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9. ABSTRACT

The material in this report is the result of a 60 man-day visit by the staff of Development Alternatives, Inc. (DAI) to the Sudan (Khartoum, Nyala, and Juba) and a perusal of documents on Sudanese development strategy since 1972, when relations with the South were normalized. This paper identifies issues, raises questions, and provides suggestions for a process by which AID could re-establish a development assistance program in the Sudan. Issues include: 1) equity and the distribution of benefits; 2) short-run versus long-run benefits; 3) export versus domestic market orientation; 4) pricing and marketing; 5) roles of government, private sector, and cooperatives; 6) involvement of foreign capital and manpower; 7) mechanization versus employment; 8) land reform; and 9) administrative decentralization. Section I of this report discusses these issues in summary form and the implications as seen for U.S. decision-making. The second section presents a more detailed analysis of the health, education, and agriculture sectors in the Sudan. Finally, Section III, which is not included here, will provide specific programmatic recommendations in harmony with the prevailing expert opinion as determined during the first days of the seminar.

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**STRATEGIES FOR THE REINTRODUCTION
OF DEVELOPMENT ASSISTANCE
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**A Seminar Held Under the Auspices of the
Office of Eastern and Southern African Affairs,
Bureau for Africa,
Agency for International Development
October 18 and 19, 1976**

**DEVELOPMENT ALTERNATIVES, INC.
1823 Jefferson Place, N.W.
Washington, D. C. 20036**

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PREFACE

The material in this report is the result of a 60 man-day visit by the staff of Development Alternatives, Inc., (DAI) to the Sudan (Khartoum, Nyala and Juba) and a perusal of documents on Sudanese development strategy since 1972, when relations with the South were normalized. Donald R. Mickelwait was the team leader and had prime responsibility for the preparation of the seminar report. Craig V. Olson contributed the health and education sector analysis, and Eric W. Crawford provided the agricultural sector insights.

This paper will identify issues, raise questions and provide suggestions for a process by which the Agency for International Development can re-establish a development assistance program in the Sudan. Such a program should be consistent with the Sudanese development plans and with newly established directives and mandates to guide AID policies. The mandate to begin redefining a development assistance policy for the Sudan has been given, and this paper is an attempt to present those issues which are significant for programs or projects of interest to the U.S. Government.

In visiting the Sudan, the DAI team did not intend to usurp the responsibilities of such organizations as the International Monetary Fund, The World Bank or the ILO/UNDP. Their

documents are particularly relevant to this report. They are "Sudan -- Recent Economic Development" (August 5, 1976) by the International Monetary Fund and "Economic Memorandum on Sudan" (September 27, 1976) by the World Bank. The most thorough study on the Sudan was completed in 1975 by a team from the ILO/UNDP; their report entitled "Growth, Employment and Equity: A Comprehensive Strategy for the Sudan." All three documents are referenced herein, extracted from and commented on from the viewpoint of a bilateral donor's specific interests and objectives which may or may not coincide with the international bodies studying the Sudan. This paper is concerned with fulfilling the Congressional mandate which calls for demonstrable benefits to the poor (in this instance the rural poor) as a result of AID programs and projects.

There are three sections of this report. Section I includes the basic issues in summary form, and the implications as seen for U.S. decisionmaking. The second section presents a more detailed analysis of the health, education and agriculture sectors in the Sudan. Finally, Section III, which is not included in the original distribution, will provide specific programmatic recommendations in harmony with the prevailing expert opinion as determined during the first days of the seminar.

SECTION I: AXIOMS AND COROLLARIES ON MODERN SUDAN

In this section we present eight axioms on events, trends, policies and circumstances in modern Sudan. Corollaries relate these issues to U.S. policymaking. The summary statements are boldly stated, without the usual "on-the-other-hand" qualifications. The documentation, reasoning and details follow for those persons with the time and interest to pursue the issues at greater depth.

AXIOM ONE

The Sudan has huge untapped development potential, and identified foreign donors have allegedly promised to provide much of the needed foreign exchange to exploit that potential. There are few short-term problems; the key to success will be dramatically expanded exports six to ten years downstream.

COROLLARY

U.S. assistance must fit within the framework of the evolving development plan (which is not independent of the special interests of the major foreign donors) and should do its share in strengthening the export base.

DISCUSSION

"The Sudan is the largest country of Africa with an area of about one million square miles. Its considerable size, straddling several temperate zones and with an abundance of water resources from rivers as well as from rainfall provides it with a vast agricultural potential which has thus far only been partially exploited. Out of an estimated 200 million acres of potentially agricultural land, only about 20 million acres are presently dropped. In addition, there are about 60 million acres of pasture lands only sparsely utilized by traditional herdsmen."¹ Beginning in 1974/75 the government

¹ "Sudan -- Recent Economic Development" by the International Monetary Fund, August 5, 1976, p. 1.

undertook to double its development budget, and considerable strides have been made in overcoming constraints to the exploitation of the agricultural resources. Constraints are most severely felt in a lack of transportation facilities. Table 1 which follows gives the GOS development budget expenditures for the 1970-1976 plan in current and deflated figures.¹

TABLE 1

PUBLIC SECTOR DEVELOPMENT EXPENDITURE¹
(In millions of U.S. Dollars)

	<u>1970/71</u>	<u>1971/72</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u> ²
Agriculture and irrigation	24.3	26.0	27.7	33.7	32.5	72.5
Industry and mining	4.0	3.7	4.7	16.3	84.5	77.0
Transport and communication	7.7	7.5	16.5	37.5	81.5	98.3
Central Electricity and Water Corporation	9.0	8.5	6.3	7.5	12.5	17.5
Local governments	7.0	3.5	2.5	3.8	12.5)	
Social services	7.5	9.5	8.8	11.3	22.5)	68.5
Other ³	<u>7.0</u>	<u>15.8</u>	<u>7.5</u>	<u>16.7</u>	<u>20.0)</u>	_____
Total	66.5	74.5	74.0	126.8	266.0	333.8

¹ Apart from 1975/76 when an allowance of 24.25 million U.S. dollars is made for self-financed development expenditures by Sudan Railways and C.E.W.C., the figures do not encompass self-development expenditures by the public entities or the local governments.

² Projection based on nine months provisional actual data.

³ Includes the imputed value of technical assistance.

Source: "Sudan -- Recent Economic Development" by the International Monetary Fund, August 5, 1976, p. 31

¹ For this seminar paper, all Sudanese pounds have been converted to U.S. dollars at the rate of one Sudanese pound = U.S. \$2.50.

TABLE 2

DEVELOPMENT EXPENDITURES
(1970/71 prices; in millions of U.S. Dollars)

<u>1970/71</u>	<u>1971/72</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>
66.50	70.25	65.00	76.25	152.50	173.75

Source: "Economic Memorandum on Sudan, Report No. 1273a-SU, September 27, 1976, The World Bank, p. 12.

Most experts place the growth rate of GDP approaching five percent for the current plan period (1970-1976). Different quantitative estimates for the next plan are more optimistic, but all assume large public and private capital inflows as follows:

TABLE 3¹

<u>Source</u>	<u>Growth Rate</u>	<u>Required Capital Inflows</u>	<u>Completion Time</u>
ILO	5-8% GDP	\$5 billion	1985
Arab Fund	6.5%+ agricultural sector	\$3.7 billion	1986
ADAR (Arab)	7.8% transportation	Not available	1985
IBRD	5.5% GDP	\$2.6 billion	1980

¹ All such projections require estimations of growth in government revenue and expenditures, domestic savings, exports and changes in the terms of trade. The details are well reported by the IMF and the IBRD. The purpose here is to demonstrate the magnitude of the capital flows required under several different assumptions.

The new Six-Year Plan (1977/78-1982/83) prepared by the Ministry of Finance, Planning and Economy has received approval from the Council of Ministers for a development budget of \$6.5 billion for the next six years. Of this amount, four billion dollars is for the public sector. The government of Sudan also claims that the Arab Authority for Agricultural Investment and Development (AAAID) will provide \$2.85 billion to the plan. As of March 1976, the Arab oil states had extended credit totaling \$.5 billion to the Sudan. This represents 80 percent of the outstanding external debt excluding international agencies. The international agencies (IMF, IBRD, ILO/UNDP) apparently assume that the bulk of development resources needed by the Sudan will be met by oil producing countries during the next six years.

U.S. interests in traditional farmers and equity considerations must be matched by a realism that the country is increasingly mortgaged, that the debt service requirements are very heavy and growing, and that an export base is a vital necessity to continued economic growth.

AXIOM TWO

Significant development activity is already underway, a broad outline of a development approach exists and the identification of specific Ministry or quasi-governmental agency projects within that approach, for the coming Six-Year Plan is currently in progress.

COROLLARY

The Sudanese development approach is pragmatic, and its details can be easily modified to fit U.S. interests if AID works within the prevailing development strategy.

DISCUSSION

The broad outline of the development approach is apparent, even though the Six-Year Plan is some months from adoption. Agriculture, the leading sector, will fuel the agro-industrial sector, its products will be moved by the transportation and communications systems and the services sector (training/education/health) will assist in the development of the necessary human resources. The percentages of the public development budget (the equivalent of \$4 billion) for the coming Six-Year plan are:

Agriculture	30 percent
Industry	25 percent
Transportation	25 percent
Services	20 percent

This distribution of the development budget, of course, does not tell the whole story. The plan is to significantly broaden both irrigated and rain fed agriculture; to use the

surpluses to end food/grain, sugar, textile, and kenaf imports; and to develop strong export potentials.

The ongoing major investment projects under implementation are extensive, and they sorely tax the domestic counterpart of foreign assistance. They include the following:

- Major railway investment in management, locomotives and cars;
- 1,000 miles of new roads or major road upgradings;
- Three power generation stations with attendance transmission lines;
- An oil pipeline from Port Sudan to Khartoum;
- A micro-wave link with major urban centers;
- Major river transport investment in tugs and barges;
- Expansion of vast acreages of irrigated farmland;
- Four major sugar projects;
- Two major rice projects;
- Two major kenaf projects;
- Three mechanized farming projects;
- Eight major textile factories;
- Two major leather tanneries; and
- 16 schools or research/training stations under expansion.

Some efforts, such as a major road network, may have three foreign donors, with a fourth portion being constructed by the GOS Public Works Department. Nevertheless, these endeavors are few in comparison to the hundreds of small development assistance projects. For example, the UNDP project donor listing has nearly 75 separately funded activities, although many of these are studies or technical assistance in agriculture, forestry and fisheries.

The purpose of UNDP/World Bank support to a project planning unit within the Ministry of Planning was to coordinate the individual projects within the framework of the upcoming Six-Year Plan. According to Bank advisors to the planning unit, project submissions from the various agencies and departments were disappointing in their lack of detail, manpower requirements and division of funding between foreign and domestic sources.

AXIOM THREE

The benefits of development assistance promoted by donors of large sums of money, particularly the oil interests, will not be realized without complementary capital and technical assistance in areas not suitable for, of interest to, or within the capabilities of such donors.

COROLLARY

Several kinds of development assistance from the United States will be needed. The most important would fill those obvious gaps which constrain the efficacious use of huge blocks of project-tied development funds. This is particularly true in the development of human resources and knowledge needed to manage gigantic development undertakings.

DISCUSSION

The following tables present the major development efforts which are underway and under consideration by the World Bank and those being contemplated by the AAAID. The efforts by both organizations, with a few important exceptions, are very project/output oriented. Such a development strategy, with little concern for the institutionalizing of human capabilities and skills, will not make efficient use of the capital resources which may be available in the future.

TABLE 4

ONGOING WORLD BANK PROJECTS IN THE SUDAN

<u>Year</u>	<u>Project</u>	<u>Amount \$ (Millions)</u>	<u>Type</u>
1958	Railways and Water Transport	39.00	IBRD
1960	Managil Irrigation	15.50	IBRD
1961	Roseires Irrigation	19.50 13.00	IBRD IDA
1965	Railway II	31.00	IBRD
1968	Education	8.50	IDA
1968	Mechanized Farming I	5.00	IBRD
1968	CEWC - Power I	24.00	IBRD
1972	Mechanized Farming II	11.25	IDA
1972	Highways I	7.00	IDA
1973	Rahad Irrigation	42.00	IDA
1973	Industrial Bank of Sudan I	4.00	IDA
1974	Railways III	24.00	IDA
1974	Southern Sudan Agricultural Rehabilitation	10.70	IDA
1975	Education II	10.00	IDA
1975	CEWC - Power II	23.00	IDA
1975	Rahad Irrigation - Supplement	20.00	IDA
1975	Industrial Bank of Sudan II	7.00	IDA
1976	Technical Assistance	4.00	IDA
1976	Domestic Aviation	20.00 <u>9.00</u>	Bank IDA
	Total	\$347.45	

TABLE 5

POTENTIAL WORLD BANK PROJECTS IN THE SUDAN

<u>Member Country, and Borrower or Implementing Agency</u>	<u>Amount and Probable Lender (Millions of U.S. \$)</u>	<u>Project</u>	<u>Stage of Processing and Action on Procurement</u>
Civil Aviation Department	29.0 (Bank/ IDA)	Domestic Aviation - Improvement of airports and facilities at southern provincial capitals and at Port Sudan. Total project cost estimated at \$86.1 million, of which, foreign exchange \$62.5 million.	Approved by the Executive Directors on June 15 (Third Window and IDA terms).
Roads and Bridges Public Corpora- tion	20.0 (IDA)	Highways II - Technical assistance and further development of roads on lines indicated by preparatory work under existing road project. Total cost about \$90.0 million.	Feasibility studies completed. Detailed engineering being arranged. (Co-financing being sought.) <u>Procurement:</u> Retro-active financing of detailed engineering studies under consideration.
Ministry of Agri- culture and Animal Production Corpora- tion	6.0 (IDA)	Fisheries - Development of inland fisheries on the Nile, Lake Nubia and in the Southern Marshland Fisheries.	Preparation work underway in cooperation with FAO.
Agricultural Pro- duction Corpora- tion and Ministry of Irrigation	15.0 (IDA)	Pump Scheme Rehabilitation - Rehabilitation of existing pump schemes on the Blue and White Nile Rivers.	Feasibility studies in progress.
Sudan Railways Corporation	13.0 (IDA)	Railways IV - Further development of railway system, including workshop equipment, track materials and rolling stock, technical assistance and feasibility studies for track improvements. Total project cost: \$35.0 - 40.0 million.	Investment proposals under preparation by Sudan Railways Corporation and the Government. (Co-financing being sought.)
To be determined	5.0 (IDA)	Research and Extension - Agricultural research.	Will be prepared in cooperation with Ford Foundation.
Mechanized Farming Corporation	15.0 (IDA)	Third credit to the Mechanized Farming Corporation.	Project under preparation by consultants.
Ministry of Agri- culture	13.0 (IDA)	Savannah Development Project - First Phase Development Program in Western Savannah, including improvement of livestock marketing, delivery facilities and export trade.	Appraisal scheduled for July. (Co-financing being sought.)
Sudan Ports Corporation	20.0 (IDA)	Port Development I - Project components to be determined	Feasibility study under- way.
Government of Sudan	15.0 (IDA)	Water Supply - Project components to be determined.	Identification mission currently in field.

TABLE 6
 AAAID
 INVESTMENT GROUPS FOR THE BASIC PROGRAM (1976-1985)
 AND FOR THE FIRST INVESTMENT PLAN

Types of Investment	Number of Projects		Costs in Million U.S. \$		Percent of Total Cost	
	Pro-gram ¹	Plan ²	Pro-gram	Pro-gram	Pro-gram	Plan
1. Direct investments suitable for joint financing and which have commercial returns						
Agricultural Products ³	9	6	962.5	425.0	17	22
Animal Production ³	9	5	600.0	250.0	10	13
Agro-Industries	11	4	887.5	225.0	16	11
Transport and Construction	<u>2</u>	<u>2</u>	<u>157.5</u>	<u>100.0</u>	<u>3</u>	<u>5</u>
Total (1)	31	17	2,607.5	1,000.0	46	51
2. Investment for Sudanese Public and Private Agricultural Sectors						
Agricultural Products	9	6	940.0	327.5	16	19
Animal Production ³	10	4	422.5	55.0	8	3
Agro-Industries ³	<u>6</u>	<u>1</u>	<u>70.0</u>	<u>25.0</u>	<u>1</u>	<u>1</u>
Total (2)	25	11	1,432.5	452.5	25	23
3. Investment in Infrastructure and Basic Services						
Transport	23	17	1,027.5	277.5	18	15
Water Resources and Electrical Power ⁴	6	1	305.0	12.5	5	1
Supporting Infrastructure	5	5	195.0	145.0	3	7
Basic Services	<u>10</u>	<u>10</u>	<u>150.0</u>	<u>62.5</u>	<u>3</u>	<u>3</u>
Total (3)	<u>44</u>	<u>33</u>	<u>1,677.5</u>	<u>497.5</u>	<u>29</u>	<u>26</u>
Grand Total	100	61	5,717.5	1,950.0	100	100

¹ The Basic Program for the Ten Years 1976-1985.

² The First Investment Plan of the Basic Program.

³ Sugar industries are included in agricultural products and animal production industries in animal production.

⁴ This group excludes two irrigation projects (1) Upper Atbara and Rahad and (2) Kinana, as they are included in the agricultural products in the second investment group; the total cost of these projects amounts to \$612.5 million.

Source: *The Arab Authority for Agricultural Investment and Development*, Table 1, Embassy of the Sudan, Washington, D.C.

Two notes by the international agencies give some indication of the problems inherent in project-specific development strategies:

"Accrual investment (after 1973/74) fell substantially short of Plan targets due to a number of organizational, financing and physical constraints. These include the lack of proper project evaluation, the failure of assuring the necessary complementary infrastructure and the existence of severe gaps in the supply line and markets."¹

"Because of a number of financial and physical implementation problems, notably, delays in completion of infrastructure and allied facilities and non-availability of foreign exchange at the desired times, a majority of these development projects (those ongoing) will not be completed until this year."²

The fundamental economic justification for AID in the Sudan is the inability of any project-oriented development approach to identify and overcome all the exogenous constraints to project performance. By comparison with the oil countries, small amounts of strategically located capital investment and technical assistance can help the large sums of money work as planned.

¹ Ibid., p. 20

² "Economic Memorandum on Sudan", World Bank, Sept. 27, 1976, p. 13.

AXIOM FOUR

Sudanese politics, with its replication of the Soviet model of dual structures (party and administration) from the village to the central government is obviously concerned about equity and the distribution of the benefits of development. However, for all practical purposes, the development budget is dependent upon foreign capital, which is controlled in most cases by bankers or investment portfolio managers. Both desire quick, sure returns. This places the government in the position of acknowledging (and we would argue, believing) in equitable distribution of the returns from investments in agriculture, without either the knowledge of how to accomplish such distribution or the wherewithall to do so if that knowledge were available. Without some direct intervention, the predictable result at the end of the next Six-Year Plan will be an even greater income skew.

COROLLARY

One critical role for U.S. assistance will be to involve the traditional farmer in the modernization of agriculture. Although this is a stated goal of the GOS, U.S. assistance must necessarily coincide with the definition of modernization (mechanization) as understood by the Sudanese government.

DISCUSSION

One continuing argument throughout the ILO/UNDP report on *Growth, Employment and Equity*, was the need to rethink the heavy emphasis on mechanizing all possible farm operations, particularly in the huge irrigated schemes such as the Gezira. The authors argued persuasively that the migrant labor wage bills were actually an equitable redistribution of profits from subsidized irrigation schemes, and to do away with that cash earning potential would further bias income distribution in the country.

In our discussions with dozens of Sudanese officials, we found no support for such a view. The prevailing philosophy is that mechanization is necessary to overcome labor scarcity and attendant high labor costs and that it should proceed with all possible speed.

The arguments regarding irrigated lands differ significantly from those about rain-fed agriculture. In schemes like the Gezira, the "tenants" are actually farm managers who have far greater land holdings than can be worked by a single family and who have strong tendencies to hire wage labor rather than do the manual work themselves. We do not consider these farmers either small (15 to 40 acres each) or poor (with income potentials many times the national average). Nor is an extension of large areas of irrigated land a reasonable method of bringing development benefits to the traditional farmers due to the enormous cost of establishing the irrigation systems -- estimated \$833 per acre-\$12,500 per 15-acre tenancy.

The rain-fed mechanization arguments are centered on:

- The unsuitability of the clay soils for hand cultivation;
- The serious weeding problems which limit yields and land under cultivation unless the land is first broken by tractors;
- The scarcity of rainfall, which requires the fastest possible preparation and planting; and
- The need for area spraying for insect/disease control.

Traditional farmers will have little or no involvement in the very large expansion of rain-fed cultivation without special emphasis and consideration. The Sudanese government, over the objection of World Bank experts, insisted that cooperatives

be allowed to share in the first Mechanized Farming Schemes. Eight have apparently been successful. (See the Cooperative Sector analysis which follows.) Without special assistance, training, capital and organizational/management skills, the traditional farmers will be bypassed by the six-million-acre expansion of mechanized farming schemes under the coming Six-Year Plan.

AXIOM FIVE

The South poses development problems of a different magnitude and different dimensions from the problems encountered in the North. Therefore it follows that solutions applicable to the North may be unsuited for the South. The destruction of infrastructure, the near absence of human resource talent below top levels, the lack of communications and the ethnic heterogeneity all suggest an approach which is different from that to be recommended for U.S. assistance in the North.

COROLLARY

Current AID policies which prevent infrastructure or institutional development outside the context of specific projects may need to be reconsidered in the context of development of southern Sudan. The DAI team believes that the time needed to devise a development strategy which has a strong production basis will take far longer than in the North. Such an undertaking would provide a time-phased U.S. assistance effort in the Sudan -- early efforts would concentrate on the North while planning is ongoing for projects in the South.

DISCUSSION

The devastation of the South during the long civil war is well known. Presently new techniques in education and rural development are being attempted there by international donors such as the World Bank and numerous private voluntary agencies. The lack of management talent in the South is legend, but the experience of the World Food Program (UN) will no doubt prove instructive to donors considering these in the future.

In the North, the World Food Program imports grain into Port Sudan, consigns it to the Ministry of Education for sale and allows the Ministry to use the proceeds to purchase locally available food for rural school lunch programs. The WFP monitor believes the program works with as much or more efficiency as other programs in the Third World, and he commends the Ministry of Education for their management capabilities.

In the South, after much trial and error, the food stuffs are imported from Kenya by trucks belonging to WFP with drivers paid by the program. WFP has paid representatives at each province level who accompany the distribution of the food-stuffs to the local village/school. This system has proven necessary because WFP could not guarantee delivery of food from its sources to the ultimate consumers.

Other projects requiring infrastructure, management, lines of authority, control and direction will likely face similar problems for the foreseeable future. This calls for development strategies which are significantly different than those in the relatively well-developed North.

AXIOM SIX

Adapted from the Marxist philosophy, the Sudanese pricing and resource allocation system can only be called chaotic. Scarcities abound; foreign exchange constraints require the licensing of imports; transportation is not sufficient, particularly when export crops such as cotton must be moved to the one port. Allocation decisions are by committee. The entire pricing structure is fragmented so that it can be used by special agencies and interest groups for special purposes. Finally, incentive patterns are neither rational in the distribution of scarce resources nor equitable in their discrimination against traditional agricultural production.

COROLLARY

Major adjustments are needed within the pricing/resource allocation system of the Sudan. The U.S. should cooperate with the international agencies in an attempt to generate sufficient force to push through potentially unpopular changes. In addition, any U.S. assistance program should probably piggyback with a development project or program which has sufficient horsepower to obtain the resource priorities necessary to make the program successful. Small, independent, unattached development operations, even those with strong interest and support, can easily be overlooked in the press of centralized decision-

making. Decentralized decisionmaking should be an integral part of any project or the time required for communications with the ministry offices in Khartoum will consume project management capabilities.

DISCUSSION

Several observations are useful in understanding the pricing/import/transportation allocation system in the Sudan. First, visitors at the major tourist hotels will be struck by the absence of imported items, such as towel rods which were ordered several years ago but "lost" in the priority system which allocates movement. Second, the UN has its own expeditors located at Port Sudan in an attempt to move the goods off the docks and onto the overtaxed, inefficient railway. Needless to say, the frustration level is high. Third, the water shipment down the Nile from the North to the South requires competing for scarce space on old and overused tugs and barges. Since one branch of the government tends to pay its bills late to another branch, priority on the water lines goes to the private merchants who pay more quickly and who are willing to pay higher rates. The United Nations Mechanized Training Program destined for Malakal in the South suffers from a requirement for government furnished housing for the instructor staff, as well as other counterpart assistance. In spite of signed agreements, and government interest, this program has yet to be activated nearly three years after initiation.

All of these problems are to be expected in countries without adequate infrastructure, and with rapidly expanding development aspirations. They are not reasons for withholding development aid. Rather they suggest that the aid given should be carefully integrated into programs and projects of sufficient size and priority as to help overcome some of the most serious bottlenecks.

The summation of the IBRD on this point is worthwhile to repeat:

"Since rapid economic growth in Sudan would appear to be dependent upon an agricultural-export-based development strategy, trade, fiscal and price policies

should stimulate modern agricultural sector production (especially for export to the Middle East and other expanding markets), encourage traditional farmers to enjoy returns from the cash economy and ensure that expansion of the industrial sector does not extract a heavy tax on agriculture. But detailed analysis by the ILO indicates that present policies discriminate against agricultural production in general and exports in particular.¹ More specifically, these policies² have led to crop producer prices which imply sizeable implicit/explicit taxes on crops relative to their international price parities. Together with the taxes on imported inputs for agriculture these add up to significant effective taxation on value-added in crop production. Furthermore, significant differences in the rates of such taxation across crops, together with slow adjustments of cropping patterns in agricultural parastatals inhibits Sudanese agriculture from making best use of international trading opportunities. Finally, and equally significant in its adverse effects, is the fact that the administrative procedure and responsibility for designing the relative price framework in agriculture is severely fragmented. The cumulative effect of these policies are manifesting themselves in declining crop yields (para 9) and worsening financial position of the agricultural parastatals.

¹ The ILO, Growth Employment and Equity: A Comprehensive Strategy for Sudan, 1975.

² The main policy determinants of the structure of incentives in the agricultural sector are: (i) foreign trade taxes, subsidies and quotas; (ii) producer price policy/marketing arrangements; (iii) local taxation.

AXIOM SEVEN

Two government organizations which may be of direct interest to AID work (or have the potential to work from the central government down to traditional farmers. These are the Ministry of People's Local Government and the Ministry of Cooperatives. A 1971 reorganization of the Ministry of People's Local Government has established a formalized system of elections, committees, budgets and services with some decentralized responsibility; but much subsidy from central government resources. The Ministry of Cooperation is new, embarking into the area of rural production services. Both should be the object of considerable study by the U.S. to examine their development potential at the bottom of Sudanese society.

COROLLARY

Traditional peoples need organization, lines to higher authority, channels to outside resources, champions in higher councils which decide on priorities and development projects. Either or both of these Ministries might perform such roles. Both are recommended for consideration for any U.S. assistance program.

DISCUSSION

Rather lengthy details on the Ministry of Local Government are given in Annex I to Section I, and details on the Ministry of Cooperation are presented in Annex II.

AXIOM EIGHT

The United States is likely to provide only minor contributions to capital requirements of development in the Sudan. However, most officials appear ready to accept this reality if the U.S. provides "high technology," admired and desired by the Sudanese. This high technology is defined broadly and can be used to justify AID's concern for traditional farmers as well as satellite imagery. The result may be that the more useful the technology as perceived by Ministry of Finance, Planning and National Economy officials, the less capital contribution will be required to obtain the advantaged position of a preferred foreign donor.

COROLLARY

There are many areas in which the U.S. has advanced technology of direct utility to the Sudan. Some of these are:

- Communications space technology;
- Manpower development -- management training, middle-level organizational training, specific job-related training;
- Adaptive research, particularly in the application of modern farming methods (and modern farming machinery) to rain-fed, drylands in the western savanna and in the application of ecological maintenance and development of the lands recently brought under mechanized cultivation or lands in conflict between nomads and traditional farmers;

- Techniques of modern project monitoring and evaluation, to be used as tools for improving the efficiency and output of development projects; and
- Assistance in building local institutions which are viable, yet can enter the modern agricultural system.

DISCUSSION

During the final briefing with the Undersecretary of the Ministry of Planning, he commented upon the appropriateness of U.S. technology for the development of the Sudan. In particular he recommended manpower training at middle-levels, an emphasis on local institutions and traditional farmer development in which some results (e.g., water, health, feeder roads) were forthcoming rapidly while other results (e.g., increasing crop yields) might take more time. He was particularly interested in the application of adaptive research -- research to be used in ongoing development projects to make improvements on the impact of the development assistance.

ANNEX I: THE MINISTRY OF PEOPLE'S LOCAL GOVERNMENT

INTRODUCTION

The 1971 revision in the People's Local Government Law replaced a structure which was established in 1951, with modifications in 1960. Under the 1951 law there were 86 local units for rural administration; Province Act of 1960 instituted decentralization by introducing with provincial councils. The 1971 act provided for just one corporate body at the provincial level -- the executive council. Thus one budget holder makes a budget for the entire system including the lower tiered councils, sending authority down the structure (as well as taxing responsibility) and sending its own general expenditure budget up the structure to the central government for approval. The budget is approved by the central government (Ministry of Finance) and when the local revenues are not sufficient to meet the current expenditures, the central government makes up the deficit in a revenue-sharing kind of operation.

THE BUDGET

Each province sends in a consolidated budget, one designed to cover operating expenses in the province. In addition to current expenditures, each province is authorized to have 12 percent of its total budget in development expenditures, to be selected by the Executive Council of the province.

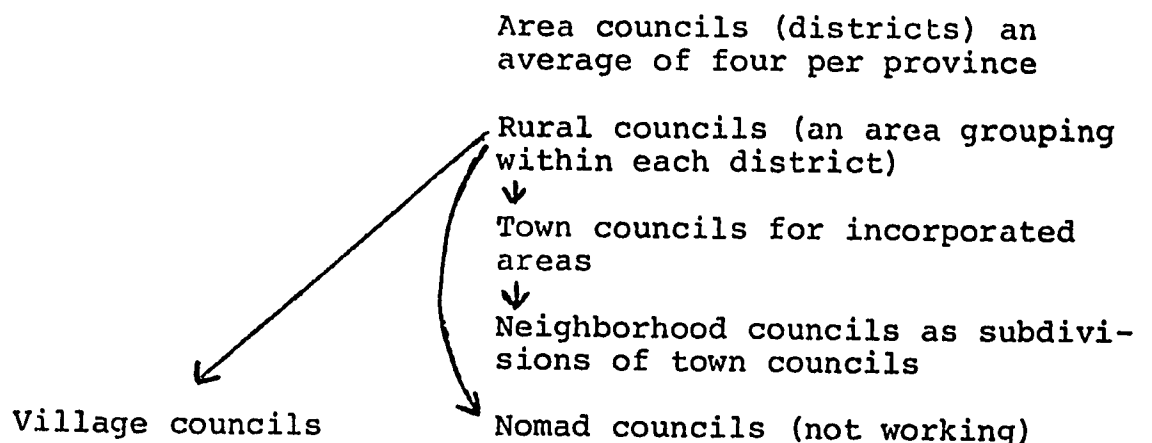
In addition to the provincial budget (much of which must be covered from central government funds due to a deficit in obtaining local revenues) the province has several additional means of obtaining resources. First, the line ministries can place money in their development budgets for work in the province. The Mechanized Farm Schemes, the Agriculture Research Stations, the textile mills, sugar refineries, etc., are funded from the national development budget and are not a part of the provincial budget. In addition, the Ministry of People's Local Government can place funds in its development budget for items which the province requests and which other responsible ministries have not covered in their budgets. Any duplication is expected to be identified and eliminated by the planning commission during the formulation of the six-year plan.

In actual practice, this means that the province budget may include funds for the purchase of road building machinery to maintain the roads outside of the national network. In addition, the Ministry of Public Works may have money budgeted in its development budget for road maintenance machinery for provinces. Further, the Ministry of People's Local Government may have (and in fact does have for the coming plan), funds in the development budget for road building machinery.

The budgeting process has several other features. The maintenance of any construction, salaries to keep it going, etc., pass from the national ministries to the provincial budget after construction has been completed. This means that each national development program in a province brings with it an increase in provincial current budget expenditures. Thus the roads to the mechanized farming schemes are originally constructed from the Mechanized Farming Corporation budget, but must be maintained by the local village council, a responsibility which the councils are not eager to assume, having no budget, equipment or staff of their own. While most large modern schools are built by the Ministry of Education, the vast majority of rural schools are constructed by the local population, occasionally with some small help from the provincial budget or national ministry budget. Salaries for school teachers then shift to the current expenses of the provincial budget.

THE STRUCTURE OF GOVERNMENT IN THE PROVINCES

The Executive Council, headed by the Province Commissioner, is the authority. Beneath the council are the following structures or tiers:



The village councils, nomad councils and town councils are elected by popular ballot.

Staffing

All provincial and lower tier personnel are seconded to the province, as the subordinate arm of the Ministry of People's Local Government. The Province Commissioners are appointed by the President and do not hold civil service status. There is no history of a commissioner being transferred from one province to another. He is either retained as commissioner, or replaced and given some other job, or perhaps given no job at all. Most commissioners are drawn from the ranks of the administrators from the Ministry of People's Local Government.

The People's Local Government staff at the province level averages about 60 -- that is, the staff which is not seconded, but which is on the permanent payroll of Ministry of People's Local Government, with retirement, salary, etc. This includes (approximately):

Executive Council	15-20 (headed by the Deputy Commissioner for Admin- istration)
Area Councils	5 each
Rural Councils	2 each
Town Councils	2 each

There are no administratively appointed salaried staff for the village councils or the nomad councils.

Composition of the Councils -- Provincial Level

Each Province has a warrant which specifies who will be on the council. In Kasalla province there are 97 seats on the council as follows:

- 30 allocated to regional representation, from rural and town councils:
- 10 seats to functional organizations, policy, army, unions, etc.;

- 13 to SSU people's organization, youth, women, workers, etc.;
- 20 to professionals, government, health, education; and
- 24 to women, since the law says 25 percent will be women on a geographic basis.

DEVELOPMENT BUDGET FOR MINISTRY OF LOCAL PEOPLE'S GOVERNMENT
FOR SIX-YEAR PLAN

The Ministry suggested the following areas for USAID support:

- Feeder roads, from the main highway -- some specific roads;
- Nine selected bridges which connect villages with towns;
- Road construction and maintenance equipment for use in local areas;
- Support for electrification -- there are now 100 sets of electric generators, wiring, etc.; assistance is needed in installation; and
- Training of engineers and technicians.

SELF-HELP IN THE SUDAN

There is, by all accounts, a strong tendency for self-help projects in the Sudan. These include health centers, dispensaries, stations (all different classifications of health delivery posts), schools, refuge collection, drainage, roads, markets, etc. When local communities cannot bear the entire cost of self-help operations, they can appeal to the development budget of the province, the current expenditure budgets of the province, concerned ministries, or the Ministry of People's Local Government. There are no line items in any development budget submissions of any of the ministries, including the Ministry of People's Local Government, for support to self-help projects.

ANNEX II: THE MINISTRY OF COOPERATION

INTRODUCTION

Cooperatives were started in the early 1930's in the Sudan, and cooperative law was passed in 1948. Cooperative organizations were very strong in the irrigated (pump) schemes along the Nile north of Khartoum. This situation is due to the fragmentation of land and to the use of cooperatives to farm land on which the owners were not living or working. Although cooperatives have received little support from previous governments, the people work together in a spirit of cooperation and this can be the basis for a strong cooperative movement.

In April 1975, the Ministry of Cooperation was established, with a Minister of State for Cooperation and an undersecretary. Cooperatives are now officially appointed as the second sector in the economic structure:

1. Public sector;
2. Cooperative sector;
3. Joint sector (mixed);
4. Private sector.

Nationally, 3,000 cooperatives are registered and 2,000 more are in the process of approval for registration. There are 60 local unions composed of groupings of local cooperative societies and 12 regional cooperative unions which are organized on a provincial level. As an illustration, in the area around Khartoum there are three regions. The local cooperative societies form into a cooperative union for each of the three regions. Then all three unions are grouped into a regional cooperative union. This is the organization which deals with the Provincial Executive Council, and through which the Executive Council makes its distribution of scarce commodities.

REQUIREMENTS OF THE COOPERATIVE MOVEMENT

Training and Credit

According to ministry officials, the cooperative movement needs training because the purpose of cooperatives is to create and support local initiatives and credit facilities. At present there is little credit available and high rates of interest are charged on that credit. The Agricultural Cooperative Bank has a capitalization of \$ 10 million, which it lends to both cooperatives and commercial enterprises, public and private. The Ministry of Cooperation has submitted a proposal to the government that a Cooperative Development Bank be created to finance development needs of the cooperative movement. This would be financed with a capitalization of 37 per cent government with the remainder of the funds raised internally from the co-op movement.

Cooperative Projects to be included in the Submission for the Six-Year Plan

1. Offices and homes for officials of the Ministry.
2. Model villages for cooperatives. This would apply to the 50 per cent of the rural population who live in settled villages.
3. Regional training centers (5) to be established.
4. Mobile mechanical workshops for Northern and Nile Provinces. At present there is one mobile maintenance lab and 14 technicians. This has British support.
5. A building for the Central Ministry.
6. The introduction of carpet manufacture. Home producers now operating in Northern Darfur should be brought together and better machines obtained. This scheme has been surveyed and approved by the Industrial Bank.
7. Maintenance workshops in the Gezira where the tractors are owned and maintained by local cooperatives. (Ministry people claim that many of the activities in Gezira are organized under cooperatives.)
8. Women's workshop for embroidery and handicrafts in Khartoum.
9. Mobile camera automobiles (audio-visual vehicles) to assist in the mobilization of local rural villagers to understand and join cooperatives. Twenty-eight cars are needed for the initial "organizing" phase.

10. Hostels or boarding houses for trainees at regional and national training centers.
11. Two fishery projects; marketing in the White Nile and marketing and production in Lake Nuba.
12. Model cooperative training farm.

Miscellaneous Requirements

1. Assistance with consumer cooperatives.
2. Help with the rehabilitation of old pump irrigation cooperative schemes in Northern and Nile Provinces, areas in which cooperative societies are a decisive factor. They have problems because the Nile changes course, and the pumps wear out. Small schemes should be consolidated into bigger ones.
3. A documentation center and library. They also believe it would be very helpful to have some scholarships to the University of Wisconsin Cooperative training school and some exchange with experts coming to the Sudan.

Regional Centers

The Six Year Plan calls for the establishment of regional training centers. Branches will be assisted by the national center, yet they will be autonomous in operation. They will send their advanced students to the national center, much like post-graduate training. The first center is scheduled for Northern Kordofan province, and two are to be constructed during each of the next two years.

The centers will train cooperative members (membership training), Boards of Directors of cooperatives, local cooperative union leaders, etc.

Consumer Cooperatives

Employees of government public corporations can apply to be recognized and licensed as a consumer cooperative. This is to allow the employees cum co-op members to receive distribution of scarce goods through the cooperative system. As explained by Undersecretary M.A.H. Giha, the Province

Commissioner has the responsibility to provide for the distribution of scarce commodities (sugar, for example) sent to him by the central government. One of the options for this distribution is through the regional cooperative union, to the area cooperative unions and then to the local cooperative societies. In greater Khartoum this system is used by the Provincial Commissioner which places great emphasis on joining such local societies. All members of the senior staff of the ministry -- including the undersecretary -- were in fact members of some consumer cooperative.

Production Cooperatives

Sixty per cent of the agricultural output in the Northern and Nile Provinces has been handled by agricultural cooperatives, although emphasis in the Ministry of Cooperation is shifting to production cooperatives. This is caused by land fragmentation in the North, where many of the farmers have inherited land which is too small to work profitably. Some of it is worked by the cooperative with hired labor. There are 60 Ministry of Cooperation staff in the Northern and Nile Provinces, but they do not provide extension or agricultural technical services, a responsibility held by the Ministry of Agriculture.

The Ministry of Cooperatives cooperates with the Ministry of Agriculture by requesting trained agriculturists be made managers for all agricultural production societies. At present there are 15 schemes which are run by Ministry of Agriculture personnel. More will be coming in the future as the Ministry of Cooperatives presents a list of all the agricultural societies which need trained agricultural managers. By agreement with the Ministry of Agriculture, these will be furnished. In the future, however, the Ministry of Cooperation intends to train its own managers.

The Ministry has nearly 300 university graduates, but many are not adequately trained. Of 13 newly opened rural offices in South Kordofan Province, seven hold a B.S., five are cooperative officers with 10 to 15 years experience, and two are co-op supervisors with five to six years experience.

Report on a Trip through Southern Kordofan Province

The Deputy Undersecretary for the Ministry of Cooperatives, Babiker Mohamed Ali, recently led a 40-day trip through

Southern Kordofan Province. He was heading a team of specialists surveying the needs of the local people, helping to organize new cooperatives and to strengthen old ones. This included an audio-visual car to show movies. In a separate interview with him, he reported as follows:

There are two categories of mechanized cooperative crop schemes in the Sudan. The first category includes those cooperatives in the Northern and Nile Provinces, which he believes are not successful. The original owners no longer live on the land, nor do they work the land; the cooperatives serve as management for hired labor. He would prefer to organize the laborers. The land, originally owned by the state, was given to the cooperatives. The license was issued to the cooperative, and land is not individually owned. This is the general formula where land is not freeheld.

The second category is in Southern Kordofan Province in the Habile area, where there are 8 or 9 societies. There are still many problems, since the land allocated to the cooperative is often many miles away from their village homes, which does not allow a permanent settlement at the site. Not all the society members are farmers. Some examples of cooperatives follows:

The Al Bur Rat (phonetic) cooperative was started in 1973 with a membership of 213. There were no shares for the agricultural society; it was formed with the profits of a flour mill. All members are farmers. They obtained 1,000 feddan and cleared it themselves by cutting the trees and removing the stumps. In 1974, they added 300 feddan. Tractors and drivers were rented from the Nuba Mountain Agricultural Scheme at a charge of \$ 2.12 per feddan, which was paid by the society. They planted dura. The first season they had an excellent crop. In 1974-75 they expected an excellent crop but found an invasion of rats and field mice attacked the crop in the fields before it was harvested. This severely limited their output from the harvest estimated by the farmers at 40 sacks of dura a day. They have replanted the fields and they expect to clear 2,000 more feddan during the next year.

The Abus Noon (phonetic) cooperative was a flour mill society, too. The members decided to shift to an agricultural production society with 1,500 feddan and a membership of 348. They grow cotton, dura and sesame, and they use the machines from the Nuba Mountain Corporation. In 1975-76, this society obtained yields of 10 kantars of cotton per feddan from their land: an excellent yield.

Prior to the introduction of the tractor, the local people worked approximately 3 feddan, cultivating it by hand. There was a lack of dura in the area, and food had to be imported. The ability to work 5 feddan is a tremendous improvement on their income.

A third example is an area which does not yet have a mechanized farming scheme. This is Troujay (phonetic). People are very primitive. They collected money and opened a bakery, but it closed due to old equipment and procedures. They wanted a tractor so that they could cultivate the clay land. The Deputy Undersecretary attempted to obtain financing from the agricultural bank, but found that the local people could not meet the collateral requirements because they had no assets. The small village has a police station, a clinic and two shops; the people subsistence farm .5 to 1 feddan.

The Deputy Undersecretary also held discussions with the Nuba Mountain Agricultural Corporation and determined that they believe the approach should be to develop profitable mechanized farms first, and then turn the farms over to the cooperatives. The Ministry of Cooperation believes that cooperative organization should precede mechanization in order to establish a basis for a profitable operation and for the distribution of benefits from the mechanization prior to its implementation.

In dryland farming there appears to be little conflict between anyone offering technical assistance and the Ministry of Agriculture. This is because there is little or no Ministry of Agriculture extension in dryland farming. In irrigated farming, the Ministry of Agriculture is very strong in maintaining its dominate position.

Conclusions of the Field Trip

The team visited villages one by one and surveyed their needs. It covered all four areas of Southern Kordofan Province. They found people very interested in cooperation and advanced mechanized agricultural schemes. Everywhere there was a shortage of dura, the basic subsistence staple. The average cooperative had about 200 members, many started with flour mill operations. The Ministry of Cooperation submitted a request to the Province Commissioner to have 23 or 25 new cooperative projects in different places, and posted 13 new staff to assist in the development of cooperatives. His major recommendation was to give the villagers who had organized cooperatives land to farm which was close to their own village, thus allowing a permanent settlement. The Ministry of

Cooperation is now pushing multipurpose cooperatives in the agricultural sector.

The Nuba Mountain Agricultural Corporation

The Nuba Mountain Agricultural Corporation was formed in 1970 after a visit by President Nimieri to the Nuba area. He promised 60 tractors a year to allow the traditional farmers to mechanize. The original shipment of tractors was from the U.S.S.R.; those which followed were underpowered for the soil conditions, and few of the total actually work the land. There is no geographic concentration to the Nuba scheme; four tractors work in one area and three in another -- all on a rental basis to the village.

Deputy Undersecretary Babiker said that the heavy clay soils prevented cultivation except with mechanization. However, especially in the southern part of the province, there was plenty of rainfall.

The process by which the agricultural cooperative is organized is as follows:

1. There is generally a consumer cooperative, or a flour mill cooperative as a base;
2. A multipurpose cooperative is registered, and land areas for agricultural production are identified;
3. A request is made to the Province Commissioner to allow the village to use the land. It is particularly critical that land be made available close to the village, or the mechanization schemes will fail;
4. Once public land has been allotted, it will be cleared by the villagers and then it is ready for tractors. The Nuba Mountain Scheme can only supply a limited number of tractors, and the final purpose of the scheme is to allow the local villagers to have their own equipment and maintenance;
5. There is an open joining policy to the cooperatives. After organizational visits by Ministry of Cooperation officials, the people themselves elect 12 leaders, and these leaders are the ones who make contact with the Province Commissioner and allocate the land to be used. The land must be in economically viable units, usually 5 feddan. If there is not enough land for all those who want five feddan, it is allocated by the local cooperative committee.

6. The breaking of the land is done by tractors, which prevents many of the weeding problems. Spraying is also done communally, since all areas must be sprayed at the same time. However, the remainder of the cultivation is done by the individual farmer and family on individually designated plots. The farmers, after paying for communal charges of equipment and spraying, take their individual shares, depending upon their own fields and field efforts.

Mr. Babiker said that the maintenance of tractors was obviously a problem, but that the Nuba Mountain Agricultural Corporation was presently utilizing local people to drive and maintain the equipment. He said that the cooperatives could utilize the services of the Nuba Mountain maintenance shops for major overhaul, and teach the local cooperative personnel how to conduct the local maintenance. He mentioned that there were hundreds of tractors working on cooperative schemes in the east, and that these were maintained by the local cooperatives themselves.

VISIT TO THE NATIONAL COOPERATIVE DEVELOPMENT (AND) TRAINING CENTER

The center is new, not yet officially opened by the President. However, it is in use and 672 trainees have been part of intensive and specialized courses. Three of the most recent classes offered included advanced accounting training for Khartoum consumer cooperative managers.

The Physical Plant

There are three buildings inside the ubiquitous fence. One small building houses nine lecturers, one director, one foreign advisor (ILO/UNDP), secretaries, etc. A second larger building has two classrooms and a library on the second floor; the first floor is open space for small gatherings, etc. There is also an audio-visual aids room, and some equipment. The library has desks for clerks and assistants and lots of room with air coolers and ceiling fans. The third building has a kitchen and reproduction room on the ground floor and a large meeting room which could hold 200 people on the second floor. The center appears to have all the necessary fundamental requirements: it is well constructed without being in any way ostentatious.

There are plans to begin in 1977 (with the first year of the Six-Year Plan) a hostel for 50 students. In each of the succeeding years two more will be constructed with UNDP/ILO assistance. The hostels are necessary to provide a place for students to live during training.

SECTION II : PRELIMINARY SECTOR ANALYSIS

HEALTH

INTRODUCTION

More than any other sector in the Sudanese economy, the health sector is the most advanced in its planning. With the help of the World Health Organization (WHO), the Ministry of Health has put together a comprehensive National Health Program (published in 1975) which includes eight specific programs and a special volume devoted to the Southern Region. The entire program has been planned for the period 1976-77 to 1983-84. Although one of its key concepts is self-help, the recurrent costs for the entire period are at least \$40 million, the training costs at least \$1 million and the development price tag conservatively estimated at \$125 million.

It is noteworthy that the Sudanese government, faithful to its socialist precepts, has assumed full responsibility for health care of the Sudanese population. Except for government coordinated community self-help efforts, the private sector has only a very small role to play in the health sector.¹

¹ There are only about 120 fully private practitioners in Sudan, the majority of whom are in Khartoum. Government doctors, however, are allowed to run private clinics on the side.

HEALTH PROBLEMS

The government has identified malaria as the number one health problem in the country. Although endemic to the entire country, its prevalence increases from north to south due to different environmental and climatic conditions. In 1974, there were one million reported cases, but the true incidence of malaria in the country is probably at least three times that many.

From a program point of view, it is important to distinguish between two types of malaria. The first is the "natural" nation-wide malaria which exists wherever there is an environment hospitable for the breeding of the Anopheles gambiae mosquito. These conditions exist throughout Sudan but are particularly prevalent in the Southern Region. Since it is not feasible to change the natural environment, the only practical long-term strategy for control of this "natural" malaria is to eradicate the mosquito larva.

The second type is "man-made" malaria, a term which refers to a malarial situation produced and/or aggravated by agricultural practices related mainly to irrigated areas. This problem is particularly acute in the Gezira where it is predicted that without an immediate program of action, the malarial situation would progress from its current "low

meso-endemicity" to "holo-endemicity" by 1984. Since this type of malaria is at least partially created by human tampering with the environment, it should also be susceptible to corrective techniques. An effective anti-malaria campaign in the "man-made" areas would proceed on three fronts: first, a medical front, including mass chemotherapy and curative activities; second, an agronomic front, including improved irrigation and water management techniques and a considered spraying and insecticide policy; and third, a human front, which would include components of public information, health education and training in agricultural techniques which would reduce the prevalence of breeding grounds for Anopheles gambiae.

Another category of disease which the government has placed high on its list of problems are those caused by poor sanitary conditions. Gastro-enteritis, especially in children, figures importantly in this list. This category of health problems is among those which the community health aspects of the Primary Health Care Program (see below) are designed to attack.

Anemia and malnutrition are also widespread in the Sudan but have their highest incidence in the eastern districts of Red Sea Hills and Kassal and the western district of Darfur, where drought frequently occurs. Protein deficiency is also a problem in the south among people who do

not live along the rivers (where fish would be a source of protein).¹ Clearly, this kind of health problem is linked directly to the socioeconomic conditions.

Communicable and infectious diseases, such as tuberculosis, polio, diphtheria, whooping cough, measles and cerebrospinal meningitis, are sources of considerable concern in certain parts of the country, particularly the South. Another debilitating disease endemic to the South is onchocerciasis (river blindness). Worm infestations are also a severe problem. It has been calculated that schistosomiasis alone represents a yearly loss to the Sudanese economy of more than \$100 million.² Immunization and community health programs are indicated for these problems.

CONSTRAINTS TO IMPROVED HEALTH CARE

Constraints to improve health care in Sudan can be divided into five categories: socioeconomic conditions, lack of facilities, inadequate and improper training,

¹ Cattle are considered a source of wealth and are rarely slaughtered for consumption.

² See "Economic loss due to Bilharzia," Health Statistics Department Publication, 1974.

lack of finances, and an inadequate information and reporting system.

Socioeconomic Conditions

From the above discussion, it is evident that many of Sudan's health problems are linked to socioeconomic conditions. It is virtually axiomatic, of course, that poverty and poor health go hand-in-hand, but it is necessary to go beyond this to identify the socioeconomic conditions that create poverty and affect health. Such conditions in various parts of Sudan include:

- Severe climatic and environmental conditions;
- Lack of available technologies for improving agricultural output;
- Low levels of education among the populace pertaining to health, sanitation and nutrition;
- Customary attitudes inimical to potential sources of food and modern preventive and curative medical practices;¹
- Modernization techniques (such as irrigation) which create new health hazards or exacerbate old ones.

¹ Two examples from the southern region are illustrative: 1) the Nuer people have certain taboos against eating eggs and even chickens; 2) in the Murle area, there has recently occurred a drastic increase in infant and pre-natal mortality (due probably to venereal disease in mothers); one result is that the affected tribes have resumed the ancient practice of raiding neighboring villages to steal children.

Once health is clearly perceived as not just a medical but also a socioeconomic problem, projects can be designed in which both health and socioeconomic effects can be taken into account.

Facilities

Virtually all medical facilities in the country are government-owned and operated. These include 171 hospitals, including specialist hospitals, about 300 health centers, 1,000 dispensaries and some 1,500 dressing stations. There are also about 1,300 doctors (but fewer than 1,000 practicing) and about 1,700 medical assistants. Although the ratios of hospital and doctors to the population (1:1,000,000 and 4:100,000 respectively) compare favorably with many other African countries, this advantage is minimized by the low population density, the tendency for settlements to be scattered or for the people to be nomadic and by the uneven distribution of medical facilities throughout the country. The southern region, for example, with one-quarter of the population and with some of the more severe health problems has only 27 hospitals, six health centers, 110 dispensaries and 300 dressing stations.

The most common of these medical facilities, the dressing stations, are not much more than first-aid facilities.

Generally staffed by one assistant nurse, they are in no way set up to run an effective community health program.

Training

Medical doctors are trained at the University of Khartoum which produces about 180 medical graduates a year. A major problem, however, is that many of these doctors emigrate to Libya, Saudi Arabia and other Arab oil-producing countries to earn higher incomes.

Khartoum has one school of nursing which produces about 30 to 40 nurses a year. In addition, about 1,000 assistant nurses (male and female) a year are trained, the best of whom become medical assistants. Assistant nurses are recruited after nine years of education (end of junior high school) and are given three years of in-service, on-the-job training, very little of which is in community health techniques. Since it is these assistant nurses who are to become the backbone of the government's new primary health care program, it is clear that a massive retraining effort will be necessary.

Finances

As mentioned previously, the price tag for the government's proposed new health care program is steep. Development expenditure by the Ministry of Health has never exceeded \$7 to 8 million per year, yet the average yearly development cost of the new health program is in the neighborhood of \$15 million. Clearly, the government is counting on a heavy external subsidy for the greater part of its health program, and to this end, it has called a conference of potential donors to be held in Khartoum in October 1976. Representatives from AID and HEW have been invited.

Information System

In the course of preparing the National Health Program, it was discovered that the information and reporting system on health matters in the Sudan was inadequate. Some basic statistics were simply unavailable; hospital attendances were often underreported and systematic reporting lines had not been established.

The new National Health Program will inevitably place greater demands on the reporting and information system. Expansion of facilities over greater areas will probably necessitate a greater decentralization of information system operations. Personnel will have to be trained in basic data

collection and record-keeping. Of greatest importance will be the establishment of a system whereby communications can flow two ways, enabling village health personnel to pass on vital data to regional and national headquarters and enabling them also to receive whatever information they should have to do their jobs. As indicated in the preceding discussions, this information will not be just of a medical, but also of a socioeconomic nature.

THE NATIONAL HEALTH CARE PROGRAM

Sudan's National Health Care Program was prepared by the Ministry of Health with the collaboration of consultants from the World Health Organization and represents the government's attempt to establish priority areas of development in the health sector and to construct programs to overcome constraints to improved health care.

Certain features of the new program represent either departures from previous practices or new emphasis of the National Health Service. More attention will be paid to preventive as well as to curative medicine. Coverage will be aimed at rural and nomadic peoples as well as the urban population. Community participation and self-help will be fostered, particularly in conjunction with the Primary Health Care Program. Agricultural and economic development

TABLE 7

SUMMARY TABLE OF PROGRAM COSTS FOR NATIONAL HEALTH PROGRAM, SUDAN

Item	Program Title	Costs in U.S. Dollars		
		Development	Training	Recurrent
1.	<u>Malaria</u> nationwide	\$ 800,000	-	\$3,262,500
2.	<u>Malaria</u> man-made	-	-	6,322,500
3.	<u>Primary Health Care</u>			
	3.1 PHC services	41,966,610	518,250	16,896,900
	3.2 Public lack of health information and hygiene habits	609,125	309,375	119,000
	3.3 Communicable diseases that can be prevented by immunization	Unit cost: 20 piasters per immunized child		
	3.4 Protein calorie malnutrition ¹	-	-	3,047,500 ²
	3.5 Gastroenteritis	6,330,000	-	692,500
	3.6 Tuberculosis	-	-	461,575
	3.7 Sleeping sickness	137,500	-	112,500
	3.8 Kala-azar (Phase II)	77,750	-	46,913
4.	<u>Bilharzia</u> man-made	-	-	2,185,500
5.	Safe <u>water</u> supply	16,875	-	19,350 ³
6.	<u>Environmental</u> health	Subject to program formulation		
7.	Lack of food (<u>dura</u>) in certain regions of the Sudan	79,375,000	-	-
8.	<u>Onchocerciasis</u>	590,000	-	287,500

¹ Optional component.

² Cost of plan for production of parental rehydration fluids and the recurrent cost for the same plan per year. The actual cost for rehydration fluids by this program if imported by the Central Medical Stores, would be \$8,398,250 per year.

³ Pilot project, for research only.

Notes: 1. The annual recurrent costs for hospitals is \$25,689,983.
2. All these costs are at 1975 rates. An annual inflation rate of 6.5 percent is officially expected for the plan period.

Source: Extract from "Blue Book", National Health Program, p. 130.

will be seen as key elements in a comprehensive health strategy.

To address the health problems of the country, eight specific programs have been drawn up, the most important of which is the Primary Health Care Program. Each program has a separate budget and implementation plan and schedule.

1. Malaria Nation-Wide

The aim of this program is to reduce malaria transmission, with the aim of eventual eradication. DDT will be used in rural areas, and cases in the southern region will be treated with chlorquine. The major constraint to implementing this program is logistic - i.e., gaining access to scattered rural settlements via a poor or non-existent transportation system.

2. Malaria "Man-Made"

The aim of this program is to reduce the incidence of malaria by controlling the conditions which create breeding places for the malaria mosquito; by educating the residents and farmers of the large irrigation schemes in effective malaria prevention techniques, both at home and on the farm; and by establishing basic treatment centers for those who contract malaria. Benefits from this program are both social and economic. Included in the latter are the savings from avoiding future treatment costs and from reducing losses in production stemming from work-days lost by malaria sufferers.

The foreign exchange cost of the program, covering anti-malarial drugs, Malthion, larvacides and vehicles, represents 36 percent of the overall recurrent budget.

3. Primary Health Care

This program represents the government's attempt to rate good on its commitment to provide free health services to the entire population. The crux of the program will be the establishment by 1984 of 1,247 new Primary Health Care Units (PHCU), each manned by a single Primary Health Care Worker (PHCW). The aim is to establish one PHCU for 4,000 people.

The PHCU will have four functions. Like its predecessor, the dressing station, it will provide basic curative health care. It will also refer major medical problems to larger health units (clinics and hospitals). In addition, the PHCU will engage in such preventive health care activities as identification of malnutrition cases, immunizations, notifications of epidemics, ante-natal advice and case detections. Critically, the PHCW will also carry out health promotion activities such as advising the community on sanitation, hygiene, safe water, nutrition and will become actively engaged in all community development activities.

The major constraint to development of this program will be the training and retraining of assistant nurses, or PHCWs.

These key staff will have to be retrained in community health and preventive medicine. In theory, the PHCWs should be recruited from the communities which they will serve.

4. Control of Bilharzia in Irrigated Areas

The aim of this program is to control bilharzial infection in the Gezira and Managil irrigated areas by combining snail control with mass treatment of severely affected age groups, particularly children. An additional component of this program is research on snail ecology, infection rates and the economics of bilharzia infections and treatments in irrigated areas.

5. Safe Water Supplies

The aim here is to provide potable drinking water for human consumption. Shallow wells would be the main source of such water. An increase of 100 government dug and maintained wells per year is projected, which would add to the 900 government wells already in existence. A major drawback to this approach, however, is that it would not have a great deal, if any, impact on the majority of Sudanese who rely on some 30,000 privately owned wells, 850 haffirs and 30 dams for water consumption.

6. Environmental Health

The aims and details of this program have not yet been formulated.

7. Food (Dura) Supply

Certain areas of Sudan, notably Darfur, Red Sea and Equatoria, suffer from chronic shortages of the staple food dura.¹ These shortages are due to lack of rainfall, lack of storage facilities, inadequate road and transport facilities and other problems identified in the agricultural section of this paper. Thus the aim of the program is to increase agricultural production in these areas in order to overcome these shortages. By including this as a major program for the Ministry of Health, the government has recognized that food shortages are as much a health as an agricultural problem.

The overall development costs of this program, from 1976 to 1984, could surpass \$70 million. Major financial requirements are to establish safe water supplies for human and animal consumption, provide storage facilities for the dura and supply agricultural inputs such as improved seeds, fertilizers, tools and machinery, pesticides and credit. Major constraints which must be overcome include inadequate road and rail transportation, persuading basically nomadic peoples to adopt a sedentary way of life, and persuading even the settled population to adopt modern agricultural concepts.

¹ Dura is a type of sorghum.

8. Onchocerciasis

The aim of this program is to reduce blindness and other disabling complications of this disease through treatment of victims, while at the same time instituting limited vector control in areas of high infestation. Training of field staff and transportation, especially in the southern region, are major constraints to implementation of this program.

OPTIONS FOR USAID ASSISTANCE IN THE HEALTH SECTOR

The government of Sudan has gone farther toward identifying its priorities and establishing a development program in the health sector than in any other sector. The elements of the National Health Program as outlined here will almost surely be included, virtually as written, in the Six-Year Plan when it comes out in 1977. The program is ambitious, as it attempts to comprehensively tackle many different problems at once. The overall program is, nevertheless, quite sound in its objectives, its basic strategies and its fundamental concept including emphasis on preventive medicine, community health and including agricultural and economic development as integral parts of a health strategy.

With its large price tag and multiplicity of programs, the National Health Program will undoubtedly be seeking aid from many donors. The program, therefore, presents USAID with

several options for assistance which would fit both USAID and Sudanese priorities and complement the activities of other donors.

As a basic strategy for assistance to the health sector in Sudan, perhaps the best use of limited American development resources would be to concentrate on the primary constraints to improved health within the context of larger (integrated or area) development projects. The National Health Program offers ample opportunity to adopt this strategy.

Perhaps the most obvious area for assistance of this kind would be in the dura food supply program. The agricultural section of this paper will recommend assistance in food crop production, notably in Darfur and Kordofan Provinces, singled out as areas of food shortages. This would be a natural area for the design of a rural development project which would integrate health and agricultural objectives and would also attack the increasingly common development problem of sedentarization and resettlement.

The Primary Health Care Program also offers opportunities for adapting this strategy to USAID intervention. The PHCP clearly goes beyond simple medical assistance in its objectives. It is in essence a community development program with a fundamental health output. With this in mind, one way

USAID could be of assistance would be in the training of Primary Health Care Workers, not so much in the medical aspects of their jobs as in the community outreach and development aspects. USAID could provide technical assistance to actually perform the training or could offer to refine the methods by which the PHCWs are recruited.

An alternative strategy for USAID assistance would be to study how certain components of the National Health Program might be accommodated through an existing or to-be-established USAID country or regional program. Several of the eight health programs, for example, have a training component which might be funded through the African Manpower Development Project. This would apply to the training of Primary Health Care Workers as described above or to the training of administrators, researchers and other specialists for some of the other eight programs.

As recommended elsewhere in this paper, another USAID or country program might generate information systems to support development projects. Review for the National Health Care Program identified faulty reporting and information, both on the national and on the provincial level, as a major constraint to the promotion of health activities. Among the new responsibilities of the PHCWs in the PHCP will be reporting not just on medical activities per se but on community development activities and on concomitant behavior changes in the community.

Learning what to look for, how to get the information, how to report it, how to analyze it and how to disseminate it are not skills that are easily learned. Virtually all the new health programs, if adopted and implemented, as well as development programs in other sectors, will need to develop an information system of this sort.

EDUCATION

INTRODUCTION

The government of Sudan is now in the process of conducting a comprehensive Education Sector Review which will establish priorities within the education sector and formulate a program for the sector's development. The result of the Review, which is due out in early 1977, will in all probability become the basis for the education portion of the Six Year Plan. This paper, based on a review of interim reports and on discussions with members of the Review Task Force, officials in the Ministries of Education in Khartoum and Juba, University and research institute officials and with other members of the education community, will look at some of the issues in the development of education in Sudan.

SALIENT ISSUES IN THE EDUCATION SECTOR

1. The Role of Education

Education "in support of development" is only one objective of the government of Sudan, with regard to its

educational system. It should be noted that the government is very conscious of other roles for the educational system.¹ Other responsibilities of the system include training in morals and religion, inculcation of Sudanese values, citizenship training, national integration and understanding of the role of Sudan in Africa, the Arab world and the world at large.

These "other" responsibilities appear to be given as much if not more importance than the "development" objectives. The setting of these objectives clearly affects instrumental decision-making on types of education, curricula development and teacher training and also affects the setting of short-term targets. With national integration as a major responsibility of the education system, for example, the government has apparently made a commitment to achieving "universal" primary education in a relatively short period of time.

2. Primary or Basic Education ?

The Review Task Force has identified elementary education as the number one priority for educational development in the forthcoming Six Year Plan. There is still some question,

¹ See "Objectives and Targets of Sudanese Education: Final Report of the Task Force on Objectives and Targets." Education Sector Review, Ministry of Education, Khartoum, July 1976.

however, as to whether elementary education should continue to be a primary education cycle or whether it should conform more strictly to principles of basic education.

A primary education cycle is one in which the content of education as well as the selection of students are geared exclusively to preparing students for entrance to a secondary cycle of education. For those students who are selected to continue their education past the primary cycle this system works well, but for the majority (80 percent in Sudan) who do not continue their education past elementary school, there is little in the primary school cycle which prepares them for productive employment. Basic education, in contrast, is open to all age groups and is designed specifically for the majority of its students for whom the basic education cycle will be terminal. Basic education stresses attitudes and learning practices which are geared to the socioeconomic conditions of the community. It produces citizens with basic and functional literacy and numeracy skills and with certain pre-vocational attitudes and skills which are community-based.

The system which is emerging from the work of the Sector Task Force represents a compromise between these two education philosophies or, in other words, an attempt to adopt both philosophies at once. Structurally, the system incorporates two elementary cycle streams. The first provides continuation of the present primary school cycle run by the Ministry of

Education and lasting six years. The second stream (rather ill-defined at the moment) consists of an assortment of primary learning systems followed by a two-year "consolidation center". Included in this assortment would be village schools (started and run by villages themselves with little or no Ministry of Education input); religious schools (Khalawi, Koranic schools, etc.); basic education centers (only in the idea stage at present); adult literacy classes (ages 14 and above); private teaching and self-learning; and integrated rural education centers (IRECs).¹ It is through this combination of learning systems that the GOS hopes to achieve its goal of universal primary education.

These alternative learning systems (which have no defined length of time) are followed by the possibility of admission into "consolidation centers". Admission to these centers is open to anyone who can pass a basic literacy and numeracy achievement test. The consolidation cycles will run two to three years at which point students, along with the graduates

¹ IRECs are a type of primary schooling being promoted as part of the Second Education Loan of the World Bank. IRECs would have a multi-purpose function including primary schooling (grades 1-6), adult education, training in agriculture, farmer cooperatives, domestic science health and village crafts. The World Bank will finance 40 IRECs over a period of six years, the GOS will finance another 40. As pointed out by the head of the Education Review Task Force, even if this output were doubled, IRECs would be able to meet only about two percent of the primary schooling demand, and the rather high costs of the IRECs (\$1.3 million over the period of the Six Year Plan), plus the fact that they require a settled community to function make them impractical as the basic primary schooling model for Sudan.

of the regular primary school cycle, would be eligible to take the junior secondary school entrance examination.

Many of the elements of this new system of elementary schooling -- finances, teacher training, etc. -- have not yet been worked out. It would appear that the alternative learning systems, in conjunction with the regular primary cycle, offer some opportunity to spread the benefits of basic education to a maximum number of people at little cost and without putting inordinate pressure on the absorptive capacity of higher educational streams. However, the content of education in the alternative systems must be defined in such a way that the systems are seen as terminal for the vast majority of students.

3. Technical, Vocational and Agricultural Education

The GOS has apparently already decided against an expansion of secondary school facilities in favor of upgrading the quality of and a diversification of the content of those facilities.¹ A debate is now in progress, however, over whether technical and agricultural education should remain apart from general academic education or whether they should be combined into a comprehensive secondary school curriculum. The Sector

¹ There are now in Sudan 10 technical crafts schools, two agricultural schools, three combined schools, one home economics school (for girls) and three vocational crafts schools, all at the upper secondary level.

Review Task Force is leaning toward comprehensive schools for academic and technical subjects while keeping agricultural and also vocational training separate. At the same time, the Task Force favors an attempt to introduce both technical and agricultural components into the curricula of all schools down to the primary level.

The DAI team felt that the Ministry of Education would be well advised to adopt the comprehensive, rather than the two-or three-track model of secondary schooling. It should also avoid the temptation to "vocalionalize" or "agriculturalize" the primary and secondary school curricula. There are two general reasons for these recommendations. First, formal schools are not well adapted for the teaching of skills leading to specific jobs: teachers are not properly trained, equipment is costly and difficult to maintain and the general attitude of a classroom is not conducive to learning "hands-on" skills. Second, a growing amount of empirical literature attests to the fact that students trained in technical, vocational and agricultural skills within the formal (usually secondary) school system emerge equipped with, at best, pre-apprentice level skills and often do not obtain jobs for which they are trained.¹

¹ Even if the "technically trained" students do possess the requisite skills, employers are often reluctant to hire them because they demand a higher salary than employees with less formal education but who have acquired their skills through informal and non-formal means (informal

Sudan, like many other African countries, has not had a particularly favorable experience with the training of secondary-level students in agricultural skills. In the 1950's, an attempt was made to introduce agricultural training into the junior secondary school curriculum at Bakt-el-Ruda with the intention of creating a corps of modern farmers. An office job in the Ministry of Agriculture was the closest most of the junior secondary school graduates got to working in agriculture.

4. Adult Education

The GOS has placed a high priority on adult education, which generally means literacy training. In June 1976, a central body for the abolition of illiteracy was established within the Sudan Socialist Union (SSU), thus lending the strongest political support to the activity. Local SSU cadres will organize adults (age 14 to 65) into literacy classes and the department of adult education in the Ministry of Education will provide the teaching and technical support for the literacy effort. Goals have been set to raise enrollments in literacy classes from the current 20,000 per year to 800,000 by the end of the Six-Year Plan. It is esti-

apprenticeship, on-the-job training, etc.). See the ILO/UNDP report on an employment mission to the Sudan, October 1975, Volume Two, p. 16. See also Foster and Clignet, *The Fortunate Few* (a report on secondary school leavers in Ghana and the Ivory Coast), Praeger, 1968; and Craig V. Olson, *Employment and Education in Senegal* (Ph.D. dissertation, The Johns Hopkins School of Advanced International Studies, Washington, D. C., 1976).

mated that the fulfillment of these targets will reduce illiteracy in the Sudanese population from the current 80 percent to 30 percent by 1982.

The government has also made some operational decisions which will go a long way toward facilitating the implementation of these programs. First, the operations of the adult literacy campaign will be decentralized, using local SSU cadres, and meeting administrative, transportation and other costs out of provincial budgets. Second, there will be some attempt to adapt the teaching to the needs of students; to this end, at least four types of functional literacy will be instituted: one for the agricultural sector, one for the industrial sector, another for the services sector and another for housewives.¹ Third, in order to recruit as many people as possible for the campaign, maximum use will be made of radio for advertising the program.

One major constraint will be in the recruitment and training of teachers. Some thought is being given to the establishment of a National Center for the Training of Trainers for Adult Education. Such a center would probably

¹ Based on the lower rates of literacy among women, the "housewives" literacy program will receive priority attention.

be costly, however, and ill-adapted to the decentralized functional goals of the campaign. Training designed for use at the provincial level, that could be run on an occasional and eclectic basis perhaps by mobile teams, and integrated into ongoing development activities would probably have a greater impact for less cost.

5. Education and Manpower Requirements

As mentioned previously, the goals of the Sudanese education system are multiple and do not stop with adapting education to the requirements of economic development. Thus, any assessment of how the output of the various streams of the educational system can be tailored to fit manpower requirements must start with the recognition that this output must fit into other than just manpower goals.

This having been said, there should still be considerable room within the educational system to adjust planning, at least in some strategic sense, to fit the nation's needs for trained manpower and to minimize an overproduction of graduates in those areas for which demand is weak. Unfortunately, the capacity to do this is virtually non-existent within the Sudanese government. The Ministry of Public Service and Administrative Reform (MPSAR) is responsible for meeting the requests for training of various ministries, but the DAI team could find no evidence that these requests stemmed from some

assessment of manpower requirements or that the MPSAR director of training had any criteria by which to judge how well these requests fit with the requirements of the economy or the government. Thus, the department of training functioned more as a department of educational exchange, processing requests and finding places (in Sudan or abroad) to fill those requests. There is, in short, no Manpower Department within the government and no capacity to perform this function. Only in August 1976 was a Manpower Section added to the planning capacity of the Ministry of Finance, Planning and National Economy.

One consequence of this administrative shortage is that many plans for secondary and higher education in the country seem designed either to increase the output of students in areas of surplus or to ignore areas of education where there is a real demand. The manpower survey conducted by the ILO¹ concluded, for example, that at current enrollment and growth rates, there would be a surplus of university graduates in so-called "development" occupations: engineers, architects, chemists and biologists, agriculturalists, veterinarians, medical doctors, and teachers; and also of technicians and skilled workers in the fields. The study also found that the

¹ See report of the ILO/UNDP employment mission, op.cit., Volume Two, T.P. 15, pages 17 - 23.

social rate of return to university education in general was only four percent compared to seven percent for tertiary non-degree education and eight percent for higher secondary education. The report states: "Much more is being invested in higher education than it would be possible to justify on economic grounds."¹ Despite these findings, there is every indication that the government will further expand the output of the higher education system. Two new universities, in fact, are scheduled to open next year, one in Wad Medani, the other in Juba. Both these universities will concentrate on turning out graduates in fields which the ILO predicts surpluses.²

The ILO study and a current study being conducted by a United Nations advisor attached to the Ministry of Finance Planning, and National Economy have also identified some areas of manpower shortages. Great demand is projected in coming years for managers and administrators, secretaries, and perhaps most important of all, for agricultural extension workers, particularly for services to traditional agriculture. Most agriculturalists and extension workers have in the past

¹ Ibid., page 22.

² These surpluses of high-level manpower help feed the continuing brain drain from Sudan to its neighbors. Most of the exodus of university graduates is to the Arab oil-producing countries where huge salary differentials also increase the drain. It is reported, for example, that the starting salary for a new graduate with a B.S. in a typical Arab oil state is \$800 per month, for an M.A., \$1,200 and for a Ph.D., \$1,600 per month. Comparable starting salaries in Sudan are \$125, \$150 and \$150 per month, respectively.

been absorbed by the parastatal agricultural agencies but these agencies have little or no function in traditional agriculture. Traditional agriculture remains the direct responsibility of the Ministry of Agriculture whose extension service currently employs only 47 university graduates, 31 technicians, and 83 field extension workers, operating 15 units throughout the Sudan. The demand projected here is not for university graduates but for agricultural technicians and extension workers who would normally come from secondary schools and from the agricultural institutes. But the Faculty of Agriculture at the University of Khartoum now produces more graduates annually than do the country's two secondary and two tertiary level agricultural institutes.

Another area of great demand -- and this is true particularly in the South -- is for trained managers and administrators. This demand is expected to increase as more of the economy modernizes and requires management either by the government or a parastatal organization. Thus there is a great need for institutes of public administration and management. At present, the only such institute in the country is the Management Development and Productivity Center (MDPC) in Khartoum. MDPC is government-financed and trains small groups of managers and supervisors in general management, industrial engineering, marketing, accounting, personnel and

research. It also does some consulting for organizations with specific management problems. MDCP appears to be well-run and doing a commendable job as far as it goes, but it is not large enough to dent the huge management training needs of the country.

The government will undoubtedly go ahead with expansion of its higher education system, despite indications of a low economic and development payoff from this initiative. The United States should probably resist overtures to give assistance directly, in the form of equipment, etc., to the new universities. However, there will no doubt be some scope for assistance in particular manpower fields through the African Manpower Development Project.

6. The South

The South, with its own Ministry of Education, has development problems in education which are at once more severe and different from those in the North. First, the South is only now emerging from its period of recovery and rehabilitation from the nearly two decades of "disturbances". During that time, most education, except in a few towns, ground to a halt. Thus schools have had to be rebuilt, teachers recruited and trained, equipment purchased, administration structure reassembled.

Already there has been a remarkable recovery. The region now boasts 488 primary schools, 58 junior secondary schools, 12 senior secondary schools, five teacher training institutes and soon, one university. Still only 20 percent of the primary school age group is enrolled in school, compared to 38 percent for the entire country, while the adult population is at least 95 percent illiterate.

The South faces problems: that of language. In the North, all instruction from first grade on is in Arabic. In the South, the first two years of instruction are given in one of nine vernacular languages. In the towns, the medium of instruction after the first two years then becomes Arabic, with English taught as a subject. But in the countryside, however, where the children have had little exposure to Arabic, English is used as the medium of instruction after the first two years and Arabic is taught as a subject.

The South must therefore start from next to nothing, to somewhat meet its own needs for trained manpower and to develop its system of education to fit regional needs without severing all educational ties to the North on which the South relies for the majority of its educational finance.

7. Research

Sudan has a number of different research institutions. Within the structure of the National Research Council is an Agricultural Research Council, a Social Science Research Council and a Medial Research Council. The University of Khartoum has the newly established Development Research Institute. In addition, many of the parastatal corporations possess their own research arms. The Agricultural Research Corporation (ARC) has prime responsibility for research in modern agriculture.

Almost all the research carried out in the Sudan is either of a theoretcial nature or is of a kind that cannot be easily translated into policy or action. This is hardly surprising in view of the fact that the University of Khartoum does not teach a single course in applied research or research methodology.¹

¹ "Applied" research is used by the ARC to mean work on problems which have been identified by field workers or project managers of development schemes. "Applied" means that the results, if there were results, would serve a real world function. But when ARC was asked how it had helped translate its research findings into use, it replied that all research results were published in annual reports and the extensionists could interpret the findings. The point is that "applied" research in the context of Sudan is not "adaptive" research - i.e., research to assist a development project to overcome a specific obstacle or problem, carried all the way through to the successful adaptation of the new technology by the farmers the project was designed to assist.

Many research institute personnel and University of Khartoum faculty members recognized this gap and requested assistance in developing an applied or practical research capacity.

A complete strategy for USAID assistance to education in Sudan must await the outcome of the Education Sector Review and the Six-Year Plan. Some preliminary suggestions, however, are in order.

OPTIONS FOR USAID ASSISTANCE IN THE EDUCATION SECTOR

As was recommended for the health sector, perhaps the best strategy for USAID assistance to the education sector would be to assist in those areas which would directly complement other USAID or GOS development activities. Since training or trained manpower are necessary components in almost any economic development activity, it should not be difficult to uncover ways in which this can be done.

One possible area for USAID intervention, for example, would be in curricula development or training in certain specialized areas in which the United States has expertise and which there is a demonstrated need for trained manpower in Sudan. One area could be public administration and management. The need for both of these high level skills will be greatest at the local level -- in provincial administrations, in the regional government of the South, within the structure

of cooperatives or new mechanized farming corporations, in the management of integrated rural development projects.

Another area would be training in applied research techniques. Virtually every economic development project should have a research component designed into it capable not just of carrying out base-line research but of carrying out the type of evaluative "applied" research that can be used to diagnose and correct problems as they arise in projects.

A third area for USAID intervention suggested by the operating discussion of issues would be in field of training for community development. Priority attention in education is apparently to be given to a community-based attempt to achieve basic literacy and universal primary education. The success of this will depend to a large extent on community cooperation and the tapping of whatever human and material resources are already available. Instructors for the World Bank's IRECs, in particular, are to be seen more as community education teachers than as primary school instructors. Such assistance might be offered in conjunction with a Food For Work Program through the legal arms of the Ministry of People's Local Government.

A fourth area for intervention would be in the field of educational technology. A large country like Sudan must rely heavily on modern technology, even space age technology for communications, education and related development activities. Sudan has already decided to install 15 receiving stations for domestic communication satellites and there is some reason to believe that the recently demonstrated ATS-6 satellite could be used for development benefit. In education, the receiving stations would facilitate the transmission of radio and television programs, but the necessary software would have to be developed.

Perhaps the most obvious area for USAID intervention, however, would be in the field of agricultural extension, particularly in traditional farming areas. This suggestion is detailed in the agricultural section analysis which follows.

AGRICULTURE

BACKGROUND

A. Summary

Sudan displays a wide range of ecological and agricultural production zones, but an essentially dual agricultural economy, split between the modern sector (large-scale irrigated and rainfed schemes) and a traditional sector of small subsistence cultivators and livestock herders. There is considerable potential both for expanding acreage under cultivation and for raising productivity per land unit. With the exception of areas in the west between the 16th and 10th parallel where population pressure and primitive technology have brought about overgrazing and environmental deterioration, Sudan, in general, is not a labor surplus, overpopulated country.

Relatively abundant high level manpower, underutilized resources and the friendship of wealthy Arab donors are a combination of factors that promise excellent prospects for agricultural development, providing that future projects can overcome constraints of inadequate transport infrastructure, chaotic pricing and marketing arrangements, scanty credit and inputs supplies, and a shortage of technical and low-level manpower. These constraints are particularly forbidding when

considering the development of the southern region, and of traditional agriculture as a whole which has been entirely neglected by governmental research and support organizations in their drive to expand modern, export-oriented agriculture.

GOS priorities and the activities of international donors lean in the direction of greater investment in modern irrigated and mechanized production schemes, but GOS policy also recognizes the importance of transforming traditional agriculture. This may well be the most fruitful area for AID assistance, given the need to address the equity objectives of development assistance in line with the Congressional Mandate's focus on the rural poor, and considering the desirability of avoiding overlap and duplication of other donor efforts now underway or planned.

B. Agricultural Regions and Production Systems

Sudan's ecological makeup includes:

- Northern desert inhabited by camel and goat herders;
- Traditional small-scale irrigation along the banks of the Nile, roughly from Khartoum north;
- The so-called central clay plains found in Kassala, Blue Nile, Southern Kordofan, and part of Southern Darfur Provinces;
- A semi-arid savannah zone stretching from Northern Kordofan west through Northern and Southern Darfur, where soils are a combination of heavy clays and goz sands;
- A heavy clay flood plain in Upper Nile and part of Bahr el Ghazal Provinces in the Souther region, site of the extensive Sudd swamps;
- Scattered hilly areas in Darfur (Jebel Marra), Southern Kordofan (Nuba Mountains), along the Ethiopian border in Blue Nile and Equatoria Provinces;

- The lateritic "ironstone" plateau in the extreme southwest in Bahr el Ghazal and Western Equatoria Provinces; and
- A limited "green belt" area of heavy vegetation in the southern highlands along the Zaire and Uganda borders.

The clay areas of Blue Nile and Kassala Provinces are the home of major irrigated schemes such as Gezira, Rahad, and Kashm el Girba, where cotton, wheat, sorghum, and groundnuts are grown by tenant operators on a combination of freehold and government land under the management and overall direction of semi-autonomous public corporations.

Traditional livestock herding occurs on a nomadic basis in the western and central parts of Sudan, with a pronounced and regular seasonal migration from dry weather grazing areas in the southern part of the range (Bahr el Ghazal and Upper Nile Provinces) northward accompanying the advance of the rains reaching Northern Darfur and Kordofan, and then retreating southward again.

Mechanized rainfed farming is a newcomer to Sudan agriculture; located in the cracking clay zones of Kassala, Blue Nile, Southern Kordofan and Upper Nile Provinces, mechanized farming is done primarily on a state-operated scheme and on privately-owned 1,000 to 1,500 acre sections, with sorghum and sesame as the principal crops.

Subsistence cropping on a shifting cultivation basis is widespread in the non-clay areas of the western savanna, the

mountain and highland areas, and in much of the southern region. Staple crops are sorghum (dura) and millet (dukhn), with small amounts of cassava, groundnuts, other legumes and pulses, and vegetables. Lastly, traditional irrigators follow ancient practices on five to 15 acre farms along the Nile banks north of Khartoum, in growing the staple cereal crops, fruits (e.g., bananas) and vegetables.

The involvement of smallholders in agriculture is found largely in the traditional sector; the major irrigated schemes are divided into 15 to 20 acre plots farmed by resident tenants and hired seasonal laborers. As noted below, these farmers are relatively high on the income scale, and therefore present different possibilities for AID assistance in comparison to smallholders as yet largely untouched by modern agricultural methods. Several modes of smallholder participation in improved agriculture are possible, including group or cooperative mechanized farming, combined livestock and cereals production in the savannah and southern zones, and production of high-value cash crops such as coffee, tea, tobacco and other horticultural crops in high rainfall upland areas.

C. Agricultural Population, Incomes, and Employment

Out of Sudan's total population of 17 million, about 90 percent live in rural areas and are engaged in either traditional or modern agriculture, including livestock herding.

Over 70 percent of the households in the Sudan have annual incomes of less than \$ 500, and less than 7 percent have annual incomes that exceed \$ 1,000.¹ Farm sizes range from averages of 2.5 feddan in Khartoum and 3.4 in Northern Provinces, to nine or 10 feddan in Blue Nile, Darfur, and Kordofan Provinces, to 37 feddan in Kassala Province.² Farm sizes in southern region are estimated to range between three feddans for largely nomadic peoples to 10 feddan for cultivators.

Illustrative incomes for specific segments of the agricultural population are given in Table 8.

Table 8: Agricultural Incomes

Category	<u>Income U.S. dollars</u>
1. Modern irrigators	-
2. Traditional irrigators	-
3. Livestock herders	-
4. Traditional cultivators	-
5. Gezira scheme cotton pickers (for 10 week season)	33.50
workers from Kassala	30.00 - 45.00
workers from S. Darfur	25.00 - 37.50
family from Darfur	75.00 - 100.00
6. Mechanized farming operators ³	10,000.00 - 15,000,000

¹ ILO vol. II, Technical Paper 20, p. 2.

² Ibid., p. 6.

³ ILO vol. I, section III-1, p. 22. Figure obtainable in a good year; in a bad year, losses may be made.

7. Cotton gin workers (6 mth season)	250.00
8. Urban sector (minimum wage)	40.50

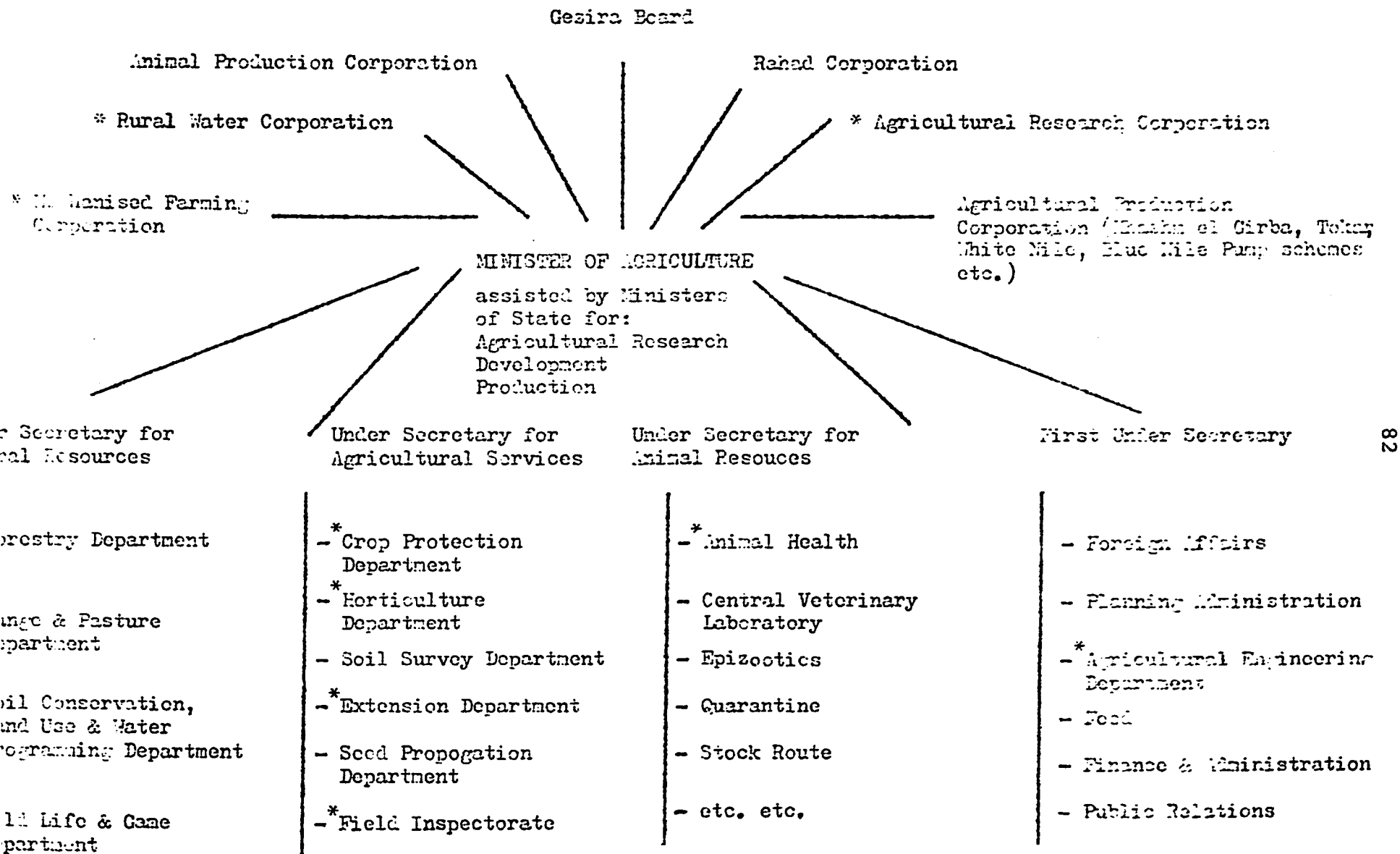
There are distinct regional differences in incomes. For Kassala and Khartoum Provinces, average annual per capita incomes may be \$ 375, five times that of the relatively poor southern region (\$ 75). The national average is about \$ 162.50. Regional differences are a function of the historical concentration of investment in areas along the Nile, and of resultant productivity differentials. The agricultural population of Kassala Province produces three to four times its proportional share of national agricultural output; for Blue Nile Province the figure is two to 2.5. Kordofan produces the same proportion of agricultural output as its population, whereas Darfur and southern region produce only a quarter to a half of their proportional share. These regional disparities in incomes are accentuated by uneven distribution of infrastructure and social services, which are particularly lacking in the southern region.¹

D. Agricultural Institutions

Land tenure varies throughout the country. The majority of land belongs to the government by law, but significant areas traditionally irrigated along the Nile are privately

¹ ILO vol. II, Technical Paper 20, pp. 13-15.

Organisation of the Ministry of Agriculture, Food & Natural Resources



* Departments represented in Southern Darfur Province

owned on a freehold basis. Similar private holdings are found in the major irrigated schemes such as Gezira and .Kashm el Girba. In traditional farming areas, cultivation rights are obtained by reference to tribal or official GOS administrative authorities. Mechanized cultivation requires a specific permit. Grazing rights are only nebulously defined, but areas customarily used by particular tribes are well known. Conflicts over cultivation or grazing rights are increasingly common, particularly in the western areas where nomadic groups must compete more and more with each other and with settled cultivators for resources.

Several ministries are involved in the agricultural sector; these include:

- Ministry of Agriculture, Food and Natural Resources (includes crops, livestock, forestry, fisheries)
- Ministry of Irrigation and Hydroelectric Power (does the civil engineering works for irrigation schemes, with technical and managerial inputs supplied by MOA and its public corporations)
- Ministry of Commerce and Industry
- Ministry of Cooperation
- Ministry of People's Local Government

In addition, there are a large number of semi-autonomous public corporations which fall under the aegis of the Ministry of Agriculture and are charged with the actual implementation of various agricultural schemes. Some of the most important ones are:

- Sudan Gezira Board

- Agricultural Research Corporation
- Agricultural Production Corporation
- Animal Production Public Corporation
- Mechanized Farming Corporation
- Rural Water Corporation
- Regional Development Corporation (southern region)

These corporations are funded partly out of their own revenues (when these are substantial, as in the case of the Gezira scheme) and by grants (subsidies) from the central government.

The role of these corporations in development is of paramount importance; aside from taking charge of specific schemes, they often also represent virtually the whole of the government's activity in certain functional areas, such as research and extension, input supply and marketing.

E. Pricing and Marketing

The GOS acknowledges the ad hoc and chaotic nature of agricultural price decision making. Decisions are generally taken at meetings organized by the Ministry of Commerce, in which the Ministry of Agriculture is represented. In principle, the committee considers production, export and pricing issues as a whole, but it is clear that in practice special pleas from the public corporations or other interest groups are presented and dealt with haphazardly. A Development and

Trade Committee has recently been established by the President, but apparently it has yet to begin deliberations.

As a result, the incentives reflected by relative prices are not always in line with GOS development priorities. Cotton, groundnuts, wheat and castor are the main crops which are subject to fixed producer prices. On some schemes such as Gezira where the emphasis is changing away from cotton and in favor of increased wheat and groundnuts production, price relationships are obviously important in determining farmer cooperation in new production campaigns. Other important pricing issues include:

- Charges for water -- not all irrigation schemes charge users for water supplied, and most (such as Gezira) provide water at heavily subsidized rates. Since expansion of irrigated production will substantially increase water demand in coming years, it is critical that this scarce resource be properly priced to encourage efficient water use.
- Livestock prices should be changed to reflect quality considerations. One aspect of improved livestock production is increased sales of young male animals to raise offtake rates, stabilize or reduce cattle populations and to provide a source of feeder animals for the proposed fattening operations. Marketing organizations must introduce the appropriate grading and pricing system.
- Agricultural inputs and credit. As in many developing countries, Sudan maintains a selective low-interest credit policy which has the ultimate effect of stifling the growth of local financial institutions. Together with import and tax policies that favor the use of capital goods, the tendency is to subsidize the industrial sector at the expense of agriculture. However, these are complicated issues that may not be subject to immediate policy change.

Marketing organizations are found largely in the modern sector. Cotton, wheat, groundnuts and castor must all be marketed through the appropriate public corporation (Oilseeds Corporation, Gezira Board, etc.), which has the marketing monopoly. In addition, the output of the state farms, which usually represents at least a part of any particular scheme, is marketed by the corporation concerned, while that produced by farmers within the schemes who are working freehold or leased land is marketed by the farmers themselves on an individual or cooperative basis.

Crop and livestock commodities produced in the traditional sector are largely consumed, but an active network of local markets and private traders serve as the outlet for any surplus. Private traders are often used as agents of public corporations, e.g., for purchasing of groundnuts in Western Sudan. Such traders occasionally provide their clients with consumer goods or cash advances against the value of the future crop, set at much below the market level. This sheil system of traditional moneylending is estimated to involve interest rates of 50-100 percent per season.

Certain ethnic groups may be exclusively involved in the marketing of a particular commodity, such as the Jellaba traders for livestock and Nigerian women for groundnuts. Typically, these traders are regarded as exploitative profiteers who capture benefits that ought to accrue to farmers

themselves. Whether their profits are indeed out of line with the true cost of the services they provide is difficult to say, since the obstacles to obtaining accurate information on trading costs have prevented any useful empirical answer.

F. Transport and Communication

Road, rail and river transport are all important elements of Sudan's infrastructure, and they are all inadequate for the needs of rapid development. The single rail track from Port Sudan to Khartoum, and the shortage of rolling stock present perennial and severe problems to private and public enterprise alike; the rationing of rail freight space is a source of inefficient resource allocation and abuse. River navigation by steamer service is available from about 60 miles north of Khartoum south to Wau, Pibor Post and Juba in the Southern Region. However, the facilities are antiquated and heavily overstrained on the southward leg of the journey, while underutilized on the northward return. Roads throughout most of the country are impassable during the rainy season and so poorly maintained that the costs of transport are very high. Khartoum and Wad Medani are currently linked by an asphalt road, and donor support has been obtained for many sections of the Khartoum-Port Sudan and Khartoum-Kosti links.

In sum, this situation leaves important producing or potential producing areas such as western and southern Sudan

isolated economically, as transport charges place a prohibitive constraint on regional imports and exports, if not rendering them literally impossible. Juba, for example, is 1,500 kilometers from the nearest sea port at Mombasa, reached by road through Uganda and Kenya, yet this route provides a more reliable source of supply than via Port Sudan, Khartoum and Malakal.

In addition to limiting the economic viability of many potential agricultural enterprises outside the Khartoum-Blue Nile-Kassala triangle, poor transport and communication are a major obstacle to the provision of government services-- whether development or social welfare -- and the growth of private enterprise. Development projects therefore face severe cost and logistical difficulties.

G. Supporting Services

Basic agronomic and social science research is carried out by the University of Khartoum (the Faculties of Agriculture, Veterinary Science, Animal Husbandry, Economics and Social Sciences and the Development Studies Institute), and the National Research Council, which includes subcouncils for agricultural, social and economic research.

Applied agricultural research is largely the function of the Agricultural Research Corporation. Based at Wad Medani and originally set up as the Gozira Research Station,

the ARC now includes all research disciplines at least nominally; it has four regional stations (Northern, Gezira, Kenana, and Yambio) plus several substations. In addition to crop research, there are stations dealing with fisheries, forestry, wildlife and pasture research.

While these research institutions do a good job of servicing the major irrigation schemes, they are otherwise quite inadequate. Economic evaluation of research results began at ARC only in 1974. Mechanization, improved livestock, and traditional farming in general have been virtually neglected, a fact which the GOS readily recognizes. Adaptive research using on-farm trials to generate valid field recommendations is almost non-existent. Furthermore, the transmission of research results from the station to the farmer breaks down at several points, one of which is the absence of any capability within the ARC or the MOA Extension Department which receives the formal research reports to digest and simplify results into usable form. Moreover, since the ARC has little contact with development planning institutions such as MOA or the Ministry of Trade, they are generally unaware of what crop or livestock enterprises currently have high production or export priority and should receive research attention.

Consequently, for most of the agricultural enterprises or farm systems in which AID is likely to be interested,

there is a complete lack of any applicable technology for improved production. This includes improved livestock, field crop production on a smallholder subsistence basis, and to a lesser extent mechanized farming. Neither the technical, nor the economic, nor the social requirements and benefits of transforming traditional agriculture are sufficiently known to serve as the basis for immediate development interventions.

If possible, the situation is even worse with respect to agricultural extension services. The Agricultural Extension Administration of MOA was established with U. S. assistance in 1958, and it represents the only extension capability outside the specialized production corporations. Staff number 208, of which a quarter are university graduates and a quarter have two years of post-secondary school training. An organizational structure stretches on paper from Khartoum to village level through province and district level, but in fact there is no field presence at all. Aside from their pitifully few numbers in relation to the needs of some two to three million farm families, the extension service is without transport, equipment and materials, or most importantly, any useful technical advice to offer.

In terms of manpower, training and extension message, the public corporations are clearly better equipped to service their tenants, although the DAI team was not able to investigate their strengths and weaknesses in any detail.

Yields on all the irrigated schemes are disappointingly low, and it may be that some responsibility for this lies with the organization or approach of the extension personnel concerned.

Agricultural credit is hardly available outside the organized production schemes, even to progressive well-endowed farmers. The Agricultural Bank of Sudan provides some medium-term development loans at concessionary rates, but only a handful of farmers, mostly those undertaking mechanized enterprises, benefit from this. There is no institutional credit for genuinely small farmers (in terms of farm size and income) in the traditional sector. Although the number of functioning agricultural cooperatives is still small, they suffer as well from a shortage of credit facilities.

Thus, there is no institutional capability, or successful experience, with respect to smallholder credit. As is commonly the case, the administrative and financial difficulties of operating such credit programs are likely to be formidable in the Sudan, especially considering that the requisite supporting services of extension and marketing are absent. In any case, the lack of a profitable package for improved traditional agriculture means that an effective demand for smallholder agricultural credit is yet to arise.

As the above remarks imply, transport and communication constraints hamper the provision of agricultural inputs and marketing services, both physically and by elevating their cost to unattractive levels. There is room for strengthening the institutions involved, but at present the infrastructure limitations are the most important. The weakness of these particular supporting services is likely to be especially damaging to development schemes involving mechanization (with its requirements for timely supplies of fuel and spare parts), and production of perishable commodities.

CONSTRAINTS, DEVELOPMENT POTENTIAL AND PRIORITIES

A. Constraints

Many of the constraints and problems that have a bearing on future development programs are implied by the above discussion and can be easily summarized. The major constraints are:

- Environment: unsuitable soils, topography rainfall and vegetation locally constrain agricultural production. In general, however, productive land is relatively abundant; climatic variation -- mainly erratic rainfall and river flows -- pose the greatest problems.
- Infrastructure: lack of road, rail and river transport and difficulties of communicating between various parts of the country are serious constraints.
- Manpower: though blessed with numerous highly-trained personnel, the Sudan lacks middle and low-level manpower, both technical and administrative. Agricultural labor supplies can be seasonally inadequate, a problem felt most acutely at present on the modern irrigated and mechanized schemes.
- Technology: a complete lack of profitable and well-adapted technologies for improving traditional agriculture and livestock herding, as well as noteworthy problems with introducing western techniques and machinery for mechanized farming under Sudanese conditions. Research programs and institutions have neglected these areas.
- Finance: balance of payments deficits to support a burgeoning development program will make it difficult for the Sudan to finance a normal level of local costs as part of its ambitious development program.

- Institutions: a variety of constraints are involved here. Agricultural planning, and pricing and marketing policies are poorly coordinated. Policy and implementation decisionmaking is fragmented among numerous GOS agencies, many of which still exist only on paper. Agricultural extension, livestock development, statistics and economic analysis have particularly weak institutional backup.
- Social/cultural: traditional values, combined with the hard realities of physical, technical and economic constraints, imbue the majority of subsistence cultivators and herders with a conservative, risk-averse outlook and very limited consumption demands. As attractive opportunities for improving agricultural productivity become available, however, it is expected that adoption of innovations will not be abnormally inhibited by cultural factors. Interethnic hostility is occasionally important, most notably (though decreasingly) between northern and southern peoples.

B. Development Potential

The potential for agricultural development in the Sudan, both in terms of agronomic and economic feasibility, is quite significant. Opportunities for development are sufficiently plentiful as to require some critical choices about what type of development is sought and for whom its benefits are intended.

One important source of Sudan's development potential is simply its ecological diversity, as the earlier description of agricultural zones indicates. Another is the comparative abundance of land and water resources in relation to the existing population; as yet resource scarcity has not become a binding constraint on increasing agricultural output and

incomes, although the incidence of population pressure and overgrazing in nomadic herding areas is increasing.

Scope for higher output, productivity and incomes is shared by all of the principal modes of agriculture:

Irrigated Agriculture

Of the four million feddan now under irrigation, about 2.3 million is cropped. Large-scale flood irrigation schemes make up two-thirds of this total, the remainder being smaller pump irrigation schemes mainly along the Nile south and north of Khartoum. Potential for expanding the areas under irrigated cultivation, mainly along the Nile or its important tributaries, is estimated at approximately two million feddan, but full implementation of this capacity would require additional supplies of irrigation water, which would be forthcoming from the proposed Jonglei canal project. Wheat, groundnuts, sugar and rice would be the best candidates for production on such schemes, in addition to cotton. Yields on existing schemes are low in comparison to feasible levels, and notable additions to output could be obtained through campaigns to improve cultivation techniques, water use and proper application of modern inputs, as in Egypt, Mexico or Peru. There is also ample potential for horticultural production under both flood and pump irrigation conditions, but realizing these opportunities would involve overcoming the economic constraint posed by deficiencies in transport infrastructure. Produc-

tivity on traditional small-scale irrigated plots along the Nile is also low; however, improvements in this sector await the identification of suitable technological and organizational formulas.

Rainfed Mechanized Agriculture

This is feasible over much larger areas than the 3.2 million feddan currently being cropped; as much as 4.5 million additional feddan may be suitable in areas of level, heavy clay soils.¹

Traditional Rainfed Agriculture

This covers roughly 15 million feddan and occupies about 1.7 million farm families. Labor supplies and primitive technology limit both the area cultivated and crop yields per unit of land. Improved seeds, inputs, equipment, and cultivation practices would permit both acreage expansion and greater productivity, resulting in higher output and incomes. Since the appropriate technology is not immediately available, attaining these potential gains is a long-term proposition. Staple cereals, legumes, horticulture, coffee, tea, and tobacco are all agronomically feasible.

¹ ILO III-1 [21-23] Production of sorghum, sesame, short-staple cotton and groundnuts could be substantially increased on a combination of large-scale state and private farms, and on groupings of mechanized smallholder plots.

Livestock Production

With 26 million cattle, 14 million sheep and goats and 2.7 million camels, Sudan has one of the greatest livestock resource endowments in Africa,¹ plus a potential grazing area of 120-150 million hectares. Development of these resources, like those of the traditional cultivation sector, will depend on research-based derivation of higher productivity methods and the provision of marketing infrastructure. The returns to such improvements are significant; an increase in the off-take rate from six percent to eight percent would result in significant incremental output of livestock products (meat, milk, hides, skins, etc.). However, an offtake rate of 16 percent may be necessary to prevent destruction of the ecology of the western savanna.

Fisheries

Fisheries along the Nile River and in Lake Nuba on the Egyptian border hold out the prospect of a potential 150,000 tons of fish per year. This is being assisted by the People's Republic of China. Small-scale fishing takes place more widely throughout the country, but the opportunities for developing this mode of production (except for protein) are limited.

¹ These figures were obtained from the Animal Production Corporation. The ILO Report estimates approximately half these numbers.

Forestry

This represents a very valuable resource development opportunity in the southern region, and gum arabic gathered from arid zone acacia trees now brings in export earnings of \$35.5 million. Commercially exploitable forests cover over 600 square feddans in the South, and include 21,000 feddan of teak with the remainder in softwoods. Properly managed harvesting of mature forests could yield substantial export earnings of both hardwood and softwood, with increased potential for sustained production over the long run. Gum arabic forestation in the western savannah areas would potentially provide export earnings while assisting in the maintenance of soil fertility in the western savanna. Other types of arid zone forest plantations are possible, but difficult to implement.

Naturally, the extent of Sudan's agricultural potential needs to be scrutinized in much more detail, in the light of technical, economic and social feasibility. The team observed several projects which were feasible in one respect (e.g., perfect climate and soils for horticultural production) but not in other equally crucial respects (e.g., availability of markets or effective demand). GOS plans and donor project documents also tend toward a rhapsodic assessment of development potential which needs to be sobered by a consideration of the obstacles which lie ahead. Nonetheless, it was the team's overall feeling that remarkable potential does exist in the Sudan.

Having looked at agricultural potential from the supply side, it is appropriate to analyze also the demand for increased agricultural output. A number of important commodities are in short-supply relative to domestic consumption requirements. These include wheat, sugar, rice, edible oil-seeds, fibers, coffee, tea, tobacco, fruits and vegetables, milk and eggs. Rough estimates obtained from the Southern Region Six Year Agricultural Plan (pp. 6-7) are:

<u>Commodity</u>	<u>Needs (Tons)</u>	<u>Production Targets</u>	<u>Surplus</u>
Cassava Flour	100,000	100,000	-
Dura (sorghum)	485,000	530,000	45,000
Maize	80,000	100,000	20,000
Rice (clean)	5,000	24,000	19,000
Millet	30,000	30,000	-

<u>Crop</u>	<u>Present Needs (Tons)</u>	<u>1982/83 Needs</u>	<u>Local Target</u>
Tea	22,000	25,500	1,000
Coffee	15,000	20,000	10,000
Cotton	10,000	25,000	NA

A substantial demand for processed or semi-processed agricultural commodities can also be inferred from the disparity between domestic supplies and domestic requirements. Demand for processing facilities therefore represents an important potential for development, together with that for production increases themselves.

Export demand for most of these same commodities, including cereals and legumes, also exists in large measure and represents an important longer-term potential. Nearby

Arab states in particular form a ready market, and their investors and the GOS appear to have reached a more or less explicit mutual recognition of the role Sudan can play in supplying its Arab neighbors with agricultural products. Horticultural crops and livestock products could also find a market in Europe, and some initial steps have been taken in this direction, particularly in supplying fruits and vegetables during the winter season.

C. Government Priorities

A complete and formal expression of the priorities of the GOS with respect to agricultural development will not become available until the publication of the 1977/78 to 1982/83 Six Year Plan, expected by the end of the year. Nonetheless, the team's conversations with Ministry of Agriculture and Ministry of Planning officials in Khartoum and the southern region suggest a consensus on the following priority areas:

- Achievement of self-sufficiency in strategic commodities such as wheat, rice, sugar, oilseeds milk, meat, eggs, fruits and vegetables -- essentially all those in which Sudan is now a net importer. Self-sufficiency in basic food crops is a particularly high priority in the southern region, where the 17-year civil war devastated regional services and infrastructure and caused over one million people to abandon their farms and flee to surrounding countries.
- New export of major items such as sugar, wheat, oilseeds and meat, in addition to continued exports of cotton.

In the southern region, priorities in addition to rehabilitation and self-sufficiency in food crops are to introduce cash crops (coffee, tea, tobacco) and improve traditional smallholder agriculture.

A similar emphasis on traditional smallholder agriculture was expressed by central government officials, although their actual priorities as revealed by specific project plans appear somewhat different. These concentrate heavily on expansion and mechanization of the major irrigation schemes, and on major additions to rainfed mechanized agriculture. In addition, the organization forms usually selected for implementing the major non-irrigated development programs concentrate heavily on large-scale state farms, plantations and involvement of large private farmers with relatively minor shares being accorded to nucleus estate/smallholder outgrower schemes, or schemes based on cooperative or group farming of smallholdings. And on the major irrigation schemes such as Gezira, plot sizes tend to be above average (15-20 feddan) and the tenant farmers earn incomes that place them in the relatively well-to-do minority by comparison to traditional smallholders.

On the question of priorities generally, the team observed a uniform tendency on the part of GOS officials to attach priority to nearly all sectors of the agricultural economy. The Director of the southern region Ministry of Finance and

and Planning explicitly stated the view that in the South development on all fronts should receive high priority. This may be more rhetoric than reality, but to the extent that it is true the result of course is to eliminate any effective setting of priorities and divert attention from the need to consider at a minimum where the country's scarce planning and managerial resources should be concentrated.

KEY POLICY ISSUES

GOS and donor decisionmakers face a variety of choices in development policy. The important ones that relate to the agricultural sector are discussed below. With respect to many of these policies, the GOS position is already clear, but in some areas the position is still evolving and might be usefully influenced during the continuing dialog between donor organizations such as AID and the GOS.

A. Equity and the Distribution of Benefits

The equity objectives of development are clearly important to the GOS, whose general political ideology is one of socialism. Particular interest has been expressed by the GOS in ensuring that the benefits of development are distributed to the relatively disadvantaged regions of the country, and to the large numbers of relatively poor inhabitants of the traditional rural sector. Some measures have been taken in this direction, by locating projects in the western and southern parts of the country and by encouraging the formulation of plans for improving traditional agriculture and bringing more of the rural population into the modern economy.

These measures are slow to bear fruit, and in the meantime, stronger rival interests -- namely the government and public and private corporate sector -- are making a claim for development

benefits as well, in terms of higher output, financial incomes and foreign exchange earnings. The government's poor balance of payments and financial position, and shortages of key agricultural commodities understandably drive it to seek higher output and incomes wherever they are most immediately available. For this reason, a good deal of emphasis and support are given to those in the agricultural sector who are already well off -- e.g., major irrigation corporations and their prosperous tenants, large-scale private farmers in both irrigated and mechanized agriculture and agribusiness investors in production or processing.

B. Short-Run Versus Long-Run Benefits

As noted above, the need to improve its international and domestic financial position and satisfy local demand for critical food products forces a short-term horizon on the GOS in some areas. Part of the emphasis on quick-returns mechanized farming derives from this concern, since alternative investments in expansion of irrigation and especially the modernization of traditional cultivation and livestock herding require a longer wait before benefits can be realized.

C. Export Versus Domestic Market Orientation

Both in policy and in practice, the GOS has consistently underlined the primary importance of securing a reliable food supply for domestic consumption, and for raising the production

of commodities in which Sudan is a net importer. Together with investments in oil mills and textile factories, this approach should bring the Sudan to self-sufficiency in many items in the near future. At present, then, there seems to be no serious cause for alarm that the quest for export earnings will divert attention from basic domestic needs.

B. Pricing and Marketing

GOS policy is to intervene extensively in the marketplace, through the use of price controls, tariffs and subsidies, and the granting of marketing monopolies to public corporations. Distribution of staple commodities such as sugar, oil and matches is the primary responsibility of consumer cooperatives located predominantly in the urban areas. In rural areas where traditional private traders are often believed to be exploiting the buyer, a frequent government solution is to propose public or cooperative takeover of transport, purchasing and distribution functions. Given the uncoordinated nature of price policymaking, and the shortage of organizational and managerial skills, this trend toward greater government involvement in market activities is not a desirable one.

E. Roles of Government, Private Sector and Cooperatives

As the above discussion suggests, much of the responsibility for production and distribution is assigned to public and private corporations, with more limited roles for cooperatives and small individual operators. By this emphasis, the GOS evidently ex-

pects to gain efficiency and speed up the implementation of development by relying on proven organizational actors. Yet the full participation of rural people in the benefits of development is not likely to be served by this approach, since it relegates the small man to roles as seasonal laborer, small-scale tenant or employee instead of giving him greater access to the profits involved. Whether state-controlled or private monopoly enterprises will in fact carry out their economic functions efficiently is of course debatable. More detailed analysis on the efficiency and equity implications of this strategy would be desirable.

F. Involvement of Foreign Capital and Manpower

Despite its socialist ideology, Sudan is eager to invite foreign nations to supply it with capital, whether public or private, and with skilled manpower. Major increases in proposed development spending since 1973 depend entirely on these capital inflows, and the Sudan has opened its arms to virtually all comers from Communist bloc countries, the EEC, the United States, the Arab oil states and the international agencies such as the IBRD and the United Nations.

Foreign technical assistance is welcome too, although Sudan is blessed with large numbers of highly qualified personnel at top levels in the government and its public corporations. The University of Khartoum has supplied many excellent

graduates, and substantial numbers have received post-graduate training from the United States and United Kingdom, as well as Eastern European countries. However, because of its brain drain of skilled people to neighboring Arab countries, and in order to benefit from the experience and diversity of training and skills which technical assistance offers, the GOS is relying on foreign experts to assist in the development process.

The investment of private agribusiness firms is also encouraged, and those specializing in farm machinery and agricultural engineering have already initiated contacts with the GOS. Sugar, tea and livestock production have been singled out as areas where corporate involvement would be welcomed by the GOS.

G. Mechanization Versus Employment

This issue has aroused considerable debate. The GOS has clearly attached high priority to expanding mechanization in its irrigated schemes and to opening large new areas to rainfed mechanized cultivation. For irrigated schemes, the rationale has been that key agricultural operations such as weeding and especially picking of cotton are hampered by seasonal labor shortages. Labor use on schemes such as Gezira involves large numbers (500,000 cotton pickers) and considerable organization, as tenants must travel to distant areas in western and southern Sudan to contract with and transport workers

to the scheme. In years of bad weather, subsistence cultivators in those areas readily migrate in order to supplement their inadequate on-farm production; in good years, there is less incentive to seek off-farm employment, and the possibility of labor shortages on irrigated schemes does arise.

Mechanization is also favored for its benefits in terms of improving the timeliness of agricultural operations, and permitting more thorough weed control -- both key aspects in increasing yields of cotton, wheat, sorghum and groundnuts.

To what extent this trend toward mechanization threatens the employment and incomes of small laborers and cultivators cannot be answered conclusively. What is clear is that it will displace some agricultural employment, create other jobs in ancillary processing, supply, service and distribution activities, and raise hard currency expenditures on imported machinery and fuel. Assessing the net effects of mechanization on output and the distribution of employment and incomes will require more detailed analysis of particular cases.

Mechanization's agronomic impact is not unequivocally positive either. Use of heavy tillage equipment can destroy soil structure, cause compaction and increase the danger of wind or water erosion. Relatively little tillage research has been done in the Sudan, but initial results show that the sandy

areas are unsuited to mechanization for reasons of erosion, and that the cracking clay soils, though best suited to mechanization, still require careful management.

Mechanized schemes especially in the remote western areas suffer from problems of servicing: maintenance, repair and spare parts supply. Fuel costs are an expensive foreign exchange outlay, and fuel supplies themselves can be erratic owing to bottlenecks in the transport system. These disadvantages of mechanization are recognized by the GOS, but there is a tendency to play down their real cost.

H. Land Reform

For the major irrigated schemes, the question is one of plot size. Tenants on the Gezira scheme have plots of 15-20 feddans, more than their own family labor can effectively cultivate and more than is necessary for an adequate income. ILO estimates indicate that with proper management, a seven feddan plot could yield an annual net income of about \$500, which is ample.

In traditional agricultural areas, an issue of increasing importance is that of the respective rights of livestock owners and the settled cultivators who occupy land within the area of customary nomadic grazing. As human and livestock numbers rise, the potential for competition and conflict over scarce water resources, damaged crops, et., has risen also and has become

a preoccupation of provincial authorities. A broad ecological perspective needs to be taken to this problem, and close dialog established with the various ethnic groups involved in nomadic herding, so that the boundaries of workable grazing zones and their interface with crop lands can be accurately determined and the rights and obligations of each group given some legal standing.

I. Administrative Decentralization

Although a heritage of centralized, top-down administration is still evident in the Sudan, the promulgation of the People's Local Government Act of 1971 led to some degree of decentralized power at the provincial level. Aside from activities within the province that are funded by the central government, other activities are financed by the province out of its own unified budget. Most of this budget, for which the province gets a block grant from Khartoum, is to cover recurrent operational expenses, but 12 percent of that total is provided in addition for the implementation of development projects of the province's own devising. Hence, the basis for local level planning and the financial capacity to implement such plans, is already in existence, and this capability can and should be strengthened.

The southern region has an even greater degree of autonomy, based on the Regional Self-Government Act of 1972. A key condition

of the settlement of the civil conflict between the North and the South, this arrangement grants the southern region its own government, including a regional Assembly and a High Executive Council with the full range of ministerial organizations. The region has its own revenue-raising authority, and its own development and recurrent budgets of which about two-thirds is financed by grants from the central government in Khartoum. Certain other development activities in the South are financed out of national development funds that are specially earmarked for the southern region.

ALTERNATIVE STRATEGIES AND OPTIONS FOR AID ASSISTANCE

For purposes of initial discussion, it will be best to consider a wide range of possible development strategies, and areas for AID assistance, which can then be narrowed to focus on those that are most promising. Criteria for eliminating some alternatives and selecting others will be suggested below, though this is not meant to prejudice or confine the discussion.

One general conclusion that the team drew from its discussions and field trips was that the parameters of development in the southern region are distinctly different from those in the North and West, so that a special strategy and project emphasis for the South will probably be required, beginning with more extensive preliminary investigations and feasibility studies than are necessary in the North. This is not to suggest that entirely unique problems are involved, but that a greater number of development preconditions are lacking in the South, and that a different approach to getting started will be called for. This will be discussed in more detail below.

The basic strategic alternatives for agricultural development are very well analyzed in the ILO report and serve as a good point of departure here. The choices are:

- o To strengthen and expand the modern agricultural sector -- irrigation and mechanized farming -- in existing relatively developed areas along the Nile and in the West and South. Such an approach would be capital-intensive, would provide for relatively little absorption of new farmers or laborers, and would be capable of implementation in the medium-term, providing the logistical problems of supply and transport can be overcome. Within this strategy there would be opportunities for altering the balance between irrigated and mechanized farming, between expansion of irrigated area or improvement of yield, or between development in the Khartoum/Kassala/Blue Nile region and that in the West or South.
- o To assist the traditional sector, both cultivation and livestock production. Given the absence of immediately applicable development technologies -- both organizational and technical -- this strategy would come to fruition over a longer time horizon. However, it would generate benefits for the relatively poor regional and income groups in the rural sector. Methods for initiating the development of traditional agriculture would in principle include (1) identification of key constraints that could be overcome with narrowly focused programs, (2) development of a low-cost, low-risk minimum package for raising crop or livestock productivity, (3) more ambitious and comprehensive integrated rural development projects, (4) state- or corporate-run estates with participation by smallholder out-growers, and (5) cooperative-based agricultural schemes. Which of these approaches is the most appropriate needs to be determined in relation to the agricultural zones and production activities concerned.
- o To develop a special strategy for the southern region, based on the following unique features vis-a-vis the North:

 - (1) the South's agricultural economy, institutions, and infrastructure were heavily damaged in the civil conflict, and the prime task of the regional government now is to complete the process of rehabilitation begun in 1972;

(2) the regional government is new and not yet fully organized or staffed; the cadre of qualified and trained manpower does not stretch below the top echelon, and the physical and financial capacity of government institutions to carry out development tasks is largely non-existent;

(3) as a result, although regional officials have formulated what is conceptually an essentially sound set of development priorities (improvements to traditional agriculture, self-sufficiency in food crops, introduction of cash crops), there is no research base, no proven technology for higher productivity agriculture, no delivery systems for information or agricultural inputs, no credit facilities, and very poor transport and marketing infrastructure.

Although it is clear from this that virtually all sectors of the regional economy need development assistance, it was the team's view that identification of effective modes of AID intervention in the South needs further investigation, and analysis, including discussions with UNDP and other donor organizations who have recently initiated programs there. The strategic dilemma is that whereas (1) tackling the South's development needs on a single front would result in a project that is immediately and mortally constrained by severe weaknesses in complementary sectors, nonetheless (2) an integrated approach to development would have to be so fully comprehensive and interdependent in its activities that the chances of successful design and implementation are remote. Since government institutions are too weak to be relied on for implementation at present, any donor project would be wise to establish a completely self-supporting, independent and vertically integrated

project management structure, and this of course would be highly expensive and possibly politically undesirable.

Subject to correction on the basis of more detailed design studies, the solution would be to emphasize activities that are simple, salient and capable of generating their own economic momentum and support through linkages to complementary institutions. One example of this is the IBRD-supported seed improvement, multiplication and distribution project based at Yei. The work of this project, easily supported by the donor, does not depend heavily on others for supplies or services, and (assuming the improvement program is an agronomic success) generates a product that is easy to "sell"--that is, can be easily distributed and adopted by small farmers.

Other examples that might fit these criteria include:

- o simple technology development for crop or livestock production;
- o training, e.g. management training;
- o equipment and technical assistance for already proposed mechanized farming projects, at least those that plan to involve smallholders--government support for this would be guaranteed; and
- o an integrated program (for a small geographical area) of adaptive research, on-farm trials and extension, perhaps coupled with construction or improvement of a key market road.

Such projects would have modest aims and yield modest benefits, but offer better chances for successful implementation.

Criteria for Selection

What are some of the criteria which should be applied in

selecting the best candidates for AID assistance from among the wide initial range of options? Briefly, these should include:

- o net effects on foreign exchange and domestic budgetary reserves;
- o the benefit distribution pattern of the project, who participates, who pays, who benefits and time phasing of the benefits;
- o ease of administration, at both the COS and project levels;
- o compatibility of the project with COS priorities, AID priorities and the Congressional Mandate, current and planned activities of other donors and areas of special US expertise;
- o contribution to more stable, nutritious food supplies; and
- o spread effects, chances for self-sustaining gains, rough benefit/cost or cost per participant measures.

Considerations of "efficiency" suggest that projects or general assistance areas should be selected that maximize the returns to scarce resources such as foreign exchange, local budgetary expenditures and managerial and institutional capacity. These will be at least implicitly in the minds of COS decision-makers, and must be taken into account. The equity objectives which are uppermost in the Congressional Mandate--direct benefits to the rural poor--are similarly important and exemplify the less tangible non-efficiency goals of development assistance which should also be reflected in the selection criteria.

How do the strategies suggested above measure up against these criteria? While noting again that a fully reliable answer to this question must await further design studies and the conclusions of upcoming international conferences on Sudan's

agricultural development, some preliminary and illustrative indications are given here.

For example, the following table gives a rough picture of the comparative effects of strategies based on irrigated agriculture, rainfed mechanized agriculture or improved traditional agriculture:

TABLE 9

<u>Category</u>	<u>Irrigation</u>	<u>Mechanized</u>	<u>Traditional</u>
Time required to achieve results	Five years	One year	5-10 years
Net foreign exchange requirements	High	Medium	Low
Demands on government services and budget	High	Low	Medium
Income and employment; what group benefits?	Middle income	High income	Low income
Cost/acre including feeder roads and water	\$750	\$50-75	\$30
Cost per farm family, owner, or tenant	\$13,750	\$75,000	\$300
Cost per farm worker	\$2,500	\$350	\$62.50
Incomes per farm family, owner, or tenant, estimates might be	\$1,000-1,250	\$10,000-15,000 ¹	\$250-500

¹ ILO figure.

Source: Based heavily on ILO Report, Technical Paper 2 and Ag Strategy Section.

A clear implication of the above table is that agricultural development strategies based on traditional agriculture are generally preferable, and they suffer only from the drawbacks of a long gestation period, high demands on government services and low resultant or incremental incomes. Another drawback is that the benefits of this strategy are uncertain as well as long term, owing to the lack of technology and delivery systems that are yet to be developed.

For this reason, a more realistic and useful approach would be to combine initiatives in the traditional agricultural sector with selected interventions in the modern sector that promise benefits to relatively low-income small farmers.

Overall, then, what specific project areas are worthwhile alternatives?

1. Adaptive Research

- On-farm trials to adapt research station results to actual farm conditions. This is a link in the research/extension chain that is not presently being handled by any institution in Sudan on a regular basis. Although a national capability for such adaptive research would be desirable, perhaps within the Agricultural Research Corporation, for AID's purposes the best approach would probably be a project-specific one, emphasizing the particular enterprises or enterprise combinations concerned.
- Anthropological/sociological research on nomadic pastoralists, again within the context of a particular development project.

- Ecological surveys related to livestock improvement and pasture management programs, as an input to design of feasible management units.
- Applied research on equipment and tillage methods appropriate for dryland mechanized farming.

2. *Seed Improvement, Multiplication and Distribution*

This is an area of particular U.S. expertise and a suitable form of technology development for improving Sudan's agriculture. Basic seed stock for cereals programs could be drawn from research programs in East and West Africa. Hybrid varieties, or those suitable for mechanized cultivation, could be drawn from the U.S., examples being sorghum, groundnuts, short-staple cotton, and soybeans, although some modification of such varieties has already taken place at international stations.

3. *Livestock Development*

- A close link between ecological and socio-anthropological dimensions should be maintained by providing the necessary technical personnel on a project-specific basis.
- The GOS is talking about livestock marketing and beef feedlot operations, supplied from increased offtake generated by various donor-supported projects (IBRD, ODM, Abu Dhabi) proposed for the western svannah region. U.S. expertise is quite relevant to both these operations.

4. Horticultural Production

Horticultural production could be a good foreign exchange earner. Agronomic research and cost studies have been carried out within the context of a semi-commercial farm run by the Faculty of Agriculture of the University of Khartoum. A small-holder production system would be the desirable one; there is some currently successful cooperative horticultural farming which could serve as a useful guide. Considerations of transport and access to markets dictate that such operations be located in irrigated areas near the Nile, but some thought could be given to fruit and vegetable production for local consumption in the Juba area of the southern region.

5. Management Services

- Monitoring/evaluation systems for improved project management could be a very valuable contribution to donor projects proposed for the western and southern regions. These involve complex objectives and activities and substantial sums of money and warrant if not require a thorough and systematic approach to project management. An AID intervention in this area could be distinctly delineated, since separate components for evaluation have been specified within the proposed projects. U.S. expertise is strong in this field also.
- Management training, especially for Sudanese officials and project staff in the southern region, would be relatively easy to implement and could be expected to have far-reaching beneficial effects.

6. Mechanized Farming

Mechanized farming is a major priority of the GOS, which intends most schemes to have a smallholder component for which AID support could be justified. Such schemes now suffer from lack of knowledge about optimum machinery types and tillage techniques for low-rainfall conditions. Financial losses and the threat of serious soil erosion and fertility decline have resulted. U.S. universities and research institutions in the Great Plains area, together with U.S. farm machinery companies, could offer useful advice here.

7. Agricultural Processing

The Team did not identify any specific opportunities for AID support here, but did note that demand for oilseed processing will increase rapidly in coming years. Other possibilities may reveal themselves in the course of later investigations.

8. Roads

Roads are not an obvious choice under the conditions of the current Congressional guidelines, but given the severe constraint posed by seasonally impassable roads in the western and southern areas of the Sudan, consideration should be given to feeder road construction or improvement in the context of particular projects, to facilitate the necessary supply and marketing operations, and the provision of productive government services such as agricultural extension.