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Sudan: Agricultural Problems

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A Research Paper

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NESA 82-10501
September 1982

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Sudan: Agricultural Problems

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A Research Paper

The author of this paper is
Office of Near East–South Asia Analysis. Comments
and queries are welcome and may be directed to
the Chief, Arab-Israeli Division,

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Sudan: Agricultural Problems

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Overview

Information available as of 1 August 1982 was used in this report.

The dismal performance of Sudan's agricultural sector has been a major factor in the pronounced deterioration of that country's economy since 1976 and is one of the most critical problems affecting the stability of President Nimeiri's regime. As agricultural production has dropped in recent years, food imports have increased sharply, causing further hardships for the financially strapped regime.

The reasons for the decline in production are many. Among the most important are:

- Severe foreign exchange shortages that have restricted the purchase of vital materials and supplies for agriculture.
- Mismanagement of Sudan's large agricultural projects.
- Inadequate transportation and communications infrastructure.
- Insufficient labor pool.

The Sudanese Government itself is to blame for many of these problems, and only with sustained effort and better planning will the country eventually be able to exploit fully its promising natural resources and realize its agricultural potential. Government officials have begun to take some corrective measures. They have instituted major changes in the irrigated projects to improve incentives for tenant farmers and increase production. In coordination with the World Bank, Sudan is attempting to formulate policies for agricultural and industrial recovery and is giving particular attention to infrastructure projects such as transport and power supply.

Far-reaching structural improvements still must be made. A primary constraint is the lack of sufficient foreign exchange, yet in a "Catch-22" situation, alleviating the foreign exchange shortage will depend in large part on increasing agricultural production. Therefore, Sudan's agricultural problems seem likely to persist into the next century and will constitute yet another serious challenge for Nimieri's already hard-pressed regime.

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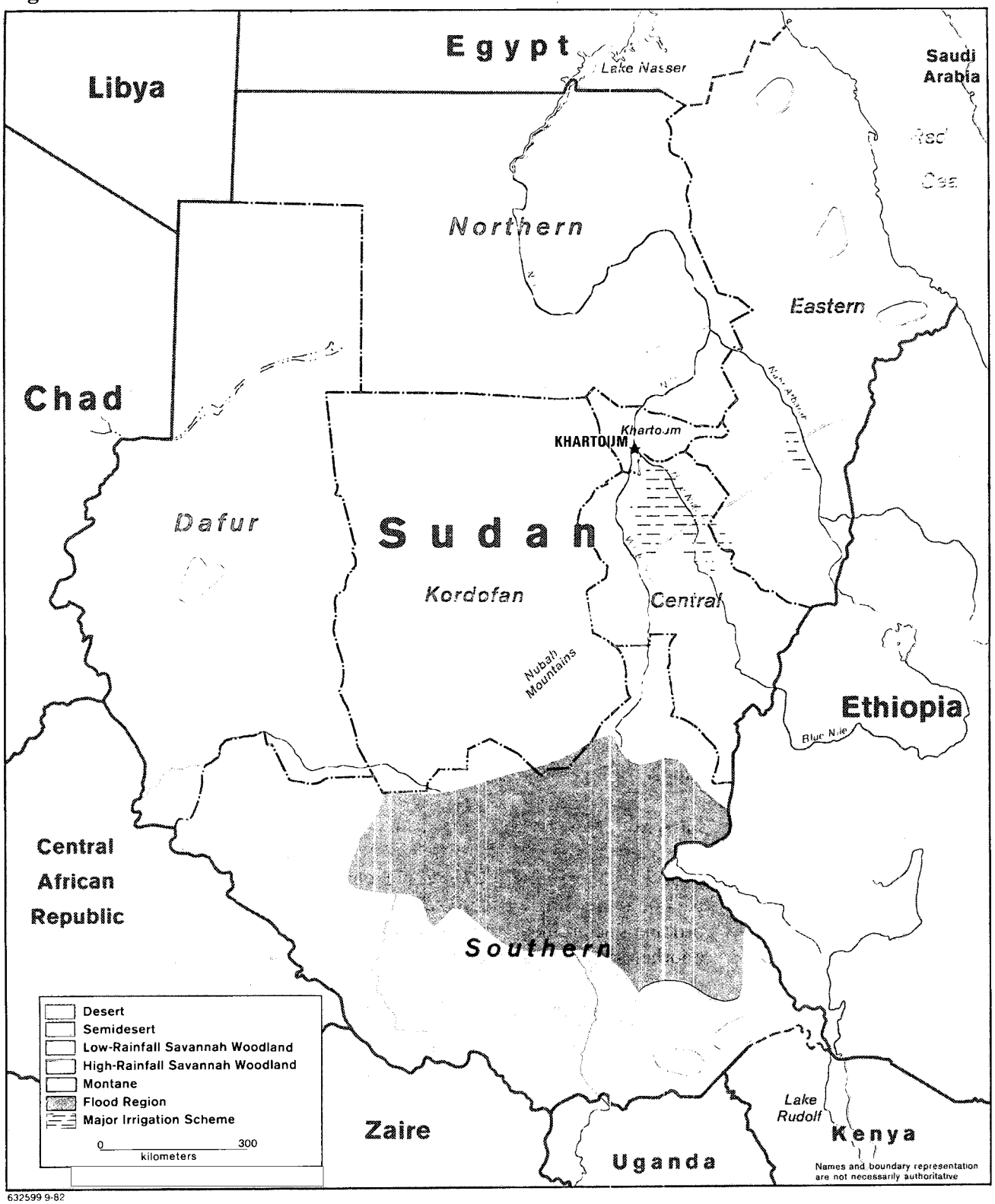
Figure 1



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Sudan: Agricultural Problems

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Agriculture provides a livelihood, directly or indirectly, for 80 percent of Sudan's population of some 20 million and accounts for some 40 percent of the gross domestic product (GDP) and 95 percent of exports.[1] (See figure 2.) GDP fell in the last three years as a result of a serious decline in agricultural production. This has led to serious balance-of-payments problems that further retard economic development (see table 1).

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Sudan's natural resources appear to favor the attainment of agricultural self-sufficiency. Some 80 million hectares out of a total area of approximately 235 million hectares are considered available for cultivation. At present only 8 million are being farmed. Three major rivers traverse Sudan and can be tapped to irrigate additional acreage.

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Sudan's hope of achieving agricultural self-sufficiency has always been just beyond reach. Over the past decade, Sudan actually moved away from this objective. Agricultural production has fallen, and expenditures for food imports have increased sharply; in 1981/82 Sudan's food import bill was twice that in 1977/78. As a result, the foreign trade deficit in 1981 amounted to $1.1 billion compared with $600 million in 1978

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Production of cotton, the major cash and export crop, was down last year almost 20 percent from 1977/78. Mismanagement of irrigated projects along with a myriad of problems ranging from an overvalued exchange rate to pest infestation caused the reduced output. Moreover, a severe shortage of foreign exchange has taken a toll on agricultural investment, maintenance of irrigation systems, and imports of badly needed agricultural supplies and equipment.

Table 1
Sudan: Gross Domestic Product, Employment, and Productivity, by Sector

	1970	1975	1980
Gross domestic production *(million 1978 LS [a])*	**1,911.8**	**2,064.8**	**2,531.7**
Agriculture	846.0	892.5	952.4
Industry	265.3	284.6	342.5
Other	800.5	887.7	1,236.8
Employment *(thousand persons)*	**7,468.0**	**8,337.0**	**9,467.0**
Agriculture	6,124.0	7,086.0	7,384.0
Industry	597.0	834.0	947.0
Other	747.0	417.0	1,136.0
Productivity *(GDP 1978 LS [a] per worker)*	**256.0**	**248.0**	**267.0**
Agriculture	138.0	126.0	129.0
Industry	444.0	341.0	361.0
Other	1,071.0	2,129.0	1,088.0

[a] LS = Sudanese pounds.

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Types of Cultivation

Sudan's agricultural sector is characterized by its duality (see appendix A). Modern capital-intensive irrigation and mechanized activities coexist with traditional rain-fed subsistence farming. About 1.7 million hectares are covered by irrigated schemes, 2.3 million hectares are under large-scale mechanized systems, and over 4 million hectares are farmed by traditional methods. The major irrigated crops are cotton, peanuts, and wheat. The predominant crops in the mechanized rain-fed areas include sorghum, sesame, and cotton. Gum arabic, millet, sesame, and peanuts are grown on the traditional farms (see figure 3).

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Traditional Rainfed Farming

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Traditional rainfed farming is the largest subsector in terms of acreage and farm population, but it provides only one-third of total agricultural output. An estimated 3 million people or almost 15 percent of the

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nation's population live on traditional farms. Traditional farms—characterized by their small size of 3 to 5 hectares and cultivation by hand tools—predominate in the west and are found to a lesser extent in the south, east, and central regions of Sudan.

Traditional farming is the domain of the private sector, but the government influences its development through pricing policy, the level of agricultural services provided, and development projects. Although supply and demand ostensibly determine pricing, the relevant price for most traditional farmers is the government's fixed minimum price.

Farmers generally grow grain for their own consumption and one or two cash crops. This subsector accounts for all the millet grown in the country, 40 percent of the sorghum, 70 percent of the sesame, 66 percent of the peanuts, all of the gum arabic, and 5 percent of the cotton. Overall, production in the traditional sector has stagnated over the past decade despite a slight increase in the area under cultivation.

Modern Agriculture

The mechanized rainfed sector in conjunction with the irrigated sector accounts for 65 percent of agricultural production. Although large-scale mechanized rainfed farming was begun by the government in the mid-1940s, it is now largely practiced by the private sector. The increase in world commodity prices after 1972 provided the major stimulus for the private sector to move into this area. The majority of the mechanized farms are located in Darfur, Kordofan, and the Central Region. At present the mechanized farms are hampered by deteriorating soil fertility and decreasing yields resulting from years of monocropping.

The irrigated projects consist of a number of large consolidated areas owned by the government and managed by public boards that rely on tenant farmers to work small individual plots. The approximately 2 million hectares under irrigation are mainly along the banks of the Nile and its tributaries and are worked by approximately 100,000 farmers. The largest of the projects is the Gezira, which covers about 1 million hectares (see appendix B).

Historically, these projects were conceived for the cultivation of cotton as the only cash crop. Two other crops were grown for subsistence purposes—usually a crop for fodder to complement cotton in the rotation of the land and a cereal crop for marginal land. This changed dramatically in the mid-1970s when the government mandated new cropping patterns that encouraged a switch from cotton to wheat.

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The relationships among the government, the management board, and the tenants on such projects are highly complex. For example, in the Gezira project the management board is responsible for overall coordination, determination of cropping patterns, and provision of seed, fertilizers, and equipment. More importantly, the board handles the marketing of the cotton crop and extends credit to tenant farmers. The government supervises the operation of the board and provides irrigation and power services. The tenants are in charge of field preparation, planting, cultivation, and harvesting. In theory a partnership, the system has in fact become a hierarchical arrangement with the government setting policy, the board managing, and the tenants doing the work.

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Crop Performance

Production of cotton, the primary cash and export crop, has dropped sharply in recent years largely because policy changes have reduced the acreage under cultivation. At the same time, pest, seed, and water problems have resulted in yields declining from 52 kilograms per hectare in the beginning of the 1970s to 25 kilograms per hectare now. Consequently, cotton output over the past three years has been only about half the 1973/74 level. With a slight increase in plantings and an expected modest improvement in yields, this year's (1981/82) crop could be approximately 800,000 bales. Although this is a substantial improvement over last year's production—the worst in 20 years—of 445,000 bales, cotton production remains far below the level common in the early 1970s (see figure 4).

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Oilseeds, mainly peanuts and sesame, are the next most important export crops (see table 2). Since 1978 the area under peanut cultivation has expanded in both the rainfed areas and in the irrigation projects at

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Table 2
Sudan: Major Agricultural Exports [a]

Million US $

	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82 [b]
Total exports	**551**	**594**	**551**	**527**	**582**	**484**	**560**
Of which:							
Cotton	300	286	296	321	333	182	160
Peanuts	115	103	80	26	13	66	50
Sesame	33	62	55	28	41	34	55
Sorghum	5	13	9	9	69	72	105
Gum arabic	31	34	35	40	44	33	45

[a] Fiscal year (July-June).
[b] Projected.

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the expense of cotton cultivation. Large increases in output during the past three seasons in the rainfed areas caused severe bottlenecks in transportation and processing, however, and led western farmers to reduce the area under peanut cultivation. A shortage of labor, especially at harvest time, is another factor limiting increased oilseed production.

Sorghum is a major food crop for Sudan and in recent years has become an increasingly important export commodity as a result of Saudi Arabia's willingness to buy expensive Sudanese sorghum. The 1981/82 crop is estimated at over 3 million tons, a historic high and well above the 2.1 million tons reported for 1980/81. The size of the current crop stems from record high prices paid to producers last season, which led to an extremely large number of plantings, as well as from sufficient rainfall. This level of production means that Sudan will face the unprecedented problem of disposing of a surplus of 700,000 to 1 million tons of sorghum.

Saudi Arabia, Sudan's major purchaser of sorghum, has agreed to buy some 300,000 tons at approximately $370 per ton, a price above international levels. The remainder will probably be put into storage. Sudan has failed to develop new markets because its sorghum is not competitive in world markets at the price demanded by Khartoum. The surplus is causing a downward slide in prices, and, if this trend continues, plantings for next year's crop are likely to be reduced.

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Wheat production has dropped since 1977/78, causing a critical situation for the country's mills and forcing some to close. The low production level was caused by a shortage of fertilizer, which forced a cutback in the planned wheat acreage on irrigated land. The shortage of wheat reached crisis proportions last February, and Khartoum was obliged to request wheat from Egypt. Cairo agreed to divert wheat it had purchased from the United States once it was assured of reimbursement from Sudanese commercial or PL-480 wheat supplies.

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Effect of Government Policies on Production

The government's past and present development strategy has concentrated on the modern sector. Agricultural services, including research activities, extension services, and crop and fire protection have not been available to the traditional sector. Most traditional farmers do not benefit from such government programs because resources are in short supply and

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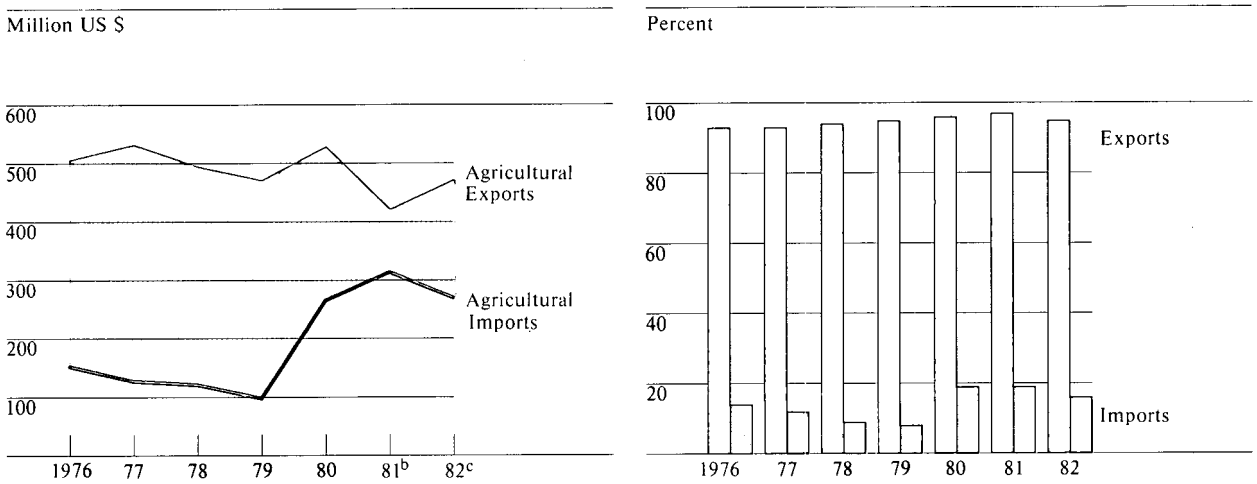
Figure 2
Sudan: Agricultural Trade and Share of Exports and Imports[a]



[a] Crop year ending 31 May.
[b] Preliminary.
[c] Projected.

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transportation problems make it impossible to get to areas of need on a timely basis. Several Sudanese agricultural experts argue that traditional agriculture may be a more cost-effective avenue to economic growth and are advocating that more resources be allocated to that sector. Ninety percent of Sudan's export proceeds, however, are derived from the irrigated projects, and their success is vitally important to the economy. These projects have been poorly managed in the past, and major changes are being made in an effort to combat decreasing yields.

The problems in the irrigated projects began in 1974 when the government, attempting to turn Sudan into the breadbasket of the Arab world to prevent the Arabs from being hurt by a possible Western food boycott, started expanding the acreage devoted to wheat and sorghum. The shift was also a reaction to the sharp rise in world prices for cereals and reflected a desire to reduce the country's dependence on cotton. As a result of the change in government policy, the area of land in the Gezira project planted in cotton fell by about one-fourth between the 1974/75 and 1978/79 cropping seasons.

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The change in the cropping pattern, however, was not accompanied by necessary adjustments in the financial relationship between the management boards and the tenants. The projects, therefore, have been hampered by financial disincentives to tenants and a deteriorating capital and managerial structure. The accounting system established in most projects averaged out costs of production (for example, land preparation, plowing, fertilizing, spraying, and irrigating) and profits in such a manner that tenants with higher-than-average cotton yields bore a disproportionate share of fixed costs and paid a disproportionate share of profits to the government. On the other hand, tenants who cultivated alternative crops paid smaller fixed costs and reaped the entire proceeds of crop sales.

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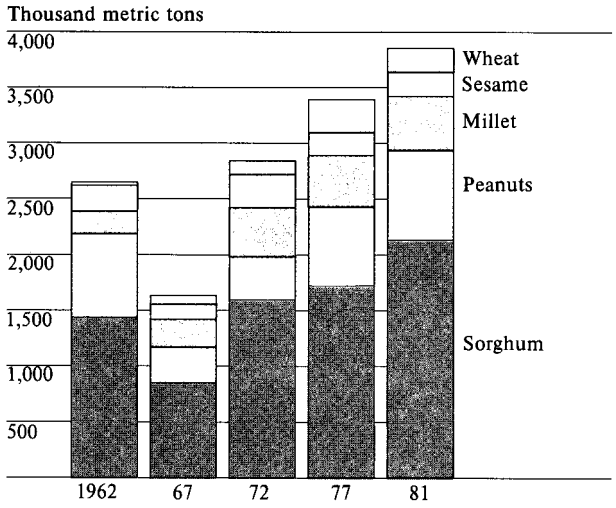
Figure 3
Sudan: Basic Food Production[a]



[a] Crop year ending 31 May.

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The disincentives against cotton cultivation were compounded by the exemption of other crops from any charges for water delivery, administration, and return on capital investment. In addition, until 1981 cotton export proceeds were converted at the official exchange rate of 50 piastres to the dollar, while other export crops benefited from the free market rate of 80 piastres to the dollar.

The decline in cotton acreage diminished the revenue base for the management boards and, together with steadily rising costs, led to operating deficits that were financed by government borrowing. Moreover, because Sudan's international competitive advantage remains with cotton, the shift from cotton production resulted in an inefficient use of resources and reduced the country's economic potential.

The diversification strained the capacity of the water delivery system. A larger amount of water was required from existing systems, necessitating greater control and more careful use of resources. Peanuts and wheat, for example, must be irrigated at the same time as cotton during the period from November to January. The intensive cropping pattern also meant almost virtual year-round use of canals. Silt buildup and weed infestation in some canals have seriously limited water flow, and production has suffered accordingly. Maintenance is insufficient because the foreign exchange shortage limits the government's ability to acquire spare parts. The situation should improve somewhat as pumps and other parts are repaired and replaced using World Bank funding

Beginning in 1978/79, the authorities moved to correct cost/price distortions. The export tax on cotton was lowered, and the exchange rate applicable to cotton export proceeds was adjusted to place cotton on a par with other exports. Land and water charges for crops other than cotton were finally introduced in early 1980 after delays caused by strong tenant opposition. 25X1

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In 1981 the government began transferring receipts for cotton exports from the then official rate (50 piastres to the dollar) to the free market rate (80 piastres to the dollar). This gave farmers an immediate 60-percent rise in income. For the first time farmers were paid immediately for their crops rather than having to wait for earnings to be collected from international cotton sales (previously they sometimes received their shares six months to a year after their cotton had been delivered to the gins). 25X1

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Starting with the 1981/82 agricultural season, the accounting system was adjusted so that each farmer bears his share of the cost of production and reaps full benefit from his effort. The previous profit-sharing system has been replaced by a system of cost recovery from each crop through the imposition of charges for water delivery and land, project administration, and a return on capital investment. The level of these charges, which has been imposed on all crops, is based on the different watering requirements of each crop. The net effect of these measures will be to increase tenant returns from cotton cultivation as well as to

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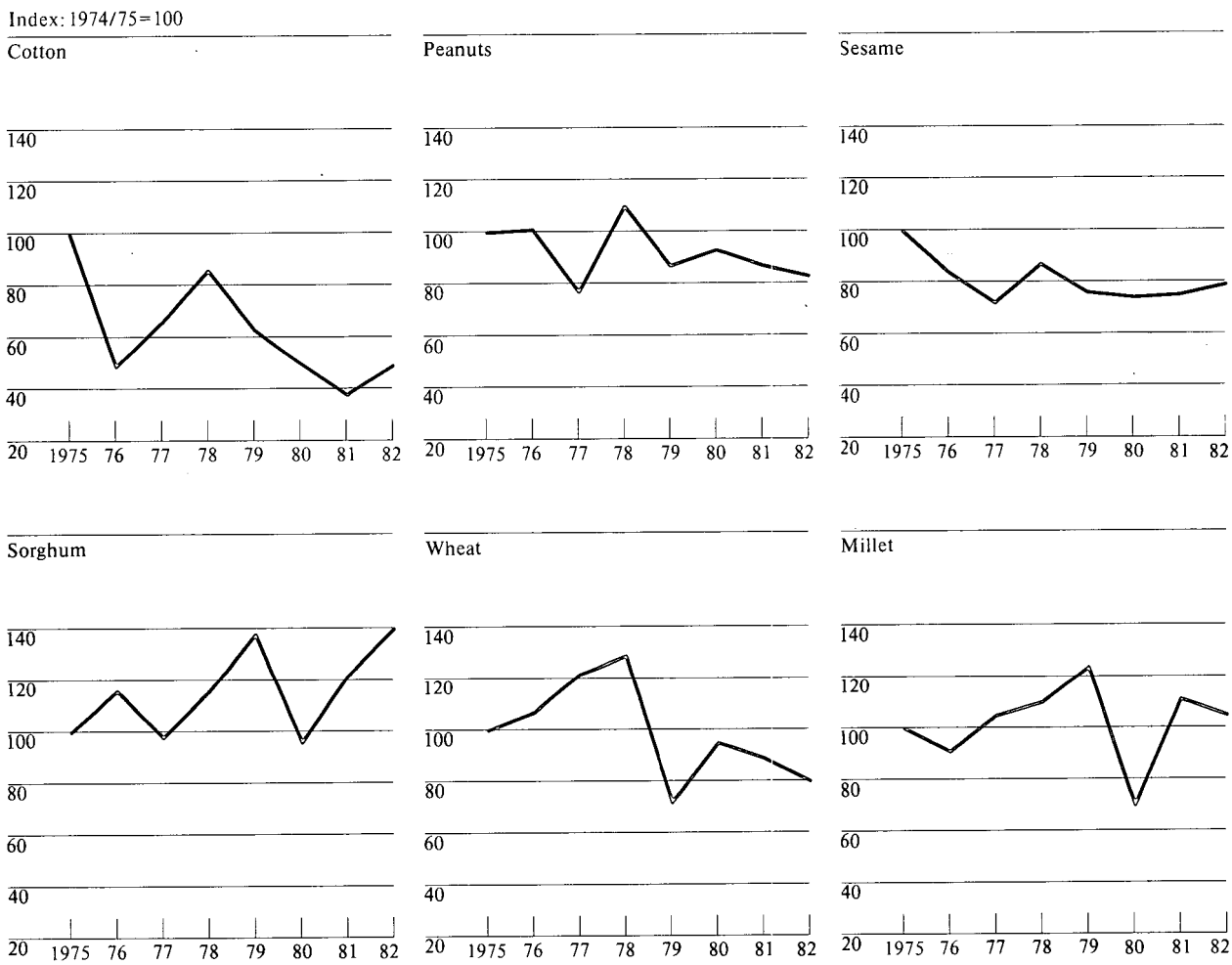
Figure 4
Sudan: Production of Major Crops[a]



[a] Crop year ending 31 May.

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raise the cost of production of noncotton crops, thereby rationalizing the relative cost structure of alternative crops and the incentive patterns facing the tenant.

Sudan's main experience to date with the individual account system has been at the Rahad project. If Rahad is taken as a model, the system will only work with better record keeping and control. At present the project board does not have the technical capacity to assess which tenants have received specific services, and costs are calculated on a rough basis only. Moreover, the additional manpower and bureaucracy necessary to run an individual account system will be very costly.

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To strengthen the administration of the projects, the Public Agricultural Production Corporation, which managed nine irrigated projects, was dissolved and its components reconstituted as independent corporations during the 1980/81 agricultural season. This move, whose full effects will be manifested during the 1981/82 season, was taken in order to decentralize management and increase responsiveness to individual project requirements.

The realignment of the cost and price structure and the reorientation of the farmer's incentive pattern toward cotton will not by themselves result in dramatic increases in cotton production. Rather, the full effects must await the completion of the physical rehabilitation of the agricultural projects and the restoration of their ability to deliver proper services to the farmer. In addition, the farmers have developed a psychological barrier against cotton since the crop was traditionally used by the government as a tax collection and debt recovery instrument. This attitude cannot be reversed abruptly.

Further Constraints on Production

Severe constraints on increased agricultural production include poor seeds, pre- and post-harvest pests, soil depletion, inadequate labor, insufficient irrigation, desert encroachment, and inadequate transportation and communication. Improved and treated seeds have not been introduced for most crops in over a decade. As a result, farmers find it uneconomical to plant some crops for commercial sale because poor seeds produce unacceptable yields. Traditional farmers, for example, no longer plant millet for other than personal use.

Some research has recently begun to improve seed quality. The Agricultural Research Corporation has been conducting research on sorghum seeds, and a 4-hectare seed propagation farm to develop better millet seeds began operation in 1981. Seed propagation units in the Ministry of Agriculture do not produce sufficient quantities to meet national requirements.

Sudan's transportation problems are formidable. Shortages of vehicles, fuel, and spare parts are widespread and constant. With only 2,400 kilometers of paved roads and an inadequate rail system, Sudan faces the task of bridging the immense distance between production centers and consumption and export points. Without the elimination or alleviation of the country's severe transport bottlenecks, other improvements may be in vain (see figure 5). 25X1

Desert encroachment and cropland degradation are serious problems as well. Because much of the country is semidesert, it is susceptible to pressures from overgrazing and deforestation. The Sahelian drought of the early 1970s was disastrous, and, since then, population and livestock numbers have exceeded the carrying capacity of the land. It is estimated that in some regions the desert is advancing by about 6 to 7 kilometers per year. Some sections in northern Darfur and northern Kordofan are now wasteland. 25X1 25X1 25X1

Overgrazing, the cutting of trees for firewood, and overcultivation in marginal lands make it difficult to reverse desert encroachment. The Sudanese Government is aware of the need to check further encroachment, but this goal conflicts with the immediate objective of increasing production of major export crops. Future increases in agricultural production, however, will be even more difficult if there are serious losses of crop and rangeland through desert encroachment. 25X1 25X1

Both pre- and post-harvest pests substantially reduce production of many crops. A senior agricultural official estimated that 25 percent of the sorghum and sesame crop in the traditional sector is lost because of the ravages of pests. Losses can be kept to a minimum when officials of the Crop Protection Department reach the endangered areas, but the transportation problems noted above prevent the effective use of their services. 25X1 25X1

Labor shortages during peak demand periods are common, and in some cases crops have spoiled before they could be harvested. Labor shortages exist mainly because the needs are enormous—a half million laborers are needed on the Gezira project alone—and better opportunities in neighboring states have led to mass migration. At least one irrigation project has 25X1

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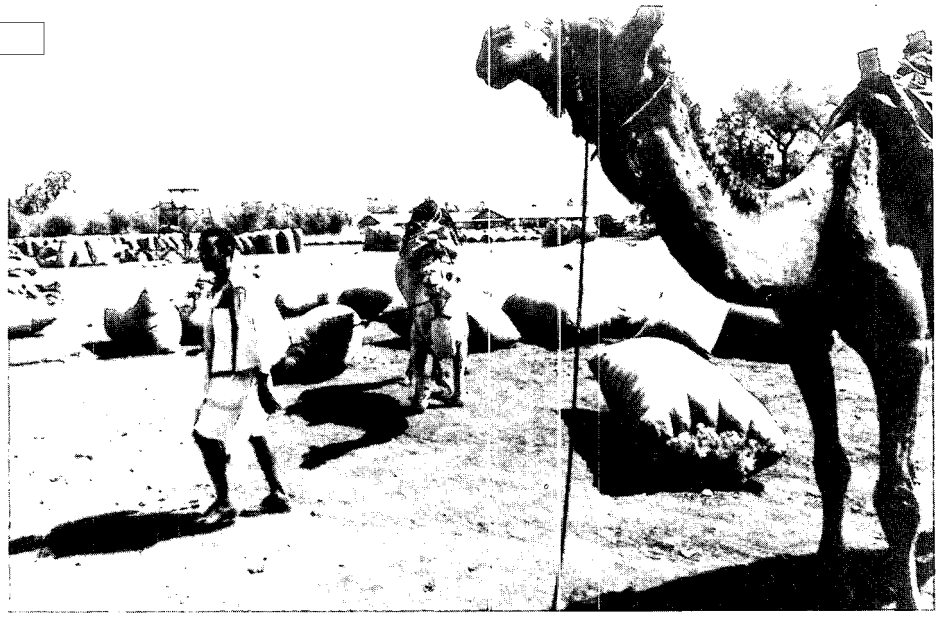
Figure 5. Camels are used to transport bags of cotton. 25X1



purchased mechanical cottonpickers in hopes of alleviating such labor problems. The switch to machines is hindered by the shortage of funds to purchase equipment, fuel, and spare parts.

Credit practices constitute another constraint on increased agricultural production. Many traditional farmers earn insufficient cash to cover requirements during the winter and planting costs the following season. As a result, they must obtain credit from a village merchant who takes a portion of the crops in repayment. This can lead to permanent indebtedness to the merchant. Even if other credit sources were available and the farmer held title to his entire crop, he still would lack a means of getting it to market. Transport is generally provided by a wholesaler who seldom pays above the government floor price. The result is a small return to the farmer and limited incentive to cultivate.

The credit practices of the large projects are equally onerous for the government. The prevailing pattern has been for tenant farmers to obtain advances against cotton and peanut crops but not to repay them, because such advances are often greater than tenant earnings. This, in turn, has caused severe cash flow difficulties for the project management boards. 25X1

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Agricultural Assistance

In March 1980 the World Bank approved an Agricultural Rehabilitation Program for Sudan. The program involves an International Development Association credit of $65 million and a European Community Special Action Fund credit of $11 million. Disbursement of the two credits was not started until late 1981. The funds were used mainly to buy tractors, harvesters, pumps, and spare parts for the major irrigation projects. The aid is mainly stopgap assistance and not developmental in nature. In January 1981 Sudan and the Bank also agreed on the outline of a three-year investment program. 25X1

The World Bank sponsored an aid donors' meeting in May 1982 to discuss details of the 1981 program committing Sudan to policies necessary for agricultural and industrial recovery. Particular importance was attached to infrastructure projects including communications, transport, and power supply. 25X1

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Sudan has been a major benefactor of agricultural assistance from the Arab world. In 1977 the Kuwait-based Arab Fund for Economic and Social Development set up a special agency, the Arab Authority for Agricultural Investment and Development (AAAID), to direct funds for the development projects. It was envisaged that approximately $6 billion would be spent during 1976-85. The aim was to develop large-scale plantations, mechanization, and infrastructure in such a way that by 1985 Sudan could provide the Arab world with 15 percent of its wheat requirements, 42 percent of its vegetable oil, and 20 percent of its sugar. These ambitious plans have fallen victim to Sudan's infrastructural bottlenecks and severe economic problems, however, and AAAID has launched only four out of 100 proposed projects.

Some wealthy Arabs also have been impressed by Sudan's agricultural potential. One, Saudi Prince Muhammad Al Faisal, became the patron of a major project that opened in 1981, 15 years after its inception. Despite Al Faisal's interest and his commitment to extend approximately $3 million in aid, the project is plagued by severe difficulties, and no profits are anticipated before 1983/84.

Sudan is also receiving considerable PL-480 food aid from the United States—$25 million is planned for FY 1982, and $30 million is proposed for FY 1983. This aid, however, has proved to be a two-edged sword. Sudan sells the wheat at below cost, which results in distorted consumption and growing patterns, domestic budget problems, and higher imports. Low prices for imported products have dampened domestic production incentives for these commodities. Meanwhile, subsidies cost Sudan an estimated $325 million in fiscal 1981. In an effort to eliminate these problems and to fulfill an International Monetary Fund requirement imposed under its economic reform program, Sudan raised wheat prices 33 percent in April. They were increased an additional 15 percent in July, and the government is planning further price hikes to totally eliminate the subsidies. The final reduction in subsidies was scheduled for the end of August.

Outlook

President Nimeiri's moderate, pro-Western regime is confronted by a formidable array of problems that threaten the stability of the government. These include persistent tensions between the northern and southern regions of the country, a Libyan-supported subversive campaign aimed at toppling Nimeiri's government, and a deeply troubled economy. One of the most serious aspects of the latter problem is the sharp drop in agricultural production over the past several years. Government mismanagement is largely to blame, but even with more prudent and realistic planning, significant improvements will take time and patience. 25X1

Sudan has neither a large pool of labor nor the resources for capital-intensive farming, either of which is essential for large-scale agricultural production. It is relatively thinly populated and loses many workers because of the greater opportunities and higher wages available in neighboring oil-producing states. Sudan's ability to turn to increased mechanization is limited by a serious foreign exchange shortage and massive foreign debt. 25X1 25X1

The foreign exchange shortage holds both the cause and the solution to most problems in the agricultural sector. It has fostered a resort to "crisis management"—tackling emergencies as they arise and neglecting development of a long-term strategy. Until the shortage is overcome, efforts to improve agricultural performance almost certainly will be only sporadic. But improvements in the foreign exchange situation will depend in large part on increasing agricultural production. 25X1 25X1

The slogan touted in the past that "Sudan will become the breadbasket of the Arab world" is unrealistic. Government leaders clearly appreciate the importance of the agricultural sector to the economy and will strive to make improvements within the constraints imposed by limited resources. With proper planning and luck the country could become a major producer and exporter of many agricultural products, but this potential will not be realized before the 21st century. 25X1 25X1

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Appendix A

Sudan: Physical Setting and Agricultural Potential

Climate and Topography

Most of Sudan is an immense, sparsely populated plain, with plateaus or mountainous areas near the borders in the west, the southwest, and along the Red Sea coast in the northeast. The most prevalent landscape is semiarid savanna—a mixture of short grasses, scattered brush, and short trees. Daytime temperatures are high throughout the year, and the dry season ranges from three months in the relatively humid south to nine months in Khartoum.

The southern provinces of Equatoria, Bahr al Ghazal, and Upper Nile receive 30 to 50 inches of rain during the six- to nine-month wet season and produce a rich variety of tall grasses, shrubs, and trees. Permanent swamps in these provinces cover about 130,000 hectares, and there is an excess of water for most of the year. The lush vegetation in the south contrasts sharply with the deserts of the Northern Region, where the occasional rains vanish in the parched sand, and broad areas are devoid of either vegetation or people.

Narrow belts of irrigated cropland, no more than a few miles wide, bisect the northern savanna and desert along the main Nile River and along the White Nile, Blue Nile, and Atbara Rivers. They contrast sharply with the arid savanna or barren desert just beyond the limits of irrigation (see figure 6).

Soils

The soils are composed mainly of clay, much of which is impermeable and difficult to cultivate, or sand that contains little clay or humus. Tropical clay soils cover most of east-central and southeast Sudan, from Khartoum southward. In the south, clay soils also stretch west beyond the Nuba mountains to include the western portion of the Sudd or swamps and adjacent plains. From Khartoum westward is a broad zone known as the *qoz*, an east-west belt of sandy mixed soil. North of the *qoz* there is a vast area of stony and sandy thin desert soils. The more important agricultural areas are the riverine deposits along the Nile, the clays of central Sudan, and the *qoz*. These soils were originally deposited by wind or water. 25X1

Hydrology

There are strong contrasts in the hydrology of the northern and southern parts of Sudan, but the Nile links the drainage of both regions. The Nile is formed by the combination of the White Nile, the Blue Nile, and, further downstream, the Atbara. In the southern Sudan about half of the Nile water that enters the vast swamps of the Sudd is lost through transpiration and evaporation. This in part explains why the annual flow of the White Nile into the upper Nile at Khartoum is only one-fifth that of the Blue Nile, but the White Nile is important because much of its water arrives during the months when the flow from the Blue Nile is very low. North of Khartoum, the Nile flows through a desert region for about 1,700 kilometers to the Aswan Dam in Egypt, fed only by the Atbara. The Atbara is shorter and more erratic than the Blue Nile, with heavy floods in summer. During arid periods it is likely to dry out before it reaches the Nile. 25X1

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Potential of the Regions

Despite the poor soil in many areas, there is thought to be sufficient good soil to permit large-scale production of a wide range of crops. In most regions of the country the main factor limiting agricultural expansion is water rather than land. In a few regions, accumulations of silt from streams create especially good conditions for intensified production of diversified crops. By far the greatest potential for expansion,

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Figure 6. Cultivation along the Nile.

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however, is offered by the vast expanse of central clay plains adjacent to the Blue Nile and White Nile extending nearly 1,000 kilometers from east to west. Rainfall in this area ranges between 5 and 10 inches a year in the northern portion to 15 or 20 inches a year in the southern part. The growing season is short, but the land can be exploited with mechanization and improved quick-growing varieties of sorghum or millet. The best regions for agricultural development are the irrigated areas in the Nile Valley. These areas contain Sudan's large projects such as the Gezira

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Appendix B

The Gezira Project

The Gezira project is located between the White and Blue Niles in the Gezira District of the Central Province. The project was conceived as early as 1904. Work on the Sanar Dam was started in 1913, interrupted by World War I, and resumed in 1921. Agricultural production finally began in 1925 when British authorities planted about 400,000 hectares in the Gezira area with cotton. The raw cotton was then exported to England.

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In the first decade the project suffered from the effects of the worldwide depression in cotton prices. This coincided with a catastrophic decline in yields because of erratic rainfall, pests, and disease. Before long, however, prices and yields increased, and the choice of cotton as the crop most likely to repay the cost of investment was justified.

In 1951 the Gezira project was nationalized by Sudan, and an administrative body was set up composed of the government, the farmers, and the council for the project. It was agreed that the profits would be divided among several groups, with 49 percent going to the farmers, 36 percent to the government, 10 percent to the council, and the remaining 5 percent to other government bodies.

During the 1950s the project flourished, and in 1959 a further 400,000 hectares were prepared for cultivation and an irrigation canal dug to supply water to the new areas. Encouraged by the success of the project, it was decided that new intensive methods of farming would be used and output diversified to include peanuts and wheat. By the mid-1970s more than 800,000 hectares were under cultivation, with cotton accounting for less than half. Peanuts and wheat each were planted on about 200,000 hectares, and another 120,000 hectares were planted with corn.

Figure 7. Farmers working in the fields in the Gezira region. Liaison ©

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One of the largest agricultural undertakings in the world, Gezira became the inspiration, if not the model, for a number of projects in other developing countries as well as for subsequent projects in Sudan itself. In recent years, however, the shortage of foreign exchange and poor management have combined to blight the promise of the projects. Irrigation canals are choked with weeds and silt; pumps need repairing or replacing; telephones—essential to coordinate irrigation—no longer work, and cottonpickers are scarce in the harvest season (see figure 7). Cotton yields have fallen from 47 kilograms per hectare in 1974/75 to 25 kilograms per hectare in 1980/81. Peanut and wheat yields have dropped as well (see table 3).

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Faced with this situation the government took radical action in 1981 and reorganized the project so that it would be run on a more competitive basis. It was decided that each farmer would be charged individually for the amount of water he used on the crops

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Table 3
Crop Output in the Gezira Project

Thousand metric tons

	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81 [a]	1981/82 [b]
Cotton	164	264	315	233	194	200	215
Peanuts	325	245	330	180	250	160	170
Wheat	231	293	260	151	200	180	175
Sorghum	209	197	190	169	110	130	150

[a] Preliminary.
[b] Projected.

25X1

that he planted and the area of land that he farmed. Previously, the water and land had been given to the farmer by the government in return for a percentage of his cotton harvest. In addition, greater attention was paid to the problem of insect and pest control, and irrigation canals were cleared and maintained more vigorously.

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Plans for reviving Gezira include two five-year phases that began in late 1981. In the first phase, the project will be put back on its feet. Tractors, pumps, and other agricultural equipment will be purchased. The second phase will focus on modernization to intensify production and improve marketing. This program is being carried out with the assistance of the World Bank.

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