4	10.1	10.3	89.7	100.0
	2015	18.0	28.6	31.0	13.2	9.3	90.7	100.0
	2030	17.6	25.3	32.5	16.4	8.2	91.8	100.0
Indian Ocean Islands	Base year	23.7	14.6	22.4	35.0	4.3	95.7	100.0
	2015	22.6	14.8	22.4	36.3	3.9	96.1	100.0
	2030	23.1	14.3	21.4	37.6	3.6	96.4	100.0
Republic of South Africa	Base year	19.7	3.0	31.9	44.0	1.4	98.6	100.0
	2015	21.0	2.8	31.5	43.4	1.3	98.7	100.0
	2030	20.5	2.5	30.8	44.9	1.3	98.7	100.0
Southern	Base year	18.6	19.4	20.2	25.6	16.2	83.8	100.0
	2015	20.7	18.9	21.6	26.1	12.7	87.3	100.0
	2030	20.5	17.3	22.7	27.8	11.8	88.2	100.0
Sudano-Sahelian	Base year	17.4	5.1	23.5	46.5	7.6	92.4	100.0
	2015	17.7	4.9	22.7	48.1	6.7	93.3	100.0
	2030	17.6	5.0	22.1	49.5	5.8	94.2	100.0

* Staple root crops, plantains and pulses.
** Nominal values based on 1989–91 produce prices which do not reflect actual farmgate or commodity prices

the Central African Republic, account for 27 percent of the total sub-Saharan Africa population. In 1997/99, in sub-Saharan Africa as a whole, the estimated farmgate value of staple root crops, plantains and pulses exceeded that of cereals, with the total value of these non-cereal staples accounting for 24 percent of the total value of agricultural output against 17 percent for cereals.

Annex 3 presents more detailed information on commodity shares. In terms of kcal/capita/day cassava, in the base year, was the most important staple food crop, with production accounting for 8.6 percent of the total of sub-Saharan Africa agricultural output, 9.5 percent of the value of all food output (including livestock products) and 13.3 percent of the value of all food crop output.

The FAO 2015/30 analysis suggests that this dominance of non-cereal staples in sub-Saharan Africa will continue, but for their contribution to the total value of sub-Saharan Africa agricultural output to have nonetheless declined to 21 percent by 2030. The contribution of cereals is projected to remain at 17 percent. There are exceptions to the dominance of non-cereal staple food crops, as in Ethiopia and South Africa, where cereals account for all but a small proportion of staple food crop output. Vegetable oils produced from seeds and nuts were also of major importance in sub-Saharan Africa in 1997/99, accounting for 9.1 percent of the value of food output and 8.3 percent of the total value of agricultural output.

A further key fact highlighted by FAO 2015/30 data is the importance of livestock in each sub-Saharan Africa region other than the Gulf of Guinea. Although the sub-Saharan Africa output of livestock products is relatively less important than in both non-sub-Saharan Africa developing countries and the world as a whole, it contributes more to the value of agricultural output than cereals in every sub-Saharan Africa region except for than the Gulf of Guinea. The importance of livestock is projected to increase further in the periods to 2015 and 2030, except in Eastern Africa and the Republic of South Africa. Within livestock products, beef and milk were the main commodities, together accounting for some 64 percent of the total value of livestock output.

Table 9 presents an analysis for 1997/99, 2015 and 2030 of the importance of feed production in sub-Saharan Africa relative to all developing countries and the world. For each of these three groups, Table 10 also contains estimates and projections of the importance in total crop production of feedgrain, other feed crops and all feed crops. As Table 9 shows, in 1997/99, about 1 percent of all crops (by value) was used worldwide as animal feed. The majority of this was grain. Some 40 percent of the total consumption of feed crops took place in developing countries, where 8 percent of all crops was used as feed. Feed use in sub-Saharan Africa was much lower, accounting for only 3.5 percent of the value of all crop output. This reflects a greater reliance on grazing and also the lower ratio of livestock to crop output. Compared with other developing countries and the world as a whole, relatively more non-grain feed is used in sub-Saharan Africa, but grain is still the main source of feed.

TABLE 9
Analysis of crop use for feed in Sub-Saharan Africa, developing countries and the world

	SSA	Developing	World
Base year (1997/99)		**(world = 100)**	
Feedgrain	1.2	35.0	100.0
Other feed	3.1	54.6	100.0
Total crop-based feed	1.8	38.8	100.0
Feedgrain as % of all crops	1.9	5.4	10.4
Other feed crops as % of all crops	1.6	2.7	3.3
All feed crops as % of all crops	3.5	8.1	13.7
2015		**(world = 100)**	
Feedgrain	1.5	45.0	100.00
Other feed	3.9	62.8	100.00
Total crop-based feed	2.2	48.2	100.00
Feedgrain as % of all crops	2.3	7.2	11.3
Other feed crops as % of all crops	1.7	3.0	3.4
All feed crops as % of all crops	4.0	10.2	14.7
2030		**(world = 100)**	
Feedgrain	2.0	51.5	100.00
Other feed	5.4	67.8	100.00
Total crop-based feed	3.0	54.4	100.00
Feedgrain as % of all crops	2.7	8.4	11.9
Other feed crops as % of all crops	2.1	3.2	3.4
All feed crops as % of all crops	4.7	11.7	15.3

Notes:
1. The data in the table exclude animal products recycled as feed.
2. Some feed is a by-product of processing and this component of feed tends to be greater for non-cereal based feed.

It is projected that the use of crop-based feed in sub-Saharan Africa will expand almost threefold between 1997/99 and 2030, raising the proportion of all crops used in feed from 3.5 to 4.7 percent. This is a much higher rate of increase in feed use than projected for developing countries and the world as a whole. However, the projected sub-Saharan Africa increase is from a small base. Worldwide, projected feed use will increase in tonnage by twenty times the increase in sub-Saharan Africa. Thus, as with increases in crop production, the increased use of feed in sub-Saharan Africa will have only a minor impact on world markets, but a greater impact on markets within individual sub-Saharan Africa countries.

Projected self-sufficiency ratios and trade

Annex 5 presents the 1997/99, 2015 and 2030 nominal value data for commodity groups as contained in the FAO 2015/30 SUAs, reworked into a set of tables that refer to each of the six sub-Saharan Africa regions plus South Africa. A final column in each table shows the extent to which the region is self-sufficient in each commodity group in the base period. These SSRs, reworked into ratios for the modified set of

commodity groups, are shown in Table 11 on the basis of the traded nominal values of the respective commodity groups.

Table 10 shows that sub-Saharan Africa cereal production is projected to be about 20 percent less than demand in 1997/99, 2015 and 2030. The lowest SSR in 1997/99 was for wheat (Annex 5), for which only about one-third of that utilized was produced within sub-Saharan Africa. About one-third of all rice consumed was imported, together with small amounts of maize, sorghum and other cereals. The FAO 2015/30 projections indicate that the percentage of consumption met by imports will increase marginally for wheat and rice.

At the regional level, the greatest cereal shortfalls will remain in Central Africa, where the cereal SSR may fall from 0.63 in the base period to a projected 0.59 in 2015 and 0.52 in 2030. For all foodstuffs, including sugar and horticultural and livestock products, the SSR for sub-Saharan Africa will fall slightly from 0.93 in the base year

TABLE 10
Self-sufficiency ratios* analysed by commodity group and region: baseline, 2015, 2030

	Cereals	Non-cereal staple food crops*	Other food crops	Beverages and industrial crops	Livestock and dairy	All food commodities	All agricultural commodities
World							
1997-1999	1.01	0.99	1.04	0.92	1.01	1.02	1.02
2015	1.00	1.00	1.01	0.99	1.00	1.01	1.01
2030	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Developing							
1997–1999	0.92	1.02	1.07	3.06	0.97	0.96	0.97
2015	0.89	1.02	1.03	2.99	0.96	0.94	0.94
2030	0.87	1.01	0.97	2.70	0.96	0.93	0.93
Sub-Saharan Africa							
1997–1999	0.83	1.00	0.93	6.55	0.93	0.90	0.91
2015	0.83	1.00	0.91	7.90	0.93	0.89	0.90
2030	0.82	1.00	0.89	8.01	0.93	0.88	0.89
Central							
1997–1999	0.67	1.00	0.87	5.72	0.78	0.87	0.88
2015	0.64	1.00	0.86	5.93	0.78	0.86	0.86
2030	0.58	1.00	0.80	5.07	0.76	0.81	0.81
Eastern							
1997–1999	0.86	1.00	0.79	1.15	0.99	0.89	0.89
2015	0.87	1.00	0.79	0.72	0.99	0.89	0.89
2030	0.86	1.00	0.80	0.73	0.99	0.89	0.89
Gulf of Guinea							
1997-1999	0.86	1.00	0.93	7.15	0.71	0.92	0.95
2015	0.83	1.00	0.92	9.12	0.76	0.90	0.93
2030	0.82	1.00	0.91	9.48	0.79	0.89	0.91
Indian Ocean Islands							
1997–1999	0.76	0.99	1.09	1.73	0.87	0.89	0.89
2015	0.75	1.00	0.92	1.76	0.89	0.84	0.85
2030	0.76	1.00	0.81	1.82	0.90	0.83	0.83
RSA							
1997–1999	0.88	0.95	1.09		0.95	0.94	0.94
2015	0.96	0.94	1.25		0.94	1.02	1.02
2030	0.97	0.92	1.40		0.95	1.06	1.06
Southern							
1997–1999	0.75	1.00	1.08		1.01	0.87	0.87
2015	0.81	1.00	1.02		1.00	0.89	0.89
2030	0.82	1.00	1.00		0.99	0.89	0.89
Sudano-Sahelian							
1997–1999	0.79	0.91	0.90		0.99	0.84	0.84
2015	0.80	0.97	0.85		0.99	0.84	0.84
2030	0.80	0.97	0.81		0.99	0.83	0.83

* On the basis of nominal values for 1989–91 producer prices.
** Staple root crops, plantains and pulses.

to a projected 0.92 in 2015 and 0.91 in 2030. For non-food crops, SSRs in sub-Saharan Africa and projected to fall sharply from 3.12 in the base year to 2.20 in 2030.

Table 11 shows there will also be growing shortfalls of other food commodities in all the sub-Saharan Africa regions, but the size and rate of increase in the magnitude of these calorie shortfalls will be much less than for cereals. The main contributor to net sub-Saharan Africa deficits will be rice and wheat. In 2030, it is projected that sub-Saharan Africa will import 11.3 million tonnes of rice and 20.4 million tonnes of wheat. As rice trades at higher prices than wheat, the cost to sub-Saharan Africa of importing its net rice needs will exceed that of wheat. For staple food crops other than cereals, their low value-to-weight ratios and greater perishability are likely to result in

TABLE 11
Value of net agricultural trade Baseline, 2015 and 2030

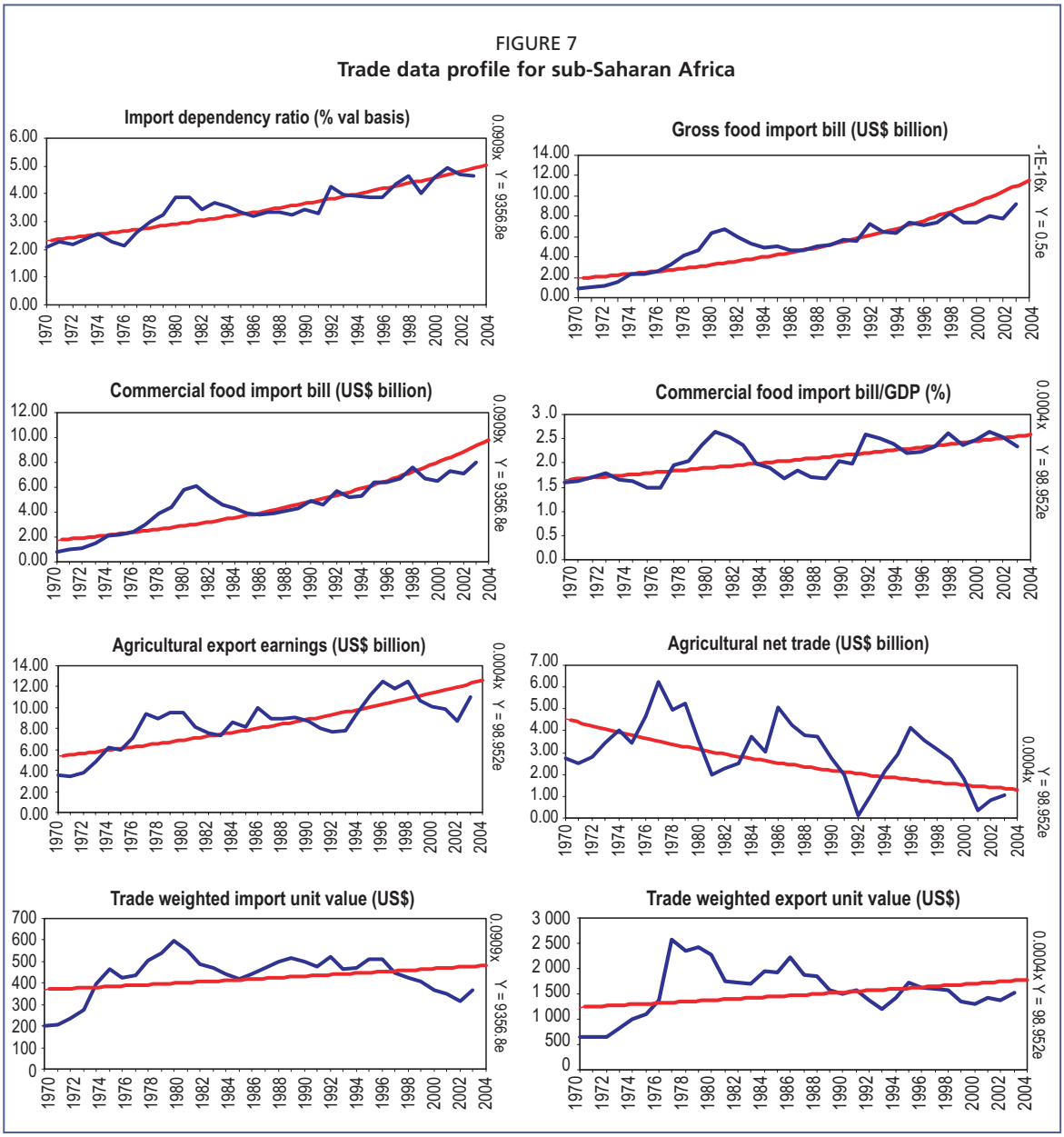
	Tonnes ('000)			kcal/cap/day		
	1997-1999	**2015**	**2030**	**1997-1999**	**2015**	**2030**
Wheat	-8 241	-13 394	-21 135	-106.38	-114.92	-132.10
Rice	-6 575	-11 443	-18 015	-70.39	-81.41	-93.37
Maize	-2 772	-3 262	-5 589	-38.79	-30.34	-37.87
Barley	-609	-988	-1 455	-6.94	-7.48	-8.03
Millet	-35	-57	-65	-0.43	-0.48	-0.40
Sorghum	-644	-191	-329	-8.24	-1.63	-2.04
Other	-184	-295	-386	-2.66	-2.84	-2.70
Subtotal	**-19 059**	**-29 630**	**-46 973**	**-233.84**	**-239.10**	**-276.50**
Potato	-114	-158	-258	-0.36	-0.33	-0.40
Sw. Potato	-21	1	1	-0.09	0.00	0.00
Cassava	-112	-12	-30	-0.48	-0.03	-0.06
Other Root	-141	-95	-128	-0.72	-0.33	-0.32
Plantain	0	-8	-81	0.00	-0.02	-0.14
Subtotal	**-388**	**-272**	**-495**	**-1.66**	**-0.71**	**-0.91**
Sugar	49	-1 347	-3 235	0.79	-14.45	-25.29
Pulses	-157	-219	-327	-2.35	-2.18	-2.38
Vegetables	-308	-203	-249	-0.38	-0.17	-0.15
Bananas	364	494	592	0.85	0.77	0.67
Citrus	778	952	1 148	0.85	0.69	0.61
Fruit	1 033	1 351	1 393	1.97	1.72	1.29
Vegetable Oils	-1 104	-1 654	-2 967	-47.03	-46.84	-61.22
Subtotal	**655**	**-626**	**-3 645**	**-45.30**	**-60.47**	-86.47
Cocoa	1 677	2 249	2 695	28.47	25.37	22.15
Coffee	962	1 082	1 234			
Teas	320	421	568			
Tobacco	331	207	182			
Cotton	792	1 009	1 204			
Fibres	6	-8	-22			
Rubber	269	576	974			
Subtotal	**4 356**	**5 535**	6 836	28.47	25.37	22.15
Beef	-14	-105	-209	-0.12	-0.60	-0.88
Mutton	10	23	30	0.08	0.12	0.11
Pigmeat	-52	-81	-118	-0.82	-0.85	-0.90
Poultry	-212	-360	-687	-1.19	-1.34	-1.87
Milk	-2 288	-3 505	-5 126	-6.99	-7.11	-7.58
Eggs	-7	-6	-19	-0.04	-0.02	-0.05
Subtotal	**-2 563**	**-4 033**	**-6 129**	**-9.08**	**-9.81**	**-11.17**
Total Trade Deficit	-16 999	-29 026	-50 407	-261.41	-284.71	-352.90
Total Net Exports	6 590	8 365	10 021	33.01	28.67	24.83
Total Net Imports	-23 589	-37 390	-60 428	-294.42	-313.39	-377.73
Total Production				2 567.39	2 615.92	2 729.46
Total Demand				2 828.80	2 900.64	3 082.36
Total Deficit (%)				**9.2**	**9.8**	**11.4**

a continuation of the present situation where markets clear nationally and there is only limited intercountry trade.

Vegetable oils will also be a major contributor to the increasing agricultural trade deficit for sub-Saharan Africa, with the oil equivalent of net imports (all oils and oilseeds combined) projected to increase by 170 percent between the 1997/99 base year and 2030. Sub-Saharan Africa will also be a major importer of livestock products, especially milk and poultry.

The main agricultural export commodities of sub-Saharan Africa will continue to be cocoa, cotton, coffee and tea, in that order. Of these, cocoa exports are projected to increase the most rapidly, expanding by over 60 percent between 1997/99 and 2030. In terms of nominal value, total food exports of sub-Saharan Africa countries are projected to increase by almost 50 percent over this full projection period, compared with a near tripling of food imports.

FIGURE 7
Trade data profile for sub-Saharan Africa



* additional production of the commodity to meet the calorific shortfall for that commodity.
** Additional production of the commodity required to make good the total calorie shortfall.

Although the expansion of the agricultural trade deficit of sub-Saharan Africa will be large in nominal value terms, the total agricultural imports of sub-Saharan Africa in 2030 will be only a projected 27 percent of the total agricultural imports of developing countries as a whole. Given that the population of sub-Saharan Africa in 2030 is projected to be 1 300 million compared with a figure of 6 900 million for all developing countries, the projected deficit per head will be marginally smaller in sub-Saharan Africa than elsewhere in the developing world. However, agricultural trade deficits are likely to be a much greater problem for most sub-Saharan Africa countries, given that their manufacturing and service sectors tend to be less well developed than in developing nations in other continents.

These findings are echoed in actual trade data. The Trade and Food Security Database compiled by FAO presents a profile for sub-Saharan Africa, which is presented in Figure 7. These data confirm an acceleration of commercial food imports for sub-Saharan Africa as a whole region and a decline of agricultural net trade.

Calories

Table 12 contains estimates and projections of calorie surpluses and nutritional/ commodity deficits in sub-Saharan Africa. For each commodity, the baseline and

TABLE 12

Sub-Saharan Africa calorie shortfalls and the additional production needed to eliminate the apparent shortfall, baseline 2015 and 2030

		1997/99			2015			2030		
		Shortfall			Shortfall			Shortfall		
	Calories per kg	Nutritional Deficit (cal's*10^9)	Commodity Deficit* (m. tonnes)	Group Deficit** (m. tonnes)	Nutritional Deficit (cal's*10^9)	Commodity Deficit* (m. tonnes)	Group Deficit** (m. tonnes)	Nutritional Deficit (cal's*10^9)	Commodity Deficit* (m. tonnes)	Group Deficit** (m. tonnes)
Wheat	2 904	23 931	8.24	20.25	38 896	13.39	33.18	61 375	21.13	56.46
Rice	2 408	15 834	6.58	24.42	27 555	11.44	40.02	43 379	18.01	68.09
Maize	3 148	8 725	2.77	18.68	10 268	3.26	30.61	17 595	5.59	52.08
Barley	2 563	1 562	0.61	22.94	2 532	0.99	37.60	3 729	1.45	63.97
Millet	2 831	98	0.03	20.77	161	0.06	34.04	185	0.07	57.92
Sorghum	2 880	1 854	0.64	20.42	551	0.19	33.46	947	0.33	56.93
Other cereals	3 253	598	0.18	18.08	961	0.30	29.62	1 255	0.39	50.40
Potato	716	82	0.11	82.13	113	0.16	134.59	185	0.26	229.00
Sw. Potato	991	21	0.02	59.34	-1	0.00	97.24	-1	0.00	165.45
Cassava	968	108	0.11	60.75	12	0.01	99.55	29	0.03	169.38
Other Root	1 156	162	0.14	50.87	110	0.10	83.36	147	0.13	141.83
Plantain	800	0	0.00	73.51	7	0.01	120.45	64	0.08	204.95
Sugar	3 632	-177	-0.05	16.19	4 892	1.35	26.53	11 748	3.23	45.14
Pulses	3 375	528	0.16	17.42	739	0.22	28.55	1 105	0.33	48.58
Vegetables	279	86	0.31	210.77	57	0.20	345.39	69	0.25	587.67
Bananas	525	-191	-0.36	112.01	-259	-0.49	183.55	-311	-0.59	312.31
Citrus	246	-191	-0.78	239.04	-234	-0.95	391.72	-282	-1.15	666.51
Fruit	430	-444	-1.03	136.75	-581	-1.35	224.10	-599	-1.39	381.30
Veg/Oils	9 586	10 580	1.10	6.13	15 854	1.65	10.05	28 445	2.97	17.10
Cocoa	3 819	-6 403	-1.68	15.40	-8 588	-2.25	25.23	-10 291	-2.69	42.93
Beef	1 954	27	0.01	30.09	205	0.10	49.32	408	0.21	83.91
Mutton	1 747	-18	-0.01	33.66	-41	-0.02	55.16	-53	-0.03	93.85
Pig meat	3 544	185	0.05	16.59	287	0.08	27.19	420	0.12	46.26
Poultry	1 262	267	0.21	46.60	454	0.36	76.36	867	0.69	129.92
Milk	687	1 572	2.29	85.60	2408	3.50	140.27	3521	5.13	238.66
Eggs	1 289	10	0.01	45.62	7	0.01	74.76	24	0.02	127.20
Total		58 804			96 363			163 961		

* additional production of the commodity to meet the calorific shortfall for that commodity.

** Additional production of the commodity required to meet the total calorie shortfall for the whole of the commodity group (thereby indicating prospects for trade).

projected production is subtracted from overall demand including human consumption, use for animal feed and seed, industrial usage, and losses. The largely positive data shown in Table 12 are in effect the calorie content of the imports of that commodity that would be necessary to allow demand to be met fully. Of all the commodities produced in sub-Saharan Africa, the only one that generates a large calorie surplus is cocoa.

The calorie deficit in sub-Saharan Africa comprised 9.2 percent of the estimated total demand for calories in 1997/99 and is projected to comprise 11.4 percent of such demand in 2030. In terms of kcal/cap/day, the sub-Saharan Africa net annual deficit will increase by more than 40 percent between 1997/99 and 2030. The projected deficit that would need to be made good through imports would need to be even larger than this in order to offset the 25 kcal/cap/day that sub-Saharan Africa is projected to export in 2030, principally in the form of cocoa and cocoa products.

Table 13 gives an indication for each commodity of the magnitude of the sub-Saharan Africa calorie deficits that are projected for 2015 and 2030. This is achieved by converting calorie deficits into the amount of the commodity that would need to be produced in order to make good the deficit. The magnitude of aggregate calorie deficits for sub-Saharan Africa is proportionally larger than the deficits specified in value terms because none of its major exports other than cocoa, contains usable calories.

TABLE 13
Absolute and relative size of projected calorie deficits in Sub-Saharan Africa, by commodity, 2015 and 2030

Baseline		2015				2030			
	Estimated production	Projected production	Projected deficit	(C) as a	(C) as a	Projected production	Projected deficit	(G) as a	(G) as a
	(m. tonnes)	(m. tonnes)	(m. tonnes)	% of (A)	% of (B)	(m. tonnes)	(m. tonnes)	% of (A)	% of (F)
	A	B	C	D	E	F	G	H	I
Wheat	4.50	6.92	13.39	-297.64	-193.55	9.69	21.13	-469.66	-218.11
Rice	11.67	18.99	11.44	-98.05	-60.26	28.29	18.01	-154.37	-63.68
Maize	34.61	55.93	3.26	-9.42	-5.83	80.95	5.59	-16.15	-6.90
Barley	1.24	1.89	0.99	-79.66	-52.26	2.64	1.45	-117.33	-55.11
Millet	13.13	20.35	0.06	-0.43	-0.28	29.31	0.07	-0.50	-0.22
Sorghum	18.54	28.39	0.19	-1.03	-0.67	39.27	0.33	-1.77	-0.84
Other cereals	2.16	3.27	0.30	-13.68	-9.03	4.95	0.39	-17.86	-7.79
Potato	5.36	8.75	0.16	-2.94	-1.80	12.67	0.26	-4.82	-2.04
Sw. Potato	43.15	48.75	0.00	0.00	0.00	64.98	0.00	0.00	0.00
Cassava	90.11	133.24	0.01	-0.01	-0.01	183.64	0.03	-0.03	-0.02
Other Root	10.56	13.61	0.10	-0.90	-0.70	17.12	0.13	-1.21	-0.74
Plantains	22.47	34.05	0.01	-0.04	-0.02	47.31	0.08	-0.36	-0.17
Sugar	7.62	10.83	1.35	-17.68	-12.44	15.03	3.23	-42.45	-21.52
Pulses	6.99	11.61	0.22	-3.13	-1.89	17.34	0.33	-4.68	-1.89
Vegetables	20.42	32.52	0.20	-0.99	-0.62	47.31	0.25	-1.22	-0.53
Bananas	6.26	10.48	-0.49	7.89	4.71	14.75	-0.59	9.46	4.01
Citrus	6.10	9.91	-0.95	15.60	9.61	14.09	-1.15	18.82	8.15
Fruits	12.82	19.29	-1.35	10.54	7.00	26.7	-1.39	10.86	5.22
Veg. Oils	6.36	10.93	1.65	-26.00	-15.13	16.79	2.97	-46.66	-17.67
Cocoa	1.98	2.57	-2.25	113.58	87.50	3.08	-2.69	136.09	87.49
Beef	3.10	4.89	0.10	-3.38	-2.14	7.35	0.21	-6.74	-2.84
Mutton	1.43	2.33	-0.02	1.62	1.00	3.55	-0.03	2.13	0.86
Pigmeat	0.58	0.98	0.08	-13.95	-8.26	1.64	0.12	-20.41	-7.22
Poultry	1.39	2.65	0.36	-25.91	-13.59	5.17	0.69	-49.42	-13.29
Milk	18.58	29.36	3.50	-18.86	-11.94	42.94	5.13	-27.59	-11.94
Eggs	1.26	2.33	0.01	-0.44	-0.24	3.95	0.02	-1.49	-0.48

Table 13 shows that the projected 2030 deficit in wheat production would be some 4.7 times the size of mean annual sub-Saharan Africa production in 1997/99 and more than three times the amount produced in 2015. The 2030 rice deficit is projected to be just over 1.5 times the size of 1997/99 production. On the other hand, the 2030 maize deficit, although substantial in absolute terms, is only some 16 percent of 1997/99 production and only 6.9 percent of projected 2030 production. The shortfall in vegetable oil, the other commodity that is projected to be a major component of the overall sub-Saharan Africa calorie deficit, would be equivalent to an estimated 47 percent of 1997/99 production.

THE CONTRIBUTION OF IRRIGATED AGRICULTURE

SSRs will remain low for most commodity groups in most of sub-Saharan Africa for the foreseeable future. However, despite: (i) the potential production increases that could be secured by means of well-planned and properly managed irrigation; and (ii) the vast undeveloped resources of sub-Saharan Africa, irrigated production comprises only a small percentage of overall production. This is shown in Figures 8, 9 and 10.

Nonetheless, the comparisons presented in these figures are somewhat artificial as they compare irrigated production with an overall production scenario that necessarily includes crops that would not normally be irrigated, and sometimes, as in the case of non-cereal staple foods these are of major importance. However, they do provide an indication of the relative insignificance of the sub-Saharan Africa irrigation sector.

No data are given with respect for the livestock and dairy group. This is because the AT 2015/2030 analysis provide no data with respect to pasture or silage crops, even though it is known: (i) that there is irrigated pasture at various locations in sub-Saharan Africa; (ii) that where farming systems involve agroforestry, fodder is often one of the outputs. Furthermore, residues or by-products from other crops, such as oil-seed cake and maize stover, are also used for animal feed, thereby introducing the risk of double counting in the absence of clarification.

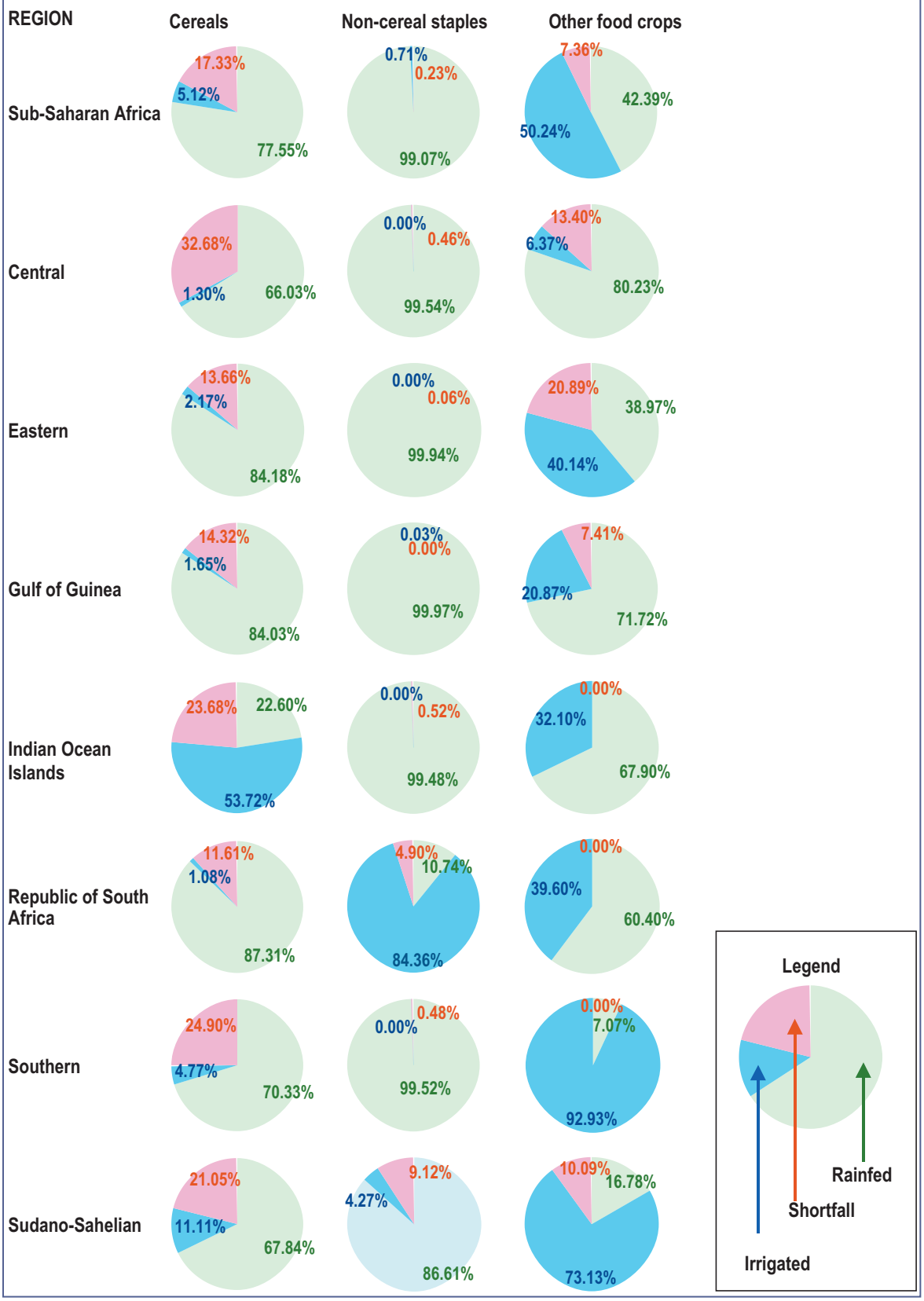
Similarly, the beverages and industrial commodity group is not featured in Figure 8 because: (i) any comparison based on calorific equivalents would be meaningless as only cocoa has any calorific value; and (ii) while tea and coffee are irrigated as estate crops in Kenya and United Republic of Tanzania these are relatively small areas upon which supplementary irrigation is applied. Also, it should be noted that the graphic for South Africa is indicative. These assumptions are that the total irrigated area will increase from 1 498 000 ha (Base Year) to the full potential of 1 500 000 ha by 2015; and that irrigated cropping intensities will increase 1.11 (Base Year) to 1.15 in 2015 and 1.2 by 2030.

The AT 2015/2030 analysis carries projections based on two assumptions: (i) increases in irrigated areas; and (ii) improved yields under irrigation (Figure 9 and 10). Despite the substantial increases in productivity assumed in the projection, unremitting population growth means that, percentage shortfalls in terms of per capita calorie requirements, remain at much the same levels across the board. The figures also indicate that irrigation continues to make only a small contribution to overall production. The only important exceptions are the country, Madagascar, and the commodity, rice. While this small relative contribution of irrigated production is most immediately obvious with respect to cereals, it should be noted that the other food crops group is dominated by sugar. If sugar were removed from the analysis, then irrigation would again represent only a very small proportion of overall productivity.

1997/99

FIGURE 8

Baseline comparison of rainfed production, irrigated production and apparent shortfalls* according to 1997/99 calorific equivalents**



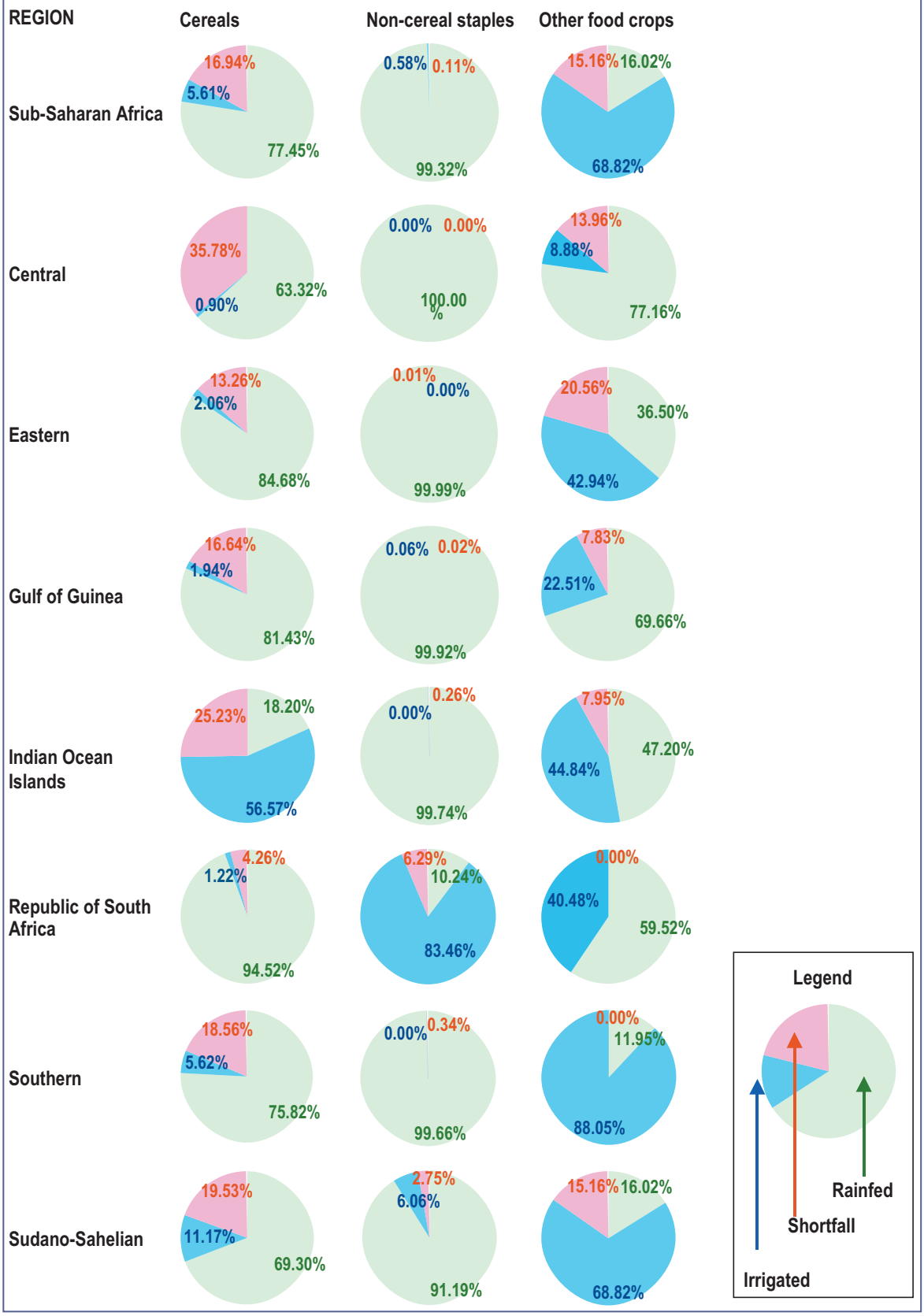
* On the basis of an assumed SSR 57 1, which may not be an appropriate goal (see Chapter 2).

** Calorific equivalents have been used for accounting purposes only to aggregate the contribution from different food crops.

2015

FIGURE 9

Comparison of rainfed production, irrigated production and apparent shortfalls* according to calorific equivalents, 2015**



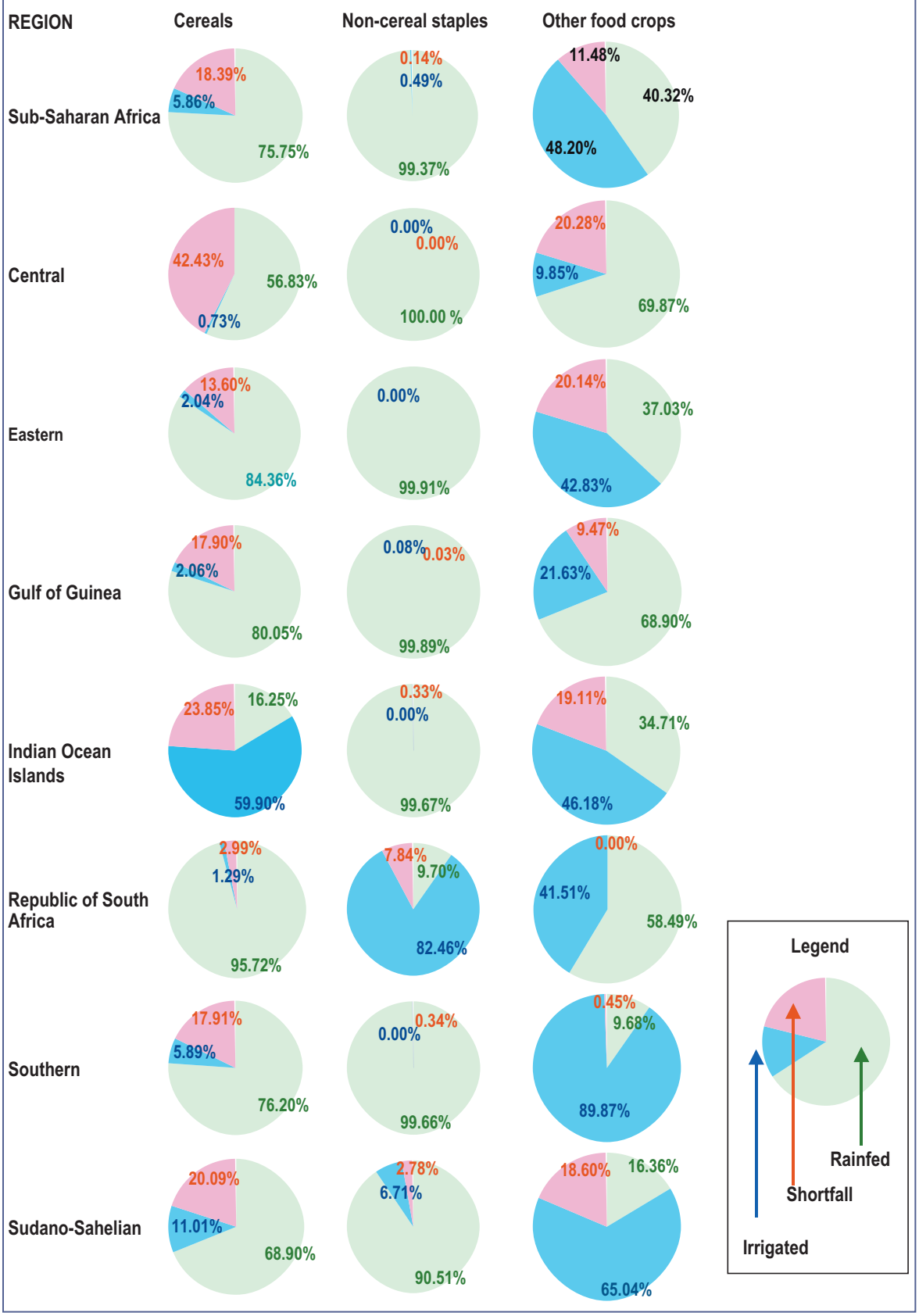
* On the basis of an assumed SSR 57 1, which may not be an appropriate goal (see page 11).

** Calorific equivalents have been used for accounting purposes only to aggregate the contribution from different food crops.

2030

FIGURE 10

Comparison of rainfed production, irrigated production and apparent shortfalls* according to calorific equivalents, 2030**



* On the basis of an assumed SCR 57 1, which may not be an appropriate goal (see page 11).

** Calorific equivalents have been used for accounting purposes only to aggregate the contribution from different food crops.

LAND AND WATER RESOURCE UTILIZATION IN IRRIGATION

The 2005 AQUASTAT update for Africa estimates that of 182 645 012 ha of cultivated land in sub-Saharan Africa, only 7 105 119 ha (or 4 percent) are equipped for some form of irrigation and only another 2 million ha are cultivated as non-equipped wetlands/valley bottoms/flood recession. While there was overall growth in irrigated areas between the 1992 and 2002 baselines established in AQUASTAT in absolute terms, much of this increase in large- and medium-scale irrigation schemes is attributed to just three countries: Morocco, Egypt and South Africa.

Table 14 presents historical growth rates in irrigated areas for all Africa countries. Some of these figures need to be qualified. For the whole continent, the increase in the equipped area is 10 percent, an annual rate of 0.88 percent in the 1992–2000 weighted year index (Table 14). The weighted year index is calculated by allocating to the year for each country a weighting coefficient proportional to its area (equipped for irrigation or under water management), therefore giving more importance to countries with the largest areas under irrigation and water management. On a national scale, the expansion in equipped areas has been concentrated in a few countries, with four countries (South Africa, Morocco, Egypt) accounting for nearly 60 percent of the total increase. Although the increases in equipped areas may not be as important, other countries have also shown considerable rates of increase.

However on a country to country basis the results need some explanation. The rate of annual increase in Ghana, the highest in Africa (30 percent), is distorted by informal irrigation that, although probably already existing, was not included in the data in the previous survey. Moreover, the area under traditional irrigation was underestimated for Ethiopia. The increase in irrigated areas in Mali (20.1 percent) is explained by the reclassification of areas previously indicated as non-equipped, which were this time accounted for as equipped areas because of better knowledge of the field situation. The increase in equipped areas in Zambia (12.9 percent) is accounted for by the equipping of areas that were non-equipped in 1992 during the first survey; indeed, the total area under water management has increased only slightly (5.7 percent). The same holds for Rwanda (11.4 percent), even though its total area under water management fell between 1993 and 2000, and again for Senegal (6.7 percent and 0.7 percent, respectively). The annual rate of increase in areas under water management is 0.73 percent, slightly lower than that of the areas equipped for irrigation (0.88 percent) since much of the previously unequipped area under water management has now been equipped. For Guinea-Bissau, a more detailed inventory (1994–96) enabled a more accurate assessment of the irrigated areas, but it is not possible to speak of a real increase. Finally, the Sudan shows a drop in its areas equipped for irrigation. This is the consequence of some of its equipment being so severely degraded that it has become unusable and even beyond rehabilitation.

Similarly, in terms of water resources, only 2 percent of the renewable water resource is used for irrigation, and even if all the potentially irrigable land were irrigated, it would still consume less than 12 percent of the renewable water resources. However, these overall figures, which were developed from basin-wide analyses, mask local variations. These become more marked as the analysis moves closer to the regional, national and subnational levels, where in a significant number of cases, expensive storage would be required to make use of the renewable resources. An indication of the local variations can be seen in Figure 11, which uses logarithmic scales to compare the percentage of renewable water actually used with the percentage of total agricultural production that is produced under irrigation. Each data point represents a specific country within a region. Figure 11 confirms that water resources so far mobilized for agricultural use are insignificant in respect of the total annually renewable resource, and that irrigated production comprises only a small proportion of overall production in many places.

TABLE 14
Historical growth rates in irrigated areas for all African countries

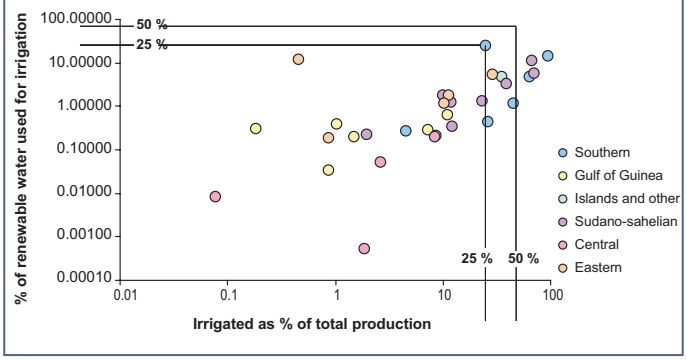
Country	Year	Full/partial control irrigation	Spate irrigation	Equipped lowlands	Total irrigation	% of cultivated area	Part of equipped area actually irrigated	Annual increase rate
Unit		ha	ha	ha	ha	%	%	%
		(1)	(2)	(3)	(4)=(1)+(2)+(3)	(5)	(6)	(7)
Algeria	2001	513 368	56 050	-	569 418	6.9	80	0.3
Angola	1975	80 000	-	-	80 000	2.4	44	-
Benin	2002	10 973	-	1 285	12 258	0.4	23	2.3
Botswana	2002	1 439	-	-	1 439	0.4	-	0.4
Burkina Faso	2001	18 600	-	6 400	25 000	0.6	100	0.3
Burundi	2000	6 960	-	14 470	21 430	1.6	-	2.7
Cameroon	2000	22 450	2 800	404	25 654	0.4	-	1.6
Cape Verde	1997	2 780	-	-	2 780	6.2	66	0.0
Central African Republic	1987	135	-	-	135	0.0	51	-
Chad	2002	30 273	-	-	30 273	0.8	87	5.7
Comoros	1987	130	-	-	130	0.1	65	-
Congo	1993	217	-	1 783	2 000	1	11	-
Côte d'Ivoire	1994	47 750	-	25 000	72 750	1.1	92	-
Democratic Reppublic of the Congo	1995	10 000	-	500	10 500	0.1	70	-
Djibouti	1999	1 012	-	-	1 012	100	38	4.1
Egypt	2002	3 422 178	-	-	3 422 178	100	100	0.6
Equatorial Guinea	-	-	-	-	-	0.0	-	-
Eritrea	1993	4 100	17 490	-	21 590	4.3	62	-
Ethiopia	2001	289 530	-	-	289 530	2.5	-	6.2
Gabon	1987	3 150	-	1 300	4 450	1	-	-
Gambia	1999	2 149	-	-	2 149	1	65	3.2
Ghana	2000	30 900	-	-	30 900	0.5	90	30.1
Guinea	2002	20 386	-	74 528	94 914	6.2	100	0.3
Guinea-Bissau	1996	8 562	-	13 996	22 558	5.1	100	14.8
Kenya	2003	103 203	-	-	103 203	2.0	94	4.1
Lesotho	1999	2 637	-	-	2 637	0.8	3	-
Liberia	1987	100	-	2 000	2 100	0.3	-	-
Libyan Arab Jamahiriya	2000	470 000	-	-	470 000	21.9	67	0.0
Madagascar	2000	1 086 291	-	-	1 086 291	31	100	0.0
Malawi	2002	56 390	-	-	56 390	2.3	96	7.3
Mali	2000	97 499	-	138 292	235 791	5.0	75	20.1
Mauritania	1994	45 012	-	-	45 012	9.4	51	-
Mauritius	2002	21 222	-	-	21 222	20.0	98	2.8
Morocco	2000	1 458 160	26 000	-	1 484 160	16	98	1.1
Mozambique	2001	118 120	-	-	118 120	2.8	34	1.3
Namibia	2002	7 573	-	-	7 573	0.9	100	2.1
Niger	2005	13 663	-	60 000	73 663	1.6	89	0.9
Nigeria	2004	238 117	-	55 000	293 117	0.9	75	1.8
Rwanda	2000	3 500	-	5 000	8 500	0.7	-	11.4
Sao Tome and Principe	1991	9 700	-	-	9 700	23.7	-	-
Senegal	2002	102 180	-	17 500	119 680	4.8	58	6.7
Seychelles	2003	260	-	-	260	3.7	77	-
Sierra Leone	1992	1 000	-	28 360	29 360	5.4	-	-
Somalia	2003	50 000	150 000	-	200 000	18.7	33	0.0
South Africa	2000	1 498 000	-	-	1 498 000	9.5	100	2.8
Sudan	2000	1 730 970	132 030	-	1 863 000	11.2	43	-0.9
Swaziland	2000	49 843	-	-	49 843	26.2	90	-
Togo	1996	2 300	-	5 000	7 300	0.3	86	0.7
Tunisia	2000	367 000	27 000	-	394 000	7.9	100	0.3
Uganda	1998	5 580	-	3 570	9 150	0.1	64	0.0
United Republic of Tanzania	2002	184 330	-	-	184 330	3.6	-	2.3
Zambia	2002	55 387	-	100 525	155 912	2.9	100	12.9
Zimbabwe	1999	173 513	-	-	173 513	5.2	71	6.9
Africa	**-**	**12 478 592**	**411 370**	**554 913**	**13 444 875**	**6.4**	**81**	**0.88**

Source: FAO (2005).

Although potential data anomalies require that Figure 11 be treated with a degree of caution, at the synoptic level its message is that there is a lot of undeveloped irrigation potential in sub-Saharan Africa. This conclusion, when considered alongside the low

SSRs and the limited contribution of irrigation, does seem to suggest, at least as regards the cereals group and to a lesser extent the other food crops group, significant potential for increased irrigation in sub-Saharan Africa provided it is demand driven and justifiable in financial and economic terms.

FIGURE 11
Irrigated production as a percentage of total production compared with water used for irrigation as a percentage of totally annual renewable water resources



On the other hand, given the high SSRs that characterize the non-cereal staple food crops group and which are being achieved with minimal irrigation, a soley irrigation-based strategy to increase production within this group would not seem justified. Similarly, high SSRs, which will continue to be achieved for the beverage and industrial group, are noted for every region except South Africa, and to an extent, the Indian Ocean Islands region. As it is unlikely that either of these regions will to want to achieve self-sufficiency in beverage and industrial crops, opportunities for expanded irrigation would seem limited, particularly as many of the crops involved are never or seldom irrigated. Further, any irrigation that does take place is limited to private-sector or parastatal producers such as tea estates.

This analysis confirms that, from a macroperspective, an increased and invigorated irrigation subsector could play a major role in reducing poverty and increasing food security in sub-Saharan Africa with respect to high-value staples, principally rice . However, any serious planning to this end must be based on a thorough assessment of the performance and achievements of the regional irrigation sector to date. In addition, where problems exist, convincing measures to fix them now and mitigate them in future willneed to be included and should reflect lessons learned while replicating as whatever successes have been achieved.

A useful way to begin assessing performance is to consider the yields currently obtained from irrigation in sub-Saharan Africa.

TYPICAL IRRIGATED YIELDS

Yield gap data for irrigated crops provide a helpful indication of how existing irrigation is performing. Figures 12–18 compare typical yields for regional commodity-groups,

FIGURE 12
Central region yield/production comparisons

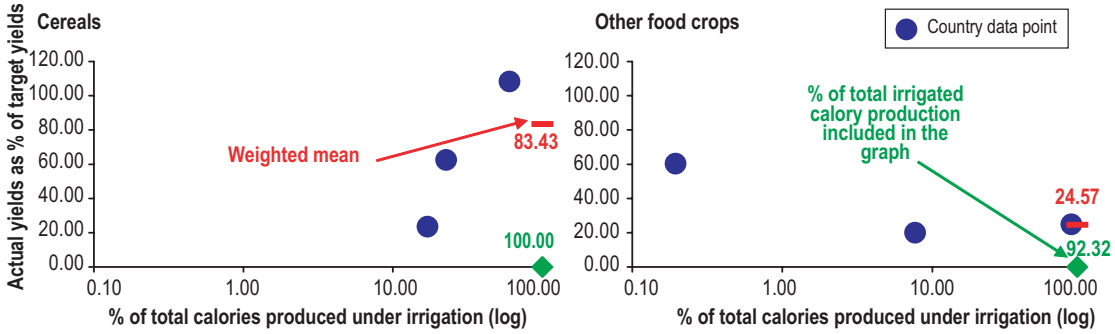


FIGURE 13
Eastern region yield/production comparisons

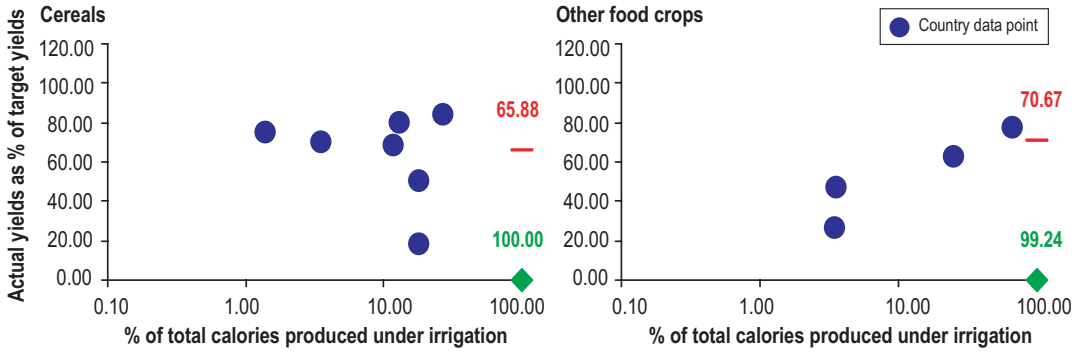


FIGURE 14
Gulf of Guinea region yield/production comparisons

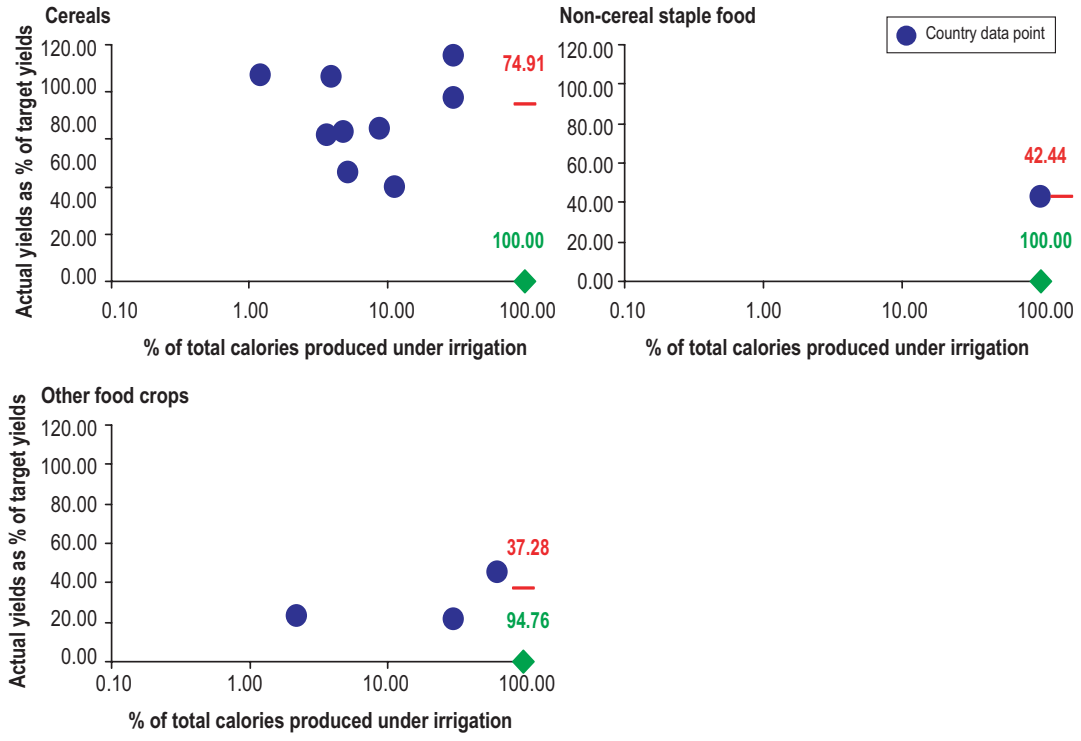


FIGURE 15
Indian Ocean Islands region yield/production comparisons

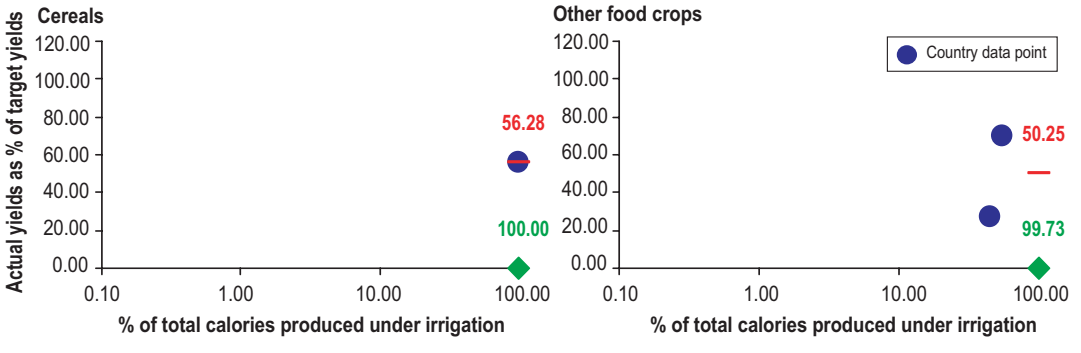


FIGURE 16
Republic of South Africa yield/production comparisons

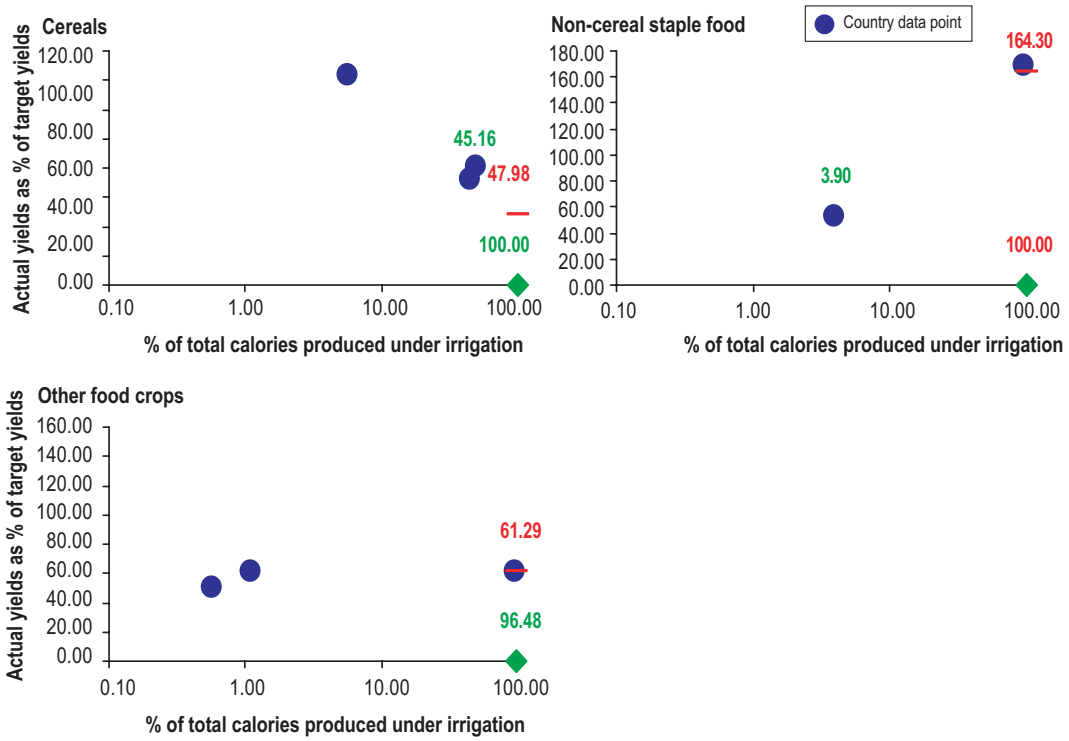
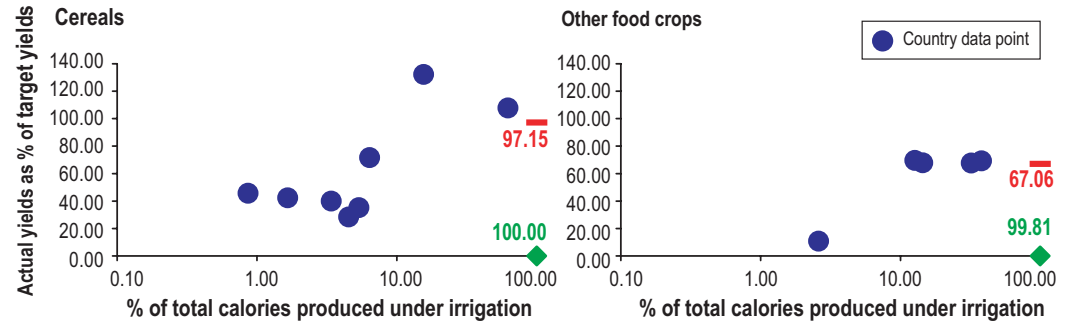


FIGURE 17
Southern region yield/production comparisons



expressed as percentages of target yields. These are plotted against the percentage of irrigated commodity production in terms of calories and plotted on a logarithmic scale. Presenting the data in this way avoids the need to consider each crop individually. In addition, Figure 19 aggregates the same information for sub-Saharan Africa as a whole, for cereals, other food crops and all food crops (no curve is provided for "other food crops" group as so little of it is irrigated). It shows that 50 percent of total calorie production is achieved at or below yields 70 percent of attainable target yields. It also indicates a remarkable degree of consistency between cereals and other food crops up to that level. The industrial and beverage commodity group is not included because of its insignificance in terms of calories. Equally, for all regions except Gulf of Guinea,

Figure 18
Sudano-Sahelian region yield/production comparisons

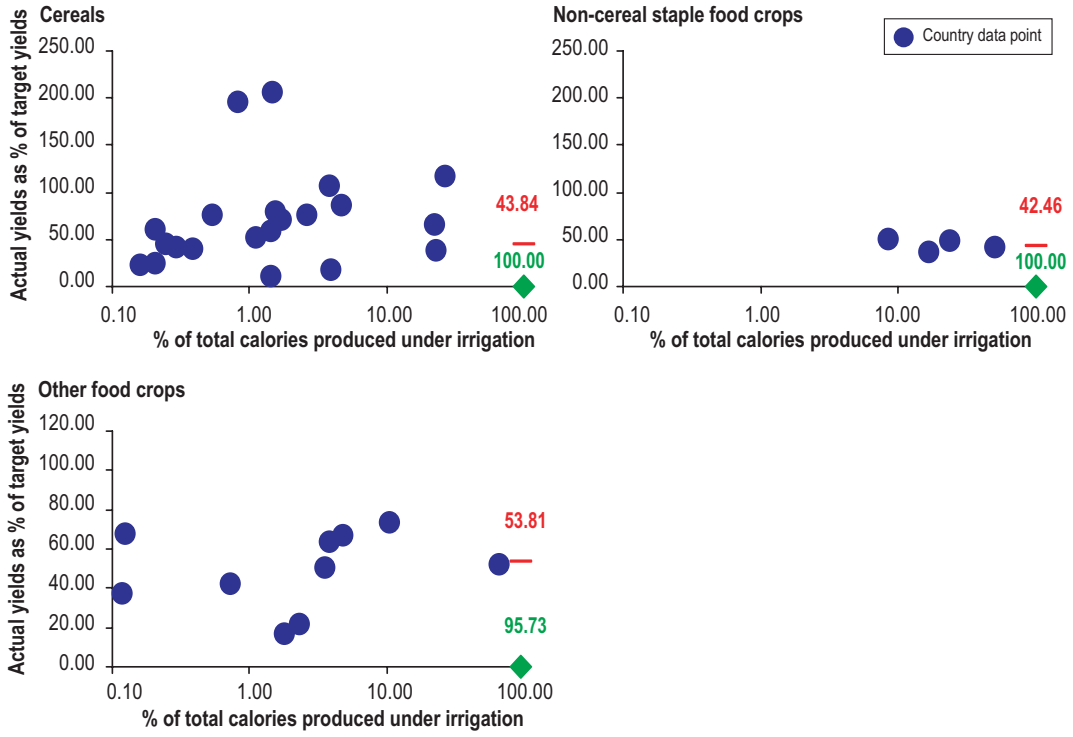
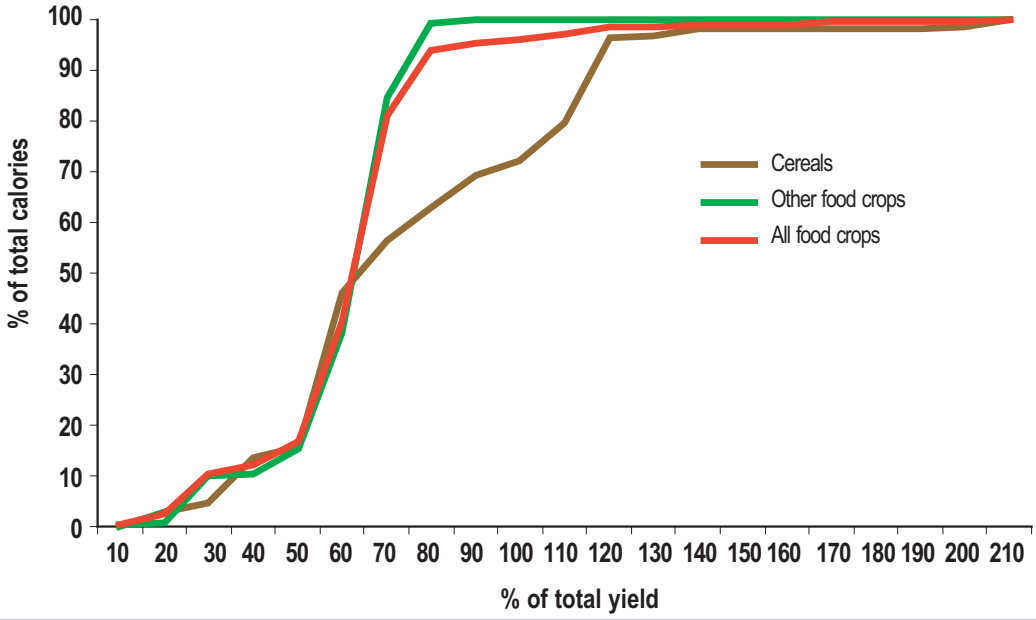


FIGURE 19
Yield levels compared with calorific production for sub-Saharan Africa as a whole



South Africa and Sudano-Sahelian, there is no significant irrigation of non-cereal staples. Table 6 in Chapter 3 presented target yields for selected crops. Target yields are not suggested for the full range of irrigated crops because reliable estimates have not yet been identified for the full range.

Any analysis of this sort is indicative and as such should be treated cautiously in overall terms, more as an heuristic than as presentation of hard data. Even so, at the synoptic level required of this study, the message is both valid and clear. Much of irrigated calorie production in sub-Saharan Africa is achieved inefficiently, the data confirm that irrigation is generally not performing as intended.

SUMMARY

Sub-Saharan Africa continues to face significant supply problems with respect to all commodity groups except beverages and industrial crops. However, the supply challenge is not homogeneous when considered at the regional and national levels. The differences at these levels may be explained by differences not only in natural resource endowments but also in terms of skills, aspirations, the status of any existing national irrigation sectors and agriculture, land-use and trade policies.

All other things being equal, irrigation has an obvious role to play in meeting existing demands. The vast irrigation potential of sub-Saharan Africa remains largely untapped, and where irrigation is already taking place, significant gains can be made in terms of improving the yields and the sophistication of the farming systems, thereby: (i) improving the returns on historic investments; and (ii) demonstrating the viability of the sector to potential IFI and bilateral investors. However, in order to establish the demand for water and any comparative advantage in specific irrigated crops, it is necessary to appreciate the impacts of irrigation on the supply chain in the context of the environmental and cultural diversity of sub-Saharan Africa. Chapter 5 explores these impacts.