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AGENCY FOR
INTERNATIONAL
DEVELOPMENT

DEVELOPMENT ASSISTANCE PROGRAM

FY 1975

Section Three:

SENEGAL, MALI, MAURITANIA

BEST AVAILABLE

DEPARTMENT
OF
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UNCLASSIFIED

CENTRAL WEST AFRICA REGION
DEVELOPMENT ASSISTANCE PROGRAM

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SENEGAL: MACRO-ECONOMIC ASSESSMENT

OVERALL PERFORMANCE OF ECONOMY

As a country, Senegal among its neighbors is reminiscent of a giant among mortals in terms of economic development. Dakar, its capital, is an impressive city with many modern buildings and articulate public officials. Per capita income in 1972 was about $200, above the regional average. Structurally Senegal resembles a more developed nation than most in Africa: the GDP in 1972 was composed predominantly of services (56 percent), of which commerce was 32 percent, transport 8 percent and public administration 16 percent. (See Table I). Industry accounted for 18 percent of GDP and agriculture for a mere 25 percent of GDP. Furthermore, raw agricultural products averaged only 15 percent of exports between 1969 and 1971. 1/

Behind this facade of development is a real Senegal with 90 percent illiteracy, low and stagnating agricultural productivity, low levels of social services, health and nutrition, and a rural population which is becoming progressively poorer in comparison to the modern, urban sector.

Senegal's relative development stems from an artificially high standard of living due to its privileged position as capital of French West Africa until 1958. This standard of living, based on expatriate presence and on the large administrative infrastructure supported by the French, was out of proportion with Senegal's economic potential and low level of education. Senegal's adaptation to reduced economic and administrative dimensions was painful, marked by a severe depression in the modern sector of the economy as agricultural production failed to expand sufficiently to support the pre-independence standard of living. The inherited ponderous administrative apparatus was little geared to respond to development problems, and initially concentrated on investment in infrastructure, manufacturing and expanded social services rather than in directly productive activities which would stimulate the economy.

According to official statistics, Senegal's growth rate since independence in 1960 has been low, averaging 4.9 percent in current prices. Translated into real terms, the annual growth rate has been around 1.3 percent slightly below population growth, reducing the real per capita income. Recent performance has been markedly improved. Although GDP showed wide fluctuation between 1968 and 1972, the growth of agricultural production averaged 5 percent per annum, value added in industry

1/ IBRD, Senegal-Economic Report, Vol I, 212-SE, 15 August 1973, page 6..

increased about 8.5 percent per annum, and services rose by 7.2 percent annually. These growth rates reflect activity spurred by the 40 percent increase in agricultural production in 1972. (See Sectors, Agriculture) Unfortunately, 1973 saw the worst drought Senegal has experienced in 60 years, resulting in a near halving of agricultural production. 2/ It is hoped that production incentives will continue to expand the agricultural basis of Senegal's economy.

A. SECTORS

AGRICULTURE

The Senegalese economy is primarily based on agriculture which engages over 70 percent of the labor force, contributes an average of 25 percent-30 percent to GDP, and provides the basis for groundnut refining and other industry. Groundnuts are the predominant cash crop, grown in rotation with millet and sorghum, the major food crops. Real potential exists for increased production of rice, cotton, vegetables and fruits in the south and southeast and in the Senegal River Valley if water resources are brought under control.

In 1972 total agricultural production amounted to nearly 1,950,000 MT, of which over half was groundnuts (988,500 MT), and about 1 percent was cotton, both cash crops. The remainder of production was for food crops, of which 62 percent was millet and sorghum, 15 percent manioc, 12 percent rice, 4 percent corn and 7 percent vegetables. 3/

The government has long sought to increase peanut production, which accounted for about 70 percent of exports during the 1960's and is a major source of government revenue (about 60 percent of government revenue). Production was anticipated to attain the 1.3 million ton mark by the end of the Second Plan in 1969. However, a combination of the low price incentive offered to the peasant, the mediocrity of extension services, and the practices of ONCAD, the peanut marketing board, prevented production from expanding rapidly and even promoted widespread smuggling to Gambia which offered higher prices.

Thus peanut production was only 830,000 MT in 1968/69 and dropped to 583,000 MT in 1970/71, owing in part to drought conditions, but mostly to a shift toward subsistence production. A major reversal seems to have occurred in 1971/72, when with a view towards regaining peasant confidence, the government introduced far-reaching measures including: 1) the cancellation of farmers' outstanding debts, 2) the payment of premiums for 1970/71 production and 3) a 15 percent increase in groundnut prices. As a result, small farmer demand for fertilizer doubled, that

2/ IBRD, page i-iii. (See Table I, Appendix)

3/ I.M.F., Senegal-Recent Economic Developments, SM/73/154, 6 July 1973, page 6. (See Agriculture Sector Analysis for details of production).

for small equipment tripled, and short-term credit jumped by almost 60 percent. Although acreage remained at about a million hectares, production increased nearly 70 percent from 583,000 MT to 989,000 MT in 1972, while 95 percent of farmer debts were repaid. 3/ Unfortunately, 1973 was a major drought year, but the government is continuing its promotional policy by having pardoned farmers' debts and by having undertaken emergency measures for food distribution and cash grants. The groundnut Stabilization Fund, which provides 40 percent of government revenue, realized a larger trading profit than forecast in 1973 owing to a 38 percent increase in the world market price for peanuts and a 100 percent increase in the price of peanut cake.

Less affected by the 1972/73 drought, cotton production has increased by nearly 10 percent annually in recent years, due mostly to expanded acreage. Cotton production is handled by the CFDT, which provides extension services, inputs, transport, ginning facilities and marketing.

In the livestock sector Senegal has made little use of its comparative advantage. This is due in part to insufficient budget allocations of only 1 percent of the government budget. Livestock suffers from the inadequacy of production infrastructure, extension services and commercialization channels. Livestock production is carried out by nomads in northern Senegal and by sedentary farmers in central and southern Senegal. The national herd was estimated in 1971 at 2.7 million head of cattle, and 2.8 million sheep and goats.

INDUSTRY

The industrial sector, defined to include manufacturing, mining, energy and construction, accounted for about 18 percent of GDP in 1972. Manufacturing production grew rapidly owing to import substitution in the early 1960s, and to rapid increases in exports subsequently. The increase in exports occurred mostly with respect to neighbor countries in the West African Customs Union. The long-term future of industrial exports lies in developed countries, particularly the EEC, if quality standards can be attained.

Food industries are the largest component of manufacturing, representing about 30 percent of output. Groundnut oil mills lead this sector, followed by canneries, flour mills, beer, and soft drinks and a sugar refinery. The textile industry is the second largest component of manufacturing, with 15 percent of output. This industry is relatively diversified, covering spinning, weaving, dying and ready-to-wear plants.

Other industries include leather, mechanical/electrical, chemical,

3/ I.M.F., page 7

tobacco/matches, a petroleum refinery, and wood products. (See Table II)

Mining accounts for a small portion of GDP, but has averaged 10 percent of export receipts in recent years. Production consists of two phosphate deposits, and salt. Transportation (about 100 kilometers to the Dakar port) has been a major bottleneck , with up to six months' production in accumulated stock. 1/ Prospecting for iron ore, copper and petroleum is under way.

B. BALANCE OF PAYMENTS

According to available balance of payments statistics for the period 1968-1971, Senegal has shown large external deficits on both goods and services and increasingly on investment income. Sizeable receipts of unrequited transfers from other governments (mostly France) and moderate net inflows of capital have compensated for these deficits. (See Table III.)

Exports have shown sharp fluctuations reflecting groundnut production (See Table IV.) Exports of other products rose steadily between 1968 and 1971, particularly phosphates and fertilizer, petroleum products, textiles, and metal products.

Imports increased at an average annual rate of 7.9 percent during 1968-72. This expansion reflects imports of capital goods, which accounted for nearly half of the total increase, or about 23 percent of total imports in 1972. (See Table IV Raw materials and semi-finished products accounted for another 20 percent of imports, while consumer goods accounted for 23 percent of imports.

Food is the largest import category, amounting to 28 percent of imports. Rice accounted for 43 percent of food imports in 1972, but is expected to rise sharply in 1973 accounts owing to the drought as well as to rising prices. Sugar accounted for about 21 percent of food imports. Domestic production of both these items is expected to rise substantially. Tomato paste and canned tomatoes, wheat, dairy products, kola nuts and beverage constitute the remainder of food imports.

Senegal's direction of trade is primarily with France, which accounts for 58 percent of exports and 48 percents of imports. The European Economic Community follows with 10 percent of exports and 15 percent of imports. The West African Customs Union claims 12 percent of exports and provides 5 percent of imports, while Ivory Coast claims 5 percent of

1/ I.M.F., page 16.

both imports and exports. The United States provides 6 percent of imports but consumes only 0.5 percent of exports.

C. GOVERNMENT FINANCE

The Senegalese Government has been unable to avoid an almost continuous decline of budgetary savings since independence, because revenues have not increased as fast as current expenditures and grew slighly less than GDP. However, if special funds are included, total government revenues increased somwhat faster than GDP to about 21 percent of GDP by 1970. This is no mean achievement because Senegal's tax base eroded considerably owing to a shift in agricultural production from easily taxable groundnuts to non-taxable subsistence foodstuffs and the decline of consumer imports owing to import substitution industry. The Government has compensated for these losses by introducing turnover taxes on manufacturing production and increasing direct and indirect tax rates. (See Table I for recent data).

Current budgetary expenditures have increased faster than revenues and GDP, and consume over 18.3 percent of GDP. However, an annual growth rate of 5 percent (2 percent - 3 percent at constant prices) is not considered excessively high for a newly independent country which must assume more developmental functions. Nonetheless, the Government's current expenditure policies are in need of improvement in two areas: First, the Government has not transformed the current budget into an effective instrument for development, maintaining instead a primarily administrative budget. Second, and partly related to the first point, the Government has not been able to reduce the number of civil servants inherited from colonial times, and has not been able to retrain them into desparately needed planners, engineers, teachers, extension agents, and other technicians. Strictly speaking, current expenditures have remained slightly under current revenues. It is the necessity of a stronger development component of the budget which has brought to the surface increasing public finance difficulties, dramatically demonstrated by the almost complete exhaustion of treasury liquidity by June 1971 to CFAC 0.5 billion, or about 5 days worth of current budget expenditures. The economic recovery of 1971/72 led to a surplus on the current budget account, but 1972/73 is likely to be another deficit year owing to the drought and to the pressure to maintain development expenditures in the final year of the Plan. 1/

The unsatisfactory financial performance of many public enterprises has aggravated the liquidity problems of the Treasury. Altogether, public enterprises have registered slight savings, if depreciation is not deducted. 2/ This is due to the constant surpluses of the Dakar Port, the Postal Services, and the Accident Insurance Fund, offsetting the

1/ I.B.R.D., page 31 - 37
2/ I.B.R.D., page 34

losses of the administrative agencies, the urban bus company, the railway, the agricultural enterprises, the family allowance fund for children of functionaires, and the low cost housing agency. The Government has been unable to ameliorate this situation. The World Bank is assisting in this respect through loans to public enterprises with substantial institution-building elements.

According to the latest available figures, investment averaged around CFAF 30 billion between 1967 and 1970. The ratio of gross investment to GDP declined from about 16 percent in 1967 to less than 12 percent in 1970. Private investment, mostly in the industrial sector, accounted for well over half of this investment; public investment declined from 44 percent of all investment in 1967 to 27 percent in 1970, and has not increased appreciably since then. Public sector investment takes place within the framework of the four-year development plans, and includes foreign aid.

D. HUMAN RESOURCES

Senegal's population in 1972 was 4,000,000 with a labor force estimated at 1.6 m. Rough estimates suggest that 84 percent of the active population is employed in the primary sector, although continuous migration of about 5,000 persons per year to Dakar (with about 18 percent of Senegal's population) and other urban centers may have reduced this figure in recent years.

At the end of 1971, wage and salary earners numbered 150,000 or 10 percent of the active population. About 66,000 were employed in the public sector, with 41,000 in government service and 25,000 in public enterprises. The private sector employed over 62,000 people including 5,231 French (8 percent); 2,712 non-Senegalese Africans (4 percent); and 1,126 other foreign workers. 2/ Thirty percent of private sector workers were in industry, 20 percent in commerce and banking and 12 percent in construction and public works. About 125,000 additional persons were self-employed as artisans and traders, and 20,000 as domestic servants. Approximately 7 percent of the population, or 110,000 persons, are unemployed, mostly in urban areas.1/

The low level of education is a major constraint to economic growth. Eighty-five percent to ninety percent of Senegal's population is illiterate. Primary school enrollment is about 42 percent, secondary school enrollment 8 percent and vocation school enrollment 1 percent, giving an average enrollment rate of 20 percent, up from 12 percent in 1960. In 1971/72, education expenditures amounted to 24 percent of total government expenditures or 4 percent of GDP (5 percent of GDP if French assistance is included). Further numerical expansion is expected to be

2/ I.M.F., page 29
1/ I.B.R.D., page 48

limited in the 1970s so that the focus and quality of education can be geared towards: 1) improving modern/technical education to upgrade the labor force, and 2) reorienting rural education to upgrade farmers' techniques and use of implements. A basic reform enacted in 1969 and partially implemented in 1972 embodies the Government's approach to their problem. (See Education assessment below, and IBRD - Senegal - Economic Survey, 212-SE, 15 August 1973, page 54 ff. for details.)

II. GOVERNMENT PRIORITIES

Senegal completed its Third Four-Year Plan in June 1973 and is presently in its Fourth Plan. Past Plans have been primarily public investment budgets, with some private investment guidelines and limited macroeconomic planning. The Plans have not attempted to provide a comprehensive development strategy or to identify critical problems such as agricultural prices, foreign trade policies, price policies, etc. The Fourth Plan is not expected to be different owing to lack of basic data and limited manpower.

In its original form, the Third Plan forecast a total investment of CFAF 125 billion, or a three-fold increase over the CFAF 39 billion spent during the Second Plan. Owing to limited absorptive capacity, the lack of planned projects and the subsequent shortfall of aid, actual investment was estimated at CFAF 58 billion. The Fourth Plan (1973-77) aims at an investment program of CFAF 180 billion, the maximum feasible financially, but also the minimum if Senegal is to diversify its economy away from peanuts.1/

Table V shows the breakdown of planned investments for revised Third Plan and the Fourth Plan. As in the former Plan, the Fourth Plan places emphasis on the development of agriculture (17 percent), fishing (4 percent), industry (17 percent), and tourism (13 percent). Economic infrastructure accounts for 11 percent of planned investments. Public sector expenditures represent 61 percent of total planned investment, covering most of rural sector, economic and social infrastructure expenditures. Seventy-six percent of public sector investment is expected to be financed from foreign sources,2/ primarily FAC and FED, and 82 percent of total plan expenditures are expected to be from foreign sources.(F(For details, See Tables VI and VII.) The Government's ability to carry out its development plans is improving. Financial management, although plagued by deficits, has enabled the Government to hold down expenditures during favorable economic years to maintain an even keel through the rough economic waters which characterized Senegal's transition from its pre-independence status. The recent breakthrough in groundnut promotion policies demonstrated a coming-to-grips with a difficult and'

1/ I.B.R.D., page 113
2/ I.M.F., page 23-25

persistent problem although similar measures in food crops are desperately needed. Industrial development has been largely satisfactory and the Government must be commended for keeping wages and prices sufficiently under control to sharpen Senegal's comparative advantage in manufactured products. Inflation has been moderate, averaging 3.9 percent per annum for African middle-class families, and 5 percent per annum for European families between 1968 and 1972. 2/ The major constraints on the development capacity of the Government stem from limited manpower with respect to project planning and implementation, especially as regards rural development; the lack of a firm data base pertaining to rural development; and limited financial resources. Public savings have consistently been limited since independence, and the drought has foiled the renewed efforts of the government since 1969/70 to increase the tax base without damaging economic growth potential and to contain budget expenditures. However, Senegal has clearly demonstrated a departure from the ponderous administrative-type of government which she inherited from colonial times. The experience of the drought has sharpened awareness with respect to the crucial role of agricultural development in Senegal's economy.

Senegal may be realtively well-off with respect to the neighboring countries in West Africa, but the difficult economic and institutional transitions forced upon her since independence reflect the mixed blessing inherent in her pre-independence role. The financial burden of the large, and politically crucial, bureaucracy which had no experience in development administration has weighed heavily on the limited economic resource of the country. The slow, almost negative growth rate experienced in the 1960's attests to this burden.

Senegal is not yet in a positon to provide substantial development funds from internal sources for her development, but she is in a position to provide intelligent, though inadequately trained and inexperienced, counterparts, not only to staff specific development projects, but also to strengthen the entire national institutional/ administrative framework in which development planning takes place.

2/ I.M.F., page 26-27

TABLE I A-9

SENEGAL - BASIC DATA

Area and population

Area	197,000 square kilometers
Population 1972	4.0 million
Population growth rate	2.2 per cent

	1968	1969	1970	1971	1972
	(In billions of CFA francs)				
Gross domestic product at current market prices	216.5	217.4	236.6	219.9 1/	263.3 1/
Agriculture	66.2	56.3	63.4	47.9	66.4
Industry	35.1	37.2	41.6	41.7	48.1
Transport and commerce	68.0	71.0	76.1	73.2	89.9
All other	47.2	52.9	55.5	57.1	58.9
Annual percentage change in GDP	(7.8)	(0.4)	(8.8)	(-7.1)	(19.7)
Gross domestic expenditure	223.8	236.8	248.0	245.7 1/	279.2 1/
Private consumption	186.2	192.8	206.7	...	...
Public consumption	11.2	13.8	14.6	...	...
Gross private investment	12.5	16.7	17.3	...	...
Gross public investment	14.0	12.0	7.2	...	...
Changes in stocks	...	1.5	2.2	...	...
Gross domestic savings (as per cent of GDP)	(8.8)	(5.0)	(6.5)	(...)	(...)
Gross fixed investment (as per cent of GDP)	(12.2)	(13.2)	(10.3)	(...)	(...)
Average increase in indices of consumer prices (percent)	(0.4)	(3.3)	(3.8)	(5.0)	(5.8)
Cash tranactions of the Treasury (July/June)	1968/69	'69/70	'70/71	'71/72	'72/73 2/
Current budget					
Revenue	36.5	41.0	40.7	45.8	45.5
Expenditure	-36.5	-36.6	-39.8	-41.1	-44.4
Surplus	--	4.4	0.9	4.7	1.1
Development budget expenditure	-5.0	-2.9	-3.3	-4.2	-4.0
Other operations (net)	--	-0.5	-0.4	-0.7	-0.8
Overall surplus or deficit (-)	-5.0	1.0	-2.8	-0.2	-3.7
Financing:					
Foreign borrowing	1.6	0.1	--	2.9	1.2
Nonbank private sector borrowing	0.9	0.1	0.2	--	--
Deposits of the Stabilization Funds	1.0	0.4	2.8	1.5	...
Operations with public enterprises	-1.0	-1.4	-1.3	-0.3	-1.0
Operations with other entities	0.5	-0.6	-0.8	-2.5	...
Deposits with the Central Bank (increase -)	2.0	0.6	1.0	-0.6	1.5
Changes in cash balances (increase -)	--	-0.2	0.9	-0.8	0.8

1/ Preliminary.
2/ Forecast.

Table II. VALUE ADDED IN THE MANUFACTURING SECTOR
(Percent)

	1959	1963	1967	1971
Foodstuffs	42	42	31	29
Textile	14	12	16	15
Leather		5	5	6
Mechanical/Electrical	4	15	20	23
Chemical Industries	4	4	1[illegible]	[illegible]
Tobacco/Matches	12	8	6	7
Construction Materials	6	5	4	4
Wood Industries	4	5	5	3
Paper/Printing	3	3	2	2
Miscellaneous	1	1	1	2
	100	100	100	100

TABLE III Senegal: Balance of Payments, 1968-71

(In millions of SDRs)

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	1968	1969	1970 1/	1971 1/
A. Goods and services	-81.28	-80.61	-64.17	-90.27
Exports, f.o.b.	145.31	150.49	158.69	138.71
Imports, c.i.f.	-214.18	-222.91	-226.28	-245.58
Trade balance	-68.87	-72.42	-67.59	-106.87
Freight and insurance on merchandise	3.48	3.37	3.10	-3.20
Other transportation	6.16	4.26	14.51	17.39
Travel	0.24	-0.70	2.41	5.54
Investment income	-13.94	-11.43	-17.14	-18.33
Other Government	-5.35	-6.32	-4.72	11.20
Other private	-3.00	2.63	5.25	4.00
B. Unrequited transfers	40.67	31.93	40.19	56.14
Private	1.13	-3.68	-2.66	1.01
Government	39.54	35.61	42.85	55.13
C. Capital, other than reserves and related items	16.40	24.25	5.40	31.44
Direct investment	6.80	2.87	4.68	4.93
Other private long-term	1.62	5.58	7.67	1.28
Other private short-term	0.24	-2.25	-4.35	4.37
Government	8.02	12.52	4.43	15.56
Monetary institutions 2/	-0.28	5.53	7.02	4.90
D. Net errors and omissions	4.09	15.64	30.05	3.38
E. Total (A through D)	-20.00	-8.77	11.47	0.69
F. Allocations of SDRs	--	--	4.21	3.64
G. Total (E plus F)	-20.00	-8.77	15.68	4.33
H. Reserves and related items (increase in assets -)	20.00	8.77	-15.68	-4.33
Liabilities	-1.78	-1.08	0.14	0.69
Assets	21.79	9.85	-15.82	-5.02
SDRs	(--)	(--)	(-1.20)	(-1.26)
Reserve position in the Fund	(--)	(--)	(-0.76)	(-0.29)
Foreign exchange	(21.79)	(9.85)	(-13.86)	(-3.45)

Source: Appendix Table XII.

1/ Preliminary estimate.
2/ Including commercial and development banks and the Postal Checking System.

Note: Figures have been converted in SDRs at the official exchange rates of CFAF 246.853 in 1968 and CFAF 277.710 in 1970 and 1971. For the year 1969 figures for entries other than reserves and other capital of monetary institutions have been converted at the rate of CFAF 258.088 which corresponds to the average exchange rate that prevailed in the year; reserves and other capital of monetary institutions have been calculated as the difference between the amounts outstanding at the end of 1968 and of 1969 the former having been converted at CFAF 246.853 per SDR and the latter at CFAF 277.710 per SDR. Because of the conversion and of rounding, figures for various components may not add up to totals.

Table IV Senegal: Commodity Composition of Foreign Trade, 1968-72[1/]

(In millions of SDRs)

	1968	1969	1970	1971	1972[2/]
Exports f.o.b.	153.31	123.63	151.88	124.99	193.15
Groundnut products	109.00	66.46	73.61	44.61	102.16
Phosphates and fertilizer	10.96	11.76	13.21	16.17	18.44
Fish	7.68	8.67	8.03	12.39	2.74
Petroleum products	1.98	2.90	4.15	6.91	7.81
Textiles	4.18	5.36	10.45	6.84	8.28
Gum arabic	1.47	3.21	5.01	5.15	1.58
Metal products	1.12	2.40	3.39	4.21	4.25
Other exports	16.92	22.87	34.03	28.70	47.89
Imports c.i.f.	185.51	195.41	193.90	218.07	250.15
Food, beverages, and tobacco	66.05	65.74	53.95	67.73	69.86
Petroleum products	10.68	11.39	10.91	13.61	14.69
Raw materials	9.14	9.74	8.29	9.33	10.08
Semifinished products	23.00	34.41	32.77	30.75	39.25
Capital goods	27.36	33.17	43.63	46.92	58.37
Finished consumption products	49.28	40.96	44.35	49.73	57.90
Trade deficit	-32.20	-71.78	-42.02	-93.08	-57.00

Sources: Banque Centrale des Etats de l'Afrique de l'Ouest, Le Commerce Extérieur du Sénégal en 1971; and data provided by the Senegalese authorities.

1/ Figures are based on customs statistics and exports include re-exports.
2/ Projection based on preliminary figures for 11 months.

Note: Figures for 1968 have been converted in SDRs at the official exchange rate of CFAF 246.853; those for 1969 at the average exchange rate of CFAF 258.088, and those for 1970, 1971, and 1972 at the official rate of CFAF 277.710 per SDR.

Table V. Senegal: Planned Development Expenditure and Financing, 1969/70-1972/73 and 1973/74-1976/77

(In billions of CFA francs)

	Revised Third Plan 1969/70-1972/73	Actual expenditure 1969/70	Fourth Plan 1973/74-1976/77
Primary sector	32.6	2.8	45.0
Agriculture	25.0	2.5	30.0
Livestock and forestry	2.4	0.1	7.5
Fishing	5.2	0.2	7.5
Industries and services	33.6	5.7	72.7
of which: manufacturing	22.1	5.7	30.0
tourism	7.1	...	23.0
Economic infrastructure	12.2	...	19.5
Social infrastructure	30.7	...	27.2
Administrative equipment	0.6	...	2.5
Research and studies	12.2	...	10.5
Total	121.9	8.5	177.4
Public sector	92.9	2.9	108.4
Private sector	29.0	5.6	69.0
Financing of public sector investment			
Domestic	36.5	1.2	26.2
Central Government	19.4	0.4	17.2
Autonomous agencies	7.7	0.2	4.0
Other public sector	9.4	0.5	1.0
Private	...	0.1	4.0
Foreign	56.4	7.3	82.2
Multilateral	25.6	...	...
Bilateral	23.5	...	...
Other	7.3	...	...

Source: Data provided by the Senegalese authorities.

TABLE VI

SENEGAL: INVESTMENT BY SECTOR FOR THE IVth DEVELOPMENT PLAN

SUMMARY OF INVESTMENTS
(billion CFAF)

Sector	Amount	% Total
Secteur rural	41,3	23,0
Secteur secondaire	26,7	14,9
Secteur tertiaire	43,5	24,2
Secteur des infrastructures	16,4	9,1
Secteur social	39,7	22,1
Etudes et recherche [1]	9,5	5,3
Equipement administratif	2,5	1,4
Total	179,6	100,0

RECAPITULATION OF INVESTMENTS BY SECTOR AND SOURCE
(In billions of CFAF)

Secteur	*Etat*	*Organismes publics autonomes, Sociétés d'économie mixte*	*Secteur privé*	*Ensemble*
Agriculture	20,0	—	4,6	24,8
Elevage	4,8	—	—	4,8
Pêches	7,0	0,9	1,1	9,0
Forêts	2,7	—	—	2,7
Total Secteur rural	34,7	0,9	5,7	41,3
Industries	2,3	—	17,7	20,0
Artisanat	0,3	—	—	0,3
Energie	—	6,4	—	6,4
Total Secteur secondaire	2,6	6,4	17,7	26,7
Tourisme (y compris infrastructure)	3,5	8,3	9,7	21,5
Commerce [1]	0,5	4,0	3,0	7,5
Transports [1]	0,4	6,1	8,0	14,5
Total Services	4,4	18,4	20,7	43,5
Routes	7,5	—	—	7,5
Ports et voies navigables	0,2	3,1	—	3,3
Aéroports	1,0	1,1	—	2,1
Postes et télécommunications	—	3,5	—	3,5
Total Infrastructures	8,7	7,7	—	16,4
Urbanisme, habitat [1]	0,9	9,9	3,7	14,5
Hydraulique urbaine et villageoise, assainissement	10,2	—	0,9	11,1
Enseignement, promotion humaine	7,4	—	—	7,4
Culture, jeunesse, sports information	3,1	—	—	3,1
Santé	3,6	—	—	3,6
Total Secteur social	25,2	9,9	4,6	39,7
Etudes et recherches [2]	9,5	—	—	9,5
Equipements administratifs	2,5	—	—	2,5
Total	87,6	43,3	48,7	179,6

[1] Les investissements privés, à l'exception de 700 millions dans le secteur urbanisme, ont été estimés à partir des données de la comptabilité nationale surtout et ne correspondent pas à des projets identifiés.

[2] Non compris la recherche pétrolière (1,5 milliard de F CFA).

Source: Republique du Senegal, Ministere du Plan, IVe Plan, pp237-8.

TABLE VII

FINANCEMENT DU IV° PLAN
1973-1977

En millions de F CFA

Secteurs	Total IV° Plan	BN-BRC	Financement intérieur — Organismes autonomes — Subvention BN	Organismes autonomes — Autofinancement	Organismes autonomes — Emprunt bancaire	Privé int. Autofinancement emprunt	Total	Financement extérieur — Subventions	Emprunt bon marché	Emprunt taux du marché	Total
Agriculture	24 810	4 787				4 610	9 397	8 654	6 309	450	15 413
Elevage	4 844	830					830	3 248	766		4 014
Pêche	9 000	709		715		1 219	2 643	82	5 875	400	6 357
Forêts	2 686	1 344					1 344	144	1 198		1 342
Industrie - Energie - Artisanat	26 674	1 603			728	17 701	20 032	150	4 262	2 230	6 642
Commerce	7 518	218		150		3 000	3 368		650	3 500	4 150
Tourisme et infrastructures touristiques	21 479	1 900			850	7 319	10 069	75	5 548	5 787	11 410
Transports	14 507	129		803	325	8 000	9 257	45	4 300	905	5 250
Infrastructures	16 368	4 329		3 629	400	337	8 695	3 679	3 994		7 673
Urbanisme-Habitat	14 547	912	2 787	425	1 440	5 746	11 320	100	3 127		3 227
Hydraulique urbaine et villageoise	11 112	2 465				850	3 315	1 740	1 017	5 040	7 797
Santé	3 594	979					979	2 615			2 615
Education	10 546	4 728		101			4 829	3 371	2 046	300	5 717
Recherche [1]	9 460	3 383					3 383	6 077			6 077
Equipement administratif	2 500	2 500					2 500				
Total général	179 645	30 816	2 787	5 823	3 743	48 782	91 961	29 980	39 092	18 612	87 684

[1] Non compris Recherches pétrolières estimées à 1,5 milliard de F.

SENEGAL

AGRICULTURE SECTOR ASSESSMENT

I. INTRODUCTION

Until the exigencies of the drought made themselves so alarmingly evident, Senegal tended to turn its back on agriculture even though 60 percent of its total exports were agricultural in origin, almost all of it peanuts. Government's lack of interest has been mirrored in the level of public investment which flowed to the sector since independence: 1960-65, 1 percent of GDP or $7 million; 1966-70, 3 percent or $24 million; 1970-74, 4 percent or $40 million. The recent surge in absolute expenditures reflects alarm in a mounting food import bill, a stagnant export sector and food production problems associated with the drought. As funds became more available emphasis has been given to the rice potential in the Casamance and to the diversification of farm activities: cotton, vegetables, rice, fruit, cattle. Nevertheless, production levels remain inadequate, support services continue to lag, and input delivery systems remain poorly developed.

The failure to promote agriculture is beginning to bear bitter fruit. Whereas Senegal's population grows at 2.2 percent annually (thus doubling every 30 years or so), per capita food production in the country has been declining. (Tables, 1, 2, 3.)Actual availability has only been maintained - at about 240 kg per person per annum - at the cost of a mounting food import bill. Much of the extra demand in the country appears to derive from the high rate of urban growth - twice the rate of population growth, or 4-5 percent per annum. In an economy such as the Senegalese, food production tends to grow proportionately with that of rural population. New people tend, in the long-run, to feed themselves, but with very little left over. Urban growth has been unable to attract sufficient extra production from the rural economy to support its needs. The difference has, therefore, to be made up from imports.

As a consequence, Senegal finds rice its major import good. The country is spending 20 percent of its scarce foreign exchange earnings just to supply rice and bread wheat to feed its cities. If fundamental changes cannot be initiated and institutionalized into the farm system Senegal will have to resign itself either to permanent dependence on the goodwill of donors or spend much of its exchange income merely to feed itself. Such an expenditure would have grave implications insofar as Senegal's need depend upon internal financing

TABLE I

Trend in Supply of Cereals in Senegal

1961 - 1973

'000 MT

Total Cereals
Rice, sorghum, millet, wheat

	61	62	63	64	65	66	67	68	69	70	71	72
Production	522	532	615	683	720	595	885	537	851	534	734	510
Total imports	193	202	212	280	280	254	238	266	332	240	361	424
Total exports	23	25	22	26	28	26	13	23	24	29	10	2
Domestic Supply	697	709	805	937	972	823	1110	780	1159	745	1035	932
Per cap. avail. (kg)	219	218	242	275	278	230	303	208	302	190	270	226

TABLE II

Trend in Imports of Rice

'ooo MT

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
169	182	155	284	276	245	236	285	224	183	284	373
										1973	(250)

TABLE III

Total Population, Senegal

'000

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
3180	3253	3330	3409	3490	3572	3657	3744	3833	3925	4022	4122	4227

SOURCE: The figures appearing in Table I, II, and III were gathered by the Sahel Task Force in early 1974. Most of the figures appearing in the narrative were obtained from the IBRD (agriculture sector paper), IBRD Country Survey, or in the course of the DAP task force visit to the area in late 1974. A few represent estimates made by this office. The particular source can be obtained on request to AFR/ODS.

of its development effort. A weak balance of payments position deriving from this sort of agricultural weakness, and one which must become yet more aggravated as urbanization moves apace, cannot but dampen donor interest. And this outlook must be taken in context of the worsening world food situation and likely persisting high-world cereal prices.

This plight need not come to pass. Senegal is in a good position, with help, to increase its foreign exchange earnings, diversify both export and food crops and satisfy its own food needs. To do this a number of constraints to the reconstruction of the rural sector must be relaxed. The country is unable to do this on its own in sufficient time: Yet the effort is worth making. With some well-considered help Senegal could become a self-sufficient and growing economy in perhaps twenty years. Few other sub-Saharan countries have such promise. Senegal may have a smaller ultimate potential than other African countries - Zaire and Nigeria come to mind - but, with help, it should be able to realize that potential more quickly. Were only the modest goal of cereal self-sufficiency to be won, pressure on world food supplies would be diminished to that degree. This alone may make Senegal, now importing in excess of 350,000 tons of cereals annually, a worthwhile venue for donor attention.

The agricultural section of the Senegal DAP will focus upon the problems which cause the sector to be less productive than its potential. Hopefully this review will suggest areas where remedial programs could be directed and the sort of policies needed to accomplish such action. The following sections will address various aspects of the rural sector - institutions, technology, market and price policy. Detailed analysis is not possible: the discussion will remain indicative rather than exhaustive.

II. AGRICULTURAL REGIONS OF SENEGAL

Senegal is perhaps the most physically diverse of the Sahalian countries, possessing lands which include well-watered savanna, the full Sahalian range and the Cape Verde. In addition it has the Senegal River Valley (MAP I) This physical diversity is complemented by unusually diverse agriculture for an African country. Not only does Senegal have an extensive pastoral and subsistence agriculture but one of the best developed commercial rural sectors as well. Indeed, an estimated 40 percent of Senegalese farmers grow some portion of their crops specifically for sale, principally peanuts.

The country can be divided into five quite distinct physical regions - each one possessing different problems, physical and economic and,

consequently,requiring a different developmental approach.

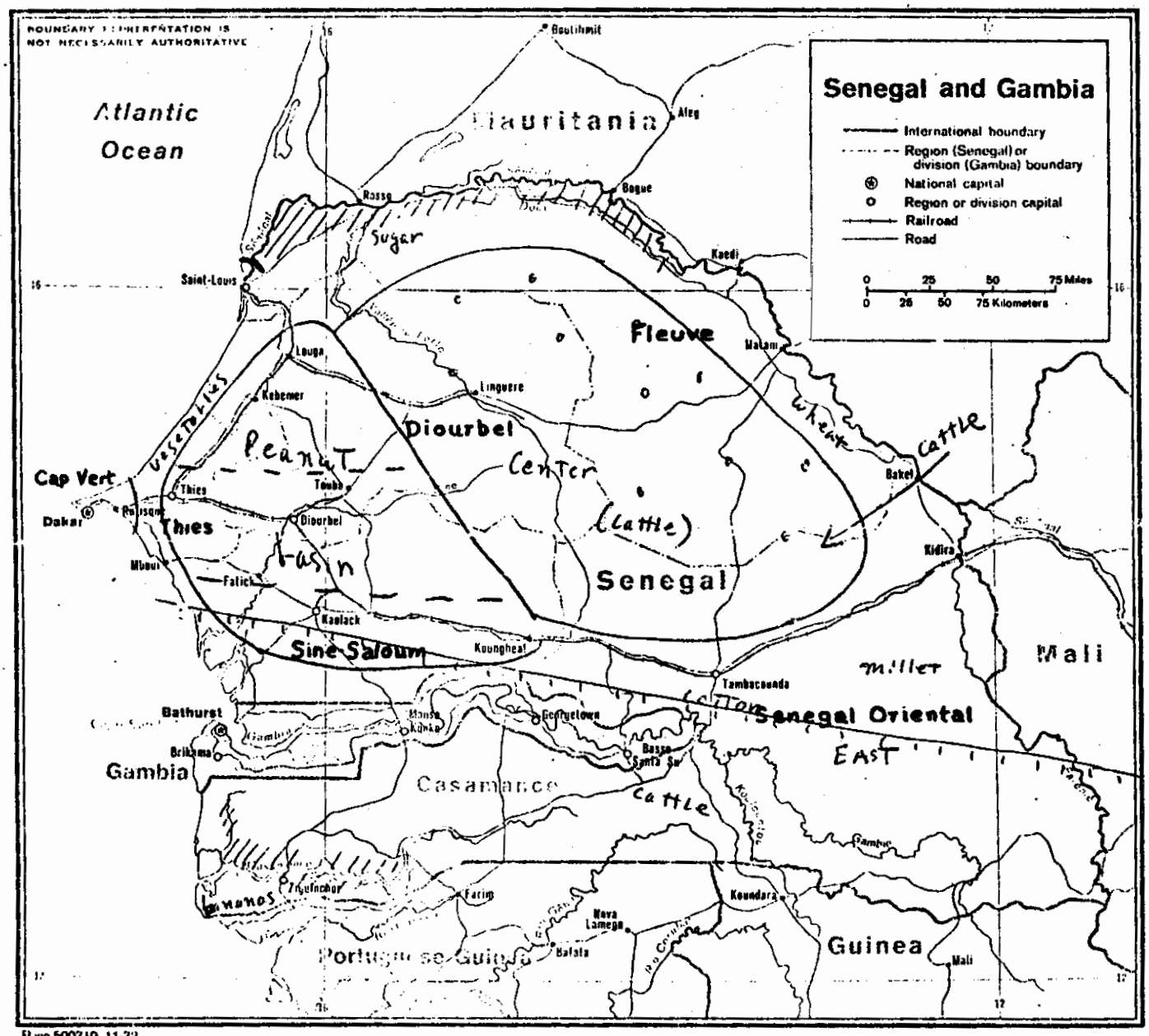
The heart of Senegal's rural economy is the so-called peanut basin, a large area immediately to the east of the Cape. Over two-thirds of Senegal's population lives in the area. Of 360,000 farms in the country 215,000 are in the basin. The peanut basin as an area of concentrated cash cropping is the product of nearly a century of promotional effort in this crop. As a result, support services, transport and market arrangements are comparatively well-developed. A great deal of progress has been marked in the introduction of animal traction, the use of fertilizers and improved tools and a rather extensive credit and extension system. The peanut basin may be divided into three east-west slices corresponding to soil and moisture conditions. Population density, the highest in the country overall, varies greatly among them. Physical conditions cause somewhat differing crop regimes to be followed: millet is favored over peanuts in the north, peanuts over millet in the south, and a rough equivalence exists in the center.

The northern section - Louga-Thies - has had the longest intensive cultivation in the country, and the vegetation cover has become quite sparse. There is concern that without an alternative crop regime the area may be faced with some degree of ecodoom; erosion is already serious. Some ground-water supplies exist under a sandy soil. The area has a population density of 15-25 person per km square.

The central section - Thies-Kaolack - is the most densely populated (80-100 persons per km square) and is the most densely cropped. The area is now under such intense pressure that the practice of fallowing has almost disappeared. Little groundwater exists. A diverse agriculture regime is practiced: food crops, cash crops and (now) some cattle. The government wants to encourage people to emigrate from the zone to the less-populated eastern regions. The southern section, the Sine-Saloum, is the best watered. The higher level of moisture also permits the tse-tse fly to flourish. This zone has a low population (15-35 persons km/sq). A fairly diverse crop program is possible to farmers in addition to peanuts, cotton, tobacco, maize and sorghum.

An area of real if barely realized potential, and linked to the coast by surfaced highway, is the Senegal Valley. By its very nature, a river transversing a number of micro-environments, generalizations are difficult. The Valley is thinly populated, 7 percent of the total of Senegal, and remains one of the poorest parts of the country. However, the Valley may become the agricultural heartland of the country if the network of dams, dikes and canals for irrigation now planned are indeed built. A barrage is projected

MAP I
AGRO-ZONES OF SENEGAL



Fline 500710 11-72

wells

N. Limit of Tsetse

rice polders

barrage

at the mouth of the river, which may be completed within five years. When this happens the river will become important for transport and irrigation. Several hundred thousand hectares can be irrigated. If the full complement of dams are completed the total irrigated area could exceed 500,000 hectares. The hydraulic potential of the river has long been recognized. The French established the Richard Toll polder after 1945 for rice. Due to overinvestment in land formation and equipment and poor engineering the scheme lost money until converted to sugar in the late 1960s. With irrigation, winter wheat could be grown in this zone.

The Casamance Valley in the extreme south of Senegal has long been regarded as most promising, especially for rice. It has good soil, low population, and adequate water. A number of rice schemes have been promoted by a number of donors: AID, FAC, China, Netherland, etc. Unfortunately, the Valley is remote from the principal markets in Senegal and it is compartmentalized within by an extensive network of swamps, creeks, streams and rivers. This makes road construction and maintenance a costly business.

The most remote, least-developed region of Senegal is the eastern. This is a thinly populated area of mixed cattle and dryland farming activities. There is little known sub-soil water except possibly on the flank nearest the Senegal River. The government hopes, eventually, to pump sufficient well water to permit more intensive cattle and crop activity. Perhaps as the Senegal Valley is developed sufficient cheap power can become available to permit pumping under economic conditions. In the southern part of the region there is considerable promise for cotton.

The most fertileregion of Senegal is the Cape Vert. Close to Dakar, well-watered and of good soil for certain crops the region lives up to its name. Intense vegetable culture is developing along commercial lines at the present time. It is also hoped to utilize the coastal area immediately north of the Cape towards St. Louis for truck farming. Another proposal would create a sanitary zone on the Cape wherein export quality cattle could be raised.

CROP SPECIALIZATION BY REGION

Crop / Region	RICE	MIL/SORGHO	WHEAT	PEANUTS	COTTON	CATTLE	VEGE-TABLES	FRUIT
Senegal River	x	x	x			x	sugar	
Cape-coast						X	X	
Peanut Basin		X		X				
Center		X			X	X		
East		X				X		
Casamance	X				X			X

III. THE CROP PRODUCTION SYSTEM

Senegalese agriculture is comprised of a large number of small producers (typically less than five hectares under cultivation). Almost all of the 2.4 million persons living in the villages are farmers; rural population represents perhaps 75 percent of the total - a rather low proportion in Africa. Somewhat different land-use patterns prevail among the different groups- Wolof, Toucoulour, etc. However, the Wolof and Serere are proportionately the most important to occupy the peanut basin. In this area farms are typically small (averaging six hectares). Some sharecropping exists, but landlordism is unknown. The distribution of rural wealth more reflects the quality of local resources (land, supply of labor, water) than any concentration of ownership among the few. Even what passes for wealth is more often not owned wealth by a particular person but assets accruing to traditional leaders who customarily must use them for the commonwealth. Land reform is not a need. However, land consolidation would be useful especially as economies of scale or the application of new technologies become important. Land parcels are presently scattered about village sites making them difficult to till, spray, weed, or water.

In recent years the role of the nuclear family holding has been gaining over group holdings and a range of intermediate arrangement exits. A good deal of labor-sharing continues as does a well-developed sense of local solidarity, especially among kinsmen. Reciprocity remains a vital glue binding rural people together, being of far greater importance than market or commercial linkages.

The assertion is commonly made that crop production in a country such as Senegal is inefficient. Careful studies of traditional agriculture in a number of countries strongly suggest that these farmers do in fact organize their resources efficiently given constraints and that risk aversion plays a large role in their planning decisions. There is every reason to believe that farmers in Senegal, as elsewhere, manage rationally. What is also true is that they operate with technologies which are low in productivity but that this production is carefully buffered to provide a reasonable yield most years.

The choice of technology by people living in a particular environment reflects, among other things, the supply and quality of resources available to that system. Apart from the densely populated portions of the peanut basin where land is scarce relative to labor, farm labor is the primary constraint to extra production. Economic theory teaches that it is efficient to maximize the production of the scarce resource by increasing its productivity either alone or in combination through technological adjustment. Arable land is comparatively abundant in Senegal, awaiting human labor and capital to make it productive. Land is cleared and prepared for tillage by adult males. Their number is consequently the limiting factor in the amount of land put under cultivation each season.

In a population structure such as Senegal's, 50 percent or more is below adult age. Perhaps another 10 percent is above working age. Half of the balance, 20 percent, are females. The entire population,

which is growing rapidly and thus producing a burden of young dependents, relies therefore on the human energy of 20 percent of the total to prepare the food production base. This portion is further diluted by off-farm migration and the effect of illness and malnutrition.

If farm production is to expand it must come from the introduction and widespread acceptance of farm technologies which greatly increase the per worker productivity of the farm sector. Better health and nutrition would surely promote the physical strength and endurance of the work force. Special training in needed farm skills could have a comparable effect. But perhaps the greatest boon would be registered by supplementing deficit human energy with animal and, where feasible, internal combustion. The energy constraint, which manifests itself in all activities - clearing, seedbed preparation, sowing, weeding, pest control, irrigation and water control, harvest, threshing, storage, transport, and even food preparation - is critical. The energy shortage can be ameliorated in some degree by technical intervention at any of these points in the crop production process.

There is great scope for the expansion of the use of animal traction. Not only does the system allow extra land to be tilled, it also permits the job to be done more quickly. With proper equipment animals can not only plow, but level land, weed, thresh, transport, pump, and grind. So far in rural Africa the few steps taken (and these accepted by only a few farmers although more in Senegal than elsewhere) tend to be limited to plowing. A great deal of adaptive research needs to be done, and urgently in this area, with primary emphasis on systems which can be integrated into typical size farms. At the present time, neither technical packages which include traction and associated traction equipment nor the necessary credit arrangments are consistent with the needs of farms other than the largest.

As traction energy becomes available, a very important complimentary step may have to be land consolidation so that both labor and animals can be used most efficiently. Farms tend to be very fragmented. This in large part reflects the rotating pattern and customary land holding systems. These should be studied and a program of action taken to rationalize land use organization, where this is a constraint.

Yield per worker and per hectare can be greatly increased and risk reduced to the degree that a sure supply of water becomes available. Apart from small populations resident along rivers and the yet small number who employ well or low-lift irrigation, Senegalese farmers are entirely dependent upon rain for moisture. However, considerable but unmeasured quantities of water exist in acquifers. Large quantities of river water go unutilized. Even rain derived moisture is not employed to the maximum possible. Assuming wells can

be bored or pumps installed, the economics of pump irrigation are open to question. Can the Senegalese afford to consume food produced under this sort of technology? Given high fuel costs, problems of maintenance, difficulties in distribution of supplies and products, motor driven pumps may be profitable and reliable only under special limited circumstances. Circumstances can of course be created as roads are improved and technical skills uplifted. Even with water supplies, African farmers have a great deal to learn about how to operate an irrigation system. Indeed, its proper use is as much an art form as pure equipment: a great deal of judgement is required which only comes with experience. Developers must give considerable thought to land preparation, land organization, water use and water distribution at the very local level as part of any irrigation scheme.

One pumping source, yet completely neglected, but feasible under local conditions, is the introduction of animal-powered pumping. Devices such as the Persian wheel in an area where the water table is comparatively shallow could be a more suitable technology than the motor. Both parts and repairs could be managed locally. The cost of operation is modest. The necessary animals could be used for a variety of activities other than pumping. In India and Pakistan such systems irrigate extensive areas. One wheel powered by a pair of bullocks can draw water efficiently from up to 50 feet depth and irrigate perhaps two hectares. It is conceivable that numerous opportunities exist for an economic use of such a pumping system in areas remote from a modern input supply system, such as the upper reaches of the Senegal River.

The technology could be integrated with extension of flood irrigation and polders in the same area. Sarakolle farmers who inhabit the upper Senegal area presently employ post-flood irrigation, taking advantage of moist soils to plant late crops. With new energy, which could be motor or animal driven pumps (or even solar powered), water could be pumped considerable distances from the river banks. In the Matam area, for example, low lift pumps have permitted double cropping, so that land is under almost continuous cultivation. A single pump (of the type being used) can supply 15-20 hectares, to a depth of 500 meters from the river's edge. In addition to the usual wet season crop of rice and sorghum dry season crops can be added vegetables and winter wheat. The development cost appears to be about $3-5,000 per hectare.

Whenever pumping is introduced, the opportunity for a vastly diversified

agriculture appears. New crops, greater use of land, extra enterprises such as livestock all become technically if not economically feasible. Risk is certainly reduced to the extent that water is reliably supplied. Any investment in pumping must be complemented by investments in feeder roads, land leveling, a water distribution system, training, inputs and maintenance.

Output per worker can finally be increased by improving the skills of the individual farmer. Better practices must be discovered and made known. This should be the objective of adaptive research and extension. So far in Senegal improved technologies have not typically been of the sort which are easily adapted by farms of all scales of operation. Neither has sufficient investment been made in training or expansion of farm training systems. These remain limited to the peanut area for the most part, and until recently mainly devoted to the promotion of cash crops among model farmers. A beginning, but an inadequate one, has been made towards improved varieties of cereal crops that do not require cash-demanding fertilizers. What are badly needed, and yet lacking, are minimum packages which are easily adaptable by farmers and do not bear extra risk.

IV. RESEARCH AND DIFFUSION OF INNOVATION

The confinement of farmers to low-level technology is not the result of lack of interest or even knowledge but rather of their incapacity to afford higher production costs or accept the extra level of risk which new technologies often entail. To be acceptable by farmers a technology must satisfy three criteria. It must be, simultaneously, technically feasible to the particular farm situation - and conform to the quantity and quality of available resources; it must be of a tolerable risk level; and it must be profitable. In addition, if the technology is to be acceptable to a wide range of farms of differing scales of operation it must be divisible; that is to say, its component inputs must be usable in discrete quantities sufficiently small that farms of any size can afford to buy into the system. This is important as early marginal returns to new inputs can be proportionately large. Sadly, this has not been the approach practiced by IRAT, the farm research group charged with the development of new cereal production systems in Senegal. The emphasis remains, after 20 years of fairly systematic work on demonstration sites and pilot villages, to focus upon model farmers. IRAT has directed its program to the best 15 percent, which group is hoped to influence another 60 percent through a process of demonstration and diffusion. The remaining

25 percent are not believed to be potentially viable farms under modern conditions.

The approach reflects both the traditional French philosophy of rural development and the desire to get large early returns to efforts to promote cereal production. In practice this has meant that technical packages have emphasized capital intensive inputs such as fertilizer and improved energy sources, which because of the cost, eliminates the majority of farmers as early adaptors.

In theory, IRAT has attempted to design a stream of technological improvements to lead farmers step-by-step from a traditional system through a process of gradually adding practices ultimately to a maximum package which included heavy use of fertilizers and animal traction with full range of equipment. In practice, emphasis has gone to the full package to the neglect of the early and intermediate steps. Needed work in varieties of millet and sorghum suitable to minimum package users have been very much neglected. Furthermore, and following from the monocrop nature of extension in Sengal, improvements in peanuts have often not fitted well into farmer crop programs. Improvements in peanuts have in many instances been unacceptable to many types of farms and thus restrict their cash earning opportunities. Or, their acceptance has had an adverse cereal production effect. What is badly needed, and is missing, is an integrated crop program which will provide ecologically and technically suitable minimum package programs which will satisfy the three above criteria.

A particularly stubborn problem limiting the rate of diffusion has been the basic cost of traction systems. A typical farmer in the peanut basin with six hectares and three adult workers has a net annual cash income of CFA 7,000. A pair of bullocks costs nearly CFA 50,000 and, to get a full line of equipment, a further CFA 100,000. Purchase on credit requires 25 percent down, three years to pay and seven percent interest. This is a schedule which is beyond most farmers. IRAT should work to find packages which suit the cash supply of smaller farms. It can help plan a credit program which farmers of all viable scales can manage over typical years.

The experience with fertilizer and improved varieties in the peanut zone demonstrates that farmers do respond to opportunity within their means to do so. Until minimum packages are designed to meet the needs of smaller units, the rate of spread of improved technologies must remain slow. The choice among crops and technologies at the present time is far too limited and much too costly to allow anything else.

V. AGRICULTURE SUPPORT ORGANIZATIONS

Senegal has adopted a regional development policy for agriculture, but this new strategy grows out of the former crop-centered approach and many elements of the earlier period linger into the new. At least six regions (see Map 2) have been identified as development areas, but as yet regional organizations exist in a mature state in only one - the peanut basin. No organization exists at all in the Casamance apart from the rice promotion program. In the Senegal Valley a nucleus exists. Yet more rudimentary frameworks are beginning to function in Eastern Senegal (see following page) and in the central region. In addition a cotton program plays an important regional role in the east.

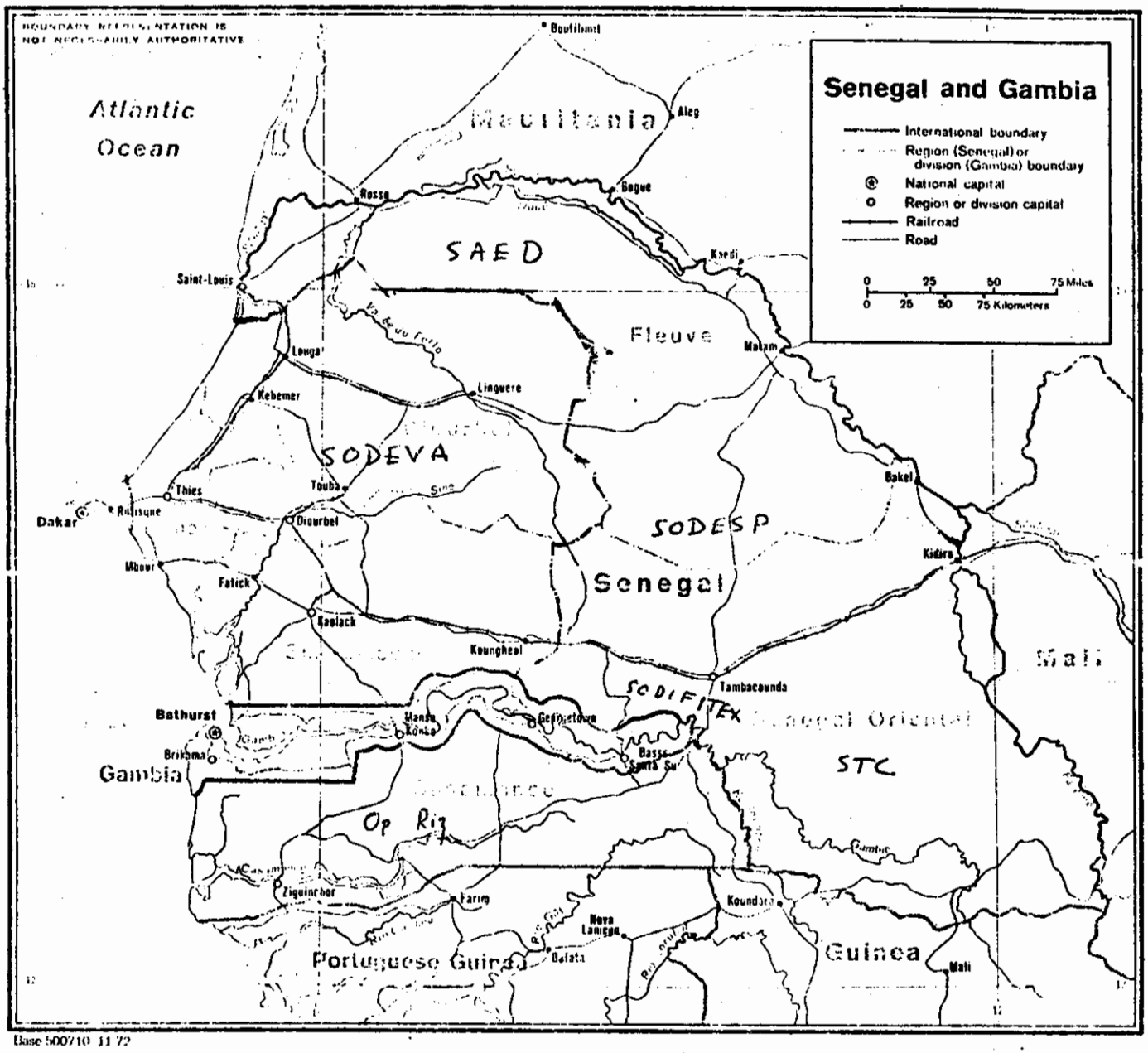
SODEVA	peanut zone
SAED	Senegal River Valley
SODESP	central region
STN	eastern region
SODIFITEX	eastern cotton scheme
Operation riz	Casamance

Eventually all of these regional groups will approximate the organizational structure which now functions in Western Senegal, in the peanut basin, with distinctions suitable to local peculiarities. A review of this organization can therefore be viewed as a model for the whole.

The farmer is the objective of the system which may be divided into two functional parts: the research and technical support and the marketing and input supply side. In addition the farmer receives some attention from several rural-oriented agencies covering political, social, health and other welfare functions. Behind all of the development structures stands IRAT, which group is responsible for fundamental and applied research into crops and supporting systems for the whole of the country.

The product of the research group is taken by the responsible development agency, such as SODEVA, which prepares a regional outreach strategy and plans the necessary steps to implement and deliver new technologies to the farmer. This is a function which must be sensitive to and responsive to the particular needs and character of each region. The peanut basin, which has three quite different soil and moisture regions requires a particular approach specially suited to each zone.

MAP 2
Areas of Responsibility of the
Regional Development
Organizations



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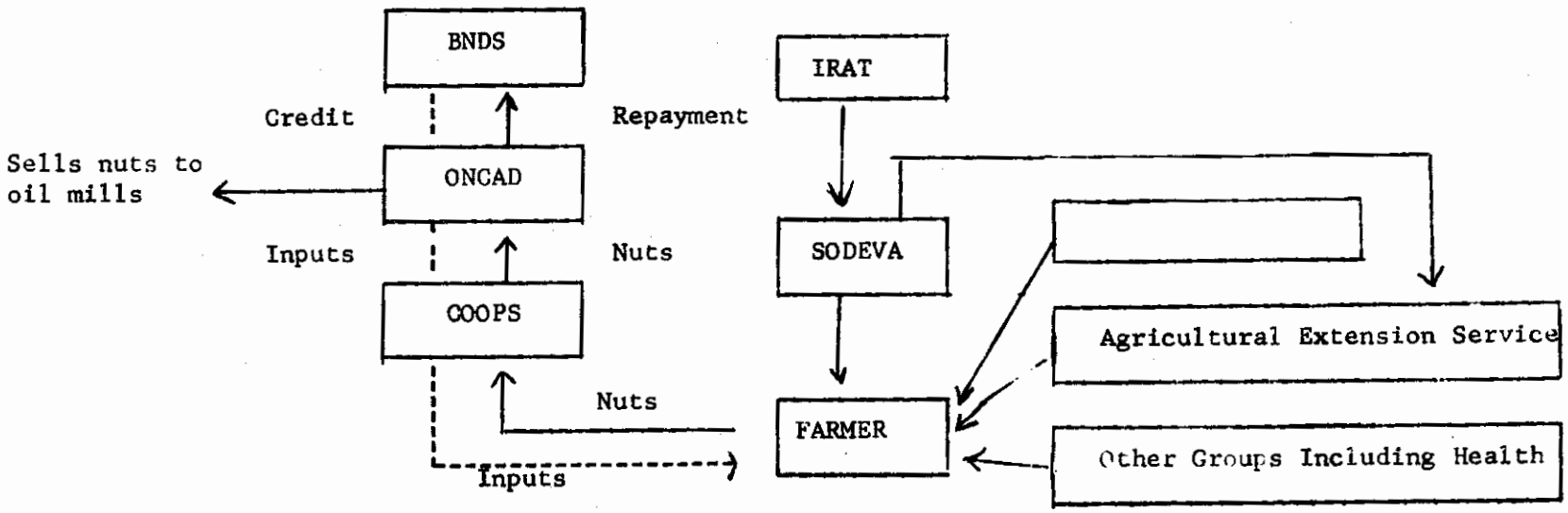
The farmer does not,however, actually receive supplies of input from SODEVA. These must come from his local cooperative. An elaborate network of local cooperatives has been imposed on the rural sector by law. The system is intended to create a marketing network, which has not existed, at a stroke. A staff of civil servants work at each outlet. In principal, a local elected body manages the cooperative, but given the lack of local skills the public employees bear most the burden. In fact, cooperatives have very little local autonomy and operate as an arm of the government. SODEVA plays a supportive and advisory role to the cooperatives and is represented on the local board of the cooperative.

Credit and tangible supplies are made available to farmers at the cooperative outlet (including tools, seeds, fertilizers, etc.). These inputs have been provided to farmers at subsidized rates (up to 50 percent) which have been supported by the revenues from peanuts. Farmers sell their peanuts to the cooperative. In theory, farmers can also sell cereals but funds have not in fact been forthcoming to purchase these staples. Credit is advanced to farmers at the beginning of the planting season and deductions made from gross peanut revenues when these are delivered to the outlet. This credit system has been functioning for ten years, a record in Africa, which suggests that repayments have kept at a high level. Government hopes that in time the cooperatives will become a true farmer organization, but this must await a great deal more experience by farmers and a wider level of practical education than is the case at present.

The cooperatives receive supplies of inputs and credit from ONCAD (Office National de Cooperation et d'Assistance au Developpement) which organization is charged, nationally, with the collection of peanuts and their marketing to the oil mills. In this function it performs similarly to the marketing boards of Nigeria and Ghana, playing a role in price stabilization to farmers. Prices are announced early in the season and a considerable but varying margin exists between buying and selling price. This margin is used for a variety of activities. It supports IRAT, the input subsidy, a domestic oil user's subsidy, and urban cereal price subsidy. The total value of the income from the peanut marketing is considerable and represents about 40 percent of the total income to government. In addition ONCAD plays a supportive role to the cooperatives.

Behind ONCAD's stand the BNDS (Banque National pour le Developpement du Senegal). This Bank provides finance for ONCAD's operations and thus underwrites all credit activities, the supply of inputs and the entire peanut marketing operation.

AGRICULTURAL DEVELOPMENT STRUCTURE-WESTERN SENEGAL



This regional infrastructure coexists in justaposition with the regular national and local governtmental structures including what would appear to be a somewhat superfluous parallel extension service. To coordinate all of this administrative structure an inter-departmental committee has been established (comite departmental de developpment). The indications are that this group has its work cut out, as the system appears to function only with a good deal of friction. But then it is a very new system and a certain shake-down period is inevitable.

The system must operate within three serious technical constraints. First, the lack of technology to actually extend to farmers in the near future. Second, the serious degree of underfinancing chronic to ONCAD reflecting a more fundamental problem to the country as a whole. ONCAD was unable to perform its cereal buying activity for lack of funds. Credit remains in short supply for the same reason. Third, a critical lack of staff at all levels of sufficient skill. This is a serious problem now with only SODEVA, the extension service, and regular government competing for lower and middle level people. It will become almost impossible to staff as all of these groups begin to expand and as the full claims of the Senegal Valley development authority (OMVS) come into play.

VI. PRICE POLICY

In common with other countries whose political structures are urban based and where rural areas have much less than proportionate political influence, price policies as regards basic staples are clearly biased to favor the urban population. Where civil servants play a major role in political life, the cost of living is a vital political issue to which government is very sensitive. In Senegal, agriculture is taxed to support a cheap food policy. Not only are farmers paid low prices for their marketings, but imported cereals have been subsidized to compete with domestic production. In late 1974, this policy was to some extent reversed and the wholesale price for rice raised to approximately the C.I.F. price.

The mechanism through which this policy is managed is ONCAD. In 1972-73, to use the example of a recent year, ONCAD paid farmers CFA 23/kg for peanuts and in turn sold them to oil mills for CFA 40/kg. A bit less than a third of this gross income, of CFA 12, is turned over to the Price Stablization Fund. In that year the gross transfers from ONCAD to the Fund was $76 million, or 40 percent of the total government revenues.

In 1972 $8 million was used to subsidize farm inputs (equivalent to about 30 percent of the cost of production). It is estimated that the effective tax rate on farmers that year was 20 percent. In

1973-75 this rate jumped to 55 percent! There has been an inevitable decline in inter-sectoral terms of trade-rural/urban; from 100 percent in 1963 to 83 percent in 1973. In late 1974 government undertook to make some redress to this situation in terms of prices to farmers, but the fundamental inequity remains.

Although Senegal desperately needs increased production and marketing of cereals, relative prices between millet, rice and peanuts do not reflect any attempt to affect either planting or marketing decisions on the part of farmers in favor of cereals. Most farmers, even in the peanut basin, employ a farm program designed to produce a subsistence cereal crop first of all and then, as conditions permit, a cash crop. Very few farms devote all their resources to cash crops. It would not be economically rational to depend on the market for cereals. Whereas it may cost CFA 25 to produce a kg of millet on farm, and this is equivalent to the recent harvest sale price at the farm, the same quantity off-season may cost three times as much, if it were available at all! Peanuts do not offset the average value of millet; only at harvest do they compete and then a guaranteed market exists.

A somewhat different situation prevails in the case of rice. Last year 250,000 tons were imported into the country to supplement a domestic production of 70,000 tons. Sengalese producers were paid CFA 35/kg for the small quantity that was marketed (most is self-consumed by producers in the Casamance). The value of off-loaded rice on a Dakar wharf is CFA 114/kg including port and handling charges. Government has determined to keep the wholesale price of rice at CFA 57, which covers the handling charges and farm market price of domestic rice. The stabilization fund is called upon to subsidize the difference between the wharf and the wholesale price, the sum being CFA 57/kg this year. Since late 1974, the domestic wholesale price has been raised to about 100 CFA/kg. This will greatly widen the market margin, and may allow both ONCAD and the statutory cooperatives to cover their own overheads. Farm gate prices have not been raised.

If imports continue to amount at a rate linked with that of urbanization and growth in urban incomes, and world prices remain high, Senegal could find itself spending a very large share of its income just to eat. A half-million tons of rice imports is not out of the question within a decade! In addition 100,000 tons of bread wheat is imported, which also augers to grow at least proportionately to urbanization.

Can price policy affect production and marketing decisions? A grain price stabilization policy has been recommended to Senegal and accepted in principle. The drought caused the necessary support stocks to be diverted to the more urgent task of survival, but with the hoped for returned of more benevolent rains the opportunity may soon return. A somewhat different problem exists in the case of each cereal: the coarse grains (millet and sorghum), rice and wheat.

Senegal grows 500,000 tons of coarse grains annually. Almost all farmers grownsome. Almost all is consumed on-farm. Even on-farm reserves appear limited. Price policy at the present time would probably have little effect on marketing decisions and less on production. Until a guaranteed market is established and prices competitive in terms of net margins to peanuts are supported such an influence cannot exist. This sort of program would require that a buffer stock be established, which need not be large given the very inelastic nature of prices which commonly prevail for such commodities. In addition, new technology and extension efforts would have to be made available. Equity would be served, as such a scheme, to be effective, would have to reach a very large number of farmers. Coarse grains, unmilled, cannot compete with rice or flour. Some value-added from milling will be necessary to make these grains competitive. There is a reason to believe that a ready to cook millet for couscous could be marketed at CFA 65, which now compares favorably with the wholesale price of domestic rice.

What is needed is a political decision to let domestic cereal prices rise to a point where domestic producers can grow a crop and leave enough over to pay for marketing and milling. There seems to be some recognition of this need by the government. It is said that prices for cereals will be allowed to "approach" a market price - but this seems dubious given political sensitivities.

A more likely policy will be to ignore millet and focus on large-scale production of rice in the Senegal delta in the hopes that economies of scale will permit a low per unit cost rice to become available without the need to raise prices and go to the effort to promote production among many farmers. Government seems to count on a quarter of a million tons of rice from large scale cultivation in another five years.

In the case of wheat, there is a general feeling that imports could be replaced by winter wheat production in polders along the upper Senegal.

VII. POLICY OBJECTIVES IN THE RURAL SECTOR

In the context of the rural sector, we may identify six general policy objectives, all acceptable and certainly needed:

1. Increase rural incomes.

2. Wider rural income distribution.

3. Minimize dependence on food impots.

4. Increase exports.

5. Reduce risks in agriculture.

6. Maintain and improve the ecological balance.

Any one of these objectives, to be realized, raise up a host of subordinate and inter-related problems which must be dealt with separately or collectively if anything is to be done at all. Most importantly, it must be remarked that to a very real degree full realization of all of these objectives, simultaneously, is internally inconsistent. To the degree inconsistency exists, trade-offs must be recognized and choices made. Increased rural equity, for example, as a prime early objective, requires that a particular system of farm inputs be installed, a specialized form of credit be established, that new farm technologies be highly divisible, that a great deal of training be attempted and that a price policy be followed that not only attracts marketable surpluses but also influences farm production decisions as well. If rapid food self-sufficiency is to be attempted as a primary goal, regional specializations would be required, which is at the outset contrary to regional equity considerations. Furthermore, technologies would have to be introduced that would have rapid and high returns to investment, and these would have to be modern in nature and thus costly. Poorer or more marginal farmers would obviously be left out. A quite different credit, distribution, and marketing system would be required. If, to carry the point yet another step, Senegal were to opt to maximize net foreign exchange earnings by increasing commodity production - or cereal production as an import substitute - still other strategies would have to be divised. What must be decided is the optimum mix of elements of higher food production, foreign exchange earnings and equity, each balanced so as to be simultaneously politically and economically viable as the vector of policy instruments.

This decision is at root a Senegalese one. What the nature of this decision will be is vital if we are to become a useful participant in the development process; if we are to advance without deceiving ourselves as to likely outcomes of our efforts; if we are to identify some manner of measuring our success or failure.

The Fourth Four Year Plan (1973-77) seems to be taking a very central path through these thickets. The country's planners appear to be placing their hopes on a cluster of very capital intensive projects with a heavy external input, to attain rapid self-sufficiency on the one hand and raising exchange earnings capacity on the other.

Industrialization is to play a large part: an oil refinery is planned, a free-trade zone is proposed, a ship maintenance facility is advanced to take advantage of Senegal's central position on Atlantic routes. In agriculture, elaborate hydraulic schemes are the focus of thinking, in particular in the development of the potential of the Senegal River Basin. A dam at the mouth of the Delta, it is hoped, will provide sufficient irrigated area to allow Senegal eventually to meet its sugar and rice needs.

Within agriculture, water and water management are viewed as the primary points for concentration of effort. Dependence on rain is to be reduced by increased reliance upon water engineering: dams, wells, and moisture-retaining cultivation practices. Although the Senegal River with its potential of 500,000 irrigated hectares is most important, hopes are also placed upon modest development of the Upper Gambia and Casamance Valley as well. In addition, selected well-drilling activities are proposed for the dry central and eastern portions of the country.

The Plan does not give much emphasis to equity - regional or personal - as an early team objective. It might be asking too much for Sengal to give up early tangible accomplishments in the interest of something as abstract as personal income equity. Regional equity gets somewhat more attention, but in the long-run. Eventually, regional development agencies will be set up to cover all parts of the country similar to the SODEVA approach now installed in the groundnut basin. But once again the government seems to be putting its money on large early returns from the most promising area. This, too, is a decision difficult to fault given Senegal's limited investment resources on the one hand and great early needs on the other. A great deal of equity is exchanged for rapid extra farm production and an improved exchange position. Like it or not, these are the objectives and priority parameters which donors will have to conform to when participating in Senegal. This said, it must be noted that efforts are being made to develop a more divisible farm technology, to expand the extension and credit programs, to reach both more farmers and wider areas; but at the margin, efforts are likely to go to higher production rather than to greater equity.

VIII. PROGRAM OPPORTUNITIES IN THE RURAL SECTOR

The principal agricultural problem which confronts Senegal is that of simultaneously increasing food production and cash crop production. Hitherto, expansion of one meant the contraction of the other. If yields per worker and per unit of capital input can be increased, then Senegal can have its food and cash crops, too! Senegal appears to have accepted this goal, but in a manner that will not immediately affect large numbers of typical farm operations. If AID is to work

in the rural sector to promote food production on the one hand and equity on the other it must seek to develop systems which will reach the target group and help provide technologies acceptable to them.

A price stabilization policy oriented towards cereal producers would appear to be a basic early step. Donors could support such a policy in a number of ways: training of management, organization of a management system(s), help in provision of needed storage facilities, establishment of adequate market information systems (to give timely price information and disseminate this widely), help in the construction of feeder roads, improve on-farm storage as needed. Farmers must be given wider options both as to time of sale and crop programs. The farmer could be internalized as part of a grain price program: early purchases, storage support, credit support, etc.

The latter must come as part of fundamental and adaptive research followed by adequate extension and farmer training. All-year cropping is badly needed both to increase incomes and make better use of scarce resources, particularly labor and capital. Such off-season cropping must include vastly improved water management. Rice, wheat, vegetables, livestock, fruit are all possibilities. A total crop program must be made available to all major categories of farmers in all major physical circumstances. This would represent a considerable break from the historic emphasis on a single crop.

Donor-supported programs which could have wide application to typical farm types would be a useful venue for consideration. This would involve a rather lengthy association with Senegal, certainly a decade and likely longer. It is easy to imagine a wide variety of training programs, ones oriented toward farmers (focusing upon one or two problems at a time, such as irrigation management), ones oriented towards local cooperators, marketers, extension persons, local and regional administrators and finally national planners. It is not all clear that Senegalese planners have thought through the staffing implications of their very ambitious plans: donors can play an important role in helping to reduce this constraint.

Donors could provide a very useful input to the extent they were prepared to participate in the design and performance of applied research specifically oriented towards the target group of farmers. Important work remains to be done in the design and extension of minimum packages specifically planned for farmers under a wide range of alternative circumstances. To the extent that farm budgets could be prepared in association with these packages, and they should be, credit schemes could be planned to conform to farmer ability to finance. Ecological problems pursuant to the extensive mono-cropping of the past decades should be studied and suitable crop plans designed to reduce surface deterioration.

New farm activities should be investigated. Wheat is certainly one crop which should be promoted if possible. The domestic demand for wheat flour for bread may eventually match that of rice. Wheat could become an important winter crop in irrigated lands. South Senegal along the Casamance and even the Sine-Saloum area seems to have great potential for fish ponds. The natural food for tilapia are masses of vegetation which are easily available. Senegal at present must in effect compete with the world market for fish, which are abundant offshore. Ponds would provide a simple local source close to markets.

An attempt should be made to identify new technologies which do not place great demands upon cash to buy equipment, parts or fuel. The widest possible application of animal power would seem to be an area where research and credit would have high early pay-offs to donor support. Similarly with minimum packages which do not stress much or any fertilizer. Emphasis on improved cereal varieties which are of sufficient moisture resistence but responsive to improved tillage practices would be very worthwhile. Improved milling techniques are vitally needed, both to widen the use of coarse grains and to economize on labor.

Senegal's approach, by stressing regional differences, makes good sense. Donors would be well advised to support Senegal in doing what it views as important. Placing emphasis on the particular constraints that the Senegalese programs are likely to face may be a most useful activity. These areas are likely to be, once again, training and management. Surely AID has comparative advantage in these areas. But given Senegal's financial constraints, such inputs must be part of a larger, more comprehensive package that assures the necessary capital and operating costs for area development. Participation through the area development structures (SODEVA, SAED, etc.) with loan and grant financing should help Senegal produce such packages. These inputs should also enable AID, together with other donors, to help Senegal deal with critical policy and self-help questions such as pricing, development, and budgeting.

SENEGAL
LIVESTOCK SECTOR ASSESSMENT

I. Introduction

This section addresses the status and potentials of the livestock industry of Senegal. Major concern is with outlining those areas where potentials and needs exist. The activities outlined and/or implied here should be viewed as a series of problems which are additive and which contribute individually and collectively to a viable program aimed at stimulating a self-sustained improvement in the livestock and related industries of Senegal.

A development program strategy for the livestock industries of Senegal must recognize several basic facts, many of which define the general boundaries within which subsequent activities must be framed. Production of livestock is deeply entrenched in the history and tradition of the population. Natural resources available to support human populations are generally limited and extremely fragile. Human capital and infrastructure, both physical and organizational, are limited. And, there is urgent need to do something to improve the situation of the population and to increase their ability to participate in the progess of the modern world. The reality of this urgent need is critical to the context of this dicussion and its interpretation. Although much must and can be done to assist the development effort, care must be taken to insure that each and every activity contributes a necessary element to attainment of the objectives or goals of the general strategy or plan. Uncoordinated projects of any type will not produce generally desirable results.

The remainder of this paper presents a brief background of information based on field observation and limited hard data in support of general strategy recommendations in Section III. Some suggestions for individual project activities are included in Section IV.

II. The Livestock Sector

There is no doubt that the recent drought in Senegal has seriously depleted range lands and reduced the livestock population. Approximately 4/5 of the total cattle population, currently estimated at about 2 - 2 1/4 million by GOS personnel, are found in the northern half of Senegal. Zebu and Zebu crosses predominate with major concentrations in the sylvo-pastoral region of the Ferlo Valley and in the Senegal River Basin north of Bakel. The Zebu-N'Dama crossbreds are found mostly along the mid-belt transition zone in the Sine-Saloum region and along the Senegal River to the east and northeast. The remaining 1/5 are trypano-tolerant N'Dama located in the

Casamance, the southern part of Senegal. There are an estimated 3 million head of sheep and goats in Senegal distributed similarly to the cattle production.

Cattle death losses during the past 3-4 years in Senegal have been estimated for 10-25 percent. It is doubtful that such losses exceed 15 percent or about 400,000 head. Losses resulting from stress conditions imposed by the recent drought are a major topic of concern among herders, traders, butchers and government officials. All recognize the reduced income generating potential of producers and resultant upward pressures on meat prices caused by shortages. The real concern at this point in time is to provide producers an adequate incentive to recreate their herds in a manner and with a production-grazing system geared to carefully utilizing fragile forage supplies while at the same time avoiding serious inflation of meat prices to urban consumers.

There are three different, yet somewhat overlapping, cattle raising systems in Senegal. These are: nomadic, semi-nomadic and sedentary. Well over 50 percent of the cattle are reared under semi-nomadic systems. They move north during the rainy season and back south into the cropping zone of central and eastern Senegal along the river in the dry season. Many cattle are owned by sedentary farmers along the Senegal River and are herded by Fulani. An increasing number are owned by businessmen and cattle traders from larger cities such as Thies, Saint Louis, Dakar and Kaolack who employ Fulani herders.

The true nomads are some of the Fulani and Maures who own their own cattle, sheep and goats. These nomads graze cattle in Mauritania, Senegal and Mali and sometimes migrate as far as Upper Volta in a given year.

Sedentary cattle are found around some of the larger cities such as Dakar and Saint Louis where they are kept to produce milk.

Senegal is very depedent on imported live cattle primarily from Mauritania to supply its meat consumption requirements, about 10 kilograms per capita. It is estimated that about 75-100,000 head of live cattle are imported annually. Exports of live cattle are prohibited by law. Exports of hides and skins, live animals and meat accounted for less than one percent of the total value of exports during the past four years. Imports of meat (mostly unrecorded) in the form of cattle on the hoof, were estimated at about 1.3 billion CFA in 1970 and represented about three percent of total imports.

Approximately 80 percent of the population in Senegal is rural, with 40-50 percent engaged in some type of livestock production. Current estimates indicate that from 2-8 percent of the population are solely dependent on livestock for their livelihood. The data substantiate the relevance of the concern for lack of income-producing potential for rural people resulting from the recent drought.

Economics

Meat prices in Senegal have increased sharply in the past two years. However, prices received by producers for live animals have not kept pace with prices for dressed beef. For example, dressed meat prices in Dakar retail outlets were quoted CFAF/Kilo 250-350 ($1.10 - $1.55/2.2 lb.) in October 1974 up from CFAF/Kilo 180-280 3 to 6 months earlier. Dressed meat in the open market outlets ranged from CFAF/Kilo 160-200. Prices received by producers are currently fixed at CFAF/Kilo 50 (about 23¢/2.2 lb.) by the government. This is up from CFAG 35-40 per Kilo in late 1973.

The above data represent a gross marketing margin of CFAF/kilo 150-250 of dressed meat. The wholesale price of cattle is CFAF/Kilo 80 (October 1974) and represents prices paid by butchers at Dakar markets. Assuming a 50 percent dressing percentage, meat costs to the butcher are about CFAF/Kilo 160. The remaining CFAF/Kilo 100-200 are absorbed by the processing marketing and distribution system for dressed meat.

Cattle are first sold on a head basis. Consequently, the producer and first buyer negotiate on a total price basis-- not on a weight basis. However, both producer and buyer are generally aware of prices and assume reasonably informed positions on the condition and carcass weight yield of the animals. It appears, however, that the gross marketing margins are quite high and tend to aggravate inflationary conditions in the market for food items.

Governmental controls on the price of beef, especially at the producer level, can create serious imbalances in the market system. For example, low prices to producers can create disincentives to expand or improve the production method. In this case, supply of animals will continue to lag behind demand by increasingly large amounts, creating upward pressures on retail meat prices. Similarly, controlling prices of cattle to producers and prices of meat to consumers may cause other enterprises to increase in profitability relative to livestock. The result could be a shift of resources out of livestock with an associated amplification of the gap between supply and demand. To re-establish the market balance could require sizeable government subsidies often unavailable in LDC's.

Livestock production in Senegal, as in most of the rest of the world, is carried on in those areas not presently suited for crops. This is as it should be, for livestock can not compete on economic terms with crops on land suited for agricultural production. Generally, returns from crops on good soils will yield 20-50 percent higher returns than livestock. Consequently, livestock production and producers are located on marginal lands and along the perimeters of cropping areas. Such is the case in Senegal. It should be pointed out that in some cases the opportunity exists for integrating a livestock enterprise into a cropping system in

a totally compatible manner (Section III and IV).

It has been argued by some that economic incentive is not relevant to illiterate livestock producers. The argument suggests that if production costs are very low (variable costs almost zero), market prices are not relevant to the producer's production decision or his decision to sell. Two basic observations refute this argument. First, even the most illiterate producer knows whether he is being treated fairly or not. And second, data reflecting production and sales patterns in Senegal tend to show some positive correlation with price surfaces and trends.

GOS officials indicate that a typical herd in the Senegal River region will have 20-40 animals. About 30 percent are potentially productive females with the remainder being males, young calves and baren cows. A potentially productive female has a current value of CFAF 30-50,000 head (October 1974). Average estimated production characteristics of a typical herd are:

Age at first calving	2 1/2 - 3 years
Productive life of females	10 - 12 years
Calving percentage	50 - 60 percent (35 - 80 percent)
Loss of calves up to 1 year	30 - 40 percentage
Age of calves at weaning	10 - 18 months
Age of animals at sale	7 years (4 - 12 years)
Carcass weight at sale	120 - 150 Kilos

If an animal at slaughter is worth CFAF/head 15,000 (300 Kilos CFA/Kilo), the average female will produce an income of about CFAF 30-45,000 during her productive life under current production systems. Obviously, there is not a great deal of margin for error in the traditional production system when measured against economic criteria. But the production characteristics above indicate those areas where programs to improve the livestock industry need to be carefully planned and evaluated: nutrition, breeding, health, water, markets, prices and, of course, risk and uncertainty. These rough data also suggest an off-take of about 13-18 percent annually far below the 26 percent of Australia or the 20 percent average for Latin America. If variable production costs are low or technologies and methods are introduced which raise costs without major changes in these basic production coefficients, the economic return to the producer may remain low or even become negative.

Major changes in production coefficients associated with the livestock industry in Senegal will be slow (at least 10 years) and will require even more major changes in management systems. Such changes must be introduced at a rate consistent with the capacity of the typical producer's capacity to absorb them (Section III).

Although most livestock in Senegal receive no feed other than natural pasture, commercial feeding of animals has been in existence on a limited scale for several years. Cotton seed meal, rice bran and similar processed feeds have been used depending on availability and relatable prices. However, such feeds are expensive and require careful attention to price relationships and nutritional factors to remain both technically and economically viable. A commercial feeder indicated that most of the profit made from feedlot-type operations in Senegal was derived from buying and selling and not from feed conversion. Similar observations apply to feeders in the western world. Poor information about seasonal supply and demand conditions, i.e., price patterns, spreads and trends will inevitably result in poor profit performance by the feeder, low prices to producers of feeder stock and/or hardship for consumers. Such information is available to very few people in Senegal. Production costs and returns data for feeding operations are not generally available.

Human Capital, Physical and Organizational Infrasturcture

Human capital, in the form of both trained technical people and an educated general population is a relevant limitation in Senegal. However, the situation is much less serious in Senegal than in other Sahelian Countries. Conversations with various GOS officers and expatriate advisors indicate the existence of administrative capacity to develop general comprehensive development plans. This capacity is much lower with respect to livestock.

Veterinary services are readily available to a large majority of livestock producers in Senegal usually at zero or very low cost (a type of government subsidy). The supply of trained animal health personnel is quite adequate and perhaps capable of absorbing responsibility for implementing animal health activities of expanded development programs. There are relatively few trained animal husbandrymen and even fewer people capable of developing integrated agriculture-livestock plans and programs which have a real potential for actual implementation.

Relevant livestock, forage, health, management, marketing and policy research is seriously inadequate. A sound base of applied research is essential both for planning and implementation of development programs and is critical to anticipating and responding to the problems of livestock development.

The GOS is apparently well organized for planning and even the execution of livestock programs. The problem is inadequate supply of qualified people to staff designated positions. This is especially true with respect to people with management talent and innovative organizational control.

III. General Strategy and Program Recommendations

The rationale for general strategy recommendations for livestock development in Senegal is developed in this section. Some specific project activities are suggested in Section IV.

Development of a self-sustaining economically viable livestock industry in Senegal requires recognition of a complex set of simultaneously interacting phenomena. The livestock subsector involves forage and other feed, animals, water, marketing, processing, consumers, prices, government policy, and, of course, social and cultural characteristics of the people involved in various activities. Failure to appropriately address any one of these elements will result in less than optimal growth and development.

The government of Senegal has recognized the need for stimulating agricultural development with the objective of increased food production. The plans and programs already being implemented to stimulate crop production exemplify their commitment. Livestock development has received considerable governmental attention also. But, it should be pointed out that the set of alternatives for improvement of the livestock subsector is much less clearly defined than for crops. Very little expertise exists either in Senegal or the developed world which provides the basic understanding for exact evaluation of the alternative schemes typically conceived by "planning" personnel, especially with direct application to resource and climatic conditions of the livestock areas of Senegal.

Successful development of the livestock sector of most LDC's involves a carefully phased set of activities. These generally begin with planning, proceed to implementation, and conclude with evaluation. But it is essential to recognize the need to proceed through each of these general phases for each of the major elements of the livestock system mentioned above and to ensure consistent activities in each area.

Planning for livestock industry development in Senegal is being carried on by several related public agencies both independently and with the assistance of international donors. Often, these plans emphasize the need to expand the supply of livestock products as a primary objective with the caveat that desired increases will result from improvement in the production coefficients outlined in the previous section. However, changes in these productivity coefficients typically require a firmly established, reasonably modern livestock infrastructure and an increase in the uses of improved technologies, inputs and management. Herein, lies a basis for the

dilemma in planning for livestock development.

Although Senegal has a more advanced livestock industry than many other countries in the Sahel region, the producer-level infrastructure is not currently sufficient to provide the basis for major changes in productivity. The traditional production systems common to most regions of Senegal have evolved over time in a manner consistent with the fragile natural and human resources available. Existing traditional systems are reasonably well organized given the present necessity to ensure survival in the presence of unpredictable adversity. Productivity per resource unit is low, but so is the risk of absolute failure.

Imposition of modern technology and of an associated, relatively sophisticated management on a traditional livestock production environment which is oriented toward low risk activities and lacking in physical and human infrastructure will not produce desired changes in resource productivity not at least, in any reasonable period of time. What will happten, assuming adequate areas of under or unutilized land, is that producers will expand production in rather traditional low risk ways. While such traditional expansion may be desirable and totally consistent with producers' capacity to absorb change in certain cases, it does not represent an improvement in resource productivity, rather it represents an increase in production. This type of increase in production, not productivity, is difficult to sustain for long periods of time. Resource availability becomes limiting and productivity increases become the only source of added output.

An example of the above type of improvement is seen in the establishment of additional watering points in Senegal. Although it is obvious that water is a severely limiting resource, experience has shown that the simple provision of additional water sources has increased production but not productivity. Management has not changed and consequently the basis for continued improvement has not been established.

The input and support service requirements associated with most "improved methods and technological packages" relevant to livestock production are sizeable. The associated necessary upgrading of management skills is tremendous when consideration is given to the position from which the typical producer begins. Both of these requirements may present apparently unacceptable risks to the individual with the result being very slow adoption and little apparent progress.

Planning of livestock development programs in Senegal must recognize and accommodate differences in resource availability and capacity, the capacity of the individual producers to absorb change, and the capacity of both the public and private sectors to deliver necessary physical and management training services.

Implementation of livestock development programs is extremely difficult in LDC's. Senegal is no exception. To impose a package or system with great complexity and uncertainty on a traditional environment will result in failure. Phases of implementation exist and should be followed. First, the producers must be afforded the opportunity to see the potential successes and/or risks associated with a particular strategy and program. They must be able to understand each activity and change required. Demonstration "projects" help and are necessary, but often such demonstrations are not adequately integrated into the existing system to be understood, with the result that they are simply observed. Where existing levels of comprehension are inadequate, training may be necessary.

Development programs in the livestock area are often inflexible in the mode of implementation. A do-it-this-way-or-not-at-all attitude has produced numerous unsuccessful programs in LDC's. The reasons for this needed flexibility in implementation are many. Need for flexibility results primarily from over optimistic estimates of the capacity of individuals to understand and absorb change and from the lack of basic understanding of the resource capacities and constraints during the planning phases. Continual objective evaluation of program progress is essential to providing flexibility in implementation.

Integrated livestock development programs are essential in Senegal. But the pace at which implementation proceeds must be carefully geared to the capacity of people and the public sector to absorb and deliver support services, including training, required by change. The Eastern Senegal livestock project is a good example of a part of a well planned coordinated livestock program. However well planned the livestock program project activity, it must be recognized that the information and research upon which it is currently based has many serious deficiencies. There is need to insure that data and information generated throughout the process of implementing a program is objectively used to make mid-course corrections consistent with existing conditions.

Areas of transition surrounding current and potentially developed cropping areas provide a natural zone for possible livestock activity. Soils in these transition zones are typically only marginally suited to crops, and often returns to livestock enterprises exceed those to crops. Relatively extensive livestock systems such as those planned in existing projects are appropriate. Care should be taken to resist the tendency to intensify production systems whenever possible.

One type of intensification often suggested by livestock industry planners is feeding of cattle. Feeding expensive coarse grains to cattle is seldom economical in LDC's over long periods of time. The argument that animals

can be fed crop residues otherwise wasted seems logical if in fact the waste is real. Brief observation in Senegal in October 1974 suggests that the supply of wasted crop residue is much less than many estimate. Even at current prices feeding is at best marginally viable. For example, consider the following:

Short-Term Cattle Feeding 60 Days

	CFAF
Buy 10 head at 300 Kilo @ 80 CFA/Kilo	240,000
Interest @ 12 percent year on 240,000	4,800
Feed residue zero cost for 60 days at 1/4 Kilo gain/day produces 150 Kilo gain for 10 head at 80 CFA/Kilo	12,000
Veterinary costs and any capital investment and profit	7,200

If even one animal dies during the 60-day feeding period, the activity produces a sizeable loss to the producer given the above prices and rates of gain. Although these data are extremely rough, they suggest that efforts to intensify livestock production are generally very risky and require considerable management ability and good scientific and market information not readily available in Senegal.

GOS price policy designed to provide consumers with inexpensive food by controlling the price of cattle at the producer level may serve as a disincentive to livestock producers to modify and/or expand their activities. Allowing prices to seek a market equilibrium would result in some price adjustments, but would probably result in high enough returns to producers to justify change, i.e., reduce risk. In any event, control of prices at the producer level with relatively little control at other points in the system results in livestock producers subsidizing the activities of traders, butchers and consumers.

It was pointed out earlier that any major change in the system of livestock production in Senegal would require provision of a sizeable set of inputs, support services and training. Deregulation of prices would also require support services to the assembly, transport, processing and distribution system to help insure against creation of imbalances during the establishment of an efficiently functioning system. Senegal and most international donors view the food deficit situation as a production

problem. It is true that larger amounts of production are needed for both crops and livestock. But production improvements alone will not produce a self-sustaining, economically viable livestock industry. Productivity improvements are necessary in post-production activities also. Many examples of stagnated production improvement programs resulting from insufficient marketing and support systems exist in LDC's. Information needs are large and of great importance as development begins. Capital requirements expand as does the need for skilled management and responsive government policy.

A single development strategy for the livestock industry in Senegal will produce only modest gains. Different programs are required to stimulate improvement among nomadic herdsmen than among sedentary farmers contemplating an integrated farming program along with a livestock enterprise. Range management and provision of water sources may dominate activities directed toward extensive producers, whereas very delicate economic and technical consideration may dominate those directed toward sedentary producers. The degree of skills required and the capacity to absorb innovation may differ requiring widely divergent delivery and implementation strategies.

Introduction of a major livestock activity in areas such as the Casamance may be found technically and economically desirable. However, such major new attempts should follow demonstrated successes in areas where livestock production has apparently more rapid adaptibility. Careful detailed research is needed upon which to base livestock development plans. Such relevant applied research, while generally inadequate in areas where livestock production is currently found, is nearly absent in others.

Senegal has the potential for increases in livestock production. These increases will result in most instances from programs which first exploit under or unutilized resources in rather traditional ways. Subsequent increases in output will result from changes in productivity brought about by programs which carefully integrate all aspects of livestock production from producer to consumer, and which give explicit consideration to development of necessary management skills at the lowest level of activity.

IV. Some Possible Projects for Senegal

Organizational structure and the availability of trained personnel in Senegal is reasonable and suggests an existing capacity to absorb sizeable additional development efforts. Some possible project activities include:

1. Support range management projects organized by rural development groups responsible for constructing and administering deep wells.

2. Assist in development of rice producing perimeters along the Senegal River and support of mixed crop-livestock activities.

3. Support development of small scale water catchment in areas of natural pasture as a source for livestock.

4. Support for projects aimed at reestablishing natural perennial forage species.

5. Support for pilot range management projects such as the Senegal livestock project at Bakel. However, careful attention must be given to maintaining complete and accurate records.

6. Continued support for livestock disease and parasite control.

7. Reevaluation of the economic potential for livestock production (perhaps farmer cattle feeding) in the Casamance area.

8. Support for generation, compilation, and analysis of agricultural statistics.

9. Support for seed multiplication and nurseries.

10. Support for biological and economic research necessary in designing and implementing various phases of livestock subsector development plans.

SENEGAL

EDUCATION AND HUMAN RESOURCES

SECTOR ASSESSMENT

A. INTRODUCTION

That Senegal's school system is seriously out of balance was an observation few would challenge in December, 1974, least of all in Dakar itself. Few would question that a major overhaul of the school system was overdue; indeed, President Senghor and the Senegalese National Assembly had acknowledged this point several years previously in issuing the Education Orientation Act of June, 1971, from which nine subsequent decrees have been derived touching the major parts of the system. Reform was coming, but like all systematic education reform, the substantial fruits of that reform would not be maturing for many years.

In recognizing the need for major education reform, Senegal was typical of the countries in the CWR area. By 1974, all governments in the region were aware that they were paying dearly for school systems which were clearly inadequate in their coverage and obviously unsuitable in their orientation. All, including Senegal's, were seeking more direct, less costly ways of improving the productivity and the living conditions of their rural populations.

Where Senegal differed from many of the rest, however, was in the sizable array of education programs already at work in the countryside, including schools and non-formal programs alike. The opportunity was at hand in December, 1974, to begin to coordinate these programs into a coherent national strategy for rural education. Otherwise, should this opportunity slip, Senegal faced the prospect of having to maintain a rural education system which might become as inefficient and unmanageable as the traditional system it sought to go beyond in the rural areas.

The following pages trace the essential elements of a potential rural education system in Senegal, including established schools but emphasizing the non-formal programs about which less written information is available. A critical overview of the school system will be presented in terms of the system's present imbalances. The section will conclude with recommendations for ways of assisting Senegal in the formation of a rational education strategy for the betterment of the rural areas.

B. Imbalances in the Formal School System

1. Cost Imbalance: In 1973-74, education and training in Senegal

absorbed 28 percent of the government's recurrent expenditures. With Mali (over 30 percent), this was one of the highest rates in Africa. The annual rate of growth of Senegal's total education budget is already 6.5 percent per year. This must be reduced to 3.5 percent per year for the rest of the 1970's if education is not to absorb a greater percentage of government revenues than it does at present. Yet primary education (grades 1-6) must absorb 3 percent more students per year in the 1970's just to maintain the present, low levels of enrollment. Primary education accounts for 60 percent of the total education budget, with unit costs running $66, or one third of GDP per capita. Unless an acceptable low-cost alternative to the present form of primary education is found, education costs must continue to grow at the expense of other government services, and the cost imbalance worsen. The World Bank has provided funds in its Second Education Project (December, 1974) to identify acceptable alternatives to the present primary system.

2. Content Imbalance: Seventy per cent of the Senegalese labor force was engaged in rural, traditional employment (8.4 percent in modern employment). Senegal's economy looks largely to greater (and more diversified) agricultural production. Yet the content of the school system is strongly oriented towards liberal arts subjects and modern sector employment.

-- Although a 1963 survey showed that less than one percent of the population speak French at home, French is the language of instruction in all primary schools.

-- Two-thirds of students in lower-secondary schools (grades 7-10) are enrolled in general education courses, only one-third in technical. Technical courses suffer generally from a deficiency in facilities and trained teachers, making for an over-reliance on book learning. Apart from numbers of students, the best students academically usually opt for the theoretical, liberal arts curriculum offered by the general lycee.

-- At the upper secondary level (grades 11-13), only 2,500 students are enrolled in the technical lycée, as contrasted to 5,000 in the general studies programs.

-- Teacher training institutions are separated into general and technical schools, making the integration of curricula more difficult. Men's and women's technical studies are also separated. Teachers graduating from the Higher Teacher Training College (grades 14-17), who teach the general curricula at the secondary level, receive higher salaries than their

colleagues graduating from the Men's and Women's Technical Training Colleges (grades 14-16).

-- At the University of Dakar (grades 14-17), the preference of two-thirds of Senegalese students for general studies is again demonstrated by the numbers of Senegalese enrolled in the University's various programs (1973-74):

Faculty of Letters and Humanities	1,505
Faculty of Jurisprudence and Economics	1,128
Faculty of Sciences (including veterinary introductory courses)	427
Faculty of Medicine, Pharmacy, and Dentistry	383
Technical Institute (I.U.T.)	331
School of Librarians	15
Center for the Study of Information Techniques and Sciences	14
Inter-State School of Veterinary Science and Medicine	17
	3,820
Total Enrollment, including non-Senegalese --	5,847

Reforms to correct this content imbalance include the IBRD Second Education Project, which will experiment with the introduction of up to six national languages as the language of instruction, beginning with the first two years of primary school. Under the same IBRD project at the secondary levels, a major effort has begun to strengthen science/technology programs, including the building and equipping of special centers to reinforce school programs, the production of new materials, and the training of teachers in the new approaches.

3. Imbalance of Numbers Enrolled: There are two problems involved here. There are the numbers enrolled (the minority) as contrasted with those receiving no formal schooling (the majority); and there are the numbers enrolled contrasted with the number of job opportunities available to them. In aggregate terms, the latter becomes an increasingly serious concern at progressively lower levels of the school system.

-- To the first problem, only 40 percent of primary school-aged children (ages 6-12) were enrolled in school despite the heavy cost burden of the primary system. That the inefficiency of the system had much to do with this unsatisfactory showing was evident from the high repeater rate (19 percent in 1971). The government has declared that 100 percent of primary-aged children will be enrolled by 2,000 A.D. The government recognizes this to be an impossible goal at present costs.

-- Between 70 - 75 percent of children completing primary school do not continue their education. These number about 11,000 per year. About 7,000 of these leavers each year live in urban areas. These in addition to the unschooled who come to the towns on a seasonal or semi-permanent basis, compete for only 5,000 new modern sector job openings each year (although a small, undetermined number of these jobs will be in rural areas). Above this, the annual number of job openings by skill categories, 1970-1980, matched more closely the annual output from secondary and higher education institutions (adjusted to show those likely to enter the labor force):

Skill Level	Modern Sector Job Openings	Entrants to Modern Sector Labor Market
Professional/Higher-level Managerial	850	800
Technicians/Middle-level Managerial	2,150	2,000

With the need to upgrade some of those jobs presently classified as "technician," there may develop a slight surplus of secondary school leavers. At the highest level, no surplus is anticipated in the aggregate sense, without considering the inappropriateness (or absence) of training for the specific kinds of high-level jobs opening up.

4. Geographic Imbalance: Faithfully reflecting the dual economy created by the French concentration upon Dakar as the headquarters of Afrique Occidentale Francaise, much of the school system is concentrated in the Dakar-Thies region, or at other points along the coast (e.g., St. Louis). This comes at the expense of the rural, inland areas of the country.

-- The location in the Dakar-Thies area particularly, and in the coastal region generally, of nearly all of Senegal's upper-secondary schools has contributed strongly to the uprooting of students and to their alienation from rural areas. This tendency is reinforced by the schools' practice of selecting students on the basis of a national exam, thus mixing students from all areas in any one school.

-- No fewer than eight of Senegal's twelve teacher training institutions (including the university) are located in the Dakar-Thies area, about equally divided between the two cities. Government's plans are well advanced, however, for the completion by 1976 of one teacher training college for primary school teachers in each one of the regions.

-- Virtually every post-secondary school level institution is situated in the Dakar-Thies region, with the preponderance in Dakar. This concentration has no doubt helped to intensify the expression of student dissatisfactions, so evident in recent years, especially at the university.

5. Donor Imbalance: The shape and content of the French educational system is stamped indelibly on that of Senegal, from the first day of primary school in the French language to the quantity of French support at the higher levels of the system. This dependence holds at a time when France is making a thorough review of its education assistance to francophone Africa.

-- Eighty (80) percent of all upper-secondary school teachers in Senegal are French. According to Government of Senegal records, the unit cost at the upper-secondary level is $378, but if the salaries of French teachers were noted, unit costs would be over $600. A French teacher at the upper-secondary level costs the Senegalese government $300 annually, whereas a Senegalese teacher would cost his government $4,500 per annum in salary, pension, furnished housing, and other benefits. This cost differential is bound to delay the nationalization of the teaching force. It also provides a neat example of the root cause of the high costs of Senegalese education (and those of other former dependencies), namely, the close link between Senegalese and French metropolitan teacher salary scales.

-- France met 60 percent ($8,000,000) of the research costs of the University in 1971. This was 44% of all external subsidies to the University that year. The University is patterned after the French model, with largely autonomous faculties maintaining their own selection, standards, and orientation.

-- In 1971, France provided a total of $15,200,000 in recurrent aid to Senegalese education, mostly in the form of salaries to French teachers. This represented 83 percent of all external subsidy to the school system that year.

B. Rural Education Elements in the School System

Seeking to make the school system responsive to the national environment, Senegal's education reform law of 1971, together with Senegal's Fourth Five Year Plan, dated July, 1973, both call for a new content to the entire school system, a profound reform of institutions from primary school to the University. (Plan, p. 209)

There were a number of schools already in existence, however, which served the rural sector. Although it was impossible to assess their programs in the time available to the DAP team, the institutions noted below represent the present formal elements in what may become a future system of rural education and training for Senegal.

1. Although no further information was available at Dakar beyond names and addresses, the Technical Training Division of the Ministry of National Education is charged with overseeing an assortment of some 50 vocational, technical, professional, and teacher training schools and centers whose interest in the rural sector may be, in some cases, assumed, but cannot be stated with precision.

-- Technical schools generally maintain a post-brevet (10th grade) entry level and offer a three year training course, followed by six-months on-site training. Examples of this type are the Technical School for Agricultural Agents at Ziguinchor, the Technical School for Livestock Agents at St. Louis, and the Technical School for Water and Forest Agents at Ziguinchor.

-- Professional schools take students at the baccalaureate level for two years training. An example of this type is the National School of Horticulture.

-- Training centers for housekeeping and women's work dominate this assortment: 27 out of the 50 centers and schools concern themselves with this work, some in every region.

-- The Technical Teachers Training Schools, masculine and feminine, both belong to this collection, along with the National School for Maritime Training.

2. The National School for Rural Officials (Ecole Nationale des Cadres Ruraux), located at Bambey, is the chief middle-level agricultural training school in Senegal. The Bambey School was founded in 1960 in close proximity to Senegal's main agricultural research station (Centre National de Recherche Agricole, formerly IRAT).

Bambey accepts secondary school graduates who hold the baccalaureate and who have passed a special entrance examination. The school offers a two-year Ingenieur des Travaux Diploma program; most graduates are employed as extension agents by the government: in the Ministry of Rural Development, ONCAD, SODEVA, CNRA or in other agriculture-related services. After three years of such employment, many Bambey graduates obtain state scholarships for two years study abroad (usually in France) to attain the Ingenieur Agronome Degree. Since 1960, Bambey has graduated 344 men, including students from other francophone countries. Bambey's current enrollment is 85; its faculty level is 15, divided equally between the three departments. By department, those Senegalese graduating on November 9, 1974 numbered as follows:

Agronomy	12
Water Resources and Forestry	7
Livestock	6
	25 (plus 3 Chadians)

The Director of Bambey, Mr. Wagane Faye, who was appointed from the University of Dakar in August, 1974, plans to expand the curriculum and to tighten coordination of coursework with the agricultural research station. It is apparent that enrollment is also expanding with growing demand for middle-level agriculture technicians: 28 (1974), 39 (1975), and 46 (1976), compared with an average of 25 graduates per year since 1960.

3. <u>The University of Dakar: Institut Agronomique</u> The University currently has no agriculture degree program but is planning to institute one as quickly as possible. In early November, 1974, University representatives made a study visit to Brazil to discuss plans for the Institut Agronomique, which will combine French and Brazilian concepts. According to University and Ministry of Higher Education officials, the Institut will offer the Ingenieur Agronome Degree to Senegalese students and to any which qualify from the CWR area; it will stress practical, drought-related development-oriented courses in agricultural management, conservation, production and marketing practices. Officials are confident that capital funds are assured to construct and equip the new Institut, but appeals will be made to the U.S. and other donors for faculty when planning has advanced farther. Officials estimate that the Institut will begin operations within five years. An active debate has been underway as to the most favorable location for the university-level agricultural faculty. The two locations most often cited at present are St. Louis and Bambey.

4. The University of Dakar: Ecole Inter-Etats des Sciences et Medecine Veterinaires The School of Veterinary Medicine was officially founded at the University in 1972 by the francophone African Community (O.C.A.M.), but preparatory courses had begun in 1967. The six year course leading to the Diploma of Docteur Veterinaire includes one year's preparation under the aegis of the Faculty of Science (Certificat Preparatoire aux Etudes Veterinaires), four years of veterinary studies, and one year's thesis preparation. The total 1973-74 enrollment in the four year course was 72 students, including 17 Senegalese (21 Togo, 10 Dahomey, 7 Niger, 5 Upper Volta, 4 Mauritania, 3 Chad, 3 Cameroon, 1 Zaire, 1 France). Costs of the school are shared by user states on a pro-rata basis, and the school is governed by an Administrative Council on which the user states are represented.

5. The University of Dakar: Institut Universitaire de Technologie

Although the principal task of the I.U.T. is the preparation of Engineers and Technicians qualified in scientific and technical studies (electronics, chemistry, mechanics, administration) for the public and private sector, the I.U.T. does perform special studies at the request of the government. A.I.D. is currently funding several such studies, including a household consumer study and a manpower study, which are relevant to rural development.

6. The University of Dakar: Institut Fondamental d'Afrique Noire (IFAN)

Established in 1936, IFAN was formally constituted in 1973 as a public establishment with legal and financial autonomy under the aegis of the University. IFAN's function is to promote scientific studies of West Africa, in particular, including flora, fauna, African art, prehistory, archeology, Islamic studies--in short, African culture in its broadest sense. IFAN is a research institute which encourages investigations into all manner of rural practices, human as well as natural, social as well as physical.

7. Ecole Nationale d'Economie Appliquée (E.N.E.A.) The National School of Applied Economics, located at Dakar near the University, is Senegal's chief training institution for middle-level rural management. E.N.E.A. stresses practical training programs of two years, including at least six months in the field. The school also offers short made-to-order courses at the request of various government agencies. Each regular class numbers about 60 students. Formerly, most incoming students had spent several years in active government field service prior to entry; now, however, owing to the diminishing number of openings for secondary school leavers, entrants to E.N.E.A. must all possess the baccalaureate diploma and enter directly from school. Faculty is part resident, part drawn from the government service on a part-time basis.

Of the two-year program the first year offers all students a common course, combining instruction in agriculture, economics, sociology (etc.) as applied to rural analysis, followed by a six months field analysis of a Senegalese village and its surroundings (history, social-spatial-economic organization, equipment, etc.). The second year is specialized into four or five courses, named "colleges":

-- The College d'Animation for rural (and urban) development workers, including instruction in teaching and organizational techniques;

-- The College de Cooperation, for cooperative agents and inspectors;

-- The College de Planification, for local planning officers (Chiefs of Rural Expansion Centers), including development planning, project design and management, and rural organization;

-- The College de Statistique, for officers at central and local levels. The Statistics course lasts four years, and its students do not participate in the common course (first year).

The above-named institutions may be considered the principle rural education components existing today in the Senegalese school system. Other institutions have an academic interest in rural development, such as the University's Economics Faculty, or a tangential importance, such as (possibly) the National Polytechnic at Thies. This school, constituting the major Canadian development project in Senegal ($6.4 million capital, $1.0 million technical assistance), will graduate some 50 business administration/management graduates in 1978, with output planned to reach 70 graduates per year in the indefinite future.

The following section outlines Senegal's non-formal, rural development activities, grouped for administrative purposes in the Prime Minister's Office, under the General Delegation of Human Promotion.

D. Non-Formal Elements

Set up over the last two years, Promotion Humaine is composed of four offices, or "Directions," combining five separate non-formal programs, each with its independent origins and staff structures. Although the programs are complementary, even overlapping, Promotion Humaine has not yet enjoyed sufficient time or staff to develop a focus and a coordinated program strategy.

According to the July, 1973 National Development Plan, the task of Promotion Humaine is to promote popular participation in national

development (a) by encouraging the formation of popular development structures (cells, cooperatives), and (b) by preparing youth and young adults through literacy and practical training to join production organizations and processes. To carry out this task among the some 3,000,000 rural population in the 15,000 villages of Senegal, the staff of Promotion Humaine totaled less than 440 persons in November, 1974. The Promotion's expansion plans are therefore ambitious, although they are to a very great extent dependent upon external financing.

1. The Direction of Rural and Urban Development (Direction d' Animation Rurale et Urbaine) Animation Rurale is the oldest and largest of the five programs grouped under Promotion Humaine. Dating from Independence (1960), Animation Rurale today employs 279 persons in 30-40 Rural Development Centers (plus Headquarters). Of this total, 190 were women. According to official estimates, 60,000 persons have been involved in Animation activities since inception.

In organizing development from below in the service of human growth, Animation Rurale has developed a characteristic pattern of courses and seminars organized by the Rural Development Centers; these "courses" (First, Second, and Third Degree) are designed progressively:

a. to open dialogue between the villages and the government technical and administrative representatives in identifying problems and solutions;

b. to lay an organizational base for village and inter-village development; and

c. to introduce technical training and expertise in reaction to the problems identified.

Certain villagers are given short-term training (civic and technical) to prepare them to work as "animateurs" in their home settings.

Animation Rurale is seeking $1,100,000 to cover program costs (exclusive of salaries) in conducting "courses" for 50,000 people over the next four years. The chief contingency factors to the success of the Animation program (as well as the other non-formal programs) appear to be:

-- First, the availability of funds (above) and staff (e.g., 21 Peace Corps requested for 1975) from outside sources;

-- Second, the effective preparation by E.N.E.A. (above) of adequate numbers of national staff (148 additional personnel required);

-- Third, the degree of receptivity on the part of local leaders towards development programs involving popular participation and direction. Their resistance stalled the Animation program for several years until the former Director was reinstated in January, 1974 as General Delegate of Promotion Humaine. The decision to press ahead with Animation Rurale, but to redirect it towards development activities and away from organizational activities, was therefore made at the top levels of the Senegalese goverment; and

-- Fourth, the extent of cooperation offered by the technical services at local levels. Various of the production societies (e.g., SODEVA, SAED) appear to prefer to organize extension efforts in their own manner. Much would depend upon the fate of the Rural Expansion Centers (C.E.R.s), the basic groupings of technical officers at local levels under the Regional reform program. Opposed by the Ministry of Rural Development, which preferred the production societies, the future direction of the C.E.R.'s was in doubt in November, 1974.

2. Middle-Level Practical Training (Enseigment Moyen Pratique, or E.M.P)

According to present thinking, the E.M.P. Program will rank high in planning priorities for the new period, 1975-79. Designed to offer practical rural training to illiterate youth and to primary school leavers alike, the E.M.P. Program represents the government's answer to the limitations (in both content and outreach) of the primary school system.

Developed since June 1971 by the French IRFED (Institut de Recherche en Matiere de Formation et d'Education pour le Development), the E.M.P. Program by November, 1974 consisted of two experimental village training centers and a national center in temporary lodgings at M'Bour. Ten E.M.P. instructor/"agents" were in training, with nine other staff employed at the M'Bour center and in Promotion Humaine headquarters, Dakar. Yet from this experimental grouping, according to the July, 1973 National Development Plan and confirmed by figures specially prepared for the DAP team in November, 1974, the government of Senegal plans to staff and equip 176 centers, 7 regional teams, and 27 departmental teams, in addition to expanding the National Center. The total E.M.P. staffing requirement would reach 926 persons by 1978. By 1984, when the national system was complete,

the E.M.P. Program would involve 801 centers at an estimated $24,000 apiece with 1730 instructors, plus local, regional, and national support staff.

These ambitious expansion plans, before the E.M.P. Program is yet firmly established, raise three serious questions (in addition to the usual question of the source of financial support):

-- First, would such a rapid expansion not violate the principle at the heart of E.M.P., namely, the community-centered nature of the program? Assisted by the E.M.P. tutors, the community should design the learning programs, voluntarily construct the center ("foyer"), and contribute village specialists (model farmers, masons, blacksmiths) and unpaid monitors ("selibes") to supervise the students during their practical training and to provide the program with feedback from the villages. Was this concept consistent with a crash E.M.P. expansion program?

-- Second, could E.M.P. staff be prepared in time to run a drastically expanded program of the type planned? To deal with this question, Promotion Humaine headquarters plans the retraining of primary school teachers in the E.M.P., non-formal approach, beginning with six months on-the-job training in village centers. Whether regular teachers were susceptible to retraining in irregular methods, geared to the local community, was open to question.

-- Third, even if retraining were largely successful and an E.M.P. cadre established in the time allowed, when would the government be prepared to support a national E.M.P. program at the same salary levels as the existing primary school system? In time, would not the two systems bear a strong similarity to each other?

With Senegalese assurances of careful planning and supervision, the World Bank agreed in December, 1974 to fund 30 E.M.P. Centers, 4 regional centers, 15 departmental teams, a part of expanding the national center, plus training and 2 full-time experts (E.M.P. formative evaluation and E.M.P. management and logistics). The centers, it was agreed, would go to areas of Senegal entertaining development projects, according to criteria to be drawn up by the National Planning Office.

3. Rural Professional Training (Formation Professionnelle Rurale, FPR)

FPR in Senegal was initiated by I.L.O. nine years ago; under the terms of its ten year rule, I.L.O. is required by December 31,1975 to withdraw its support. The GOS is therefore actively seeking another donor who will agree to share the costs of further construction, equipment, training, and follow-up for the FPR system.

The FPR system employs between 66-70 instructors and other professionals, distributed between a small headquarters complement in Dakar, seven farmer

training centers, one herders center, and five artisan centers. Two more artisan centers are planned in association with existing farmer centers. A second herder center is planned for Bakel.

The per student costs of FPR training were not immediately available in November, 1974. As a general indication of the range of costs, however, construction costs of the Kael artisan center in Central Senegal were $80,000 in 1970, using self-help labor and local building materials. Equipment costs were $18,000. Given an enrollment of 35 currently in training, and an operating budget of $15,740 (seven staff, total), unit training costs of Kael were in the neighborhood of $500. Compared with this, the Labgar herdsman center cost about $96,000 to construct in 1970, plus $12,000 to equip and $1,250 to stock with animals. Current operating costs were $15,320 in 1974. With a total enrollment of 70 (20 in the six month course, 50 short-course students), unit costs for Labgar were about $250 per trainee. But according to ILO/UNDP records for July 1, 1971 to June 30, 1972, operating costs (natural and personnel) for 11 operating centers averaged $38,240 per year. This did not include the costs of running project headquarters (Dakar) or the value of ILO technical assistance. This discrepancy between ILO/UNDP figures and the figures provided by the centers suggests that the individual centers may not include the cost of the Center Director's salary in their operating costs, thus artificially lowering the unit cost figures cited above.

How well is the Rural Professional Training system working in Senegal? Considerable concern focuses on the problems of follow-up after training is completed. Adequate follow-up is required to ensure that the pilot farmers are properly equipped with the implements upon which they have been trained, and to ensure that they can find an outlet for their increased produce. Adequate follow-up would also ensure that the artisans can find work. Where follow-up has not been effective, as at Labgar, enrollments fall off in numbers and in quality. In an attempt to ensure a supply of tools and credit to pilot farmers and herders, Promotion Humaine agreed in 1974 with ONCAD to draw up a list of simple agricultural equipment which ONCAD will distribute to trainees through the local cooperative societies. Coop members may then purchase the equipment over five years, with Promotion Humaine guaranteeing the purchase payments. For more complex, motor-driven equipment, Promotion Humaine is prepared to set up model farms which would be manned by the top 10 per cent of graduated pilot farmers. Promotion Humaine recognizes that the local reorganization of the cooperatives themselves, to promote the wholesale marketing of farm producee, is, with credit, the second essential part of program follow-up. Too often, however, one or both parts of follow-up

is insufficient or entirely lacking.

Indications are, nonetheless, that pilot farmers and artisans trained by the FPR centers are beginning to have the leavening effect intended in rural areas: through their employment in rural development schemes, through the taking on of apprentices in the case of artisans, or in the usual way, through traditional practices of cooperation which occur at peak points in the crop year. The multiplier effect of FPR training has been estimated by ILO, perhaps too generously, at 1:10; local officials believe a ratio of 1:4 would be acceptable. The fact remains, however, that FPR has met with general satisfaction in Senegal. FPR is considered an activity meriting wider attention for possible replication elsewhere. It also would appear deserving of combined GOS and other donor support to continue the present program.

4. Rural Family Training Centers (Maisons Familiales d'Apprentissage Rurale, MFAR) The Maison Familiale program is directed at training teen-age youth and young adults at the village level in an assortment of practical skills, from literacy and crop production to spinning and health care. Although in the Promotion Humaine organization, Maisons Familiales fall under the direction of Rural Practical Training (above), the MFAR program is staffed separately and the program itself is of a quite independent origin. The Senegalese MFAR system is one of a total of perhaps 17 national systems to be found in Europe (France is the mother country), Francophone Africa (Algeria and Senegal lead), and Latin America (Brazil and Argentina).

There are nine Maisons Familiales currently in operation in Senegal, although nineteen exist on paper. These nine are distributed among four regions and enroll a maximum estimated 2,610 trainees, or 290 per center, at most. The average Maison Familiale center is purposely a simple affair, consisting of a free-standing, self-help building of between one to three rooms for class space, plus two huts of one or two rooms for the resident instructor(s) and instructress(es). The official estimated cost of constructing and equipping a Maison Familiale center in November 1974 was thus only $19,630. MFAR in that month employed an estimated 45 men and women, including teachers and regional and national supervisors, with perhaps twenty more in training. In 1972-73, total costs for the MFAR program amounted to approximately $188,000 or about $70 per trainee/year. Part of this cost already is met by local governing committees and enrollees.

In what way is the work of Maisons Familiales different from that of the Middle-level Training Centers (EMP), or even from that of Rural Development (Animation Rurale)? In many concrete instances, the differences are hardly visible. Maison Familiale's concentration on fighting the rural exodus by training post-primary aged youth in rural skills, alternating between classroom instruction and practical work supervision, is very close, indeed, to the aim, means, and methods espoused by EMP. Both programs emphasize the cultivation of host village support and guidance.

On the other hand, at the village of N'Der, northeast of St. Louis, the resident instructors of a new Maison Familiale were winning local acceptance by doing the work of rural development agents. The technical knowledge of the new instructors, but just as important, their contacts with Regional and National headquarters, won for N'Der the installation of a village well and the procurement of a motor pump for the area irrigation scheme near Lake Guier (Senegal's only lake). The MFAR monitors at N'Der continue to serve as effective spokesmen to win outside assistance for the ambitious irrigation project.

Incidentally, the distinction in outlook and attitude between regular civil service employees when posted to the bush, and Maison Familiale instructors and instructresses is no easier to draw. During a visit to the Maison Familiale at Fandene (near Thies), a DAP team member was presented by the resident staff with a well organized list of grievances: their lack of transport, their poor lodgings, the delayed payment of their salaries, their low pensions, their negligible chances of promotion, paucity of their teaching materials, and the long haul required for their water supplies. The notion that employees of the "formal" and "non-formal" education systems live by entirely different sets of expectations should be put to rest. Given the essential similarity of much of their work, it may be assumed that even fewer differences exist between employees of the five Promotion Humaine programs in terms of the support they demand.

5. Literacy (Alphabetisation) It is not strictly clear, despite the organization chart and other assurances, that literacy is an independent "Direction" within Promotion Humaine. At any rate, with the exception of EMP, which is still experimental, literacy is certainly the least developed of the five services. In a country where some 90 percent of the population is illiterate, the literacy service employs 15 persons total (13 of whom are resident in Dakar).

Literacy activities up to the present time have been limited almost entirely to the Dakar-Thies urban areas. In rural areas, almost all literacy work undertaken to date has been accomplished by SAED in the Fleuve and by IRAT in the Sine-Saloum. Preparations are being made to use six local languages for literacy campaigns: Wolof, Serer, Poular, Mandingue, Diola, and Soninke. French is used for urban (industry-related) literacy work.

Although present plans are to launch a "vast" national program, the Literacy program is seeking donor support. The FED declined to fund the $2,800,000 request submitted by the Literacy office in August, 1972; UNESCO and Brazil may provide one or two professionals apiece. Until funds are forthcoming, however, the Literacy service will remain essentially a support group, working through agents supplied by other programs and services.

E. Conclusions and Recommendations

Although Senegal's formal system of education is clearly out of line with present realities and requirements, the formal system still contains elements which speak to rural development. These elements are nurtured by the spirit of reform which is beginning to change the formal system, albeit slowly.

On the other hand, although the non-formal rural education programs, presently grouped under Promotion Humaine, speak directly to the rural producer, they speak with a barely audible voice, divided as these programs are from each other and from both the formal system and the agricultural extension services. Noting all these elements as well as the increase in foreign assistance to one or another of them, an observer in December, 1974 could foresee the time coming when Senegal's rural education "system" might well become as inefficient and burdensome as the formal education system is today.

The opportunity which presented itself in December, 1974 was precisely that Senegal's non-formal rural education programs had at last been assembled under one administrative roof. This had been accomplished only in the very recent past. The Delegate General of Promotion Humaine was not appointed until January, 1974. Clearly, the intent of the Senegalese government is now to begin to bring rational administration and planning to bear in the area of non-formal education. Certainly this is the intent of the Delegate General of Promotion Humaine. But to carry out this intent, Senegal will need help.

The first rule governing U.S. assistance to Senegal in the sphere of education, therefore, must be that this assistance shall promote the development of an effective and efficient rural education system. This system should include present and future elements of the formal, non-formal and agricultural extension programs. Such a systematic approach requires, to begin with, that the U.S. and Senegalese take account of the activities of each of the rural education programs in laying plans and setting strategies. To encourage the conscious development of a true rural education system in Senegal, it is recommended that the U.S. take the following programmatic steps:

First, beginning with a single mid-term production project, AID representatives should work with Promotion Humaine and other elements of the rural education network to devise a program which supports the aims and objectives of the production project. Such a program may involve assistance to individual programs of Promotion Humaine, to E.N.E.A., or to the University. But the result of this collaboration will be an enlarged mid-term project, not a new and independent Rural Education project.

Second, in the course of enlarging the mid-term project, AID representatives and Senegalese officials will become aware of specific ways in which Senegal's apparatus for rural education planning can be strengthened, and remedies will be recommended.

Third, to the extent that these remedies may be supplied under on-going AID programs (mid-term projects, PAID, Accelerated Rural Learning), or other donor programs, the necessary technical assistance, training, or materials may be provided without undue delay. Attention may then be given to expanding other U.S. mid-term projects.

Fourth, as Senegal's rural education planning and implementation capability is thereby strengthened, and as long-term requirements for an effective rural education system thereby become apparent, AID should be prepared to consider a long-term program proposal for U.S. financing, perhaps for FY 1977. This program might address both planning and operational requirements. The essential point, however, is that the program should arise from a sense of a coherent system rather than simply from the urgencies expressed by competing agencies.

SENEGAL: HEALTH SECTOR ASSESSMENT

1. Major Health Problems

The major health problems of Senegal are malnutrition, malaria, tuberculosis, trypanosomiasis (sleeping sickness), onchocerciasis, schistosomiasis, gastro-intestinal diseases in children, and measles.

Malnutrition: Malnutrition, especially in the form of kwashiorkor and marasmus, is reported to be the major health problem in Senegal. It has two major causes: real food shortages (in certain places and during certain seasons); and poor utilization of existing resources. Malnutrition due to the first cause is prevalent in the areas subject to drought, and in the shantytowns around some cities especially Dakar, where rural immigrants find themselves in the money economy without money. The second type is found both in the cities and the rural areas and could be corrected through programs of nutrition education, as well as by encouraging the consumption of more pulses or other protein-rich vegetable resources widely available in the country. Senegalese food habits are briefly described in Annex 1 (Nutrition Profile).

Health workers have the definite impression that the number of cases of serious malnutrition among children has increased enormously in recent years. Leaving aside the shantytowns which surround Dakar and which present a special problem, malnutrition is much more widely distributed in the countryside than in the cities. According to Senegalese physicians, the reasons for this increase in malnutrition among children are three: shortages of foodstuffs in general; shortages and decline in the quality of personnel dealing with children; and shortages of money to keep nutrition education and rehabilitation programs operating. The recent drought, of course, has magnified the problem.

On the basis of growth curves, WHO has gathered statistics on the incidence of malnutrition in various parts of Senegal which have resulted in the estimate that 9-14 percent of the under-5-year-olds suffer from Grade III malnutrition (marasmus and kwashiorkor). These children become susceptible to infectious diseases due to lowered resistance compounded by the deleterious effect of diarrheal diseases and dehydration. Grade I malnutrition is reported to be so common that it is considered a normal state.

Infant malnutrition is especially acute at the time of weaning. Efforts to correct this situation are twofold: 1) educating mothers to prepare porridges and other weaning foods based on locally grown protein-rich

resources, such as niebe and pulses; 2) producing a manufactured weaning food primarily for use in urban areas. The first type of activity is carried out at maternal and child health centers (PMI's). The history of attempts to manufacture a low-cost, protein-rich commercial weaning food based on local resources is rather discouraging. A number of products have been developed, tested and discarded either because they were unsafe or because they were too expensive for the local market to support. The two best local resources - peanut flour and cottonseed flour - are contaminated (peanut flour with aflatoxin, cottonseed flour with gossypol) and the detoxification process adds too much to the cost of the product to make it marketable. However, a new gossypol-free variety of cottonseed has recently been developed which may solve the problem. Also, test products are being made with niebe bean flour or ground shrimps heads (residue of the fishing industry).

Malaria: 82 percent of the population lives in areas of endemic malaria. Since eradication of the mosquito vector is costly and for all practical purposes impossible in intertropical Africa, reliance is placed upon utilization of drugs, such as nivaquine, to protect the population. These are distributed through fixed health posts and by mobile health teams. However, supplies in the rural areas are short and frequently disrupted due to failure of rural health workers to keep track of stocks and reorder in time, due to lack of a well-organized distribution system and due to the costliness of these and other drugs. Malaria is likely to be spread through the development of irrigation projects, if preventive measures are not taken from the outset.

Tuberculosis: Tuberculosis rates are on the increase in Senegal as a result of a slowdown in the BCG vaccination program, in spite of the fact that WHO provides vaccine. According to one of the country's leading physicians, this decline in BCG vaccinations is due to a general lowering of professional standards among health workers and lack of adequate supervision.

Trypanosomiasis, onchocerciasis and schistosomiasis: These diseases exist where water and climatic conditions favor the breeding of the vectors or the growth of the intermediate host. They are likely to spread with the development of large hydrologic projects envisioned in the river areas if appropriate sanitary engineering measures are not made an integral part of the plans.

Gastrointestinal Illnesses in Children: These are caused primarily by weaning children on brews and porridges made with polluted, unboiled water and/or polluted milk handled with polluted fingers.

Measles: Although much progress was made in controlling this disease through the U.S.-sponsored measles/smallpox program, vaccinations have fallen off due to shortages of the vaccines and lack of an adequate cold chain. Unvaccinated children born since 1972 already constitute a sizeable population of susceptibles.

2. Health Infrastructure

Senegal is divided into seven regions (Cap Vert, Casamance, Diourbel, Fleuve, Senegal Oriental, Sine Saloum and Thies). Only one outside Cap Vert has a major hospital. Casamance, Diourbel, Sine Saloum and Thies have smaller regional hospitals. These are operating at various degrees of usefulness and adequacy. Attached to each hospital there is supposed to be a maternal and child health center (PMI - Protection Maternelle et Infantile) and a maternity center.

The regions are divided into a total of 27 departments (although this may change as new departments are created), each with a circonscription medicale (CM), also referred to as a primary health center. Some departments have more than one CM, hence there is a total of 33 through-out the country (see Table 1). In theory, each CM is headed by a chief physician. In fact, at least one is known to be headed by a state nurse. The ideal CM includes a clinic or small hospital, a primary MCH (maternal and child health) center, a maternity and a dispensary, but few are ideal. The circonscriptions medicales are reportedly in varying states of deterioration, with the exception of one or two pilot demonstration centers.

Each department is divided into arrondissements where so-called rural dispensaries or secondary health posts are located. There are 85 arrondissements in all. In 1972 there was a total of 384 secondary health posts in the country (see Table 1). Ideally, the secondary health post is staffed by a state nurse, a sanitarian, an orderly and a midwife (who is often a traditional matrone). The staff weighs infants, provides advice on diet, hygiene and sanitation, distributes antimalarial drugs, and provides simple first aid. Anyone requiring medical attention of a more serious nature is referred to the nearest circonscription medicale. The dispensaries are in varying states of disrepair.

Some health posts are or should be supplemented by mobile teams which represent the only link between the health delivery system and the rural areas. On paper there are twelve such teams planned, three or four of them serving the rural areas. The number actually operating is questionable due to vehicle maintenance problems and fuel shortages.

Each arrondissement is comprised of an indefinite number of villages.

At this level a few village pharmacies are established which are supposed to distribute simple drugs. One pharmacy serves several villages and many villages have no pharmacy within reasonable distance (there are in all about 13,000 villages, some very small).

In addition to the above-described infrastructure, there exists a Service to Fight Against Major Endemic Diseases (La Lutte contre les Grandes Endemies) such as yellow fever, smallpox, cholera, leprosy, tuberculosis, schistosomiasis, ocular diseases and trypanosomiasis. Prevention and surveillance of these diseases is carried out through "sectors" where vaccinations are made and other preventive environmental measures taken. In 1972 eight such sectors existed.

The following tables show the public health infrastructure as it existed in 1972 and the ratio of health posts to population by department in 1973.

TABLE 1

PUBLIC HEALTH INFRASTRUCTURE - SENEGAL 1972

Region	Number Inhabitants	Nat'l Hospitals No.	Nat'l Hospitals Beds	Regional Hosp. No.	Regional Hosp. Beds	Primary Health Centers No.	Primary Health Centers Beds	Maternities No.	Maternities Beds	Beds Per Inhab.	Secondary Health Posts	Grandes Endemies Sectors	Hygiene Services
Cap Vert	649,000	3	2020			1	78	6	425	1/257	49	1	1
Casamance	601,000			1	72	6	340	7	137	1/1094	78	2	1
Diourbel	607,000			1	128	6	129	9	161	1/1952	47	1	1
Fleuve	372,000	1	548			4	64	5	116	1/510	61	1	1
Senegal Oriental	227,000					3	94	3	31	1/1816	27	1	1
Sine Saloum	772,000			1	275	8	122	10	201	1/1290	76	0	1
Thies	527,000			1	128	5	147	7	175	1/1171	46	1	1
Total	3,755,000	4	2568	4	603	33	1074	47	1146	1/696	384	1	1

Source: Groupe Technique de Planification No. 8 de la Sante Publique et des Affaires Sociales. Elaboration du 4eme Plan Quadriennal de Developpement: Sante Publique et Affaires Sociales - Rapport Provisoire, Vol. 1, January 1973.

TABLE 2

RATIO OF HEALTH POSTS TO POPULATION, BY DEPARTMENT - SENEGAL 1973

	Primary Health Centers			Secondary Health Posts		
	Density/population	Density/km^2	Radius of Activity in km	Density/population	Density/km^2	Radius of Activity in km
Cap Vert	1/324,500	1/165	10	1/13,250	5/10	5.6
Casamance	1/100,000	1/5,790	42.5	1/7,700	1/445	12
Diourbel	1/100,000	1/5,590	42	1/12,914	1/714	15
Fleuve	1/93,000	1/11,629	60	1/7,914	1/762	15.5
Senegal Oriental	1/75,000	1/22,266	84	1/8,407	1/2474	27
Sine Saloum	1/96,500	1/2,883	30	1/10,157	1/315	10
Thies	1/105,000	1/1,588	22		1/150	7

Source: Groupe Technique de Planification No. 8 de la Sante Publique et des Affaires Sociales. Elaboration du 4ème Plan Quadriennal de Developpement: Sante Publique et Affaires Sociales - Rapport Provisoire, Vol. 1, January 1973.

3. Personnel Availability

The supply of health workers in Senegal is inadequate at all levels, either in terms of numbers or distribution, and the quality of training received often does not correspond to the country's needs. Moreover, all health personnel are oriented toward curative medicine since preventive medicine and public health courses are not significantly included in the curriculum of the medical school and other training institutions. The medical school graduates about 30 students per year, only 10 or 12 of which are Senegalese (the rest being from other West African countries).

There is a nursing school at St. Louis which now graduates 40 - 50 nurses per year (see Table 3 on page A-71). These nurses do their practical training at the St. Louis hospital which is reported to be in a very bad state of deterioration with a low level of hygiene. If nurses receive their introduction to the profession in such an atmosphere, it is perhaps no wonder that the health posts they eventually supervise are not well-maintained. There were 559 state nurses in 1973 (see Table 4 on page A-72).

Sanitarians receive 1 year of nurse's training at St. Louis and then attend a 1-year course at the Khombole School for Sanitarians. Only 10 are graduated each year. There are a total of 1,307 sanitarians presently working in Senegal. Midwives are trained at Dakar at the rate of 18 per year. In 1973 there were 193 state midwives working in maternity and MCH centers. This is far below the need. In an effort to reduce this deficiency, the Government has undertaken, with the help of UNICEF, to retrain traditional matrones, putting them through a 1-month training program in simple sanitary delivery practices. So far 50 have completed the program.

At present there is no formal training program for village level health personnel. A total of $480,000 is written into the budget of the Fourth Plan for training and recycling, but at the time of this writing the work had not begun (December 1974).

TABLE 3

YEARLY GRADUATION OF HEALTH PERSONNEL - SENEGAL 1969-1973

Year	Midwives	State Nurses	Supervisors	Social Workers	Education Workers	Sanitary Agents	Garbage Collectors
1969	18	10				41	10
1970	19	33	5			33	10
1971	18	49	5			32	10
1972	18	47	5			35	10
1973	?	?	5	15	5	?	6
Total	73	139	20	-	-	141	36

Source: Groupe Technique de Planification No. 8 de la Santé Publique et des Affaires Sociales. Elaboration du 4ème Plan Quadriennal de Developpément: Santé Publique et Affaires Sociales - Rapport Provisoire, Vol. 1, January 1973.

TABLE 4

PUBLIC-HEALTH PERSONNEL AS OF JUNE 30, 1972 - SENEGAL

Personnel	Cap-Vert		Other Regions		Total			Change since 12/31/69 in %
	National	Foreign	National	Foreign	National	Foreign	Total	
Practicing M.D.s	48	53	43	23	91	76	167	+4.4
Med. School Profs.	62						62	+26
Pharmacists	7	6	1	1	8	7	15	+ 7.1
Dentists	9	2	2	3	6	5	11	+37.5
State Midwives	111		82		193		193	+26.1
Matrones	42		22		64		64	- 5.9
Technical agents	59		150		217		217	88.7
State Nurses	227	20	277	35	504	55	559	+24.5
Specialized Nurses	24		68		92		92	53.3
Other nurses & sanitary agents	397		910		1307		1307	+28.3
Social assistants & others	73	5	38	4	111	9	120	- 1.7
Technicians	105		17		122		122	-32.6
Other operational personnel	1431		845		2276		2276	- 2.3
Administrative personnel	311		135		445		446	- 7.2
Orderlies	255		302		557		557	- 9.1
Total	3094	86	2900	66	5994	152	6146	-10.8

Source: Groupe Technique de Planification No. 8 de la Santé Publique et des Affaires Sociales. Elaboration du 4eme Plan Quadriennal de Développement: Santé Publique et Affaires Sociales-Rapport Provisoire. Vol. 1, January 1973.

4. Summary of Sectoral Constraints and Causes

a. There are inadequate numbers of trained personnel at all levels.

b. Training facilities need to be upgraded in terms of curricula, standards of professionalism, etc.

c. The level of cleanliness and efficiency at hospitals and maternities where physicians, nurses and midwives do their internships is below the acceptable level, thus imparting to these personnel at the beginning of their career low standards of maintenance expectation.

d. There is inadequate supervision all along the health delivery system chain, which results in the gradual degradation of services and facilities and an increasing tendency to send even simple cases to overburdened Dakar hospitals for treatment, which further deteriorates the standard of service and adds its weight to the delapidation of the urban hospitals.

e. The numbers and maintenance levels of rural health posts are inadequate. Health posts cover only 15 percent of the population, which means that practically none of the rural population is reached. Table 2 on page A-70 shows that urban areas such as Cap Vert and Thies are the only ones with an acceptable coverage. No MCH centers serve the rural areas. (It should not be overlooked, however, that health posts serving the urban suburbs are in fact, serving a portion of the rural poor -- those who have immigrated to the cities in the all-too-often frustrated hope of finding work).

f. The supplies of essential basic drugs are inadequate and there is a lack of means to preserve them in the field. While antibiotics and biologicals are often offered to the Government at reduced prices or as gifts from the pharmaceutical firms, these are usually near or past their effectiveness limit date.

g. The effectiveness of mobile health teams is hampered by the shortage of vehicles, inadequate vehicle maintenance and the shortage of fuel.

h. There is an overall lack of funds to support the health sector. Only 8 percent of the national budget is allocated to health. (However, Senegal is second only to the Ivory Coast in the percentage of funds devoted to health).

5. Government Plans and Priorities in Health

The Fourth Four-Year Plan for Economic and Social Development 1973-77 states two primary objectives for the health sector:

-- Maintenance of the present coverage of the population in the rural areas by making sure that every existing health post is operational.

-- Increasing coverage to 200,000 additional inhabitants per year. This expansion can take place only by yearly stages at the rural level while at the intermediate regional level, it will take place at an accelerated pace.

In order to attain these objectives, a series of projects is proposed, with highest priority given to:

Central Reorganization: The bureaucratic structure of the Ministry of Health is cited as a major constraint to progress in the health field, and hence a complete reorganization of the Ministry of Health and Social Affairs is planned. A study of the reorganization has been made, but no steps have been taken to implement the recommendations. An example of the inhibiting nature of the present structure is the fact that the Director of Health has technical responsibility for health without having administrative and budgetary authority. These powers are held by the Minister through his Chief of Cabinet. All external aid is channeled through the Cabinet which limits and delays the Director's ability to act on implementation. (To remedy this situation vis-a-vis drought relief activities, the USAID insisted that relief funds bypass the Cabinet and go directly to the Director of Health. This procedure might well be worth duplicating in the future.) The President of the Republic is reported to favor changing the system (which holds in other ministries as well), but he has some opposition from Ministers who feel they would lose a certain degree of power.

Remodeling and New Construction: The following table summarizes the Government's plans for remodeling old health posts and building new ones.

TABLE 5

Summary of Remodeling and New Construction to be Carried Out During the Fourth Plan

Activity	Primary Health Centers	Secondary Health Posts	Maternities	MCH	Grandes Endemies Sectors
Remodeling	19	150	3		2
New Construction	4	30	2	3	2

Source: Groupe Technique de Planification No. 8 de la Santé Publique et des Affaires Sociales. Elaboration du 4ème Plan Quadriennal de Developpement: Santé Publique et Affaires Sociales - Rapport Provisoire, Vol. 1, January 1973.

MCH Centers attached to some of the primary and secondary health posts are to be remodeled and presumably will be included in the modernization program.

Logistical Equipment: The lack of vehicles and the shortage of gasoline are major constraints to effective operations of mobile units and are to a certain degree responsible for the present standstill in the penetration of the rural areas. The Fourth Plan calls for the following purchases, but sources of financing are still uncertain.

TABLE 6

Vehicles to be Purchased for Health Sector Under the Fourth Plan

Kind of Vehicle	Number
Ambulances	26
Automobiles	20
Trucks	11
Small Cars	7
Barges	4
Buses	1
Motor Bikes	10

Source: Groupe Technique de Planification No. 8 de la Publique et des Affaires Sociales. Elbaoration du 4eme Plan Quadriennal de Developpement: Sante Publique et Affairs Sociales - Rapport Provisoire, Vol. 1, January 1973.

Development of Basic Health Services: A pilot center has been established at Fatick where integrated medical, environmental sanitation, health education (including nutrition education), and social services are provided. During the Fourth Plan period the Government hopes to expand such services to 200,000 additional inhabitants per year, with an end-of-plan goal of 1 million inhabitants in the regions of Sine-Saloum and Thies; hence, it will take three or more four-year plans to cover the whole population. For a detailed description of this program, see Annex.

Fragile Vaccines: A number of vaccines, such as those for measles and smallpox, require preservation in refrigerated containers. The cold chain in Senegal is still very weak and often these vaccines lose their potency because they may have to be transported 800 to 1,000 miles away from the last available refrigerated container. The Government is legitimately interested in strengthening and increasing the effectiveness of the cold chain.

School of Nursing: To meet the increased demand for nurses to staff the health centers to be created under the Fourth and interim plans, the Government proposes to establish a second school of nursing at Fann (Cap Vert). This project, estimated to cost CFA 250 million ($1 million), is considered to be an urgent activity by the Government, but a funding source has not yet been secured. The proposal submitted to-date is inadequate, with no indication of the curriculm to be developed or the number of students to be trained each year.

Endemic Disease Surveillance: It is planned to establish Grandes Endemies (endemic disease) surveillance services in Sine-Saloum and Cap Vert regions which presently lack such facilities.

Nutritional Protection: At present this essential activity is represented in the Fourth Plan by the indication that three more MCH centers will be built. At most MCH centers, although the children are weighed and the results recorded on a health card as a matter of routine, the significance of the growth curve is not explained to the mothers nor is it generally understoood by the staff itself. At demonstration centers at Fatick, Pikine and Khombole, efforts are being made to overcome these shortcomings and to show how MCH services can be most effective. Each child is given a health card where the record of vaccinations is kept and his growth curve recorded in comparison to a standard. A major effort is made to explain to mothers what the growth curve signifies and it has been found that the mothers take a real interest in their children's progress. Advice is also given on the kinds of foods infants and young children need to ensure good health, and nutrition demonstration programs are organized in which mothers are taught to prepare protein-rich porridges based on local resources.

These institutions' essential role in raising the level of health is understood, but only three more are planned to be created under the Fourth Plan. It is expected, however, that the Catholic Relief Services will supply a protein calorie supplement to children's diets at fourth existing centers (not further identified), but probably within some of the 23 PMI's existing and create 49 new ones as the development of the PMI system continues.

Central Laboratory and the Fight Against Tuberculosis: The Central Laboratory in Dakar is supposed to coordinate all other laboratories

in the country (the number of these is undisclosed) to establish standards and to backstop the fight against tuberculosis, one of the most important scourges. In the short time available, it was impossible for the DAP team to go beyond hearsay about this important public health activity. Regional laboratories exist in the seven regional hospitals. Their equipment and levels of efficiency could not be ascertained. The plan provides for the creation of nine additional laboratories.

Regional Pharmacies: The national pharmacy is inadequate to supply and supervise the regional pharmacies. The plan provides for new pharmacies at Kaolack, Ziguinchor, Tombacounda and Diourbel.

Promotion Humaine: The GOS has established a special agency called Promotion Humaine which is aimed at increasing rural productivity by training the rural masses in new methods and technologies of production, in proper ways of maintaining good health, in correct nutrition and the like. For more details, see Education and Human Resources section.) Promotion Humaine aims at establishing a network of semi-autonomous rural communities, each with a president, rural counsellor, budget and fiscal section. This activity has begun in Thies and will soon be expanded to Sine-Salou . Present plans are to organize twenty villages of 5,000 each into rural communities. By 1982 it is hoped that each of Senegal's 15,000 villages will be similarly organized. These semi-autonomous communities will be referred to as Centres d'Expansion Rurales (Rural Expansion Centers) or CER's. The CER's may provide a framework within which grassroots health, education and health delivery can take place. Vocational training is provided for different disciplines at a School for Technical and Vocational Education. A health training program could be added (if funded) for training community level health workers in situ. The Director of Promotion Humaine has expressed an interest in providing training in health, sanitation and nutrition for the cadre of animateurs who will work with the rural population in the CER's.

6. Evaluation of Government Plans

The top-level physicians and medical school professors visited, as well as other high functionaries, all concurred in recognizing that the traditional preeminence of curative medicine over preventive medicine is wrong and should be changed; that the little that exists in terms of preventive health practice does not reach the rural areas for lack of personnel, transportation and money; that the situation is serious in view of the enormous majority (80 percent) of the rural population. Yet, the Fourth Plan still seems to favor continuation of the present system*, mostly, it seems, because the leadership does not know how to reverse the situation and how to find the assistance needed to do so. The Plan itself recognizes this in these terms: "Appropriations in favor of hospitals (curative medicine) are on the increase, both in personnel and

*Due to resistance to change on the part of some political personnel and the demand for cure by the local urban population.

supply of drugs, while preventive medicine infrastructure receives a decreasing amount of health appropriations." The Plan further states: "The reorganization of the Ministry of Health and Social Affairs is justified by the problems already recognized during the Third Plan where a gap between doctrine and implementation exists and where the gap between investment and returns seems to have been worsening."

In the hope of turning this situation around, the Plan recommends reform of the method of training future sanitary personnel and recycling of existing job holders. The annual output of Senegalese physicians is expected to increase under the Fourth Plan so that 100 new doctors will have been graduated by 1977. All will be offered positions with the national health service, but it is doubtful if many will accept to serve in rural areas where the need is greatest unless the Government develops some kind of compulsory service system, such as requiring that all medical graduates serve 2 years in rural health posts. This would not be an unreasonable demand, since physicians receive their entire training at the expense of the state.

WHO has been asked to continue supervision of the Fatick demonstration center. This so-called basic health service unit is in fact identical with what has been called poste de sante secondaire. Its role is to protect vulnerable groups, promote health and sanitary education, carry on the fight against transmissible diseases, dispense first aid and simple basic drugs, and keep up statistics. A further dimension needs to be added to the health delivery system, however, if a truly effective method for reaching the rural masses is to be developed: the village health agent. This man, trained to keep simple health records, to dispense aspirin, anti-malarial drugs, etc., and to provide the most simple first-aid, could be the link between the basic health service unit and the villagers.

7. External Assistance

The sources of external assistance are numerous and the Plan lists potential donors for each project (See Annex 2). Lacking, however, is an indication of the proposed Government of Senegal contribution, if any, to individual projects. The costing of projects in the Plan is probably inaccurate because it was done in 1972 prior to the world petroleum crisis and consequent rampant inflation, and because the scope and quality of many projects was probably not conceived with precision.

The following table summarizes the overall funding anticipated for the Fourth Plan in millions of CFA francs:

TABLE 7

Funding of Senegal's Fourth Four-Year Plan
(in millions of CFA francs)

Source of Funding	FY 74	FY 75	FY 76	FY 77	Total	In $ Millions
National Budget	280	323	226	150	979	$4
Multilateral Aid	533	254	235	169	1,191	$5
Bilateral Aid	363	392	156	513	1,424	$6.4
	1,176	969	817	832	3,594	$16.4

The reasoning behind this breakdown is not given. The list of expected donors includes: UNICEF, USSR, FAC, USAID, France, Canada, ENAS, Rotary Club, FED, BEN, West Germany. From conversations with some of the donors, especially WHO and UNICEF, there is evidence of goodwill, under certain conditions. There is also evidence from such conversations that a consortium of donors could be set up to understand certain projects in common. It is suggested that the GOS be encouraged to seek this consortium approach itself.

The World Food Program supports four types of projects in Senegal: a) school feeding programs: b) socioeconomic projects of 3-5 years duration; c) semi-emergency projects; and d) emergency projects. The World Food Program's school feeding programs reaches 3,000 children in 280 schools. The foodstuffs supplied vary according to the contributions of the donor countries. The main difficulty is to adapt donated foods to local tastes, which requires adding spices and sugar. The price of sugar has risen astronomically in recent months, jeopardizing to a certain extent the impact potential of foreign foods and weaning supplements. Food habits play an important role in implementing well-intentioned programs. (The Canadian Government sent several tons of wheat to Senegal in 1973 which remain undistributed partly because rural Senegalese are not wheat eaters traditionally. Rice, however, is in great demand and is distributed without difficulty).

WFP socioeconomic projects have included rural works in cooperation with Promotion Humaine. An example of this type of activity is a pilot project in the Tambacounda area where the Government is resettling 2,000 families. The Government supplies each family with 40,000 CFA worth of construction materials, tools, seeds, etc, and the World Food Program provides foodstuffs.

Semi-emergency projects are short-term and include Food for Work activities. The World Food Program provides food in lieu of salary to villagers who participate in construction projects.

Emergency projects include providing relief food supplies to drought-stricken areas and furnishing food for the 15,000 refugees from Portuguese Guinea who have immigrated to southern Senegal. Many of these refugees are expected to return to their homeland after independence.

8. Possibilities for AID Interventions

The basic health problems of all the countries of the Central West Africa are similar both in terms of diseases and the weaknesses of health infrastructure. The differences are mainly ones of degree. The solutions to these problems are, likewise, basically similar. Therefore, the following discussion for Senegal can serve as a model for the other countries, taking into account, of course, the need to adapt to differences in environment, level of awareness of the problems, and ability of the Government to mobilize resources.

There are three major ways in which the United States can be most effective in helping to improve the level of health in Senegal and the other countries of Central West Africa.

- By assisting the host governments to develop preventive medicine oriented health delivery systems capable of reaching the rural masses;

- By meeting the health demands of the various water resource development schemes being considered or carried out in the region in order to prevent the spread of transmissible diseases; and

- By supporting the development of a regional nutrition surveillance capability in order to predict and avert or prepare for nutrition crises, such as the one caused by the recent drought.

a. Development of a Health Delivery System

The problem of how to deliver health services to the rural majority is a problem common to all the countries of Central West Africa and the basic pattern for dealing with the problem is the same throughout the region with minor variations. In general terms, as stated in the section on regional health recommendations, the development of an extensive health delivery system, whether in Senegal or Niger, involves five imperatives;

1) Creation or completion of the infrastructure for delivery of health services.

2) Training new health workers, recycling already existing personnel, establishing an effective supervisory system.

3) Providing health supplies: drugs, cold chain, storage, resupply system.

4) Establishing transportation facilities for mobile units: vehicles, fuel, maintenance services.

5) Obtaining budget support and investment from external sources on a diminishing scale basis.

Infrastructure: Working from the village upwards, the health delivery system infrastructure should consist of: 1) the village health post with a village health agent; 2) visiting mobile health units; 3) secondary fixed health centers; 4) primary health centers; and 5) regional health centers. With the exception of the village health post/agent, the health plan of Senegal and most other CWR countries is already based on this organizational concept. Implementation of the concept, however, is very uneven and is usually unbalanced in favor of 4) and 5) in urban areas.

Personnel: The quantity and quality of personnel is a constraint to program implementation in all countries. Training programs for new personnel should be expanded and carefully structured to provide orientation in preventive medicine and they should be applicable to the conditions workers will face in the field. In-service training programs (on-site whenever possible) should be organized to insure that personnel at all levels are following current practices and to provide stimulation and supervision Special emphasis should be given to training village-level health agents who do not now exist.

Equipment and Supplies: No significant improvement in the level of preventive or even curative medicine can be expected until a reliable and adequate supply of essential drugs is established and the means for distributing and conserving them are created. This could be accomplished under a "Drugs for Peace" scheme, whereby pharmaceutical companies in the developed nations would establish a stock of the 10-12 most essential drugs for preventive and curative medicine to be made available to the countries of Central West Africa at concessional prices until national manufacturing or purchasing capability is developed. Outright donations could also be envisaged for use in the poor rural areas or in times of emergency. At the same time, the logistics for establishing an adequate and economic cold chain for fragile vaccines should be worked out.

Transportation: The infrastructure and personnel described above and the distribution of drugs and vaccines cannot operate effectively without adequate transportation facilities. The mobile teams, which are the essential tool for reaching the rural masses, are especially dependent upon the availability of reliable means of transport. Thus, provision of vehicles, vehicle maintenance facilities and fuel is a sine qua non of the entire health delivery system. In Senegal, as in other predominantly

Moslem countries, the Arab oil producers might conceivably be challenged to provide the fuel should the U.S. or other donors provide vehicles and maintenance facilities.

Budget Support and Investment: None of the above can be carried out without adequate funding. Since the countries in question are poor, the initial investment required to establish the necessary infrastructure, training programs, supplies and transportation facilities must come largely from external sources. Even budget support to pay for operational costs may be needed for a certain period. To avoid the vulnerability of eternal dependence upon outside sources, however, a health plan should be conceived in such a way as to allow for a gradual phase out of external budgetary support. This requires careful consideration of the host country's own resources and capabilities.

All five of these inputs are essential to the development of a health delivery system. The absence or inadequacy of any one can jeopardize the rest. That does not mean, however, that the U.S. or any other donor must accept responsibility for supporting all five imperatives. A cooperative venture by external donors is entirely feasible, but requires careful planning and coordination.

In theory, the health section of Senegal's Fourth Plan outlines just such an approach to developing a health delivery system. It provides for creating an infrastructure that would reach the rural masses, for training the needed personnel, for the creation of a supply system, for expanding transportation facilities and for obtaining external financing. However, in practice, the Government's efforts to implement the health plan are disorganized and disjointed and coordination of external assistance is practically non-existent. Therefore, the first and most important assistance AID could give to Senegal in the health field would be to provide the services of a U.S. health planner in FY 1976 (or toward the last quarter of FY 75 if the present proposal is approved) to assist the Planning Group of the Ministry of Health in rationalizing the health plan.

Since it is anticipated that this US planner could work on a regional basis, the scope of work and estimated cost of this activity have been described in the section on "Regional Recommendations."

The GOS should appoint a rapporteur for the Planning Group to work as the full-time counterpart of the U.S. health planner. The salary of this rapporteur could be paid by the U.S. for the duration of the project to allow for his full-time devotion to the project. As the health plan is elaborated, concrete opportunities for U.S.-supported interventions in FY 1977 will develop.

b. Meeting the Health Demands of Water Resources Development Projects

Senegal's Fourth 4-year Development Plan provides for a series of relatively

modest hydraulic projects (in addition to the great OMVS project of damming the Senegal River),the health dangers of which cannot be ignored. These projects include:

- The Nianga barrages (funded by the FED)

- The OAVA Cuvette (funding uncertain)

- The Bao Bolon Project (funded by FAO and UNDP)

These projects open possibilities for expanding the area of risk of schistosomiasis (by enlarging the breeding environment of schistosome cercariae-bearing snails), malaria (by enlarging the surface of mosquito breeding), trypanosomiasis and onchocerciasis (by widening the possibility of glossina and/or simulidae breeding if certain ecological conditions are met). Moreover, the concentration of a labor force to construct these projects in an area where only poor and sometimes no health resources exist can create considerable health hazards, such as increased tuberculosis and malnutrition, veneral disease and many others whose infectious agent can be directly transmitted to man if preventive measures are not taken. Concentration of new settlers in a new area can result in serious epidemics if not carefully planned, and there is at present no evidence that such plans have been made. Interventions to prevent adverse health results from such projects can take several forms:

1) Providing funds for building into water development projects appropriate sanitary engineering services at the planning stage.

2) Supporting a regional technical organization capable of providing such sanitary engineering services, as well as the entomological, parasitological and lymnological studies needed to maintain surveillance of these transmissible diseases. This could be done either by expanding the capabilities of the already existing OCCGE (Organisation de Coordination et Cooperation pour la Lutte Contre les Grandes Endemies), or by creating a new entity.

A study to determine whether the OCCGE could be upgraded to provide these services could be part of the mandate of the U.S. health planner recommended above.

3) Strengthening national capacities to organize and maintain disease control programs within national boundaries.

c. Cooperation with UNICEF on "Women, Youth, Children" Project

Following a UNICEF-sponsored conference in Lima in 1972, it was decided that a special effort should be made to improve the health and standard of living of women, youth and children. Goals set included, in addition to improving health, the distribution of clean water, the rural and agricultural education of youth with emphasis on truck gardening, home economics with emphasis on

transforming the way of life of young mothers and their children. More specific goals are to assist women to free themselves from domestic chores so as to be able to devote more time to their children and in general to improve nutrition through school gardens, canteens and small animal projects.

In order to reach these goals in Senegal, a global program has been developed by UNICEF aimed at improving peripheral health infrastructure, training paramedical personnel at the nursing school in Dakar, upgrading the performance of indigenous matrones, intensifying sanitary education, integrating all sanitary activities, increasing the number of rural maternities and village pharmacies, increasing the drilling of wells, and expanding the capabilities of sanitary agents, improving the performance of the laboratory of the school for sanitary agents at Khombole, stimulating the interest of young people in staying in the villages, expanding the teaching capabilities of the national center for the training of animatrices. The total program is estimated to cost $4 million. UNICEF has already appropriated $200,000 per year for a three-year period and is seeking the cooperation of other donors to complete the program. This is a possibility for AID input which should be explored.

ANNEX 1

NUTRITION PROFILE
SENEGAL

POPULATION

Total: 3.5 to 4.0 million
Growth rate: 2.5 percent in rural areas, 6 percent in Dakar
Rural population: approximately 75 percent of total
Major tribes:

Wolofs (36% of total) - sedentary farmers settled throughout western part of the country north of the Gambia River. Dominate leadership of the country.

Peuls (Fulani) (17.5%) - pastoralists and nomadic herdsmen normally concentrated in center and northeast of the country, with some south of the Gambia River.

Sérérés (16.5%) - fishermen and peanut farmers in coastal area of Thies Province, who also raise livestock.

Diolas (9%) - sedentary rice farmers in the Casamance Valley.

Mandingues (9%) - occupy border area adjacent to Mali and Guinea in southeast corner of the country.

Toucouleurs - found along the left bank of the Senegal River and some are south of the Gambia River. Many have moved to cities.

Lebous - primarily fishermen who occupy a small area of Cap Vert. They are active in politics and their representation in the National Assembly (13%) far exceeds their proportion of the total population.

AGRICULTURE

Major crops:*

Millet	-	650,000	tons in	1971
Rice	-	170,000	" "	"
Corn	-	50,000	" "	"
Peanuts	-	1,010,000	" "	"
Pulses	-	35,000	" "	"

Millet production has been declining since 1966 while that of rice and corn has been increasing.

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*Figures from FAO Production Yearbook 1971.

Livestock:

Cattle	2.7 million in 1970/71
Pigs	97,000
Sheep	1.4 million
Goats	1.5 million
Camels	30,000
Poultry	7.3 million

Cattle, sheep and goats are primary livestock, raised in northern third of the country, principally along the Senegal River. The nomadic Peuls are the major herdsmen. The Sereres are the only tribe which efficiently combines sedentary agriculture and cattle-raising. Meat and milk production for general consumption is very low since the herds are kept mainly for subsistence purposes and as "wealth."

General:

Senegal is a country of small, family-operated farms numbering about 300,000. Farmers hire some migrant workers in October to help with the harvest. Cooperatives are promoted by the Government and seem to be acceptable in the African culture where private property is traditionally collectively owned by the tribe with the head man or chief assigning land to a family or group of families on the basis of their needs and ability to work the land.

Storage:

Storage methods vary with type of food and region. E.g., paddy may be stored communally in large cribs of about 12 tons capacity constructed of millet stalks and bamboo. Dimensions vary considerably even within the same community and are determined by quantity of grain expected to be stored.

FISHING

The waters of Senegal are an abundant source of fish. The annual catch may be as high as 120,000 tons, most of which furnishes raw material for a growing fish processing industry. Of this catch at least 80,000 tons come from the Senegal River alone. Freshwater fishing in the Lac de Guiers accounts for an additional 30,000 tons per year. Ocean fishing, particularly for tuna, also takes place. A fishing school has been operating in Dakar since 1961 and offers prospects of increasing the efficiency of Senegalese fishermen.

SEASONAL FOOD AVAILABILITY

The availability of food supplies varies with the season. In the north, the food cycle is dependent on the regime of the Senegal River. From November to January, sorghum, corn, and sweet potatoes are available.

From February to May, the people live on the stores and many use this otherwise free time for collecting and storing salt. During June and July the farmer plants his crops on the dry terrain soon to be watered by the August floods. By this time the stores are exhausted and the diet is based on wild leaves and berries. Dogs and rats are eaten if available. In August, cereals and beans become available, helping to bridge the gap until the cereal crop is harvested.

Farther north, beyond the reaches of the river, the food cycle is similar to that of Mali. Sorghum and millet are the staple foods with sweet potatoes and manioc as supplements. The lack of food during the preharvest season forces the people to rely on the gathering of wild plants and berries.

DIETS

The standards of living in Senegal vary greatly among the different cultural and ethnic groups. Except in the cities and large towns, the economy is of the mixed subsistence-money type, with the prevalence of the money economy gradually decreasing away from the coast.

Most of the women's time is used in the preparation of food, leaving little opportunity for education and recreation. The structure of a polygamic society, however, makes this servitude more tolerable because it is shared by all. Women have learned a number of Western food preparation techniques and presumably will learn more as time passes. The introduction of very simple time-saving devices such as mechanical handmills or peanut crushers would do much to ease the women's burdens and to raise the standard of living.

In general, the Senegalese diet provides a daily average of 2,300 to 3,000 calories per person, but there are many variations geographically, socially and chronologically. The main fault of most diets is their unbalanced character with a generally high consumption of starches tempered, however, by the high level of fats supplied by peanut oil. The lack of vitamins A and C, calcium and iron is also noticeable, especially in children. The most favorable common characteristics of all diets is the use of wild, uncultivated foodstuffs gathered in the countryside. These plants are often rich in proteins, minerals, and vitamins and too little attention is paid to them when evaluating the diets.

Sereres rely on millet which is not available in adequate quantities. They grow peanuts primarily as a cash crop and use the proceeds for nonfood puchases. Purchased foods are bought with the cash earned by the side activities of the women. Overweight wives are a status symbol among the Sereres and hence obesity is a health problem. The Sereres also raise livestock -- cattle, goats, and sheep. The cattle are not raised for meat but the sheep, and both cow's milk and goat's milk are consumed.

The diet of the Toucouleurs of the middle Senegal Valley, based on cereals, fish and milk, is one of the best in the country. Sorghum and millet supply energy; fish and milk supply proteins and minerals; leaves, cereals, and milk supply Vitamin A, and grains supply thiamine.

The Diolas of the Casamance River Basin eat rice with beans, fish and oysters. Occasionally millet, sorghum, and tubers are added to the diet. During the lean months, gathering and hunting become very important. Like the Sereres, they keep cattle but do not slaughter them for meat, although they do milk their cows and drink curdled milk. Geophagy is common, especially among pregnant women and children. Roasted yams or manioc are between-meal snacks. Palm toddy is the principal alcoholic beverage and causes considerable intoxication. Sugarcane, carrots, and pineapples have been introduced in the area as cash crops.

NUTRITION EDUCATION PROGRAMS

Since 1964 nutrition education has been provided to students at the School of Medicine, the State Teachers' College for midwives, the Institute of Pediatrics, the School for Social Assistants, the National School for Applied Economics, the Center for Teacher Training, the School for Sanitary Workers and the School for Rural Cadres. In 1968, there was a preschool child feeding program in rural communities. There is a Bureau of Food and Applied Nutrition within the Ministry of Health.

ANNEX II

HEALTH INVESTMENTS UNDER THE FOURTH PLAN - SENEGAL 1973 - 1977

TITLE OF PROJECT	POSSIBLE SOURCES OF FUNDING	1973/74	1974/75	1975/76	1976/77	TOTAL
Central reorganization of MOH	--	--	--	--	--	--
Remodeling of existing facilities	*BN-UNICEF	50	63	83	13	209
New facilities - health posts and health centers	BN-UNICEF URSS	47	54	93	123	317
Logistic support	BN-UNICEF FAC	38	35	34	32	139
Basic health service development	BN UNICEF	15	11	13	16	55
Fragile vaccines	USAID-FR USSR	14	16	17	16	63
School of nursing	Unknown	--	250	--	--	250
Fight against Grandes Endemies	FAC	25	35	10	10	80
Nutrition protection program	BN-UNICEF	19	6	3	2	30
Central public health lab. and fight against TB	BN-Canada	121	--	--	86	207
Regional pharmacies	BN-Unknown	4	4	18	18	44
Regional public health labs.	BN-FAC	--	32	16	22	70
Blood Bank	BN-FAC	17	9	8	--	34
Dental care	BN	9	2	11	14	36
Psychiatric assistance	BN-ENAS Royar, club	20	16	--	--	36
Social centers	BN-UNICEF	2	55	44	55	156
Cobalt bomb	FAC	--	16	--	--	16
Environmental sanitation - Somone and Nougouma	BN-FAC FAO or FED	5	11	25	14	55
Kaolack Hospital	BN	--	29	--	--	29

*BN = Banque Nationale

TITLE OF PROJECT	POSSIBLE SOURCES OF FUNDING	1973/74	1974/75	1975/76	1976/77	TOTA
Hospital complex Fleuve area	FED-BEN	490	244	195	112	1041
Tambacounda Hospital	FAC	--	--	--	150	150
Diourbel Hospital	W. Germany	--	--	--	60	60
Zinguinchor Hospital	FAC	--	--	--	150	150
LeDantec Hospital Stomatology	BN	7	--	--	--	7
LeDante Hospital - laboratory	BN	32	25	32	25	114
Pediatric ward at Fann	BN-Canada	261	--	--	--	261
Doctors offices, hospitals at Thies and Diourbel	?	--	20	15	--	36

MALI
MACRO-ECONOMIC ASSESSMENT

OVERALL PERFORMANCE OF ECONOMY

Mali is one of the world's poorest countries. Its per capita is only $60-70, its national budget $63 million. Isolated geographically, the nearest port is some 1,000 km. from Bamako and vulnerable to drought and disease Mali has had to struggle since independence even to keep pace with the growth in population. Yet Mali contains a hardy, energetic people, some of the most enterprising programs in the area, and major power and power potential which may be tapped significantly in the next decade. In the period 1968-72 Mali's GDP in real terms rose at an average annual rate of 3.3 percent or an annual increase in per capita income of 1 percent. In the three year period 1970-72, the average real growth rate was 5.2 percent. The recent drought affected agricultural production most severely in 1969, 1973 and 1974, therefore real GDP is expected to decline again in 1973 and 1974.

The structure of the economy has remained virtually unchanged during this period. In 1972, as in 1969, agriculture (including livestock, forestry and fisheries) accounted for 43 percent of GDP, the secondary sector for 14 percent, and the services sector for 43 percent of which commerce was 25 percent and public administration was 11 percent.

A. SECTORS

The agricultural sector provides a livelihood for 91 percent of Mali's population and provided 76 percent of exports in 1972. About 90 percent of cultivated land is devoted to subsistence food crops. Millet and sorghum are the most important food crops amounting to about 750,000 MT in 1972 of which 25,000 MT were marketed. Rice population amounted to 180,000 MT in 1972, of which about 42,000 MT were marketed. Other crops include corn, sugarcane, tobacco, tea, vegetables, fruits and root crops such as manioc, yams and sweet potatoes. After a sharp decline in 1968/69 due to drought conditions, food production increased steadily in three following years, but did not attain 1967/68 levels except for corn, which doubled output during this period. Production in 1972/73 and 1973/74 reportedly suffered from another year of severe drought conditions.[1] (See Table I). Factors inhibiting a more rapid rate of growth in food production are discussed in the agriculture assessment, below.

Export crops consist mainly of cotton (31 percent of exports in 1972) and groundnuts (16 percent of exports). Production of both these crops increased substantially between 1968 and 1972, cotton

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1 / I.M.F. Mali - Recent Economic Trends, SM/73/189, August 1973, pp.6-7

by 87 percent and groundnuts by 30 percent. These increases stem both from FED and FAC-sponsored assistance for inputs and credit, and from producer price increases and other incentives.

Livestock production contributes over 17 per cent of GDP and accounts for 23 per cent of exports. In 1972 cattle was estimated at 5.5 million head while sheep and goats were at 11.3 million head. Most livestock production takes place in the region of Mopti and Gao. The net annual increase in herds is estimated to be 3 per cent - 5 per cent. Controlled slaughtering and exports have shown consistent annual increases since 1968: slaughtering of cattle increased by 34 per cent to 87,000 head in 1972; and exports of cattle increased by 104 per cent to 86,000 head in 1971; sheep and goat slaughtering increased more dramatically by 104 per cent to 179,000 head in 1972, while exports increased by 465 per cent to 108,000 head in 1971.[1] These increases in marketing through official channels reflect the hardships of the drought such as increases in cash needs for food purchases, and the need to sell cattle before they die, as well as increases in purchase prices, a reduction in the cattle tax, and liberalization of the trade payments systems. No figures exist for non-official marketing of livestock. FAC, FED, UNDP and USAID assistance to livestock beginning in 1972/73 are expected to improve livestock routes, establish water points and set up ranches. The 1973 and 1974 droughts have damaged livestock herds severely: the authorities suspended the domestic tax on cattle in April 1973 in exchange for FED grants to alleviate the hardship to farmers.

River fishing in the Niger represents an important economic actitivy in Mali, contributing 2.3 per cent of GDP and 3.5 per cent of exports. Some 30,000 families depend on fishing for a livelihood. Production has been relatively stable at 100,000 tons a year. Exports declined by more than 50 per cent between 1968 and 1972, reflecting increasing competition in export markets (Ivory Coast and Ghana) and to a lesser extent rising cost due to low water levels. Most fish is preserved by smoking or drying. The government is attempting to cut losses and improved quality by introducing better processing methods, and developing marketing channels.

The modest manufacturing sector more than doubled its contributions to GDP between 1968 to 1972, to 6 per cent of GDP. Fourteen of the 42 industrial plants are state-owned, with 60 per cent of gross turnover. Since their inception they have been beset with financial and managerial difficulties, and have operated below capacity.

Half the industrial plants are agricultural processing plants (8 cotton gins, a groundnut oil mill, and factories for rice, sugar, canning ,pasta, and beverages). In addition there are 6 construction material plants, 2

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1 / I.M.F., pp. 7.

textile plants, cigarette and match factories, a tannery, a shoe factory, and a bicycle/motorcycle assembly plant.

The adpotion of more liberal policies by the government since the enactment of a new code in 1969 has been instrumental in promoting private investment.

Various minerals deposits and possibly oil exists in Mali, but none are presently exploited.

B. BALANCE OF PAYMENTS

Mali's balance of payments improved markedly between 1968 and 1970 but weakened in the following two years. The overall deficit declined from $17.4 m. in 1968 to $1.1 m in 1970 and rose again to $4.5 m. in 1972. (See Table II, Appendix) The improvements prior to 1970 resulted from a devaluation in 1967, followed by the restoration of convertiblity into French francs and the abolition of many controls on trade and payments. Equally important were increased incentives and higher prices to producers, which helped to reduce clandestine trade. Thus exports rose by more than 200 per cent between 1968 and 1972.

Major exports (see Table III) derive from agriculture, and are almost uniformly small farmer-produced. Cotton heads the list, followed by livestok, groundnuts and derived groundnut products, fish, baskets, etc.

Despite the consistent growth rate of exports, imports outpaced exports consistently by an average of about $14 millinn annually between 1968 and 1972. Food rose consistently as an import commodity, tripling in value by 1972 and totalling 34 per cent of all imports. Imports of machinery and equipment also tripled in volume, and represent 18 per cent of imports. The relative share of other imports did not change appriciable with the expception of textiles which declined from 12.6 per cent to 1.8 per cent of all imports (See Table IV.)

The continuous trade deficit was augmented by a service deficit nearly doubled the size of the trade deficit. Unrequited transfers (about one third private and two-thirds government) more than doubled over this period to compensate in part for the deficit. Net capital movements, mostly government, helped fill the gap to a lesser extent. (See Table II.) Thus the overall balance of payments account improved,despite an increase in the goods and services deficit.

The deficits of 1973 and 1974 are predicted to be larger than previous deficits owing to increased food imports to compensate for the drought. The government is likely to continue to run deficits as long as the French treasury allows: it would be irrational in a bureaucratic sense to do

otherwise, since curing the deficit would involve a painful and politically dangerous transition.

C. PUBLIC FINANCE

During the past four years Mali was unable to generate any budgetary savings, although small current account surpluses existed in 1970 and 1971. (See TAble V.) External grants covered most of the deficit through 1971, and declined to almost half the deficit in 1972. Borrowing from the banking system has been relatively little since 1969.

The 1972 budget showed a substantial deficit as expenditures rose by 13 per cent over the previous year. The 1973 budget projected ordinary revenues of MF 29.9 billion, an unrealistic 27 per cent above 1972 receipts. Expenditures were estimated at MF 31.6 billion, or 14 per cent over 1972 expenditures. The 1974 budget foresaw receipts of MF 31.8 billion, balanced with expenditures of MF 31.8 billion. Owing to a renewed drought in both 1973 and 1974, the actual budget situation probably deteriorated drastically, although figures are not available.

Sources of government revenue in 1972 were:

Taxes on income, profits, property	10 per cent
Taxes on production and consumption	27 per cent
Taxes on external trade	33 per cent
Other taxes	10 per cent
Nontax revenue	4 per cent
Regional government	14 per cent
Rural equipment fund	2 per cent

Source: I.M.F., Mali 1973, pp 70.

A breakdown of planned expenditures for 1974 appears in Table VI. Nearly 70 per cent of budgeted expenditures were allocated to personnel, while 19 per cent were for materials and 11 per cent for other items. Thus the 1974 budget continues the trend of high personnel expenditures, due partly to an increase in wages in 1973. The Defense Ministry received 17.6 per cent of all allocations, followed by regional governments (15.3 per cent) and higher education including allowances (12.4 per cent).

The level of capital expenditures for 1974 is not available: projected expenditures for 1973 were MF3.58 billion, or about 12 per cent of all investment. Capital expenditures usually increase the budget deficit. (See Table V.)

The state enterprises consitute another drain on Malian resources. Net profits have been negative since 1968, the deficit averaging MF 3.6 billion through 1971, which represented 18 per cent of total revenue during the 3-year period. The trading enterprises showed the largest

deficit in 1971 (MF 2.5 billion), followed by agricultural enterprises (MF 1.4 billion), [1] Much of the deficit is attributable to selling below cost, a practice largely motivated by social considerations. This situation besets government finances not only in terms of transfers to the Treasury, but also through arrears in tax payments which amounted to MF 2.1 billion by 1972.[2]

Clearly, the financial situation of the government bears considerable reform. As long as French budget subventions are forthcoming, however, it is difficult to imagine that the government will have incentive to undergo the transition pains of reform.

D. HUMAN RESOURCES

There is little comprehensive data on employment in Mali. Most of the population is self-employed in agriculture, animal husbandry and fishing. Wage-earners in the public sector were estimated at 26,700 in 1970, and have grown by about 1,000 persons per year since that time. The large enterprises in the secondary and tertiary sectors employed about 22,000 people, of whom 73 per cent worked for state enterprises. The number of jobseekers have also expanded owing to rural-urban migration. The government is trying to encourage employment generation and is attempting to strengthen technical education.

The education system in Mali reaches very few people: primary education was available for only 15 per cent of the 5-14 age group, and secondary education for 2 per cent of the 15-19 age group. Both these ratios have quadrupled since 1955. More detail is provided in education and human resources assessment.

E. GOVERNMENT PRIORITIES

In July 1970, the government launched a Three-Year Program for Economic and Financial Recovery. The overall growth rate envisaged was 5 per cent, with a 4.5 per cent rate in agriculture, 7 per cent in manufacturing and construction and 5.9 per cent in commerce and services. Table VII shows the planned allocation of expenditures, and the parts which were secured by the end of the second year. A 5.2 per cent annual growth rate obtained during the 2-year period. The primary sector received 24 per cent of revised allocations, and financing was nearly 80 per cent secured, higher than for other sectors. The majpr cash crops, cotton, groundnuts and rice received most of agricultural investment. 67 per cent of financing for the 2-year period had been secured. A 60 per cent attainment rate is predicted for the Three-Year Program becuase of Mali's low domestic savings rate and low level of GNP, investment derived from foreign sources. At the end of the second year, 83 per cent of actual investments were foreign in origin. The FED provided a third of their investment, followed by France, UNDP, and Germany.

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1 / I.M.F., Mali, 1973, pp. 31
2 / I.B.R.D., Mali, 1973, pp. 12.

Program implementation has been hindered by delays in securing and disbursing foreign funds, and in project preparation. There have also been shortages of managerial and technical skills and transport constraints.

The next development plan (1974-78) will continue parts of the present plan and will stress regional development in three main fields: food crops and livestock, agro-industries, and water/energy resources. Total investment is estimated at MF 250 billion ($500 m)of which MF 100 billion will be for two large dams, with integrated projects evolving from the dams. Transportation to neighboring countries also figures prominently in the new plan.

Mali's capacity to carry out development projects is seriously limited in several crucial respects. First, the country has low savings potential at least over the next five years, both because of internal policies, and because of the two consecutive years of severe drought. Second, the country has limited manpower and technical expertise to bring to project preparation and implementation. Third, Mali's dependence on foreign funds causes uncertainty, frequent delay, and lack of complete control with respect to the allocation of funds and implementation of projects. Donor funds have become increasingly available to Mali, both for development aid and for emergency measures. But to make Mali's development efforts self-sustaining, considerable adjustment of internal policies such as price policies with respect to both food crops and state manufacturing enterprises, government revenue and expenditures policies, and balance of payments policies will have to be encouraged.

Table I Mali: Production and Producer Prices of Main Crops, 1967/68-1971/72

	1967/68	1968/69	1969/70	1970/71	1971/72
Millet and sorghum					
Production (thousands of tons)	881	556	700	715	750
Yield (kg/ha)	780	600	770	590	650
Marketed production (thousands of tons)	62	14	27	12	30
Producer price (MF/kg)	16	16	18	18	18
Rice					
Production (thousands of tons)	195	186	146	163	180
Yield (kg/ha)	1,477	1,500	1,140	1,061	1,226
Marketed production (thousands of tons)	27	28	36	40	52
Producer price (MF/kg)	18	18	25	25	25
Corn					
Production (thousands of tons)	66	66	151	107	150
Yield (kg/ha)	950	1,019	877	823	930
Marketed production (thousands of tons)	2	1	1	1	2
Producer price (MF/kg)	17	17	20	20	20
Cotton					
Production (thousands of tons)	39	49	51	58	73
Yield (kg/ha)	584	530	587	800	940
Marketed production (thousands of tons)	33	43	45	53	68
Producer price, unginned (MF/kg)	35-40	35-40	35-45	35-45	35-50
Groundnuts (unshelled)					
Production (thousands of tons)	117	93	125	158	152
Yield (kg/ha)	885	450	600	523	550
Marketed production (thousands of tons)	29	26	57	74	60
Producer price, unshelled (MF/kg)	24	24	30	30	30

Sources: Banque Centrale du Mali, Rapport d'Activité, Exercice 1971; and data provided by the Malian authorities. IMF, 1973, p. 4.

Table II. Mali: Balance of Payments, 1968-72

(In millions of SDRs)

	1968	1969	1970	1971	1972[1]
A. Goods and services	-37.2	-34.9	-31.6	-33.4	-40.8
Exports, f.o.b.	17.9	23.3	32.0	38.7	40.9
Imports, f.o.b.	-30.5	-38.3	-41.7	-49.0	-57.6
Trade balance	-12.6	-15.0	-9.7	-10.3	-16.7
Services (net)[2]	-24.6	-19.9	-21.9	-23.1	-24.1
B. Unrequited transfers (net)	13.1	20.9	22.6	23.6	27.9
Private	5.1	3.6	5.2	9.7	9.7
Government	8.0	17.3	17.4	13.9	18.2
C. Capital (net)	5.1	-1.0	8.3	4.5	7.2
Private	-13.5	-5.8	5.8	-0.5	2.9
Government	18.6	4.8	2.5	5.0	4.3
D. Total (A + B + C)	-19.0	-15.0	-0.7	-5.3	-5.7
E. SDR allocations	--	--	2.9	2.3	2.3
F. Total (D + E)	-19.0	-15.0	2.2	-3.0	-3.4
G. Errors and omissions	1.6	-0.1	-3.3	-2.4	-1.1
H. Overall balance	-17.4	-15.1	-1.1	-5.4	-4.5
I. Monetary movements (net)	17.4	15.1	1.1	5.4	4.5
Central Bank	18.1	15.7	-2.0	2.2	5.2
Deposit money banks	-0.7	-0.6	3.1	3.2	-0.7
of which: bilateral accounts	(-1.5)	(0.5)	(0.5)	(2.0)	(-0.4)

Source: Banque Centrale du Mali, in IMF, 1973, p. 39.

1/ Provisional.
2/ Includes sales of CFA francs to the Mali banking system.

Table III Mali: Composition of Exports, f.o.b., 1968-72

(In metric tons and billions of Mali francs)

Commodity	1968			1969			1970			1971			1972		
	Volume	Value	Unit value 1/	Volume	Value	Unit value 1/	Volume	Value	Unit value 1/	Volume	Value	Unit value 1/	Volume	Value	Unit value 1/
Cotton	11,309	3.1	274	14,905	4.3	288	16,600	5.5	331	17,965	5.9	328	22,308	7.1	318
Groundnuts	15,851	1.3	82	10,378	0.8	77	17,600	1.6	91	24,389	2.7	111	22,000	2.4	109
Fish (dried and smoked)	6,354	1.3	205	5,928	1.6	270	5,150	1.5	291	4,380	1.2	274	2,866	0.8	279
Livestock	7,400	2.0	270	11,250	3.9	347	15,245	5.4	354	14,185	5.2	367	15,000	5.3	353
Meat	280	0.1	357	360	0.1	278	320	0.1	313	360	0.1	278	520	0.2	385
Groundnut oil and karité butter	1,750	0.2	114	4,700	0.8	170	5,300	0.9	170	5,739	1.3	227	6,100	1.3	213
Tannery products	360	0.1	278	340	0.1	294	500	0.1	200	500	0.1	200	510	0.1	196
Baskets (thousands)	400	0.1	250	400	0.1	250	1,400	0.4	286	850	0.3	353	880	0.3	341
Other	--	0.6	--	--	1.2	--	--	2.3	--	--	4.7	--	--	5.2	--
Total		8.8			12.9			17.8			21.5			22.7	

Source: Customs data, as revised by the Direction Nationale du Plan et de la Statistique, IMF, 1973, p. 41

1/ In thousands of Mali francs.

Table IV. Mali: Composition of Imports, c.i.f., 1968-72

(In billions of Mali francs)

Commodity group	1968		1969		1970		1971		1972[1]	
	Value	Percentage of total	Value	Percentage of total	Value	Percentage of total	Value	Percentage of total	Value	Percentage of total
Food	4.6	23.1	6.7	26.5	9.1	31.1	10.0	29.7	13.6	34.3
Textiles	2.5	12.6	2.4	9.5	2.2	7.5	1.1	3.3	0.7	1.8
Vehicles and related parts	2.2	11.1	2.4	9.5	2.5	8.5	3.4	10.1	3.8	9.6
Machinery and equipment	2.9	14.6	3.9	15.4	4.1	14.0	5.7	16.9	7.3	18.4
Petroleum products	2.4	12.1	2.7	10.7	3.0	10.2	3.4	10.1	3.6	9.1
Chemical and pharmaceutical supplies	1.4	7.0	1.7	6.7	1.6	5.5	2.3	6.8	2.4	6.0
Other	3.9	19.6	5.5	21.7	6.8	23.2	7.8	23.1	8.3	20.9
Total	19.9	100.0	25.3	100.0	29.3	100.0	33.7	100.0	39.7	100.0

Source: Direction Nationale du Plan et de la Statistique, cited in IMF p. 43.
1/ Provisional.

Table V. Mali: Consolidated Financial Transactions of the Government, 1967/68-1973

(In millions of Mali francs)

	1967/68	1969	1970	1971	1972	Budget 1972	Budget 1973
Current revenues	19,270	17,997	20,448	22,315	23,357	27,885	29,177
Central Government	15,490	13,990	15,674	17,394	17,074	20,136	21,316
Regional governments	3,270	3,147	4,014	3,301	3,316	4,080	4,402
Rural Equipment Fund	510	860	760	596	507	507	500 1/
Road Fund	--	--	--	1,024	1,968	2,127	2,017
Autonomous Amortization Fund	--	--	--	--	492	1,035	942
Current expenditures	18,250	18,150	20,044	20,961	23,985	24,599	27,091
Central Government	14,980	14,832	16,162	17,118	19,834	20,365	22,723
Regional governments	3,270	3,318	3,882	3,843	4,151	4,234	4,368
Current surplus or deficit (-)	1,020	-153	404	1,354	-628	3,286	2,085
Debt service 2/	890	3,222	1,176	1,209	596	1,310	1,145
Internal debt	...	594	542	968	422	735	723
External debt	...	2,628	634	241	174	575	422
Capital expenditures	2,170	1,377	2,104	2,326	3,077	3,578	3,358
Central Government	911	354	678	976	595	1,162	1,044
Rural Equipment Fund	510	543	526	356	564	564	500
Road Fund	749	480	900	994	1,918	1,852	1,814
Overall deficit	-2,040	-4,752	-2,876	-2,181	-4,301	-1,601	-2,417
Financing							
External	1,000	5,480	2,844	2,000	2,000	1,575	2,417
Grants	1,000	5,000	2,344	2,000	2,000	1,575	2,417
Borrowing	--	480	500	--	...	--	--
Borrowing from the Banking System 3/	570	1,478	-727	267	313	--	--
Central Bank	2,040	1,026	356	372	251	--	--
Deposit money banks	-20	--	-232	-107	257	--	--
Postal Checking System	1,450	452	-851	2	-195	--	--
Deferred payments at the Treasury	1,970	-1,257	-42	347	192	--	--
Other Treasury operations 4/	1,500	-949	801	-433	1,796	26	--

Sources: Treasury Accounts; Budget d'Etat; and data provided by the Malian authorities; in IMF, 1973 p.

1/ Staff estimates.
2/ The breakdown between interest payments and amortization is not available.
3/ Figures derived from the monetary survey. Data for 1969 exclude special loans extended by the BDM to repay certain external obligations not recorded in the Treasury accounts.
4/ Represents the net financial operations of the Treasury with autonomous public agencies and unclassified items.

TABLE VI

MALI: 1974 NATIONAL BUDGET EXPENDITURES
(in Billion MF)

ITEM	PERSONNEL	MATERIAL	OTHER	%
Common Expenditures	1.56	1.44	.73	8.6
Contributions/Transfers			2.06	6.5
Military Committee	.02	.01		0.1
Presidency	.23	.19		1.3
Justice	.30	.02		1.0
Interior	.65	.14		2.5
Information	.15	.10		0.8
Labor	.07	.02		0.3
External Affairs	.42	.33		2.4
Defense & Security	4.23	1.38		17.6
Commerce	.12	.02		0.4
Finance	1.06	.14		3.8
Public Enterprises	.02	.01		0.1
Industry & Pub. Works	.53	.05		1.8
Transport	.09	.06		0.5
Production	1.07	.27		4.2
Higher Education	3.68	.26		12.4
Basic Education	2.27	.12		7.5
Public Health	1.25	1.21		7.7
Social Affairs	.12	.01		0.4
Regional Budgets	4.33	.29	.24	15.3
Investment			.55	1.7
Sub-Total	22.18	6.06	3.58	1/
% Total	69.7	19.0	11.3	100%
TOTAL		31.82		

1/ Does not add to 100.0% due to rounding.
Source: Republic of Mali, Ministere des Finances, Budget d'Etat 1974 Rectifie, Bamako, pp. 2-3.

Table VII Mali: Investment Under the Three-Year Program by Economic Sectors, July 1970-June 1973

(In millions of Mali francs)

	Planned investment July 1970-June 1973		July 1970-June 1972	
	Initial estimates	Revised estimates	Financing secured	Actual investment
Primary	19,950	23,811	19,458	11,833
Agriculture	16,802	18,421	15,827	10,356
Livestock	1,926	2,352	1,077	578
Fishing	606	840	836	436
Water resources	616	2,198	1,718	463
Secondary	14,902	23,901	17,496	10,122
Manufacturing	9,623	18,051	14,471	7,600
Energy	1,337	2,076	1,573	1,573
Mining	3,942	3,774	1,452	949
Transportation	3,022	4,791	2,330	2,330
Transportation equipment	1,938	3,707	1,328	1,328
Maintenance	1,084	1,084	1,002	1,002
Infrastructure	24,887	28,061	18,787	8,756
Roads	5,237	5,865	4,664	2,880
Railways	1,574	1,963	1,058	1,058
Rivers	358	258	60	--
Aeronautics	8,076	8,052	6,223	2,751
Water	3,288	4,236	3,417	1,232
Telecommunications	1,053	1,848	1,799	53
Housing	1,260	2,028	589	7
Information and other	4,041	3,811	977	775
Social	9,985	13,369	6,079	4,292
Education	7,659	9,160	3,564	3,038
Health	2,014	3,731	2,330	1,103
Social services	312	478	185	151
Studies and research	4,808	5,490	3,297	2,597
Total	77,554	99,423	67,447	39,930
of which:				
External financing	66,993	87,569	60,243	33,057
Domestic financing	10,561	11,854	7,204	6,873

Source: Direction Nationale du Plan et de la Statistique. [illegible], 1973, p. 15.

MALI
AGRICULTURE SECTOR ASSESSMENT

I. INTRODUCTION

Traditionally, Mali has been self-sufficient in grains, at one time it was an exporter and it is a common place that Mali has the technical (if not the economic) potential of becoming a major cereal producing center in West Africa. Post-independence events have cast doubt upon any early fulfillment of this hope. It is open to question, even given a series of average rain years, whether Mali is now self-sufficient or gradually becoming a chronically deficient country.

A number of "ifs" stand between Mali and realization of its potential. If technologies could be developed and incorporated into Malian agriculture that were productive, feasible, profitable and of acceptable levels of risk, and if sufficient markets could be found, and if an acceptably cheap transportation system were installed to move goods, and if neighboring countries were to cooperate by opening their markets to Mali, and if manpower needs could be met, then Mali might realize some portion of its promise. Lacking these in full measure, Mali will have to content ifself with the reconstruction of an agriculture that can meet present and future domestic needs adequately. Just to do this will require considerable external assistance.

There is evidence that such assistance is urgently needed now. The rate of population growth is believed to be increasing as a result of improved health measures, in particular mass vaccination. Per capita availability of food seems to have declined in rural areas since indepence, partially due to the drought but more fundamentally due to a failure to increase food production proportionately to population over the past two decades. This per capita decline reflects a 50 percent increase in population since 1950. There appears to have been some shift from grains to manioc which despite its high caloric yields and low labor requirement is a poorer food from a nutritional point of view. Cereal consumption has always fluctuated between harvests but average year-long availability has declined (calculated from admittedly quite crude figures): from an estimated 250 kg per capita in 1961-63 to 220 kg per capita in 1970-62 (Table I). Per capita meat consumption in rural areas is low (20 kg per capita), although high by African standards. This level is likely declining as a result of the drought and its consequences, but may be offset to some extent by fish and game. As a consequence of this trend, Mali has become increasingly dependent upon food imports (Table I), which have more than doubled in the past decade. Imports remain a small share of total demand but the problem although yet small is clearly growing.

The following sections of this paper will examine critical aspects of cereal production in Mali to identify major constraints to the increase

TABLE I

SUPPLY OF CEREALS - MALI

1961-72
'000 MT

Total Cereals
rice, sorghum, millet, wheat

	61	62	63	64	65	66	67	68	69	70	71	72
Production	1067	1206	1004	934	935	974	1099	963	1162	822	1154	914
Total Imports	9	8	10	4	22	16	13	11	12	20	34	26*
Total Exports	3	2	1	1	-	-	-	-	-	-	-	-
Domestic Supply	1068	1212	1013	935	997	990	1112	974	1174	842	1088	940
Per Cap. Avail. (Kg)	256	285	233	211	220	214	235	201	236	166	228	176

*Almost entirely sorghum, wheat.

SOURCE: The figures appearing on this table were gathered by the Sahel task force, based on FAO feed balance sheets, in early 1974. Figures which appear in the narrative were obtained from IBRD and IMF publications on Mali. A few represent estimates either prepared by this office or gathered in Mali in the course of interviews. The particular source can be obtained on request to AFR/CDS

of production. These will likely be limitations common in Africa: technology, organization, skills physical base and economy. Hopefully the pattern of need will indicate programmatic choices open to the potential donor.

II. AGRICULTURAL REGIONS

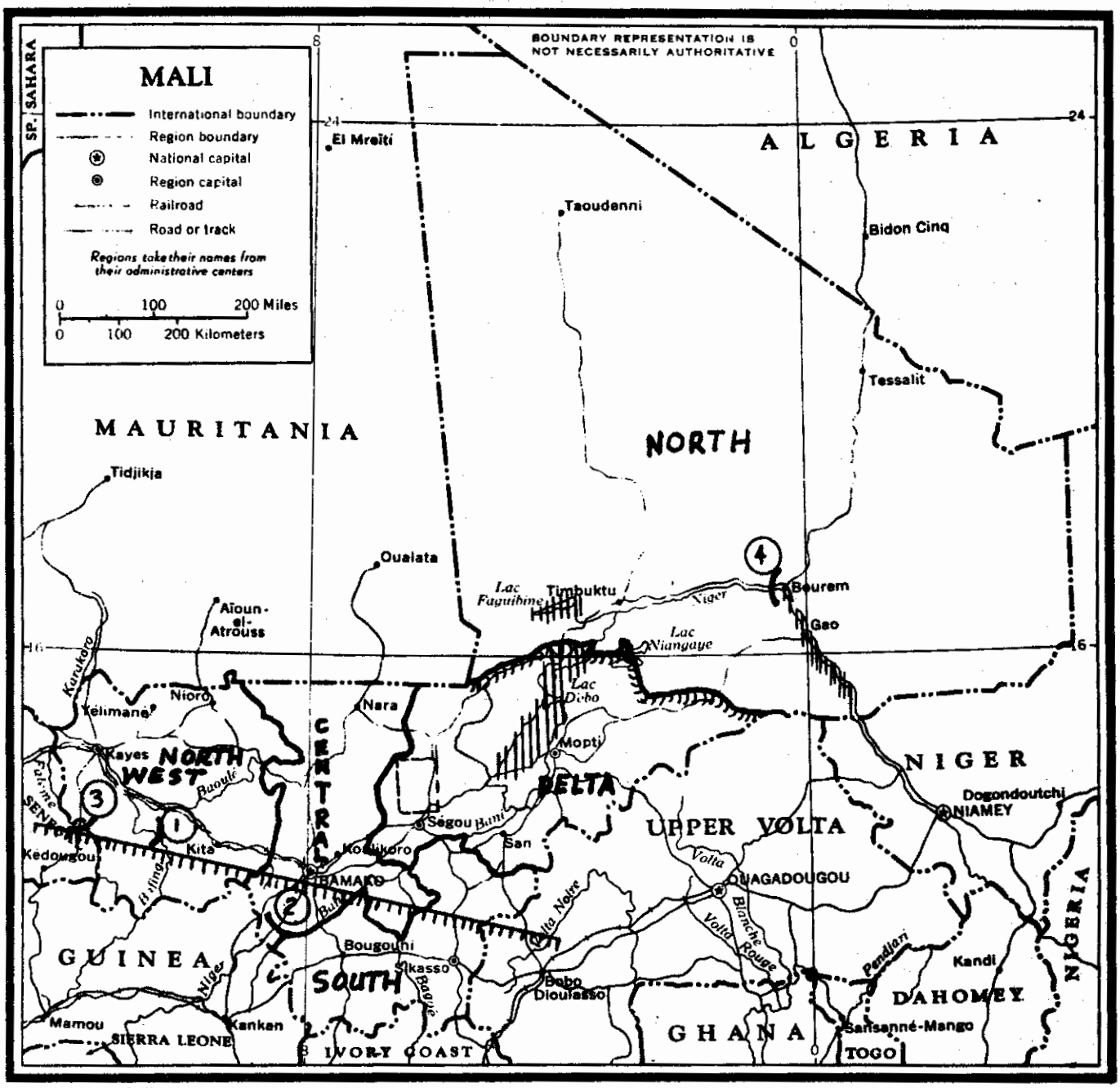
Mali is a butterfly-shaped country that sprawls across several environments - from moist savanna to very arid sahara. One wing of the country, comprising the whole of the sixth region is an agricultual zero, suitable only for extensive pastoral activity and some limited cultivation immediately adjacent to the river (including potential for wheat). Mali is a dry country (from 1300 mm in the extreme south to 400 mm in the northern most fifth region), however agricultural conditions are affected by the presence of the Niger River, which flows for 1700 km across the country. A substantial portion of this River and its tributary, the Bani, regularly overflow their banks and at one point join to form the vast interior delta which extends from Mopti across a network of lakes almost to Timbuktu. The delta makes possible the irrigation of large areas and provides excellent pasture during the dry season and an abundance of fish. However, the full irrigation potential of the Niger has scarcely been tapped.

The River aside, Mali's agricultural regions roughly conform to isohyets of rainfall (map 1 & 2). The northern-west and central regions (map 1) are of mixed millet and peanut cultures with some local tobacco, vegetables and rice; the latter along the rivers. Cattle are raised in much of the area on an extensive basis. There is considerable local potential in several particular locales in the region - the Kayes-Nioro area for instance. Good areas are however remote from markets. Transport is especially poor in this part of the country. Once the Manantali Dam scheme is underway both the market and transport situations may change rather rapidly. The northwest in particular will benefit from the OMVS program for the Senegal River basin. Irrigation, water transport, cheap electrical power, industrial centers will all come in the wake of the scheme. For the time being Western Mali must remain somewhat neglected.

The lands south of the Niger, perhaps the most advanced part of the country, are the heart of the Malian cotton industry. It is also the most densely populated. Most of Mali's surfaced roads are here. A French cotton firm (CFDT) has, over a period of 20 years of intensive effort, introduced animal traction, local supply and markets, an extensive service. In addition, sorghum, millet, maize, fruit and vegetables are grown.

Much of Mali's immediate agricultural potential may exist in the delta. The zone is now a center for cattle feeding (before trekking to coastal markets), millet and paddy rice. It is hoped to greatly extend cattle and rice production through a better use of the water in the delta, most of which now goes to waste. In recent years intensive rice polder development has gone on near Mopti and Segou. In addition there is the Office du Niger, north of Segou, where on 50,000 ha is grown much of Mali's rice and all of its sugar.

MAP 1
AGRO-ZONES OF MALI

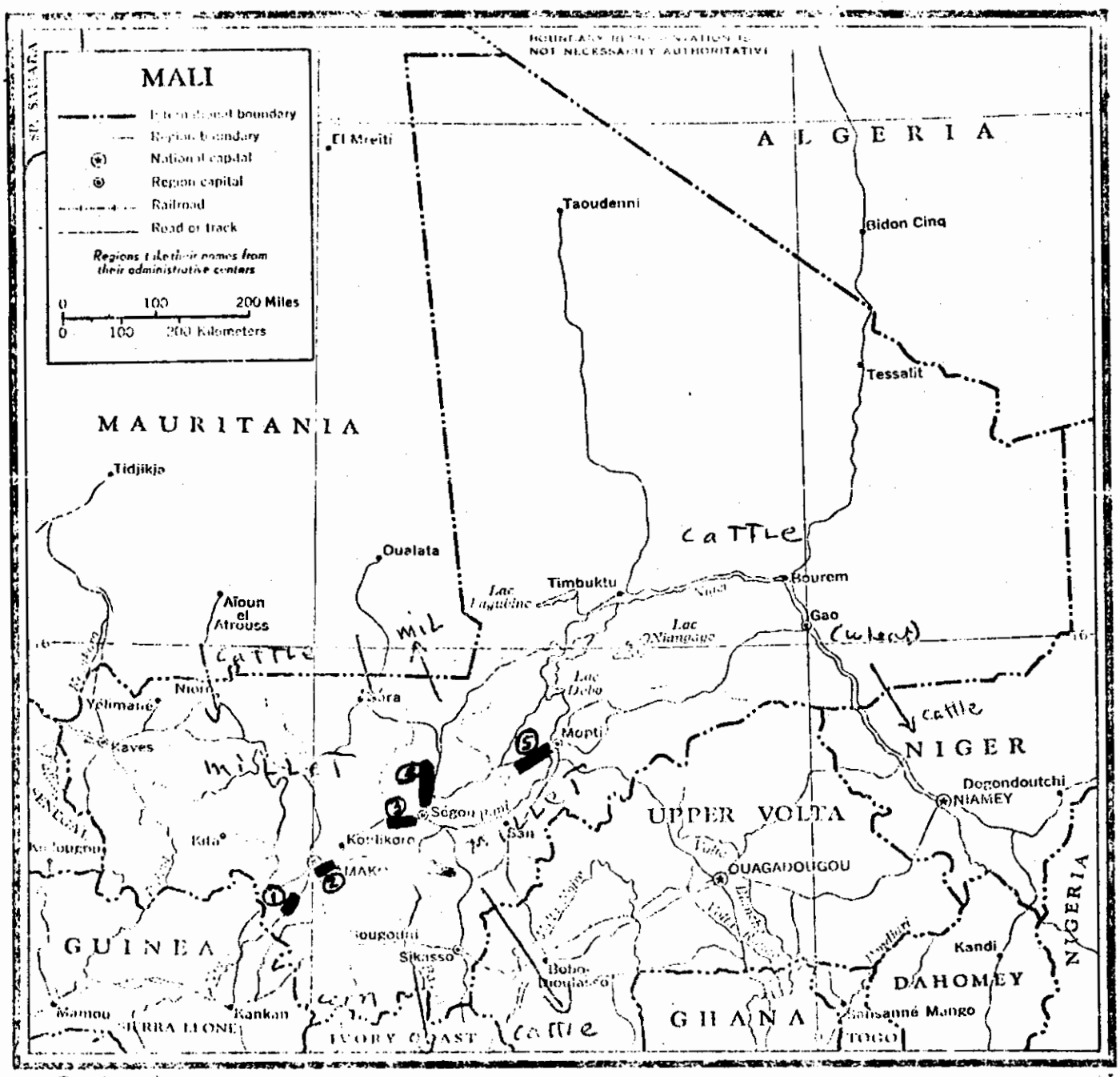


1. Manantali
2. Selingue
3. Gourbassi
4. Liptuka-Gourma, Tosaya

office du Niger

Inland delta
Boundaries of agro-zones
Northern Limit of tse tse
Norther Limit of Cultivation
Proposed forrages

MAP 2
CROPS OF MALI



1. Haute Vallee
2. Baguineda
3. Segou polder
4. Office du Niger
5. Mopti polder

Peanuts

Cotton

Intensive Irrigation

CROP SPECIALIZATION BY REGION

	REGION				
CROP	NORTHWEST	CENTRAL	SOUTH	DELTA	NORTH
rice		X		X	
millet/ sorghum	X	X	X	X	X
cotton			X		
vegetable					
peanuts	X	X			
wheat					(X)
cattle	X	X		X	X
sugar				X	

(potential)

The proposed Selingue Dam, upstream on the Niger from Bamako, for which financing from FED seems assured, may change this agricultural pattern somewhat. Riverside culture may become possible all year-round. Eventually some intensive use of the delta may become possible. River transport will benefit.

III. THE CROP PRODUCTION SYSTEM

In common with most African farm systems the Malian is composed of numerous small farms on lands occupied by lineages of their families. Member families are provided sufficient land on which to sustain themselves but land ownership does not exist in the common sense of the term. Resources, land and labor, are viewed as joint goods between extended and nuclear families. These can be utilized both for the common good and to provide the necessities of life for the basic family. Farming, typically, centers around a cereal (millet or sorghum, or both). In Southern Mali cotton has become a popular cash crop. In the west,peanuts. Recently rice has become an important staple.

In any given locality there is little variations in wealth. Wealth derives mainly from the quality of resources controlled, so that considerable regional differences are likely to exist. Important lineage persons often are the focus of such "wealth" as exists deriving from their special claims to labor. However such 'ownership' is concommintant with special obligations to the community. Hereditary wealth and permanent skewness of the distribution of wealth is not the practice in such an economy. Production, distribution, and welfare revolve around collective responsibility, joint efforts, reciprocity, and kinship. Given the low absolute level of Malian per capita, GDP, programs having as their objective redistribution would precipitate a raid by the penniless on the poor rather than the poor on the rich.

The Malian rural social system provides welfare and employment for most citizens. To attempt to replace it with any system equally effective would require cadre and investment vastly greater than Mali could mount. Like the traditional marketing system it is best left alone and supported to help become more effective, than replaced.

Malian farmers devote most their efforts to the production of coarse grains. Typically seeds are planted 3-5 per hill, 16,000 hills per hectare, all prepared by hoe. These are weeded and thinned depending upon the supply of labor. Cereals are cut with a hand scythe and threshed by hand.

The traditional system has been influenced to some extent by the introduction of cash crops, in particular peanuts and cotton, over the past two decades. A separate development organization has been responsible for the

promotion of each crop (see below) and considerable success has been marked. Perhaps 20 percent of Malian farmers devote some land to the commercial production of one of these crops. Animal traction has been an important element in the cotton program: 75 percent of the land under cotton is plowed. Nearly half of the 72,000 cotton farmers possess traction equipment. It is difficult to estimate to what extent improved practices deriving from cash crops have affected cereal crop production. Certainly these have benefitted from the residual effects of fertilizer and manure. It is likely that elements of improved tillage have made themselves felt where the economics of the matter permitted. It is also likely that the hoe and scythe will remain the primary technology in cereal production.

There appears to be adequate land in Mali, although its general quality is low. The critical constraint to extra production, apart from sufficient moisture, remains labor. It is estimated that half of Mali's population is under 15 years of age. When the aged and femal portions of the populations are deducted, the balance comprised of adult males is less than 20 per cent of the whole. Man-supplied farm energy is therefore very scarce. The availability of draft animals, which has become quite widespread in Southern Mali has no doubt been the principal factor permitting the growth of the cotton industry.

Farmers put 90 per cent of their land under cereal crops. Moisture and weeds are critical determinations of final cereal yield. Dense weeds can reduce millet yields (commonly 450 kg per ha ± 100 kg) by half. Given the nature of cereal culture weeding must be done by hand. Observers note that Malian farmers allocate scarce labor as a function of availability of moisture. When deficient, they weed cereals intensely. If abundant, they cultivate their cash crops and weed cereals less, (as extra moisture has sufficient yield effect to offset the effects of extra weeds.).

If we are to help change Malian agriculture we must know a great deal more about the role of labor. Its supply will affect the choice of technology. the nature of the crop program and the intensityof individual crop cultivation. Much more need be learnt about the availability of labor throughout the year especially during peak demand periods; the requirement of different crops and activities; the extra output possible from extra energy investment and the opportunity costs to energy of particular activities. A better understanding of farm incentives and perceptions of risk are needed.

The traditional agriculture is losing the race to keep up with absolute population growth. It is likely that the best lands, both in terms of soil and moisture have alraady been taken up. Evidently the system is at maximum output now given water and energy supplies and technology. Increases in cereals can only be at the expense of cash crops and vice-versa.

A real investment in dryland agriculture research is needed; work on manues, erosion, forage, mixed enterprises, water management, all-year cropping, economic sources of extra energy -- all must be studied. A major effort to increase skills and systems related to irrigation is needed to tap more fully the water resources that are there.

Some of Mali's best prospects for increased farm production lie in efforts to improve flood retreat cultivation and to develop other forms of irrigation. Malian farmers resident along rivers have traditionally sown immediately after the ebb of water from the summer rains. In some areas a type of polder water control has grown up. Since 1970 several rice Operations which employ the system, supplemented by pumps to improve water control, have been created with the support of FAC, FED and IDA. The latter funds a scheme near Mopti, 31,000 ha., which cost some $7 million. This site employes low lift irrigation and careful water management which have provided a four-fold increase in rice production (from 42,000 tons to 180,000 tons): partly from increased yields and partly from greatly extended area. A FED-finance scheme at Segou covers 44,500 ha. Nevertheless, yields in most of these schemes remain low (less than 2 MT/ha.) except as fertilizer is subsidized or other special intensive efforts employed. In very few places in all-year cropping practices through irrigation during the dry season.

Nevertheless, a number of opportunities exist to employ low lift pumping to irrigate perimeters a few hundred meters immediately beyond the banks of rivers, where, with adequate prices, crop output can be substantially increased. Water can derive from both the river itself or from the associated water table. One example is the so-called Haute Vallee above Bamako. Here irrigated tobacco, kenaf, cotton, vegetables and rice are included in the traditional regime, under the supervision of the extension personnel assigned by the local operation. With good markets and prices, these schemes have been quite successful.

Fuel costs and difficulties in maintenance cloud the economic and technical practicality of motor pumping in all areas. Animal-powered pumping would seem an alternative. The Persian wheel, for example, could provide an alternative which is cheap to build and maintain, and would give an additional use to draft animals.

Large scale irrigation schemes in Mali have not been notably successful. The two of significance -- Baguineda and the office du Niger -- have encountered basic difficulties of poor soils, farmer inexperience, high operating and overhead costs, pests, inadequate markets, supply problems, etc. Perhaps the best example, and certainly the most costly, is the Office du Niger. Without question the most elaborate development scheme ever attempted in the dryland zones of West Africa, the Office du Niger, has had a very checkered experience in its 30 years. The scheme began in the 1920s with a pilot project near Bamako. Here, in a canal

irrigated perimeter parallel to the Niger, 3,000 hectares of rice and vegetables were cultivated. Some 6,000 colonists were settled. The Baguineda scheme was considered a sufficient success to encourage a much larger one on fertile but dry land north of the Niger beyond Segou. Over 1,000,000 hectares seemed potential, using rice as the subsistence crop and cotton as the cash crop. Planners foresaw a settler community on irrigated land become an "island of prosperity" in the Sahel. A barrage was built (Markala) and nearly 300 km. of canals dug, 50,000 hectares were put under cultivation tilled by a colonial settlement numbering nearly 40,000. Close to $200,000,000 had been invested by independence.

The office has never lived up to promise. It has far too much infrastructure for the area cultivated. The hydraulic basis for several hundred thousand hectares is in place as well as a staff of some 2,500. Moreover, colonists are subsidized as an incentive to remain in place. In fact settlers do have a superior standard of living to those not in the office. On an operational level the office has at least three problems. Its essential engineering is faulty so that there are persisting irrigation and drainage difficulties. A serious lack of manpower exists. The office has conspicuously failed to attract sufficient settlers, even when persons from other countries were invited. There is not serious overcrowding in Mali itself and few Malians appear interested in setting up a whole new way of life, even with a higher living standard. Lacking workmen, the office has attempted extensive mechanization which has only added to costs. Finally, attempts to increase production, especially through intensive cultivation, have failed to produce proportionately to effort, partly because low prices have reduced incentives for use of fertilizer.

The experience of the office is a worthwhile one to reflect as the Senegal River states are presently contemplating schemes not dissimilar in their demands for good engineering, labor, management, revenues and productivity. The Office was given immense autonomy, it manages its people and lands as a separate entity outside of normal government. It has a monopoly of marketing in its zone, a lavish basic investment in structures and has been the product of intense effort. Yet results remain disappointing. Government is perplexed as what to do with the office: it can scarcely drop it; it is hard to justify any expansion and it is losing money as it is. There is a present effort to produce sugar (and crush it), expand rice and add cattle, all under capital and management intensive conditions. Some parts of the canal system are being allowed to decay. Perhaps a smaller office may eventually emerge shown of superfluous personnel and overhead.

Agricultural Support Organizations

Mali does not have at the present time a meaningful national research organization. Neither is extension very well organized. In fact, apart from a rather feeble indigenous IRAT station Mali has been

entirely dependent upon two French companies for its applied farm research and extension. These are Compagnie francais pour le developpement des fibres textiles (CFDT) and Bureau pour le developpement de la production agricole (BDPA). The former deals in cotton, the latter peanuts, CFDT, has been especially successful in the extension of cotton, which success is based on a combination of factors. The company selected a good cotton variety and did the necessary adaptive research in Mali to produce a satisfactory crop technology. An adequate extension service was organized which was able to advise and was provided with the means to perform its tasks. The needed inputs, animals, equipment, seeds, fertilizer, etc., were made available. A guaranteed market was provided. And a price paid that covered production costs and risks and provided the necessary incentive. Of particular importance in the CFDT experience has been the attention given the need to increase energy available to the farmer. With this energy farmers have been able to add land for cotton, which has reduced the substitution effect against cereals. Farmer participants were provided a unites de culture, essentially a part of animals and their equipment on condition that proper practices were followed. Supervision was made available. If, after 2-3 years, farmers wanted to purchase the unite they could at a very reasonable price. The result of this approach has been a very rapid spread of cotton culture. A similar experience has been marked by BDPA in the expansion of peanut production.

There have been problems. Although cash has been available, devaluation reduced the supply of consumer goods and raised their price, reducing the incentive value of cash. There have been problems in obtaining timely supplies of inputs, in particular fertilizer. A serious problem not yet resolved in the training of a cadre of persons technically skilled in maintaining the equipment in the hands of armers.

In recent years, and in part as a consequence of government prodding, the companies have been widening their perspectives to the inclusion of the whole farm crop program, with the view in mind of raising farm production generally. Mixed animal and cereal enterprises have been included in the extension program. Off-season animal feeding is being attempted. Improved crop rotations are being studied. The programs remain essentially oriented to dryland cultivation, which is what will benefit most Malian farmers.

In addition to the company supply structure a cooperative system exists which dates back to the post-independence period when the government attempted to promote, in the long-run, a cooperative agriculture. Essentially the cooperatives were set up to replace the former private trade network. The units were given monopoly on both the sale of cash crops and the sale of consumer goods. Farmers greatly reduced their marketing during the period. In recent years there has been a de-emphasis away from the cooperatives, private trade is again permitted. However, a shadowy structure remains and a role is seen for it in the zones where crop Operations are to function.

In recent years Mali has made considerable efforts to expand output of export crops, and food crops through the implementation of rather well-coordinated area-specific projects officially termed "Operations." These operations aim eventually, but gradually, to be full-scale rural development projects involving local persons, cooperatives, credit, extension and so on in the context of market, supply, and incentive support.

Ideally each operation will attract either a specific donor, or parts of the activity will be supported by one donor. Of itself Mali has few resources to invest. It can provide personnel; but transport, fuel, much vital training, technology for the most part, must come from abroad. Present plans call for operations to be autonomous bodies, able to pay unique wage scales and organize themselves and their work to conform to the particular needs of their areas. The approach is appealing in that it frees the field work from the tedium of government channels. On the other hand, and in the especial case of personnel, it means that operations and government will be simultaneously bidding into a very limited job market. If Operations are not to be crippled by lack of trained persons expatriates will likely be needed in the beginning, though this in itself does not solve the problem of Malian manpower.

An equity issue may come into play as well. By its very nature, a strategy of selecting leading local areas and concentrating resources in them to produce a large early results will require that leading farmers and better areas be identified and helped. The result clearly will be the rapid advance of some farmers and some locales. To the extent production is oriented to foreign markets (total market opportunities could be larger) more farmers should be able to participate (witness cotton). However where local and limited markets are the only outlet comparative advantage will shift to well-located very efficient operators.

To the extent Mali still fancies itself a socialist state the emergence of a class of comparatively well-to-do farmers may be distasteful.

Regional equity will be served to some extent to the degree that Operations can be mounted all over the country. Operation riz-Segou and riz-Mopti are already in place. Operation haute vallee is just beginning. Operation mil is beginning east of Mopti. Additional Operations are planned in the west, as funding becomes available. The cotton and peanut programs are regarded as successful examples of the approach.

Price Policy and Marketing

Since independence the government of Mali has sought to manage the price of basic food products. By law prices of essential consumer

goods both locally produced and imported are subject to control. Government directly sets prices for millet, rice, sugar, flour, and peanut oil. Overly stringent price controls, set at a very low level led to a serious decline in rural marketings by 1966. Since that time cereal prices have been raised several times (but have never caught up with the parallel private market where millet prices, off-season, might be three or more times as high). The progress of millet prices are as follows: 11 million francs per kg. (1966), 16 (1968), 18 (1969), 20 (1970), 26 (1973) and 30 now. Rising official prices have lost some of their incentive effect as a consequence of devaluation and relatively high prices paid for cash crops. Over the same period government sought to control demand by freezing government wages; they remain unchanged for a decade. Although no comprehensive national price indices are available ones prepared for the Bamako market 1962-1972, on a base 1962 = 100, indicate a nearly four-fold rise in the price of millet (387.9), rice 308.1, peanut oil 214.8. Government has rather successfully resisted pressures for significant wage increases on the rationale that this would only set off an inflationary trend, which would inevitably fuel demand for further increases. The Government of Mali, which has a political base largely limited to the urban civil service, cannot afford to pay this and does not want to ask for additional French subsidy. There has been a small increase recently but a mere token given price levels. The supply situation has worsened as smuggling to higher price neighboring countries has continued, with persisting high prices for cash crops, with drought, and as low prices for cereals discouraged official marketings.

It is estimated that only five percent of total millet production is marketed. Given high transport costs and the low relative value of the crop especially at official prices, a national market does not likely exist. One estimate is that Bamako draws on a producing area of 200-250 km. radius.

Mali is unique amongst Sahelian states in having a national marketing system for food grains. A statutory institution exists OPAM (Office pour les produits alimentaries malienne) which is responsible for buying, storage, transportation, pricing and distribution on a national scale. Formerly in a monopoly position, it remains the preferred staple marketing organization. Law requires farmers, if they plan to sell, to give OPAM opportunity to buy 40 percent of their potential marketings. OPAM is a high cost operation which consistently loses money. Its staff is inadequate to the task, it lacks many critical assets vital to the operation (storage, market information, handling mechanisms, bags, etc.), and it is seriously underfinanced. This said, Mali remains the only Sahelian country structured to: (1) assure farmers of an outlet for their surplus cereals; (2) buy and store enough grains to begin to operate a stabilization scheme and reserve program; (3) move substantial volumes of grain from surplus to deficit areas; and (4) make officially announced

prices effective in real markets. The system does not provide credit or forward selling to producers, it has a difficult time buying cereals because of lack of buying points, supply of sacks, is unable to pay promptly and has poor internal financing system. Internal costs are so great that the market spread accruing to OPAM is 42 percent of the retail price of cereals (13 franc/kg). If this margin could be cut in half and the difference offered to farmers the resulting price would be most competitive (over 40 MF/kg).

Policy Objectives in the Rural Sector

Development opportunities in Mali are, practically speaking, limited. Industrialization in an area so far from the coast seems unpromising. In terms of comparative advantage there is little Mali has to offer. Its domestic market is a poor one and is mainly centered in Bamako, a city of perhaps 300,000. The employment and other effects of a few import substitution industries (textiles, tobacco, sugar, matches, etc.) is very limited.

In agriculture, efforts to intensify production outside of irrigable lands will be of limited value. It would seem more reasonable to concentrate in areas where water is not a seriously limiting factor, though with attention to geographic distribution of population and food needs. This restricts major schemes to river basins, the delta and the highest rainfall areas in southern Mali. In these areas efforts must be directed towards continuous cultivation, with improved water management, supply of adequate farm energy, use of manuer and the perfection of a full crop program which includes food, cash crops and livestock.

The Government of Mali sees its long-term salvation in water development and management. With reliable water, Mali should be able to meet its food needs, produce raw materials for its industries and perhaps for export, and increase production of export crops. The country is sited over the head waters of two major river basins -- Senegal and Niger -- and possesses the unique hydrological phenomena of the delta. In addition considerable but unmeasured (estimates are controversial) sub-surface resources appear to exist. Mali plans to make use of this base in two ways: large scale dams, such as Selengue and Manantali, and minor irrigation using deep or low lift wells or diversion canals off the rivers. Over the next five years no dam project will have any production effect. However, preparations for their construction will certainly affect project selection and the flow of resources to non-related projects. There will be competition for manpower, funds, transport, etc., just to prepare for Selingue.

Moreover, to make use of the water that does become available through these dams, a vast amount of experience is needed at all levels -- from the farmer to the national planner -- in water management, engineering and irrigation. That skills development must begin now if the large-scale investments are not to lose their impact.

It is the Operations which will have the primary production and training role over the coming half decade. Mali will be dependent upon donor assistance for almost every element of these operations. Ample scope for all donor support available for Mali will exist to support several or all of these schemes.

Donor Program Opportunities

Mali seems poised to make an attempt to promote rural development along new lines. Essentially the strategy is an attempt to make the traditional system operate as close to its potential as is feasible: technically and economically. Support will be given to help relax traditional constraints: energy, seeds, markets, water -- but not to change that system in any significant degree. Later, as markets grow, transport improves and technologies become available, the system will gradually metamorphose. A radical break with the past is not planned or even desired.

Given the many constraints which confront, if not confound, Malian planners, this approach provides considerable scope for donors. Indeed one could argue that donors could do much worse than to direct support to aid the Operations. Certainly three central problems exist -- personnel, equipment, finance -- where external support would be welcome. This assumes that the basic technologies needed now exist, the Malians themselves believe this. In the short-run it may be true.

It is impossible to overstate Mali's critical shortage of skills. Mali has several specialized institutes of higher education devoted to fields related to rural production, but still only 8 percent of high level manpower being trained are scheduled for these institutes, and the total pool of high level manpower is small (see Education assessment). Even when able people function their knowledge is often deficient to perform critical tasks. There is need to train at every level, for every activity. A dozen parallel rural production structures may come into existence over the coming decade, if the Operations work out. All must be staffed. There is not time to fully train; good people are too scarce to be released from their jobs for prolonged training. A rich opportunity exists to provide highly specific short-term training to staff persons at all levels.

Every Malian Operation will be critically short of transport and, even more important, fuel. A reliable supply of fuel along could make the difference in many circumstances. In addition a supply of parts and maintenance is of almost equal importance. This is true for transport equipment and farm machinery and tools. Assistance to support equipment could be a vital venue for donors. It could take the form, at the local level of materials, credit, training and budget support.

Even when the GOM has personnel, equipment and a plan, funding is commonly lacking. This is not too surprising in a country where there is almost no capacity to save or invest. Malians are competent planners, they articulate their problems well and they know what they want. They can organize. What they usually lack is simple funding to finance the resources they have in place. Donors should be sensitive to this and make provision for it in their plans for Mali.

There are a number of Operations, or parts of these Operations where AID could make a critical input: Operation Baguineda, near Bamako, meets a number of AID criteria as to productivity, nutrition promotion, feasibility, etc. Discrete technical and other needs can be perceived. Similarly in the case of operation Mil-Mopti, the haute vallee, etc. Along with these efforts, longer-run needs must be met. New production technologies for agriculture must be developed: Multi-cropping, surface control, water management, energy, forage, etc. Whole new crop regimes must be devised, perhaps new crops introduced. Donors should consider interventions in applied research.

If cereals are to become abundant in markets a grain stabilization program must be installed. In OPAM, Mali possesses the nucleus on which a viable system might be built. This system could be perfected with donor assistance. Better inventory management methods need to be introduced. Better crop estimation and production forecasts are needed. Grain buying methods must be improved -- indeed OPAM should be able to provide year-long market to farmers. Forward purchasing of standing grain could be attempted, or OPAM could store on the farmers' account. These actions could support both income and price stabilization objectives. Mali must face up to the need to put cereal production on a commercial basis with prices that are competitive. This must be done in context of cereal production promotion programs along lines of the proposed operations. Donors have a large opportunity in this area.

Mali does not yet constitute a single national market. Few African countries do. There is real need to help such a market, or even wider regional markets, develop, especially if public farm policies are to be made effective. A more dense network of feeder roads are needed to reduce internal assembly and distribution costs. Of great importance would be the provision of market information by radio -- production, weather, prices. Better use could be made of the traditional market structure; there is a persisting instinct on the part of government to replace this with public structures. Efforts should be made to improve the efficiency of the 'commercants' and to integrate them into modern structures. Marketing should be something where western donors could make useful contributions.

Little can be done to internalize modern technologies into the farm system until farm incomes rise and savings can be mobilized. Efforts to promote commercialized agriculture, even for foreign markets, should not be dismissed out of hand. Basically, the domestic market is so poor that there is little to transfer between sectors. Foreign markets are needed and must be exploited if sufficient resources are to become available to farmers. Thus vegetable and fruit, cash crops, and livestock should be encouraged even where the products are exported. Donors can help make the technology of export oriented industries as divisible as possible so that typical farm types can participate.

MALI

LIVESTOCK SECTOR ASSESSMENT

I. INTRODUCTION

Georgraphy and Demography. Mali's 465,000 square miles of territory stretch from approximately 10° north latitude, where it borders the Ivory Coast, to approximately 25° north latitude, where it borders Algeria. Road and rail facilities to neighboring countries are very limited.

The Niger River flows 1,070 miles from the southeast corner of the country through the northeast central region. It is navigable for only part of the year. Each year the Niger and its tributaries overflow their banks and create a vast interior delta where cultivation and grazing is possible during the dry season. The river is also an abundant source of fish.

About 5.5 million people live in Mali. Most of them are of Mande or Peul origin. The Moslem religion predominates. The population, increasing at an annual rate of about 2.0 percent, is predominately rural; less than ten percent of the population is urbanized.

Agriculture and Livestock. The agricultural Sector (agriculture, livestock, fisheries, forests) constitutes Mali's principal resource and is the occupation of about 90 percent of the population. The value of agricultural production in 1972 was $188.7 million or about 43 percent of GDP. Of that amount, 49 percent was from cultivated crop production, 40.5 percent from livestock, 5.2 percent from fisheries, and 5.4 percent from forestry.

The livestock industry occupies a significant place in the agricultural sector and in the economy of Mali. In 1972 the value of animal production was estimated at $34.5 million and accounted for 39.5 percent of total Malian

In 1970 there were about 5.5 million cattle and 11.8 million sheep and goats; there were approximately one head of cattle, one sheep and one goat for every human being in Mali. The 4.5 million Zebu cattle were grazed in northern Mali and 1.0 million Taurin and cross-bred cattle are grazed in the south. Zebu cattle are not immune to trypanosomiasis which is rampant in the Sudanian and Guinean Zones south of the 13th parallel. Although the effects of the 1968-1973 drought are imperfectly known, the cattle population is believed to have been reduced by about 30 percent to perhaps 3.8 million while the sheep and goat population total is probably little changed.

Climate. Mali spans five of the seven great climatic zones that characterize West Africa (Map 1).

In the south the Guinean Zone covers 45,000 square miles or 10 percent of the country. Here annual rainfall ranges from 40 to 70 inches per year. There is normally a four to six-month dry season from about October to March. Tall grass savannah flourish in wide valleys and strips of evergreen forest fringe the streams. Settled and semi-nomadic farmers keep fair amounts of cattle in the zone, although there is still year-round incidence of trypanosomiasis.

The Sudanian Zone covers 68,000 square miles or 15 percent of Mali's total land area. Annual rainfall is about 24 to 40 inches. The dry season lasts six or seven months, from October to April. The zone is covered with tall grasses and many large trees. Trypano-tolerant cattle are grazed in the southern part of the region despite some incidence of trypanosomiasis which diminishes and almost disappears as the dry season progresses.

The Sahelian Zone occupies 146,000 square miles or about 31 percent of Mali. Rainfall varies from 10 to 24 inches per year. There is a nine to ten-month dry season from September to June. The Sahel covers large tracts between the desert to the north and the more humid woodlands to the south. Grasses in the climax vegetation are usually less than three feet high. There are no tse-tse flies in the Sahel and consequently no trypanosomiasis. About 3.0 million cattle graze this area. Overgrazing is common where there is a good water supply.

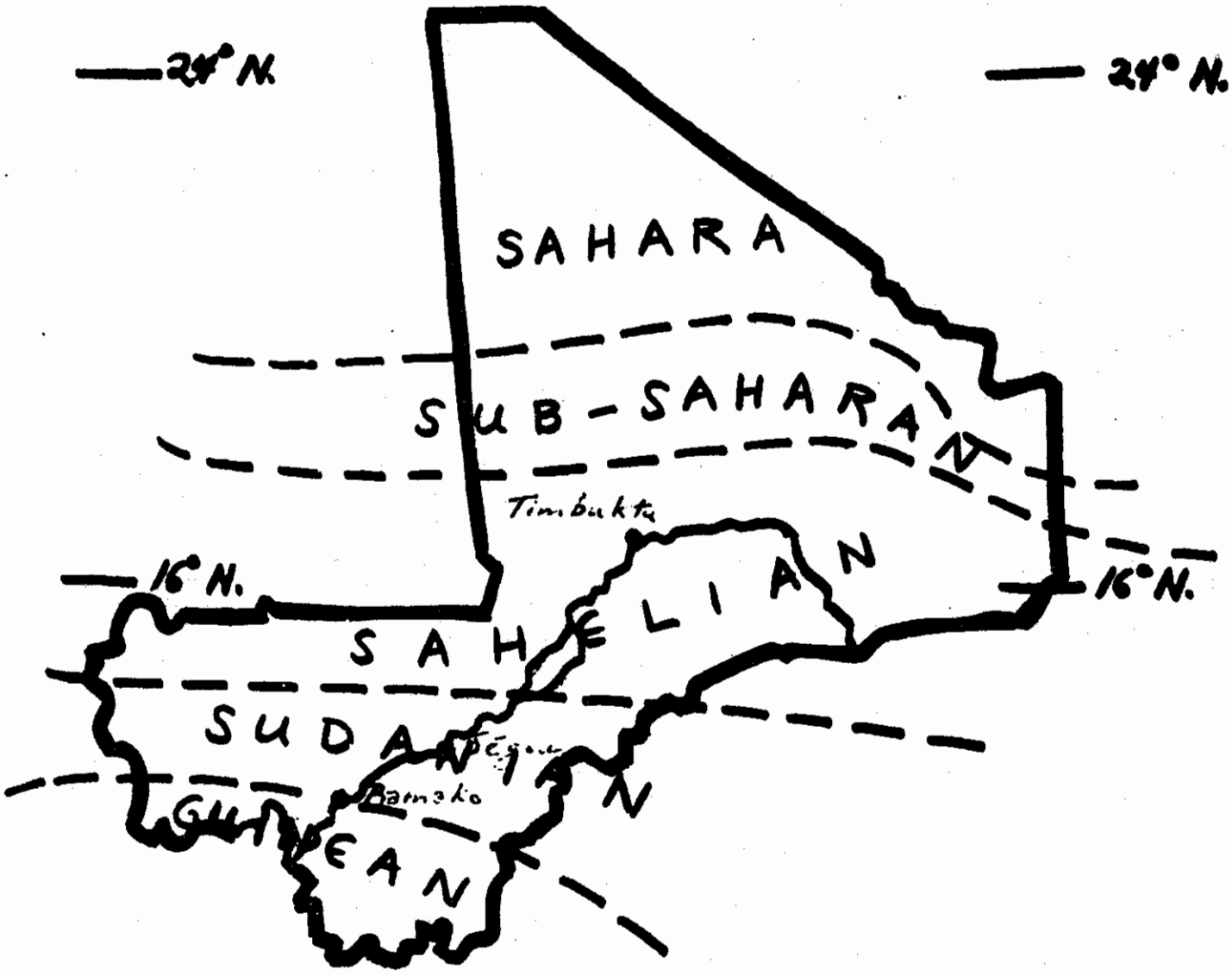
The Sub-Saharan Zone occupies 15,000 square miles or about 16 percent of Mali. Rainfall is from 4 to 10 inches per year and occurs only during a few weeks in the middle of the year. Vegetation cover consists of small, thorny shrubs and trees. Grass patches spring up during the short rains and some Zebu cattle come to this Zone for grazing at that time.

The Sahara occupies 132,000 square miles or about 28 percent of Mali. It is virtually devoid of vegetation. Animal husbandry and agriculture are impossible.

II. PRODUCTION AND MARKETING PATTERNS FOR CATTLE

A. Production Patterns for Cattle. In Mali, there are three types of production patterns for livestock, each associated with different ecological and land-use zones which in fact often overlap.

The nomadic/pastoralist production pattern is usually associated with the Saharan and Sahelian ecological zones but may also be found in higher rainfall grassland areas wherever crop production is difficult or marginal, human population is dispersed and animal disease conditions



MALI
climatic Zones
Map 1

permit. The types of livestock owned vary between zones with cattle being predominant in higher rainfall areas and sheep, goats and camels becoming more important in drier areas. Cattle tend to be managed in large family herds. Transhumance patterns tend to be long and difficult and often exceed 200 miles. Households depend upon their animals for a major share of subsistence income from the consumption and sale or barter of milk and the sale of cattle. They depend upon crop farmers for a major portion of staple food needs although women often grow millet and vegetables near rainy season camp sites.

Tribal affiliations include Taureg and Arab groups in the Saharan and Sahelian areas and Fulani (Peuls or M'Bororo) in non-desert areas. There are three principal zones of migratory production in Mali: a western zone includes the adjoining areas of Mauritania with herdsmen moving cattle between semi-desert and Sahel rainy season grazing and the Sudan Zone dry season grazers north of the Senegal River; a central zone (north of the Niger) with herdsmen following a north-west to south-east pattern with dry season grazing in the Niger delta area; and a south eastern zone (south of the Niger) with rainy season grazing in Sahel and Sudan areas of Mali and Upper Volta and dry season grazing in the Niger delta. During the recent drought period, some herdsmen pushed as far south as the northern portions of Ivory Coast and Ghana where some are said to have remained in subsequent rainy seasons.

The semi-nomadic/semi-sedentary production pattern is associated with the Sudanian Zone in Mali where livestock owners are usually agriculturalists. This pattern predominates in areas where rainfall and soils permit crop production and trypanosomiasis does not prevent year-round grazing (600-1,000 mm of rainfall). Herds graze fallow lands in the rainy season, and because forage is limited, may be moved to nearby zones for dry season grazing. Transhumance distances are usually less than 50 miles. Milk is usually less important as a dietary and income source.

Cotton or groundnuts are usually the principal source of family cash income. Tribal affiliation is most commonly Fulani but includes Malay, Bambara, and Dogon farmers. The semi-nomadic pattern occurs in a belt across Mali that corresponds largely with the Sudanian zone. In the cotton zone (south central Mali) ox-traction is well established and nearly 75 percent of cotton hectarage is plowed with oxen.

In the groundnut zone, (western Mali) nearly 50 percent of households own cattle and ox-traction is expected to increase.

A sedentary production pattern is associated with high rainfall areas in the southern Sudanian and Guinean Zones. Some owners of oxen for plowing could be included in this category. More commonly owners inhabit zones with riverine species of tse-tse fly and therefore husband pano-tolerant breeds such as N'dama or Zebu and Ndama crosses. There are an estimated one million cattle in Mali with some same degree of trypano-tolerance.

B. Marketing Patterns. The commercial cattle marketing network linking herders or farmers with domestic and export markets is complex but efficient. It is capable of gathering cattle in small lots over a vast area and moving them hundreds of miles to urban markets at low cost.

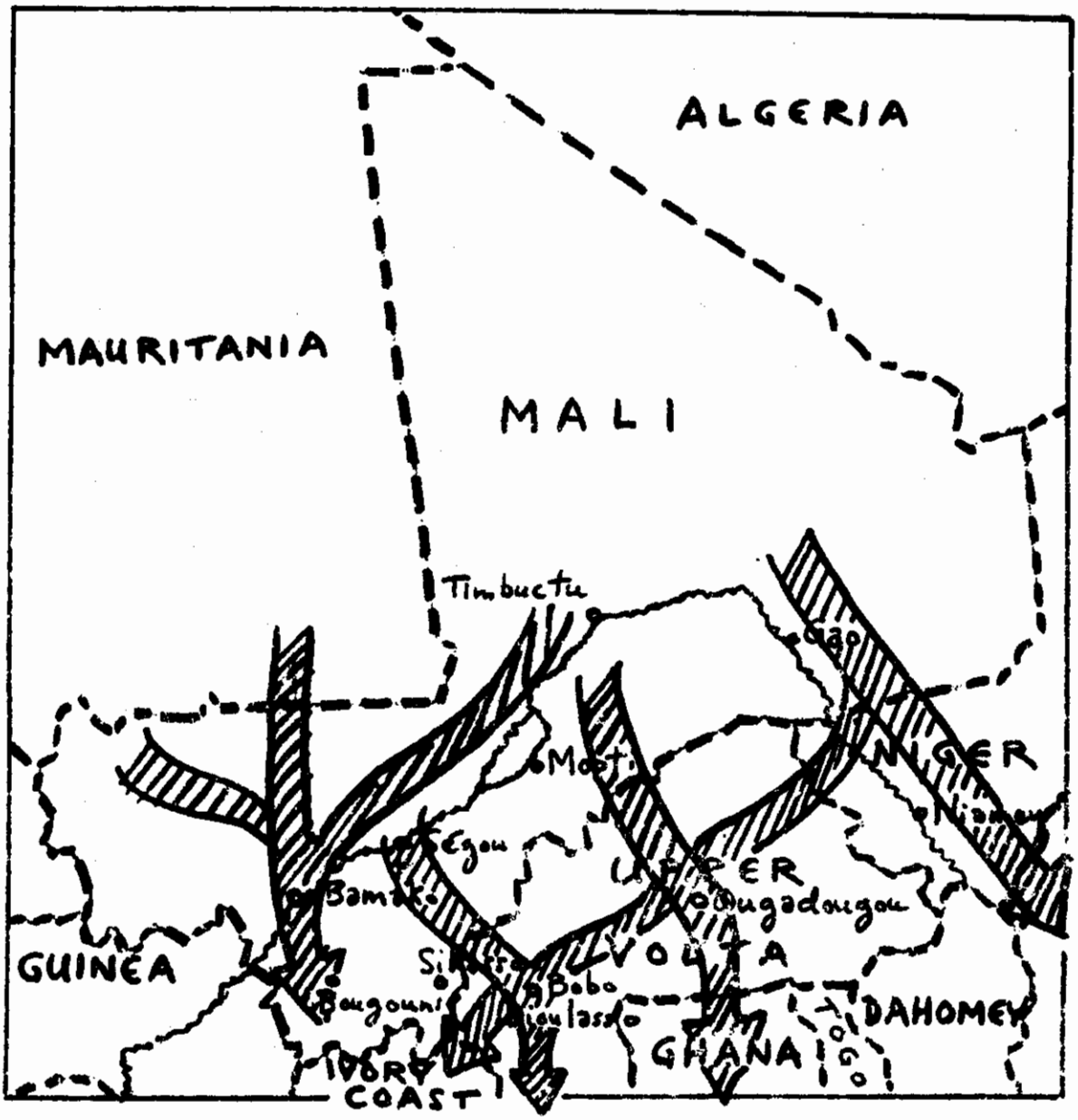
There are four principal cattle trade routes (Map 2). From the west, cattle are moved from Mauritania to the vicinity of Bamako. Some are sold for slaughter there while other continue south to the Ivory Coast. A second important route begins in eastern Mauritania and in the part of Mali northeast of the Niger River delta. Cattle are walked from those regions via Niono or Ke Marino either to Bamako or to the Ivory Coast. East of the Niger River delta cattle are formed into convoys at N'Gouma, Kona and the vicinity of Mopti, and are walked to Upper Volta where they either continue on to Ghana or are shipped by rail to the Ivory Coast. Northeast of the Niger delta cattle are walked via Angoso to Niger. Some go on to Nigeria and others to Upper Volta and Ghana.

The livestock marketing industry has been considerably commercialized in Mali during the last 20 years. There are five large markets that deal with 25 to 100 thousand head of cattle per year, small markets handling two to three thousand head of cattle per year, and many temporary markets of varying importance. Most of the markets have neither the pens nor the equipment needed to facilitate transactions and to control animals. In certain markets traders have corrected these deficiencies with precarious layouts that they have made or rented. Bank credit has played no role in the livestock industry or in the commercialization of cattle and meat in Mali.

In contrast to the uncontrolled price of cattle on the hoof, the retail meat price at Bamako is fixed at 275 Malian francs per kilogram. This price is not in harmony with those prevailing in external markets and cannot be respected any longer in domestic markets. This artificially low official price constrains the provisioning of such large urban centers as Bamako. The government is, however, aware of the situation, and revision of official prices is under study.

The drought has had varying effects on the prices of live cattle. The price of cattle destined for export has increased more than 25 percent since November 1972 and was continuing to rise in November 1973. On the

MALI
Principal Cattle trade routes
Map 2



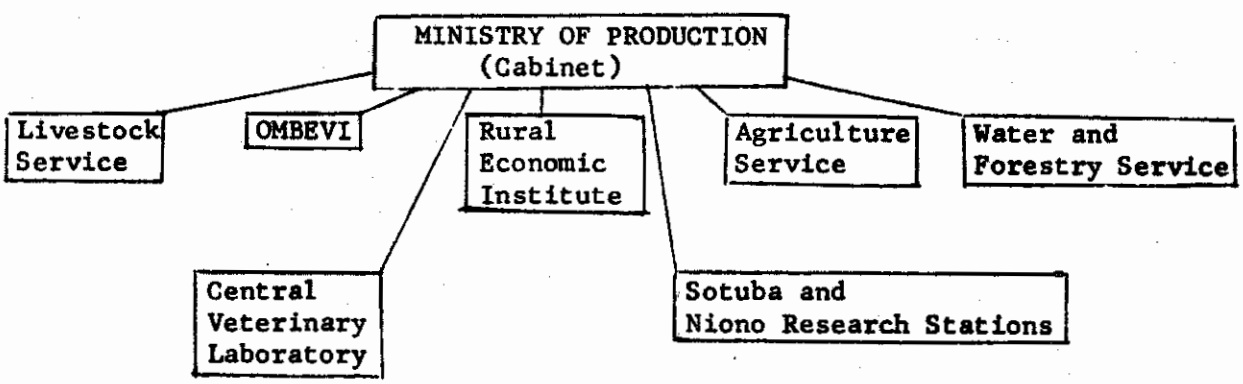
other hand, the price of the lean, meager beef that is most likely to be routed for domestic consumption or exported to Ghana has increased only 5 to 10 percent. The price of livestock incapable of reaching the far-away markets has fallen in a very significant fashion.

West Africa has experienced a 10 percent average annual increase in the price of meat for the last three years. It is possible that the increased purchasing power of coastal consumers, particularly of those in the Ivory Coast, Ghana, and Nigeria, will so accelerate the demand for meat that the drought-ravaged Sahel will not be able to satisfy it. If one assumes that the annual growth rate of real coastal consumer incomes will continue, investments to increase meat production in Mali including the Sahelian Zone would run neither a short nor long-term risk of not finding buyers for the increased output. The present and predicted future market for meat, both African and world-wide is extremely favorable.

Increased government investments in the livestock industry and justified both for investment actions long assumed to be necessary (animal health, water points, firebreaks, applied research, professional training), and also for more intensive livestock production enterprises, the economic and financial viability of which have been marginal up until now because of low cattle and meat prices.

III. GOVERNMENT ORGANIZATION AND ACTIVITIES

A. Ministry of Production. The Government of Mali has grouped within the Ministry of Production all operating organizations directly responsible for activities in the livestock sector. A simplified model of this organization is shown below:



Other agencies that may be involved in execution of livestock programs are the Service Hydraulique (water development) and the Department of Public Works within the Ministry of Public Works and Industrial Development, and the Mali Development Bank.

Three services of the Ministry of Production, the Livestock Service, OMBEVI and the Institute and Rural Economy are responsible for planning and executing livestock programs together with important participation by the Central Veterinary Laboratory and the Sotuba and Niono Research Stations.

Livestock Service. The Livestock Service is responsible for animal health programs nationwide and for supervision of local marketing. The GOM would like to expand the activities of local staff beyond that of providing necessary vaccinations to include control of parasitic disease, animal and perhaps human nutrition services and extension activities with producers. A "Service Pastoral" is planned which will take responsibility for extension of government livestock programs in specific regions. Staffing (including 30 veterinarians) is adequate for a purely epidemic disease control program but effectiveness is reduced by a shortage of funds for operating expenditures. As staff levels expand, the GOM plans to combine persons trained in veterinary service and animal husbandry into two-man local development teams.

OMBEVI. OMBEVI is a parastatal company with primary responsibility for cattle marketing development and is expanding into new kinds of cattle production activities with two objectives: (1) to increase producer incentives to produce and market cattle for meat, and (2) to introduce various schemes of intensive cattle feeding and production to expand meat production and serve as a model for modernization of the traditional sector. The company will be responsible for implementation of intensive cattle production operations within Mali. It is the parent organization for various Etablissement Public which will execute cattle production operations including feedlots and livestock credit to be provided by the Malian Development Bank.

Institute of Rural Economy. The Institute of Rural Economy is the planning and studies arm for all disciplines within the Ministry of Production. The Institute conducts project feasibility studies, evaluates work in progress, and is responsible for planning the development of new lands (areas of low population or with potential for irrigation).

Central Veterinary Laboratory. The Central Veterinary Laboratory (CVL) has very important functions in the support of livestock development functions in the support of livestock development programs as the source of vaccines and diagonosis of disease. Although physical laboratory

facilities are more than adequate, the CVL lacks certain equipment and facilities for holding animals required for testing of vaccines. It is expected that the activities of the center will be expanded to include tse-tse survey and fly control/eradication programs in the tse-tse zone. It has been proposed that the CVL might also be the implementing agency for "new lands" development projects following tse-tse eradication. It would also be the logical institution in Mali to develop links to the International Livestock Research Center for Animal Diseases (ILRAD) in Nairobi.

The Sotuba Research Station, located near the Central Veterinary Laboratory was formerly the principal livestock research station in French West Africa. Although a modest facility, it has the capacity for a considerable research program. It has also served as a post-graduate training center in animal husbandry and animal nutrition for graduates of the Katibugou Training School (see below) where facilities are insufficient. The GOM would like to upgrade the station by adding a full range of research, training and operational facilities. Either this center or the Niono Station could be developed as an outreach center in Mali for the International Livestock Research Center (ILCA) located in Addis Ababa.

The Niono Research Station is located north of Segou in the central Sahelian Zone. Its research programs includes studies of Sahelian range ecology, and the development of the zone's livestock industry.

An additional research center is located at Dilly in the western Sahel and is supported by UNDP. Personnel are investigating livestock herding practices in the vicinity of Dilly.

B. Education and Training

1. Formal Training. One of the development priorities of the GOM is the increase in the number of government service employees which are required for specific development activities and to improve their effectiveness by assuring that they are properly trained for these activities. A related priority is to increase the level of knowledge and skills of rural people through formal and informal education which will enable them to become more productive citizens.

The GOM educational system is described in some detail in the Mali education and manpower sector of the CWR DAP. Two schools that provide cadre for veterinary service and livestock development projects are discussed here.

The Rural Polytechnic Institute (IPR) at Katibougou (40 miles from Bamako) provides training to the "Ingenieur" degree at university level (4 years post baccalaureate) and is the main training facility for agricultural

technicians (a four-year program at the secondary level - post grade 9). Specializations offered in the university level program and the expected number of graduates in each subject in 1974/75, 1976/77 and 1978/79 are as follows:

Specialization	Projected Graduates 1974/75	1976/77	1978/79
Agriculture	29	36	42
Livestock	13	30	39
Veterinary	-	4	11
Water & Forests	12	11	12
Rural Engineering	-	-	12
	54	81	116

Similar specialities are offered in the technical training program. The school graduated 11 engineers and 17 technicians in livestock in 1974 but plans to increase the number of graduates in each program to 30 per year.

The IPR is also responsible for the "Ecole Infirmiere Veterinaire," a training center offering grade 6 graduates a three-year course leading to the rank of veterinary nurse. Candidates spend a fourth year of practical training at the Center de Specialization Zootechnique at Sotuba. The school graduates 25-30 veterinary nurses per year and expects to increase numbers graduated to 60 per year.

Assuming that financing is forthcoming for projected development projects, the GOM has estimated the manpower needs for the livestock sector to be 250 additional persons trained at the technician or veterinary nurse level and 100 at the engineer level during the next five-year period. The existing training institutions should provide roughly 80 percent of projected needs during this period. Although the educational program of the schools has not been reviewed, greater emphasis on applied subjects particularly animal husbandry, range management, economic subjects and sociology/extension would better equip graduates for projected activities.

In the short-run, there is a need to upgrade the training of existing staff in these subjects and to strengthen practical field training elements of the program. In addition, technical assistance personnel are required to provide the necessary mature expertise during the startup phase of most projects. Participant training at the graduate level in specialized subjects will be required for the indefinite future.

For the longer run, the GOM has requested AID assistance in organizing multi-donor financing of improvement of training facilities and faculties for training livestock cadre. AID should welcome this opportunity as a logical component of its program of assistance to the livestock sector.

While the emphasis on expanding the government cadre must be commended and effective numbers will be doubled in the next few years, it must be noted that this will add to the financial difficulties of the GOM and effectiveness is likely to remain low because of the insufficiency of recurrent operating budgets.

2. Informal Training

The GOM has initiated a number of imaginative programs of adult literacy, practical training for rural families, and community development with the objective of increasing the levels of skills and knowledge of rural citizens. These are being linked, whenever possible with integrated rural development projects. (See Education Sector Assessment.) Programs specifically for cotton, groundnut, rice and millet farming and for fishing areas have been initiated.

The segment of the population which has been least touched by formal or informal education is the migratory livestock producing family. Therefore, an experimental program directed at migratory producers as part of the Sahel development activity is planned. The target population is herder groups and those involved in livestock marketing. The objectives are:

1. To sensitize herder groups to the potential for use of information not now available to them and to advantages which may result from exchange of ideas;

2. To permit the GOM to adopt and accomplish a more favorable presence with the herders with a view to expanding its role in helping the herder to improve his opportunities for survival and for economic benefit;

3. To permit identification of the kinds of information which herders and traders would perceive as most useful and of the form in which it may best be used and to organize the collection and dissemination of information;

4. To make possible for GOM officials to obtain from herders their perception of the situation, needs and modalities for addressing them; and

5. To establish a continuous dialogue with a view to evaluating existing efforts and improving them and to organizing complementary activities.

A variety of tools are proposed. The key element will be the Service Pastoral of the Veterinary Services. Radio broadcasts, extension activities at cattle markets, places where families gather and vaccination camps and seminars for family leaders are planned. Selected individuals and leaders will be invited to visit training facilities to view demonstration plots, cattle, and the like. The Sotuba Station will be the center for both training and communications activities.

Establishing better lines of communications between livestock owning families and government is a key element of finding solutions to the complex physical, social and economic problems of the Sudan/Sahel Zone. As such, these activities deserve the support of donor agencies and are clearly compatible with AID's policy guidelines.

IV. DEVELOPMENT PROGRAM AND DONOR ASSISTANCE TO THE SECTOR

The Government of Mali. The Government of Mali is embarking upon an exceedingly ambitious program for the development of the livestock sector. This is the result of a growing awareness of the potential for expansion of the sector on the part of Malians and interest in this sector by donor groups.

It is difficult to obtain complete statistics on either government revenues or expenses attributable to the livestock sector, but as the general trend is well known an estimate can be made. Livestock probably contributes between 5 and 6 percent of direct government revenues and about one-third of total foreign exchange earnings. Government reinvestment in the livestock sector is probably between 1 and 2 percent of budget expenditures. This imbalance is typical of all the Sahelian countries, wherein productive sectors are under-supported to permit allocations to education, health, public works, military and other non-revenue producing ministries. In consequence, Mali has, by considerable effort, been able to organize a relatively well-trained and competent Livestock Service complemented by reasonably good research facilities at Sotuba and Niono and at the Central Veterinary Laboratory, but these organizations lack equipment and operating support. They have insufficient outreach, but their potential for quality service to the sector remains high.

Recently, IBRD officials estimated that total donor assistance to the livestock sector, measured by disbursements, was less than one million dollars during fiscal years 1971 to 1973. For the next three years, projects were of the order of $12.0 million (this figure does not take account of the AID medium-term program proposed nor the GOM/IBRD program in the Fifth Region (Mopti).

Considerable preparatory work on livestock activities has been done in Mali. Therefore a good study base exists and a number of active projects are now being put forward for financing.

It is difficult to project future government budgetary and human resource support for the sector. Donor contributions may be expected to take a quantum jump, at least for the near term. The manner in which the GOM plans to respond to the demands that this opportunity will bring forth is an important subject for discussion during consideration of additional programs.

Existing and Prospective Assistance from Donors.

1. A.I.D.

A.I.D.'s assistance to the livestock sector may be summarized as follows:

		FY 1974 (000s)
a.	Grant to Central Veterinary Lab.	250
b.	R&R For CVL supplies	200
c.	R&R in region of Kayes	750
d.	R&R for medicines for internal parasites and trypanosomiasis	180
e.	Mali Livestock I	3,400
	Total (excluding proposed programs)	4,780
f.	Mali Livestock II (proposed)	9,300

2. France

Apart from studies financed in 1970 (Yanfolila N'Dama breeding station) and 1971 (SEDES study of the Niger River floodplain (Fifth Region), FAC's assistancehas been for vaccines and medicines and related supplies (limited number of vehicles, refrigerators, freezers); the amounts may be summarized as follows:

1968-1972	$180,000
1973	-
1974	$ 95,000

Also undertaken in 1972 was a three-year animal nutrition and parasite treatment test study in the region of Dire-Goundam.

3. European Development Fund (FED)

The FED has been the only donor to subsidize loss of tax revenues on crop and livestock production because of drought. Grant contributions were of the order of $1.9 million in 1973 and $2.2 million in 1974.

FED also has supplied medicines, nutrition supplements and support equipment. The level was about $700,000 in 1974 of which perhaps $100,000 was for vaccines and medications.

The FED has financed the Yanfolila N'Dama production project, the object of which is to produce quality N'Dama cattle for work and reproduction and milk stock for mixed farming areas in southern Mali. FED's financing of agricultural production in the Fana area also provides for introduction of work animals and village milk herds. FED has also financed studies for two other major projects, the feedlot and ranch at Niono which is currently receiving serious consideration, and an integrated livestock development scheme for southern Mali for which FED financing does not appear likely in the immediate future.

4. International Bank for Reconstruction and Development (IBRD)

IBRD has studied for about two years a project to relieve the overgrazing condition in the Niger River floodplain.Since the floodplain is the major dry season forage resource in the central Sahel, it has been severely abused in the drought years, overgrazing being further encouraged by competitive land use for rice production. The principal obstacle to design of this project has been control of grazing around watering points. It now appears that this project will go forward with negotiation of an IDA loan of about $15 million.

IBRD financed activities for cotton and groundnut production could accurately be described as integrated rural development projects and make provision for introduction of work animals. A proposed integrated rural development project in the Upper Valley (southwest Mali) would include an important sedentary livestock component.

5. UNDP

UNDP has financed several small studies in Mali, but its principal activity is a technical assistance project providing OMBEVI, the meat marketing and commercial planning organization, with personnel to assist in planning operations and to conduct studies, training to form Malian replacements for these personnel. It is in the context of this assistance that the Dilly project was defined and an initial research effort was launched under UNDP's financing.

6. Federal Republic of Germany

The principal activity was an extensive deep well groundwater resource program in Mali's Sixth Region. The program now terminated had little success in developing permanent water sources in the area selected.

7. Canada

The Government of Canada is preparing to undertake a livestock feeding program involving forage production in the region of Kaarta (southwest Mali).

8. Arab Countries

Some drought assistance in the form of cash grants has taken place and some contracts have been let for direct export of refrigerated meat. Consideration has been given to reopening the slaughterhouse at Gao and building an airstrip for air shipping meat to Arab countries. The current amounts and prospects for future arab countries' aid to the sector are not easily ascertained, but this may become an important contribution in the future.

9. Comments

A few modest livestock projects have been financed. Certain important projects (Mopti, Niono, and the Upper Valley integrated scheme) have reasonable prospect of being financed in the near future. Other important projects remain to be finalized and accepted for financing (Mali south, Dilly and an intervention in the Fifth Region).

MALI
EDUCATION AND HUMAN RESOURCES

A. Introduction

The purpose of this section is twofold. First, it will present what is known about Mali's proposed expansion of middle and higher level training institutions over the next five years to meet anticipated manpower requirements during this period. This training capability will be an important factor in any program the U.S. undertakes in Mali. Second, this section will set forth an account of two promising institutional vehicles for rural education which may support planned and proposed AID projects in livestock and food production.

B. Background

It would appear strange that an educational system should have for its base at the Primary level, one of the more costly and inefficient systems in the CWR area, while exhibiting at its highest level an exemplary departure from the Regional norm: in the place of a multi-functional university, a series of practical Institutes which are guided in their intake and output by a manpower plan.

1. High Cost and Low Efficiency. The cost of formal education in Mali is very high in proportion to national resources and total government expenditures. In 1972, public expenditures to education and training amounted to 4.6% of GDP, while total public revenues were about 15% of GDP; the proportion of the government's budget spent in this sector was 32%. Moreover, the proportion of the increase of recurrent expenditures claimed by education and training was striking: a 15% increase per annum in the period 1967-1972, compared with an overall increase in government recurrent expenditures of only 4% per annum.

Despite this already high figure, real recurrent costs are disguised by two factors. First, these costs do not account for parents' contributions to operational expenses at the lower education levels. These payments average 0.5-3.0% of family monetary revenues per child in school. Secondly, the above cost figures do not include the salaries of expatriate teachers at the Secondary level, (58% of the teaching force). The Secondary level accounts for 12% of total public expenditures on education. Nor are expatriate salaries accounted for at the teacher training and higher education levels, which are largely expatriate staffed. These levels account for 6% and 7% respectively of total public expenditures on education.

The high costs of education in proportion to total government expenditures, moreover, are artifically low and will have to be raised. The very modest unit cost of primary education in Mali ($37 per year in

1973), and at all levels of the system, is largely due to the freezing of teacher salaries at 1962 levels (11 times GDP per capita). Teachers' salaries account for 92% of primary school recurrent costs in Mali. Thus a raise in teachers' salaries, which may not be indefinitely postponed, combined with the replacement of expatriate teachers by nationals which is proceeding apace, will make for a significant cost increase without extending in the least the reach of the school system.

While costs are high, the efficiency, relevance, and outreach of the formal education system are low. Enrollments at the lower primary school level (grades 1-6) were only 18% (1972) of the appropriate age group, among the lowest scholarization rates in Africa (along with Ethiopia (16%), Upper Volta (10%), and Somali (6%). This figure masked a considerable favoring of Bamako (29%) over the more rural centers (Gao 6%). Matters are made worse by the inefficiency factor: only 43% of the entrants at Grade 1 are still enrolled in Grade 6. Practically all of the 57% which drop out revert to illiteracy. The average child completing the six-year program takes 7-8 years to do so. The average repetition rate at this level is 30%.

Inefficiency was exacerbated, as usual, by the limited relevancy of the system. Excepting the 30 schools in the Sikasso area affected by the reform beginning in 1972 to "ruralize" primary education, the entire Primary system is geared to the preparation of the small minority who will continue to secondary school and beyond. Teaching at Primary level is thus performed in the French medium and is strongly oriented towards rote learning. Primary school second cycle (Grades 7-9) continues the theoretical training, and again inefficiency is high: over 25% of total enrollment at this level are repeaters. The drop-out from Primary first cycle, about two-thirds, is considerable but not extraordinary by regional standards. In 1971-72, some 8,916 students were enrolled in Grade 7, contrasted to the 22,393 pupils in Grade 6. At the Secondary level (grades 10-12), 4% of the corresponding age group attend school.

2. Education Planning. The other side of the education efficiency question, that of absorptive capacity, or outlets for the products of the school system, has received impressive attention in Mali. In November 1973, the GOM published a study of manpower needs for the 1974-78 plan period. Updating a previous study released in 1969, the 1973 manpower report not only attempted to take into account the effect of National Development Plan initiatives on employment, but also attempted to assess the need for trained (and untrained) manpower in public, para-statal, and private establishments, as a prologue to education planning.

The subsequent Education Plan, 1975-78, based in part upon the findings of the Manpower Study, was in the final stages of GOM clearance in November 1974. Barring last-minute changes at Cabinet level, the three guiding

resolutions of the Education Plan for the 1975-78 period are:

First, to hold Primary (first and second cycle) and general Secondary enrollments at current levels;

Second, to expand in varying degrees both secondary-level and higher technical training in the five University-level Institutes; and

Third, to extend functional literacy so as to triple the numbers of adults who can read, write, and count (from 70,000 to 200,000).

This last decision was in direct reaction to the high cost and minimal outreach for the formal school system.

While primary school enrollments might be held steady over the period, total primary school costs would be allowed to rise 7.6% per year on average, from MF 5,177 million (1973) to MF 7,476 million (1978). Of the youth trained to Grade 9 level, according to the Manpower Plan, 38% would be trained as technician helpers, 30% as administrative helpers, only 25% for rural development, and 7% for health. In 1974, however, the number of low-level trained rural workers which would be required (1974-78) was revised upward to 35% of the total, including 1,317 new agricultural "moniteurs."

Secondary school (general) enrollments would be held steady, and costs allowed to rise by an average 11% per year. But the Manpower forecast called for a higher proportion of middle-level administrators (37% of the total trained) and technicians (34% of total trained). By contrast, only 19% of the total middle-level manpower were to be in the health field and 10% in agriculture (revised in 1974 to 15%).

These middle level manpower recommendations were translated into the Education Plan (1974-1978) as follows:

Projected Costs of
Secondary Education (General, Technical, Professional)
(in millions of MF)

	Base 1973	1974	1975	1976	1977	1978	Annual Average Increase (1973-8)
General and Technical a/	662	747	799	853	973	1,124	11%
E.C.I.C.A. b/	111	119	161	199	227	269	19%
C.F.P. c/	86	100	119	142	163	188	17%
Administrative costs	18	18	19	20	21	22	5%
Total (rounded)	876	985	1,099	1,214	1,385	1,604	13%

a/ General secondary education is offered in 11 schools (4 private); technical education is provided by one institution, the Technical High School (Lycee Technique).

b/ E.C.I.C.A. is the Central Schoolfor Industry, Commerce, and Administration (four years).

c/ C.F.P. is the Center for Professional Training, which offers individual and commercial training (two years).

While the level of intake of successful primary school graduates (Grade 9) into the general and technical secondary school was projected to hold steady for the five-year period (advancing from 2,221 students in 1973 to 2,275 in 1978), recruitment into the professional and teacher-training institutions was planned to more than double (857 in 1973 to 1,865 in 1978).

If the policy were followed which is apparently favored by the GOM in the new (yet to be released) five-year plan, holding successful primary school second cycle graduates (Grade 9) to a gentle rise over the period (3,088 to 3,983), the number of holders of the Diploma d'Etudes Fondamentales (DEF) who would have no further opportunity for formal training would be negligible: rising from 10 in 1973 to only 157 by 1978. If the alternate strategy were followed, however, and the number of DEF holders were allowed to nearly double (from 3,088 in 1973 to 5,874 in 1978), the number of DEF holders without further schooling opportunity is projected to increase from 10 in 1973 to 1,734 in 1978. The fact that the expansionist

alternative has been worked out in considerable detail demonstrates the degree of interest which exists in some quarters of government for such a policy.

3. The Institutes of Higher Education. Eight percent of new personnel required by 1978 would be trained at the university level. The skills composition of this high level category, according to the 1973 Manpower Report, would be influenced primarily by the government's plans to build up industry and power facilities and to intensify exploitation of mineral resources. Thus only 20% of the total new high level manpower sought for 1978 would be trained for rural production (agriculture, livestock). This target was revised downward to 8% in 1974.

For the principal institutions of higher education, each offering four-year courses after the baccalaureate, projections (where available) over the new Plan period were as follows:

Institut Polytechnique Rural
(Ingenieur Degree)
Proposed Expansion of Enrollment
1972/3 - 1978/9

Numbers Recruited	Base 1972/3	1974/5	1975/6	1976/7	1977/8	1978/9
Agriculture	34	40	55	55	55	55
Livestock	15	40	50	50	50	55
Veterinary	-	-	4	4	12	12
Water and Forests	14	15	15	15	15	20
Rural Engineering	-	15	15	15	15	15
TOTAL	63	110	139	139	147	157
Numbers Graduated						
Agriculture	16	29	28	36	31	42
Livestock	6	13	12	30	31	39
Veterinary	-	-	-	4	4	11
Water and Forests	8	12	11	11	12	12
Rural Engineering	-	-	-	-	12	12
TOTAL	30	54	51	81	90	116
Total Enrollment (four years)	227	356	428	499	540	578
Malian Students ( )	(196)	(318)	(383)	(447)	(486)	(524)

The average annual rate of the expansion of enrollments for the four-year IPR/Ingenieur course, 1972/3-1978/9, is thus set at 18.9%. Of those entering the course, it was estimated that 82% would finish in the four years allotted.

Ecole National d'Administration
Proposed Expansion of Enrollment, 1972/3-1978/9

Numbers Recruited	Base 1972/3	1974/5	1975/6	1976/7	1977/8	1978/9	Average Annual Increase
Economics (incl. Mgt. and Statistics)	72	88	101	113	126	126	+11.8%
Administration	65	25	25	25	25	25	-21.1%
Justice	29	19	19	19	19	19	- 8.8%
TOTAL	166	132	145	157	170	170	+ 0.5%
Numbers Graduated							
Economics	24	39	56	44	70	80	
Administration	30	36	49	23	20	20	
Justice	15	26	24	21	15	15	
TOTAL	69	101	129	88	105	115	+ 8.8%
Total Enrollment (four years)	456	483	502	502	555	588	+ 4.0%

Despite the effort demonstrated above to accelerate training in economics, the number produced will fall short of the demand expressed in the 1974-8 Plan. Conversely, there will be a mild surplus of Malians trained at degree level in Justice and Administration. It was predicted that 80% of students entering the E.N.A. would successfully finish the four-year course on time.

Ecole Nationale d'Ingenieurs
Proposed Expansion of Enrollment, 1972/3 - 1978/9

Numbers Recruited	Base 1972/3	1974/5	1975/6	1976/7	1977/8	1978/9	Average Annual Increase
Construction/ Hydraulics*	29	42	45	51	51	57	
Electrical/Mechanical	25	30	30	35	41	46	

*The Hydraulic specialty was first offered in 1973, after a two-year common-core course with civil construction.

Numbers Recruited	Base 1972/3	1974/5	1975/6	1976/7	1977/8	1978/9	Average Annual Increase
Geological	7	13	13	18	23	23	
Topographical	5	13	13	15	15	18	
Non-Malians	12	12	15	15	15	15	
TOTAL	78	110	126	134	145	159	14.5%
Numbers Graduated							
Construction	10	11	15	13	25	25	
Hydraulics	-	5	5	5	8	10	
Electric/Mechanical	6	18	20	18	24	24	
Geological	3	7	6	8	10	10	
Topographical	4	7	5	8	10	10	
Non-Malians	2	11	9	8	9	13	
TOTAL	25	59	60	60	86	92	27.3%
Total Enrollment	217	310	349	405	466	513	16.5%
(Malians)	(180)	(270)	(307)	(357)	(414)	(459)	18.1%

The 27% increase in graduates from E.N.I. was in accord with the GOM's intention to expand the country's industrial and mineral base over the 1974-8 Plan period. Expansion plans, in fact, would absorb all of the graduates shown above, leaving very few for teaching at lower level institutions. The percentage of those expected to finish the course in the prescribed four-year period was 79%. The operating costs of E.N.I., borne by the GOM, were expected to more than double, from MF 96,365,000 (1972/3) to MF 216,444,000 (1978/9). In percent terms this rise is very close to the percent expansion in enrollment.

Enrollment projects for the two remaining four-year, post-secondary educational institutions (the Higher Teacher Training College and the National School of Medicine, Pharmacy, and Dentistry) were not at hand at the time of drafting. The School of Medicine, Pharmacy, and Dentistry, however, which began a four-year course for assistant doctors in 1969/70 (only the medical section) and which enrolled a total of 46 students in 1971/2, was planned to more than double its program costs from MF 31,011,000 per annum (1973) to MF 79,505,000 (1978), not including occasional expenses incurred by the presence of foreign students. The Higher Teacher Training College (Ecole Normale Superieure), oldest of the higher level four-year institutions in Mali (first graduating class in 1965) graduated 46 teachers in 1971; enrollments were expected to remain at approximately the same levels throughout the Plan period. The sixth and final post-secondary institution

in Mali, the National School of Post and Telecommunications (ENPT), offers a two-year program divided between general and technical services. ENPT graduated 19 students in 1971, its first graduating class.

The Malian strategy for manpower and formal training in the 1974-8 Plan period, then, countenances only a moderate increase in some technical areas, with a leveling off in general education. In such a way does the government of Mali honor the hard realities of, on the one hand, Mali's high cost of education as a percentage of public expenditure, and, on the other, the limited expansion of modern sector job opportunities anticipated within the Plan period.

C. Rural Education Programs

Mali's education institutions for rural development form a combination of schools and centers, both formal (secondary level) and non-formal (including adult functional literacy) directed by essentially two different Ministries at the center.* Working relations between these various institutions and programs appear to be good; and overlap in the functions which each is expected to perform appears minimal. The quality of the programs is, of course, uneven, even between different centers within the same service. For the sake of brevity, only the main programs will be summarized below. Two of these in particular, however, the Functional Literacy program and the Centers for Agricultural Apprentices, should be of special interest in the design and implementation of rural assistance initiatives.

1. The Rural Polytechnic Institute (IPR) at Katibougou (40 miles from Bamako) not only administers the rural "Ingenieur" degree at university level, covered above, but also operates the main training facility for agricultural technicians, a four-year course at the secondary level (post Grade 9). This Technician course is planned to expand from a total enrollment of 210 in 1970/1 to a 640 student enrollment level in 1978. The same four courses of study are offered at the secondary level as at the university level: agriculture, livestock, water and forests, rural engineering (in order of descending enrollment).

The IPR also is responsible for the Ecole Infirmiere Veterinaire at Bamako, a training center offering Grade 6 graduates a three-year course leading to the rank of veterinary technician. Candidates spend a final fourth year in a practical finishing course at the Center de Specialization Zootechnique (Sotuba).

2. Centres a Orientation Pratique. (Centers for Practical Orientation). Given the present context of Mali's primary schools, the function of the C.O.P.'s is to reorient primary school leavers (Grade 6) to the rural

*The Ministry of Secondary and Higher Education and Scientific Research administers the Rural Polytechnic Institute and Functional Literacy. The Ministry of Production, through the Institute of Rural Economy, administers the three Center programs.

environment. Enrollment levels are very modest. Eight COP's in 1972 offered a two-year practical agriculture course to a total of 140 students. With ILO assistance, however, in the construction of twelve new COP's, enrollments were expected to reach 1200 by 1975.

The COP program has not been satisfactory, however. Frustrated in their desire to continue in school, students' morale and inclination to learn have been low. Owing primarily to the small size of the Centers, costs have been high ($300 unit cost, contrasted to $132 unit cost in Grades 7-9). Various observers have concluded that the COP's may not become fully effective until the primary school system is reformed--and then COP's may not be required. Those persons responsible for setting up Senegal's Middle-level Practical Training Program (EMP) for primary school leavers (as well as for the unschooled) would do well to study the Mali COP experiment carefully.

3. Rural Development Centers (Centres d'Animation Rurale). The function of the CAR's is to prepare unschooled and illiterate youth in the 18-21 age category to become model farmers. Training, which last two years, involves agricultural themes and techniques, including the care of livestock and the use of simple farm equipment. Paramilitary drill and civics instruction set the tone of CAR training.

FED helped to initiate the CAR program in 1962 and to develop it thereafter. At one time, before the change of government in Mali in 1968, 104 centers were in operation. For economy reasons (unit costs of CAR training now average $200), this number has been reduced by half, but even these 52 centers have suffered in recent years from inadequate staff, materials, and operating funds. Enrollments in 1972 totalled 900 students. The government was preparing a request to UNDP/ILO in November 1974 for assistance in opening 40 additional centers by 1978.

The CAR program has suffered considerable follow-up problems. Where graduates have received a $200 loan from the national rural credit society (SCAER), as intended, many have failed to repay within the five years allowed. Where graduates have not received the loan (and sometimes even when they have), graduates have been unable to procure the materials required to make full use of their training. Some 20,000 youth to date have passed through the CAR system.

4. Centers for Agricultural Apprentices (Centres d'Apprentissage Agricole). The primary function of the CAA program is the training of Mali's agricultural extension advisors, the grass roots level of Mali's agriculture service. The secondary function of the program is to train candidates who, with some further orientation, become instructors for the COP's and CAR's (above).

CAA's recruit trainees between 17-20 years old who have completed between six and nine years of primary education. The CAA's offer a three-year course, comprised of two years technical training (crops, livestock, etc.) plus one year of supervised application in Centers of Specialization, or in government services.

There are currently three CAA centers: at Same (near Kayes), at Samanko (12 miles from Bamako), and at M'Pesoba (south of Segou). Until recently, each center has recruited an average of thirty new trainees per year; in 1974, intake increased to an average of 35 per center. The CAA program offers a mix of theory (25%) and practice (50%), plus additional work in primary school subjects (25%): French, mathematics, physics and chemistry.

After the second year of CAA training, candidates are sent for one year to one of four Centers of Specialization (Centres Specialises):

-- The Rice Center, specializing in rice cultivation at Dioro (on the Niger River, north of Segou);

-- The Agriculture Center, devoted to the application of extension methods in agriculture, especially vegetable gardening at Baguineda (Haute-Vallee);

-- The Forestry Center, for the training of personnel for the Department of Water and Forests, at Tabakoro (east of Bamako);

-- The Livestock Center, at Sotuba (near Bamako), which "finishes" graduates of the Ecole Infirmiers Veterinaire in modern methods of husbandry.

CAA graduates up to the present time have all been trained for government employment, principally the agricultural service. The extension division of Agriculture uses CAA-trained agents in the "operations": cotton, groundnuts, Haute Vallee, Mopti (rice), Mopti (millet), Segou-Sikasso (rice), and Kaarta (millet). The regional services division employs agricultural monitors at the levels of the secteurs de base (grouping 5-10 villages) and the zones d'expansion rurale (arrondissement). The Water and Forests division employs monitors who have attended the forestry Center of Specialization at Tabakoro and uses them in all Water and Forests programs: surveillance, planting, improvements and fishing.

CAA graduates are also employed as research assistants, for the Institut d'Economie Rurale, OMVS, IRAT, tobacco and fruit research. Some CAA graduates join the Office du Niger for work in rice and sugar production. In addition, as mentioned before, CAA graduates may become instructors at the Orientation Centers (COP) or Development Centers (CAR).

In the future, more CAA graduates are expected to be employed by the cooperatives and the parastatal agricultural producer organizations (e.g., OPAM, SOCOMA). Minimum future needs for CAA graduates are projected as follows:

Projected Requirement for Agricultural Monitors

Areas of Specialization	Needs 1973-74 Average Annual	Needs 1978-85 Average Annual
Agriculture	190	294
Livestock	31	62
Water and Forests	55	51
Total Monitors	276	407

Contrasted to the above minimum requirements, present output from the CAA's (and from the Centers of Specialization) is 90 per year, or thirty per center. The GOM, therefore, assisted by the local ILO/UNDP office (which began development of CAA's in 1965), is planning the expansion of the CAA plant to allow for a greatly increased production of monitors, improved instruction, and lower unit costs ($708 in 1972, compared with only $666 at IPR). The expansion program proposed in June 1974 was the following for CAA centers:

1.	To build a new CAA at Sofara, in the Mopti region, for 160 place capacity	--MF 339,600,000
2.	To expand the present CAA at M'Pesoba, from 60 to 160 capacity	--MF 232,100,000
3.	To enlarge the existing CAA at Samanko from 60 to 160 capacity, plus provision for short courses, etc.	--MF 251,500,000
4.	To rebuild and enlarge the dilapidated CAA at Same, from 60 to 160 capacity	--MF 284,600,000
	Total CAA Centers	MF 1,107,800,000

In proposing this program, a deliberate choice was made to retain the existing CAA centers, rather than to fold them into a single large establishment. This decision was made in order to preserve the more direct contact with rural living and working conditions which would be dissipated in a single grand center. Each CAA would be staffed by 13 faculty instead of eight at present. Increase of both staff and students, as planned,

will result in a 1:12.5 staff to student ratio (compared to the 1:7.5 ratio which holds at present).

Future CAA staff, as at present, will be drawn from the IPR/Technician graduates, who receive additional pedogogical training and supervised practical application. Future faculty may also be recruited from the ranks of former CAA students, with longer practical experience and added training. In fact, most CAA instructors trained to the present time have also received out-of-country training on ILO scholarships. According to the local ILO representative in Bamako, ample staff now exist or will exist to allow for the proposed expansion. But until funding is found, no progress can be made.

Linked directly to the same CAA expansion package, one Center of Specialization is scheduled to be expanded and reconditioned:

The Forestry Center at Tabakoro	-- MF 50,510,210

It is intended under the present plan that two more Centers of Specialization will be constructed:

1. One Center of Specialization at Baguineda (the present center is cramped into temporary quarters)	-- MF 83,110,210
2. One School of Veterinary Agents at Bamako (the present center is lodged in buildings for the livestock service) for 160 trainees	-- MF 122,112,600
Total for Centers of Specialization	MF 255,733,020

Thus, the Grand Total for the construction, rehabilitation, and furnishing of CAA Centers and Centers of Specialization comes to MF 1,363,544,020 or $2,964,202 at current rates of exchange.

5. Functional Literacy. The third major resolution of the Mali Education Plan (1974-8), as noted above, is to extend literacy training in indigenous languages to 200,000 adults. This marks a 300% increase over the total number of adults trained since the beginning of the functional literacy program in 1968. By 1974, therefore, the Mali government had come down decisively in favor of functional literacy as an important element of its total education program.

There were three sound reasons for giving functional literacy this special emphasis. First, the government itself was satisfied, on the basis of functional literacy work done in Mali since 1968, that literacy is cost effective, i.e., that for the cost of the training (below), it does make producers more receptive to new techniques and better able to apply them. To test the validity of this view, the IBRD is financing in 1975 an evaluation of functional literacy. FAC has recently completed an evaluation, which was reported favorable, but copies of this report have not been distributed by FAC.

Second, almost by definition, the lack of job opportunities for persons completing functional literacy training was not a constraint, since Mali offers this training only to producers (15-35 years old) in close association with production programs.

Third, costs of the functional literacy training were comparatively low. According to National Planning Office estimates, the average unit cost for literacy training (1974-8) will be $16.00 per year. This cost compares favorably with the projected average unit costs (1974-78) for primary education (first cycle)--$41 per year--and primary education (second cycle)--$133 per year. The costs of greatly extending literacy under the Plan would be tolerable for another reason as well. The government of Mali announced its intention of requesting all foreign donors to include the costs of functional literacy training as an integral part of any agriculture production program which they undertake.

A general literacy program has existed in Mali since 1961, helped in the early days (1962) by an AID grant for audio-visual equipment and training. The selective Functional Literacy program, however, has grown up since 1968 (with help from UNESCO, FAC, FED) in close association with Mali's area and product-specific agricultural "operations."

The purpose of the Functional Literacy program is, through training in arithmetic, in reading and writing, to enlarge the comprehension of the rural producer, hence to increase his openness towards innovation, thus to facilitate the adoption and consolidation of improved rural practices. In addition to this concentration on productive practices, however, reading, writing, and calculation are also considered means to more deeply impress upon adults various useful ideas for the improvement of rural life generally: in health, hygiene, and in new and more complex ways of combining socially and economically.

By June, 1974, the Functional Literacy program in Mali enrolled some 38,546 adults (15-35 years old) in operational training programs linked to crop production programs. Classes average one hour per night, three to five nights per week, for two phases of six months each. Attached is a

chart presenting a statistical picture of Functional Literacy in June, 1974, including the principal production programs and the regional and zonal organization of the Functional Literacy service.

At the center, under the purview of the Ministry of Secondary and Higher Education, the National Director of Functional Literacy is made up of two departments:

(i) an administrative division which prepares, establishes, and evaluates functional literacy programs in close cooperation with the agricultural "operations," and with commercial and industrial enterprises; and

(ii) a production division which prepares and distributes teaching materials, including radio transmissions (currently 15 minutes per day).

The comparatively low per unit cost of Functional Literacy is possible, of course, because the majority of the 2,500 "animateurs" responsible for conducting literary classes in Mali are volunteers. Those who are not volunteers are already employees of the "operations" (e.g., Operation Groundnuts) and offer literacy training as an indispensable part of their normal extension activities. A small number are social workers and rural trainers.

The volunteer instructors are chosen by the local village literacy committee in conjunction with the Chief of the local literacy Zone. The volunteers are fellow-villagers who are literate by virtue of formal schooling, or thanks to a previous program in functional literacy. Their additional training as literacy instructors includes only:

(i) Five days of instruction on teaching techniques, including the use of various teaching aids (booklets, radio, taperecorder, posters);

(ii) Refresher courses of two or three days held, in principle, every three months; and

(iii) Radio transmissions five days per week on techniques of literacy education.

The individual instructor (or two) in his "center" (a meeting place with perhaps a shed to store materials) is supported by a village literacy committee, as well as by the literacy zone and regional heads, full-time literacy service professionals who provide materials and help plan and coordinate the literacy programs with the agricultural "operations" in the area concerned. From Bamako, the Literacy Production Center supplies

materials (worth about $80 per center), which are designed as nearly as possible by language. (Bambara, Peul, Songoy, and Tamashek) and crop-culture to meet the needs of the area in which the individual course is held. Also in Bamako, a research section of the National Institute of Functional Literacy and Applied Languages (July, 1973) performs language research in collaboration with the National Pedagogical Institute (which is charged primarily with the reform of primary education). The Institute produces a publication, the journal Kibaru, as part of the (inadequate) follow-up effort with new literates. The lack of adequate printed materials in the local languages is, perhaps, the most serious shortcoming of the literacy program.

After six years, the Functional Literacy program in Mali had trained, by official estimates, nearly 70,000 producers of cotton, rice and groundnuts, distributed over five regions, 18 cercles, and 81 arrondissements. It is estimated that 5/7 of those trained remained literate.

In expanding the program over the new Five Year Plan period (1974-8) to enroll 200,000 producers, both in areas already affected by the program and in some 52 new zones, the government plans to concentrate on the areas of:

(a) Operation Rice of Mopti
(b) Operation Haute Vallee
(c) Operation Fish of Mopti

The government's aim is to assure that at least one active member of each rural family is literate. As part of this proposed expansion, Directors of Functional Literacy hope to experiment with nomadic herder programs.

Funds are clearly lacking to effect this expansion, including the badly needed refurbishing of the National Center; staff training; technical and audio-visual equipment and transport; printing equipment and short-term technical assistance in care of printing equipment. Several donors, including IBRD, require that an evaluation of the program be completed prior to making long-term grants. In the short-term, however, the IBRD agreed to cover the 1973-5 costs of establishing 720 new centers under the Groundnut Operation, pending results of a Bank-financed evaluation. FED has assured financing for the literacy program for the fourth and fifth years of the program associated with the Segou Rice Operation (1973-78).

D. Conclusions and Recommendations

1. The primary education system in Mali constitutes a major national impairment, given the system's unusually high cost and low efficiency.

Within the past two years, the government of Mali has initiated an experimental reform involving thirty primary schools in the Sikasso area.

This reform is supervised by the National Pedagogical Institute (NPI), directed by a U.S.-trained Mali national. At the same time, the World Bank is funding a study of other low-cost alternatives to primary education, alternatives which may have applications not only in Mali but in other countries in the CWR area as well.

It is recommended that the U.S. keep in close touch over the next 12-24 months with the NPI in Bamako and with the IBRD in Washington concerning the results of the Sikasso reform and the low-cost alternatives study. Based upon an evaluation of these activities, the U.S. should give serious consideration to contributing towards the wider implementation of one or more of these low-cost alternatives, beginning in FY 1977 or FY 1978 if these proposed reforms could lead to very substantial improvements in the Malian system.

2. While leaving room for improvement, Mali's efforts to order the higher education system in accordance with five year projections of national manpower requirements deserve encouragement and support.

It is recommended that the U.S. study ways to offer training and short-term assistance as required to further enhance Malian skills (a) in the preparation of manpower plans for specific purposes, as well as (b) in the preparation of costed education plans which serve to translate manpower requirements into apppropriate education and training programs. The U.S. should consider providing these kinds of training to planning personnel in each of the Ministries associated with U.S. assistance programs (e.g., Health, Transport, Agriculture), as well as to personnel in the Education and Planning Ministries proper.

3. Mali's system of education for rural development appears to have avoided much of the institutional overlap and competition displayed in other countries.in the CWR area. For intensive rural training at low levels, the CAA (Centres d'Apprentissage Agricole) program is Mali's most effective; for extensive training, Mali's Functional Literacy program is said by outside observers to be perhaps the most successful in the CWR region. Both programs are seeking assistance to renovate and expand their services.

It is recommended that the U.S. assist both the CAA and Functional Literacy efforts which may have association with U.S.-supported projects in Mali. Following the submission of the evaluation financed by IBRD, the U.S. should consider special capital and technical assistance to the National Center of Functional Literacy, including help in the expanded use of radio broadcasting.

For the present, however, the U.S. should explore ways to alleviate, out of existing programs, pressing needs of the National Center which may not continue unattended without seriously compromising the effectiveness of current Functional Literacy programs.

Functional Literacy (F.L. Centers in Operation, June 30, 1974)*

*Numbers in operation, as contrasted to centers existing on paper only

Mali Admin Region	F.L. Regions (total centers)	No. F.L. Zones in Region	Cercles	So. Et.	Cotton 1 ph	Cotton 2 ph	Peanuts 1 ph	Peanuts 2 ph	Office du Niger 1 ph	Rice Bambara 1 ph	Rice Bambara 2 ph	Rice Peul	W	Perm. Edu (1)	Total Number Centers	F.L. Animators	Participants M	Participants W	Participants Total
Kayes	Kita (303)	10	Kita				127	52					9		188	256	3395	228	3623
			Bafulabe				40	42					8	7	97	148	1450	149	1599
			Kenieba				11	7							18	23	314		314
	Koulikoro (218)	9	Koulikoro				36	6					2		44	44	886	27	913
			Banamba				22	3							25	25	513		513
			Kolokani				88	10					4		102	116	2037	75	2112
			Bamako West				33	12					2		47	49	869	35	904
Bamako	Bamako (55)	3	Bamako	2	51								2		55	127	2316	46	2362
	Dioila (214)	6	Dioila		200	14									214	302	5558	35	5593
Sikasso	Koutiala (324)	14	Koutiala		88	29									117	159	928	10	938
			Yorosso		36	6									42	51	337	27	364
			Kadiolo		32										32	45	317		317
			Sikasso		92	41									133	168	1507	44	1551
Ségou	Ségou (493)	21	Ségou		68	18				42			5		133	198	4507	179	4686
			Niono						130				2		132	262	4799	113	4912
			Macina						59				2		61	136	1945	60	2005
			San		80	35				25					140	196	4054	30	4084
			Tominian		21	6									27	44	800		800
Mopti	Mopti (40)	2	Mopti								8	32			40	77	956		956
TOTAL	7 (1647)	65		2	668	149	357	132	189	67	8	32	36	7	1647	2426	37488	1058	38546

(1) Permanent Education: Centers having terminated the two phases of their program.

MALI

HEALTH SECTOR ASSESSMENT

Major Disease Problems in Mali

Stated succinctly, the major disease problems adversely affecting the health of the Malian population are the communicable diseases and nutritional deficiencies. Because of the weaknesses of the existing reporting system, morbidity and mortality data are not accurate quantitative measures. However, they do provide a general notion of the major disease problems which over the years has been confirmed in the case of selected diseases by specific surveys. It must be pointed out that the weaknesses of the disease surveillance and reporting system in Mali are common to many countries of the world, the United States included. Within Mali, there are regional variations in the incidence of various communicable diseases, particularly the vector borne diseases.

The following is a brief description of some of the major disease problems in Mali.

1. The Vector-Born Diseases

a. Onchocerciasis

The incidence of Onchocerciasis is extremely high around the headwaters of the Bafing, the Bakoye and the Faleme rivers in western Mali and around the watershed of the Bani River in south central and south eastern Mali. A smaller focus is found on the Bandiagara Plateau around the Yame River and its affluents. The disease is also common around affluents of the Niger near the city of Bamako and around certain stretches of the Niger itself. Surveys of specific geographic areas in Mali have demonstrated infection rates of higher than 80 percent of the population. Because untreated onchocerciasis results in a high rate of blindness, it inflicts a severe form of morbidity which greatly incapacitates the adult population in endemic areas and renders them economically and socially dependent.

b. Malaria

Malaria is widespread in most of Mali and indeed there is virtually no area of the country which could be viewed as being free of the disease. The disease occurs year round but incidence rates rise during the wet months of th year (July-November) when mosquito populations increase. The disease exerts its greatest adverse effects on the

health of young children who because of a lack of specific antibodies are more susceptible to suffer severe attacks. Although specific hard data are lacking, it is known to medical practitioners that the disease inflicts a high mortality among infants and small children.

c. Trypanosomiasis

Although human trypanosomiasis was once very widespread below 14 degrees north latitude, it is now only found in a few isolated areas of Mali. The principal vectors in Mali are Glossina palpalis which is a riverine fly and Glossina morsitans which is a tsetse fly which inhabits open savannah. Until recently, the major foci of trypanosomiasis were the Dioila Cercle in south central Mali and the Bamako Cercle in central Mali. In 1972, an outbreak of the disease occurred in the arrondissement of Oulessebougou, which lies along the main paved road going south of Bamako. This outbreak has now been brought under control. It demonstrated the ability of the disease to break out in areas previously free. The presence of potential tsetse vectors throughout many areas of western, central and southern Mali poses a serious threat.

Unfortunately, the geographic distribution of tsetse species has been poorly plotted in Mali and for some areas is unknown. Breeding areas constitute roughly ten percent of fly belt zones in Mali which renders fly control easier than in forest zones.

On November 19 Dr. Imperato flew in a six seater Beachcraft plane with Dr. Maclennan, Mr. James Graham and Mr. Wanou Sylla of the Tsetse Control Service over the Niger River from the Guinea-Mali frontier to Nyamina (some 300 miles) and west of Bamako to Negala and down over the Manding Hills. In sum, numerous suitable tsetse breeding sites were identified along the river and its affluents. Of great concern to Dr. Maclennan is the development of mango tree plantations along many stretches of the river and particularly around Bamako and the town of Koulikoro. These young mango trees are potentially ideal breeding sites for tsetse.

To the west of Bamako there is a large tract of dense mature forest which lies in a triangle Kati-Negala-Siby. Glossina morsitans are found in large numbers in this triangle as well as Glossina polpalis. This reas is ecologically contiguous with areas of the Niger River some hundred miles downstream because of the Dalama River which flows out of it and parallel to the Niger before joining it. This observation illustrates that tsetse control to the east of Bamako would be unsuccessful because of re-infestation down the Dalama from those areas west of Bamako.

Although trypanosomiasis has been under control in Mali for many years, the presence of suitable vectors and reservoirs of parasites pose the constant threat of fresh outbreaks.

d. Yellow Fever

Yellow fever was once widespread in Mali prior to the availability of vaccines. In 1969 an outbreak occurred in western Mali in the arrondissement of Negela, some fifty miles west of Bamako. Cases were also diagnosed in contiguous areas in the arrondissement of Kati and farther to the west in the cercle of Kayes. The widespread use of yellow fever vaccines during previous mass immunization programs had resulted in a high level of herd immunity and this coupled with the immunization of susceptibles prevented a large-scale epidemic. The presence of suitable vectors (Aedes sp.) in many areas of the Malian savannah and of reservoirs of virus (primarily monkeys) constitutes a potential hazard. Fortunately, the availability of yellow fever vaccines provides a means of controlling outbreaks. The Dakar strain vaccine, widely used in Mali, is not suitable for children below ten years of age because of the high risk of post-vaccination encephalitis. And the Rockerfeller 17D strain vaccine, which is suitable for this age group, is extremely heat lable and not well suited for use where ambient temperatures are high.

2. Other Vector Borne Diseases

Within Mali there are several vector borne diseases such as cutaneous leishmaniasis, Bancroftian filariasis scrub-typhus, loa loa and arborvirus infections which do not cause significant morbidity for the population as a whole. Cutaneous leishmaniasis is common in the Sahel, particularly in Nioro and Timbuctu and Bancroftian filariasis in the cercles of Macina and Bougouni.

3. Non-Vector Borne Diseases

a. Dracunculiasis

Dracunculiasis or Guinea worm infection is common in those areas of Mali where surface pond water is drunk. Such ponds are formed during the rainy season in depressions created at the edges of villages and within villages by the constant excavation of soil for building and repairing houses. While precise data are lacking, it has been one observation that the disease is common in the Seno ("high place" in Fulfulde), that area to the southeast of the Bandiagara escarpment in the cercles of Koro and Bankass. It is also commonly seen in central and south central Mali. Untreated infections can be very disabling since adult worms often evoke consideration edema and impairment of joint motion in the ankle. The indigenous treatment of this infection has been to gradually wind the emerging worm around a piece of stick.

Often the worm is broken in the process, extravasating its body contents into the surrounding soft tissues. This causes a severe local reaction and tissue destruction which may incapacitate an individual for several months.

b. Intestinal Protozoa

Intestinal protozoal infections are extremely common in Mali, particularly amebiasis and giardiasis. Many cases are subclinical. The existing levels of environmental and personal hygiene facilitate transmission. It is difficult to quantify the magnitude of the incidence of these protozoal infections because of failure in diagnosis and reporting and the existence of subclinical infections.

c. Intestinal Helminths

Intestinal helminthic infections are also common in Mali, particularly ascariasis, taeniasis and hookworm infections. Many infections are asymptomatic because of light worm burdens. As with the intestinal protozoal infections, existing level of personal and environmental hygiene facilitate transmission.

d. Schistosomiasis

Schistosomiasis is a serious problem throughout the riverine areas of Mali. Both Schistosoma hematobium and Shistosoma mansoni occur. Riverine populations are more severely affected because of their exposure to the parasite in fresh water streams and rivers. Heavy infections occur among groups such as the Bozo and Somono fishermen of the inland delta of the Niger who have intense and prolonged contact with infected waters. Riverine agriculturists, including the Bambara, Dogon and Songhoi, while exposed to infected waters, do not suffer from heavy infections as do the fishermen.

The incidence of schistosomiasis in Mali is not accurately known. A few studies are presently underway, the major one being that along the Bafing River in western Mali. However, clinicians have long observed the disease throughout most of Mali.

e. Weanling Diarrhea and Other Diarrhea

Diarrheal syndromes are especially common among young children and often carry a high mortality. Poor levels of hygiene create a favorable environment for the spread of these infections. Their geographic distribution within Mali is general.

f. Other Gastro-Intestinal Infections

Typhoid fever is widespread in Mali, and has been a serious problem in the town of Mopti which because of its dense population, poor hygienic levels, geographic location in the flood

plains and swamps of the inland delta is an especially suitable environment for transmission. The true incidence of the disease is not known. Similarly, paratyphoid fever is also common.

The situation with regards to cholera is better known. Following the severe epidemic of 1970-71, the disease has occurred in scattered foci in the central and eastern areas of the country, particularly in the drier areas. At present cholera does not constitute a serious problem. However, the long-term epidemiology of the disease in Mali and other west African states is not known and consequently it is not possible to say at this time what the future pattern of the disease will be.

g. Measles

Measles has been often described as the most serious disease of childhood in Mali because of its high mortality among children below two years of age. While the Measles Control Program succeeded in controlling the disease in urban area, rural control has remained elusive for a variety of reasons. As a result, measles epidemics continue to occur in Mali among non-immunized populations. The heat lability of the vaccine and the inadequacies of the cold-chain have resulted in many vaccination failures. Unless susceptible rural and urban populations are vaccinated regularly, epidemics will continue to occur because of a build up of pools of susceptibles.

h. Other Infections of Childhood

Whooping cough, tetanus, diphtheria, chickenpox and poliomyelitis are significant problems throughout Mali. Morbidity and mortality data are inherently inadequate but indicate a widespread geographic incidence.

i. Venereal Diseases

Both syphilis and gonorrhea are common infections, the former being a major endemic problem among Sahelian populations.

j. Trachoma and Other Conjunctival Infections

Trachoma is common in the Sahel and in the norther savannah. Conjunctival infections are likewise common among the Sahelian population.

The above review of disease states is by no means complete. But it does indicate the breadth of pathology present in Mali.

4. Nutritional Deficiencies and Metabolic Diseases

Protein malnutrition, protein-calorie malnutrition and the avitaminoses are the principal nutritional problems encountered. These states are usually found among young children, particularly those around two years of age who have been recently weaned. Many children are in a state of marginal nutrition, even in towns and cities because of the quality of food consumed. Protein malnutrition (Kwashiorkor) and protein-calorie malnutrition have a seasonal incidence in Mali, being highest when food supplies dwindle (June-October).

A number of nutrition surveys have been conducted in Mali, beginning in the late 1940s. The major surveys have been conducted in south central Mali (Bougouni Cercle, Bamako Cercle), in the inland delta of the Niger and in the Office du Niger in the cercles of Niono and Segou. More recently, surveys have been carried out by Dr. Pele of O.R.A.N.A. among Sahelian population groups. The Center for Disease Control conducted two brief surveys in the same area in 1973 and 1974.

Even though kwashiorkor does occur in Mali it is striking that it rarely occurs in the severe forms often encountered in other parts of Africa. According to Dr. Benitieni Fofana, the former Director of the Nutrition Section, MOH, the disease is no longer common in Mali because of the wise availability of fish and meat proteins. Those cases which do occur, he says, are generally mild and easily treated.

Severe protein-calorie malnutrition occurred throughout the Sahel during the recent drought. At the present time, however, nutritional levels in the Malian Sahel are excellent due to the availability of both imported food supplies and the excellence of the local crops of both domestic and wild cereals.

In brief then, while protein deficiency syndromes do occur in Mali, the usual pattern is that of sporadic cases.

Clinically overt vitamin deficiency syndromes do occur, but again as sporadic cases and on a seasonal basis reflecting food supplies.

Endemic goitre due to iodine deficiency has been studied in several areas of Mali. Those regions known to be endemic include the Onassolou (cercles of Yanfoilla and Kolondieba), the Seno (Cercles of Bankan and Koro) and the area around the city of Bamako.

Diabetes mellitus is not uncommon, the prevalence varying from one geographic area to another. During a recent survey conducted in the city of Bamako, the rural area in Sanankoroba (33 kms south of Bamako) and in the Mopti Cercle, it was found the prevalence rates were highest among those whose diets and total caloric intakes were richer. The disease is recognized by indigenous populations and traditional herbal preparations have long been used in treatment.

The Health Services Infrastructure

The health services of Mali are administratively decentralized, to the level of the country's six regions. The effectiveness of this decentralization is impeded by the lack of qualified health administrators. Within each region, administrative responsibility is further decentralized down to the level of the cercle of which there are forty-two. Each region is headed by a Regional Director of Health, all of whom are physicians at present. The cercles' medical services are administered by a medecine-chef who reports to the Regional Director of Public Health. At the present time fewer than two-thirds of the forty-two cercles possess medecin-chefs who are physicians. At the level of the arrondissements into which the cercles are divided, there are rural dispensaries staffed by a variety of para-medical personnel and supervised by the medecin-chiefs of the cercles. There are 228 arrondissements in Mali. Each arrondissement has at least one dispensary and often times several. There are also maternities at the arrondissement level.

1. Functions of the Minister and his Cabinet

   a. Legislation

   b. Planning

   c. Periodic review of field services

   d. External relations with international organizations

   e. Supervision of the Health Council, called periodically to examine the health of state employees

   f. Administration of the medical school and the secondary school of public health

   g. Supervision of the Pharmacie Populaire

2. Functions of the Director General of Public Health

   a. Execution of plans, programs and projects

   b. Technical and administrative control and supervision of medical-sanitary units of the ministry

   c. Enforcement of public health laws

   d. Preparation and diffusion of public health laws and technical operating procedures

e. Coordination of medical activities

f. Licensing of medical and para-medical workers

g. Collaboration with other national services

h. Preparation of health statistics

3. Functions of Regional Directors of Public Health

a. Technical advisor to the regional government

b. Technical and administrative supervision of all medical and sanitary units within the region

c. Enforcement of public health laws

d. Compilation of regional health statistics

4. Functions of Medecin Chefs of the Cercles

a. Medical care

b. Environmental health

c. Socio-preventive medical activities

5. Functions of the Service de lutte Contre les Maladies Transmissibles (Former Grandes Endemies)

This service carries out control programs aimed primarily at trypanosomiasis, onchocerciosis, leprosy, meningitis and the treponematoses. Vaccination campaigns against measles, smallpox and tuberculosis are also implemented within the service.

The service is divided into eleven sectors and two centers. In principle each center should be directed by a physician, but in reality all are presently directed by infirmiers under the supervision of the medecin chief of the cercle in which the sector is headquartered.

6. Hospital and Medical Units

a. Hospitals

There are a total of ten hospitals in Mali with 2,127 beds. There are two national hospitals, Point G and Kati and six regional hospitals.

The Gabriel Toure Hospital in Bamako is considered a regional hospital. There are two secondary hospitals at Nioro and Markala.

b. Centre de Sante

There are 42 centers in each of the cercles. Each center is in theory composed of a dispensary, a hospitalization unit with twenty beds, a maternity and a PMI with twenty beds, a hygiene service, and a center of the grandes endemies.

c. Arrondissement Centers

The arrondissement centers consist of a dispensary, a room for inpatient observation prior to evacuation, a rural maternity of 6 to 8 beds and a leprosy control unit.

d. Maternities

There are some 140 maternities in Mali with a total of 1,129 obstetrical beds. There are 7 hospital maternities, 61 regional maternities, 64 rural maternities and 8 private maternities. Within the last year 80 new rural maternities have been built in the Region of Sikasso and 76 in Bamako under a UNICEF program.

e. Dispensaries

There are a total of 395 dispensaries of which 38 are in towns, 310 in rural areas, 34 private and 13 operated by various state societies. The ministry's plans call for the construction of approximately 50 rural dispensaries per year.

f. Dental Facilities

There are 13 dental chairs in the country of which 3 are private. Because of a lack of personnel, many are non-functional.

g. Pharmacy Facilities

The Pharmacie d'Approvisioment is responsible for supplying all of the units with drugs and medical supplies. The Pharmacie Populaire has 5 offices and 122 depots where drugs are sold.

7. Training Facilities

There is now in Bamako an Ecole Superieure de Medecine, de Pharmacie et de Dentisterie which opened in 1972. It is projected that within 5 years a total of 50 physicians will be graduated per year. The diplomas granted by the school will be considered the equivalent received in France.

An Ecole Secondaire de la Sante has been in operation since 1963 and trains Infirmiers d'Etat, midwives, Sanitary Technicians and Laboratory Technicians. Within recent years there have been more applicants than available places at the school. While the official level for entry into the Infirmier d'Etat course is nine years of schooling, the school is now receiving applicants who have had ten and twelve years of education. The duration of the study course for all categories is three years.

There is in addition to these schools a school for infirmiers at Point G Hospital which admits students after six years of primary study. Infirmiers are trained here for hospitals, the Grandes Endemies and rural dispensaries.

8. The Health Budget

The annual health budget of Mali has been about six million dollars over the past seven years, representing close to ten percent of the gross national budget. The health budget has risen by some 15.6 percent over this period, most of the increase being accounted for by personnel costs. There has been a net decline of 14.3 percent in the drug line item over this period.

9. Health Personnel

Since independence, Mali has placed strong emphasis on the training of paramedical personnel (infirmiers, mid-wives, etc.). There are now a total of 108 physicians in the country of whom 65 (60.6 percent) are Malians. Approximately half of the physicians are concentrated in the capital city.

The bulk of medical services is delivered by paramedical personnel. There are 393 Infirmier d'Etat and 1,133 infirmiers in the country. There is an average of 3 infirmiers per 10,000 population in Mali and 1 physician per 40,000 population. Medical care is therefore for the most part delivered by paramedical personnel, a departure from the pattern found in many other developing countries of the world.

Current Plans for Expanding and Upgrading Health Services

Within the context of Mali's five year development plan (1974-1978), is a program for expanding and improving health services. This health program was drawn up by the health sector of the National Commission on Human Resources under the direction of Dr. Abdul Karim Sangare, the present Directeur du Cabinet of the Health Ministry. The principal elements of this plan are as follows:

1. Basic Health Services

The first priority seen here is Drugs and Medical supplies and it is proposed that the budget for this item be raised from the current 800 million to one billion Mali francs at the onset of the plan and up to 1.1 billion Mali francs by 1977.

In order to finance this increased allowance, it is proposed that a National Health Fund be created, similar to the National Road Fund.

2. Capital Investments

A number of capital investment projects are envisioned.

a. It is proposed that the regional health centers of Sikasso and Kayes be transformed into hospitals at a total cost of 500 million M.F. each. Sikasso is planned for 1975 and Kayes for 1976. Funds are not currently available and are being requested from the outside.

b. The second development phase of the Nioro Hospital is proposed for 1975 at a cost of 250 million Malian francs. Funds for this are being asked for from outside sources.

c. The Health Center at San is to be transformed into a medical-surgical complex at a cost of 108 million Malian francs. Financing has been requested from UNICEF.

d. Point G Hospital in Bamako will continue to undergo complete rebuilding. The FAC has already agreed and provided 622 million M.F. for the first phases. The last phase, costing 500 million M.F. is also being assured by the FAC. This renovation will transform Point G into an acceptable national hospital.

e. The construction of dispensaries and maternities on the periphery of Bamako, two dispensaries at Lafiabougou and Badalabougou, two maternities at Badalabougou and Missira and a PMI at Lafiabougou. The cost of this project is 338 million M.F. The FED has agreed to finance this project.

f. Opening of the Institut de Biologie and the opening of a laboratory for the production of intravenous solutions. The Institut has now been opened and the FED has provided 7 million M.F. to finance the production of intravenous solutions aimed at treating cholera cases.

g. Strengthening of two cercle health centers by year at a cost of 50 million M.F. by cercle. Over five years, 500 million would be required. It is proposed that this cost be paid for by funds from the loterie or from a budgetary grant.

h. Repairs

50 million M.F. are required per year for five years and it is proposed to request this out of the national budget.

The establishment of a Research Institut on Traditional Medicine and the Traditional Pharmacopea. It is proposed to put up a building at a cost of 60 million M.F. to be paid for from internal resources and to request 20 million M.F. from UNICEF for equipment.

3. Socio-Preventive Medicine

Although this division of the MOH has a high priority, it receives only 16 percent of the health budget.

a. Transmissible Diseases

Since 1970 the 11 sectors of this service have received 10 million M.F. per year for operating costs which represents 2 M.F. per person per year.

The capital investment proposed to give the Grandes Endemies mobility is 41 million M.F. This is being requested of the FAC. In addition, it is proposed that infirmiers and other personnel receive a per diem for each day worked out in the field. It is estimated that this per diem should be 650 M.F. which, estimating 10,000 person-days per year would come to 6.5 million M.F.

In addition to all of this, 19.5 million M.F. are needed for the annual functioning of the service and given the 10 million now appropriated, this means that 9.5 million more would be needed.

b. Environmental Health

Activities in the area of environmental hygiene in the rural zones are projected for the Grandes Operation -- rice, peanuts, millet, fishing, cattle raising.

The cost of these investments will be on the order of 14 million M.F. of which 4 million is being requested of UNICEF for vehicles. 10 million is to be supplied from internal resources.

c. Protection Maternelle et Infantile

The service is to be reconstructed at two levels. At the national level, the director is to be freed of all medical care responsibilities in order to be able to orient and control the regional centers.

d. School Health

School health programs are in effect now limited to Bamako. It is being proposed that the service be extended to at least one regional level by year.

e. Mental Health

Psychiatric services in Mali are rudimentary even though there are some 100,000 known mental patients. The plan calls for the extension of the existing physical facilities in Bamako at a cost of 50 million M.F.

f. Ambulance Service

A central post is planned and four others on the principal highways in the country at a cost of 22 million M.F.

g. Health Education

The new orientation of the Health Education Service is in the regions of the Grandes Operations (rice at Segou and Mopti, fishing and millet at Mopti, etc.). The service is to be decentralized to achieve this end by establishing regional headquarters, one per year. The rhythm of this decentralization is as follows:

Mopti - 1974

Kayes - 1975

Segou - 1977

Sikasso - 1978

The Health Education Service also would like to have USAID assign a competent health educator to the service for at least two years to help establish a Centre de Formation d'Education Sanitaire. This center would instruct medical, paramedical and school personnel in basic health education during one week long courses.

h. Medical-Social Activities Tied to the Grandes Operations

At the UNICEF-sponsored conference held in Lome in 1972 it was concluded that it was necessary to foresee social and ecologic disruptions in the areas of the operations as well as potential health problems.

There are three types of actions being planned to meet these problems:

1. Studies and Campaigns

a. Anti-onchocerciasis campaign in Yanfolila

b. Onchocerciasis study in Kita.

c. A Study on Onchocerciasis Bilharzia and Malaria in the region of the Selingue.

d. A Study of Onchocerciasis in the Region of the Manantali Dam.

e. A Study and Experimental Center for Integrated Development.

2. Health Education activities

The following types of activities are planned:

a. Programs integrated into functional literacy activities in Operations Arachide.

b. Instruction in usefulness of immunization and environmental hygiene in Operation Roz, Mopti.

c. Health education in trachoma in Operation Millet in the Segou.

3. The Creation of Mixed Centers of PMI and Community Development.

Centers for community development have already been installed in the rice operation zone in Segou with the support of the FED. The goal now is to enlarge these centers so that they include a PMI activity. The purpose of these mixed centers would be to help the populations raise its general level of health.

The capital investment per center will be on the order of 16 million M.F. Operating budget will be on the order of 2 million M.F. per year.

Comments on Mali's Five-Year Health Development Program

As can be seen from the above-described program, the Ministry of Health is seeking to expand and upgrade its activities in most areas of health services delivery. It is important to note that the highest priority has been assigned to the purchase of drugs and medical supplies. The lack of funds to purchase drugs and medical supplies has long been a major problem for the Ministry of Health. As things now stand many rural areas are supplied with adequate numbers of health workers who do not have the necessary materials with which to dispense medical care. This situation will become progressively aggravated as more and more numbers of medical

and para-medical personnel are added to the existing cadre. At the present time personnel costs within the Ministry of Health budget represent twice that of operating costs, a situation which will get worse if other means are not found to pay for operations. It is important to note that the Malian's plans to set up a national health fund and for the most part to finance it internally through a variety of techniques. Although they have provided for outside assistance, this is listed as one of the last possible resources.

Mali's Family Planning Program

In October of 1971 the Government of Mali signed an agreement with the Canadian Government (CRDI) for an assistance program in family planning. During the period November 1971 to April 1972 a pilot center for family planning was set up in Bamako with the assistance of a technical advisor from the CRDI. In May and June of 1972 the Government of Mali implemented legislation enabling the practice of family planning within the country. In July of 1973 the government decided to create seven new satellite centers within the capital of Bamako and five within the regional capitals. At the present time only the first center is operative and the government's attitude is that other centers will be opened in a low key fashion over a period of time. To date the center in Bamako has handled approximately 4,000 women, most of whom are from the more educated levels of society. The government has a very firm commitment to family planning which is an admirable, unique position for this part of Africa. The technical staff of the pilot center is highly competent and well-qualified and, probably, fully capable of developing a program along the required lines. USAID assistance could come into play here at a number of different levels.

Recommendations

1. Assistance to the Division of Socio-Preventive Medicine

USAID should explore the possibility of giving assistance to the Service des Grandes Endemies in order to make it more viable and functional. In so doing the largest possible number of rural inhabitants in the country would be reached and would receive certain basic health services. The total cost per year for both per diems and for operating costs would be approximately 50 thousand U.S. dollars. Gasoline costs per year for the entire country would be approximately $75,000. Therefore, with an input of $125,000 per year the Service could be made more viable. USAID might consider support in the following areas: vehicles, operating costs and per diem allowances with perhaps the provision that gasoline costs might be supplied by the Arab states.

2. Expansion of Cercle Health Centers

This area would have to be explored in greater depth in order to determine in which centers an investment would bring about the greatest and most immediate results. The cost of each of these centers is approximately $100,000.

3. Mixed PMI and Community Development Centers in the Regions of Economic Development

From what has been said above in this report these centers will serve as centers of health service excellence and will, if properly managed, appreciably upgrade the level of health of individuals living within the areas of the Grandes Operations. This basic concept could be expanded to include not only community development programs and PMI activities but a much broader cross-section of health activities.

That broader health activities are needed is evidenced by the fact that Operations Peche has been developing its own medical care delivery system and has a program drafted which would provide medical care to approximately 180,000 fishermen and their families. The operations is soliciting assistance from USAID for providing them with sufficient funds to purchase drugs for the first three years. During this three-year period they will develop their own capability to buy their drugs later on. AID support of this plan is strongly recommended since it represents an expansion of the basic concept of mixed PMI and community development centers in the areas of the large operations.

The Operations Peche is also capable of producing fish meal grits in the city of Mopti which can supply the needs of approximately 7,000 children. At the present time they do not have a buyer for these grits and therefore USAID could support the possibility of initial financing of a program which should eventually allow the other Operations to purchase fish meal grits on their own.

4. Environmental Hygiene

Given the importance of environmental hygiene in maintaining levels of health, USAID should explore the possibility of rendering support in the public hygiene segment of the five-year plan. This plan calls for the establishment of polyvalent mobile teams which would be directed by sanitary technicians. Sixteen of these teams are to be in Bamako and one each in each of the capitals of the region. Because this plan is not fully developed it is difficult to say what the ultimate cost would be but the program merits careful consideration.

5. PMI Services

USAID should explore with the Malians specific areas of support in their plan to upgrade and expand the PMI services of the country. While they have made a specific request to UNICEF for 10 million Malian francs per region, at this time they have not received any commitment from UNICEF. Areas worthwhile of serious consideration by AID would be those found in the Grandes Operations.

6. Health Education

USAID should explore the possibility of providing support in the development of the health education program in the Operations Mil Peche and Coton. Serious study should be made of assigning a full time health educator from the States who is francophone and who could assist the health education section in developing a meaningful and integrated program in the areas of the Grandes Operations and to assist them in training school teachers and other health personnel in basic health education knowledge and techniques. It is difficult to say what the total costs of what this kind of program would be and this would have to be explored in greater detail.

7. Family Planning

The Malian family planning program is off to a very good start and all indications are that it will progressively expand to regional levels and then to more peripheral areas. Future development at this time is still rather unclear as is the time frame and local USAID personnel should explore with the Ministry of Health the types and kinds of assistance that they would require in the future. At the time of this report plans were not yet firm enough to develop a clear idea as to what levels of assistance would be required.

8. Nutrition

A very worthwhile undertaking, particularly in the areas of the Grandes Operations, would be the establishment of a nutritional surveillance system. This system can be both simple and inexpensive and in the long run extremely useful in that it would serve as a sentinel device of alerting health officials of developing nutritional problems. The system should be kept simple so that it can be implemented by those para-medical personnel who are out in the rural areas. Going along with this should be the development of centers in the Grandes Operations capable of dealing with nutritional problems once they have been recognized. Such centers could be integrated into the mixed PMI and community development centers. USAID should look into undertaking this perhaps on a pilot basis at first in one of the operations in which it will have significant input.

9. Retraining of Health Personnel

Although Mali does not suffer from lack of para-medical personnel, these personnel are often sent out to peripheral rural areas where they eventually are cut off from the mainstream of developments in health care and practice. In conversations with Madame Assa Soumare, the Directoress of Studies of the Secondary School of Health, it became obvious that a national program of retraining of health personnel is required. This could be done at the regional level by a traveling faculty

of competent personnel recruited from within the country. A three to four day course would be all that would be required to cover the updating of medical treatment practices. Overall, this type of program would not be very expensive, most of the cost coming from travel expenses and lodging expenses for the personnel to be trained and the faculty. As a start this could be attempted in one region of Mali on a pilot basis and then if successful extended to the remainder of the country.

10. Guinea Worm Control in the Seno

In 1971 there were 1,204 cases of Guinea worm reported in Mali. Of these 472 were reported from the Region of Mopti, especially from the cercles of Koro and Bankass which lie below the Bandiagara Cliffts. This area is cheduled to be developed within the framework of Operation Mil. Because of the depth of below the surface water in this area, populations prefer to use water which accumulates in hollows dug out in the process of excavating mud for building. This situation is ideal for transmission of the disease.

A guinea worm control program should be launched in the area of Operation Mil. This program would have to include the following elements:

a. Simple filtration of water used from ponds. (This is sufficient to filter out the Copepod intermediate host.)

b. Provision of portable water supplies from deep bore wells. The availability of such water would dissuade people from using water from ponds.

c. Treatment of active cases to reduce the human reservoir coupled with an active casefinding campaign by mobile teams.

The feasibility of provision (a) would have to be studied in the area and would have to be coupled to an intensive health education program. The cost of casefinding and treatment of active cases would run approximately 20,000 dollars for the target population of 250,000. This is based on personal costs and operating costs for three mobile teams to go from village to village over a period of four months, ($10,000) and the cost of treatment of an estimated 3,000 people ($9,000) at $13,00 per head.

Such an active case finding and treatment program unassociated with other preventive measures in the area would result only in a temporary arrest of transmission.

11. Tsetse Control in the Region of Kayes-Bamako

If a livestock program is implemented in the Kaarta (cercles of Nioro, Nara and Kayes), careful studies must be undertaken to determine the distribution of tsetse along the southern limits of the area. Likewise, the distribution of *Simuluim sp.* (vectors of onchocerciasis) would have to be undertaken. Once these are undertaken, vector control programs should be launched prior to the implementation of the livestock program. To clear the area of tsetse should not be difficult as the breeding sites constitute only ten percent of the surface area involved. Failure to do this will result in certain transmission of cattle trypanosomiasis and possibly human trypanosomiasis as well.

If USAID is unwilling to undertake tsetse clearing of the southern limit of this area, then a new site for the livestock project should be chosen. It would be worthwhile to explore the placement of this project to the east of the slated area, in the cercles of Nara and Niono which are relatively clean of both trypanosemoasis and onchocerciasis. Also, unlike the Kaarta area, they do not directly touch on fly belt areas.

ANNEX 1

MALI
NUTRITION PROFILE

POPULATION

Total: approximately 5 million
Growth rate: 1.9% (5.7% in urban areas)
Rural population: over 90% of total
Age distribution: 50% below the age of 15
Major tribes:

Mandingues (1.7 million)
- Bambara (1.4 million) - found everywhere between the Sahel Sahel and the desert.
- Dioula (100,000) - south of Sikasso; primarily traders.
- Malinke (200,000) - found around Kita, Bafoulabe, Bamako.

Peuls
- Tuaregs (600,000) - nomadic herdsmen in savanna bordering the Sahara.
- Moors

Toucouleurs (50,000) - along Senegal River near Kayes & Niono.

Markas (same as Soninke or Sarakole in Senegal) (250,000)

Bobos (90,000)

Bozos (12,000) - along Niger and Bani rivers; fishermen.

Songhais - Niger plain around Tombouctou; fishermen and sedentary agriculturalists.

AGRICULTURE

Major Crops*:

Millet	900,000	tons	in	1971
Rice	150,000	"	"	"
Corn	80,000	"	"	"
Manioc	155,000	"	"	"
Peanuts	170,000	"	"	"

The shea nut which produces a valuable fat (shea butter) is an important factor in Malian nutrition.

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*Figures from FAO Production Yearbook 1971.

Livestock:

Cattle	5.5 million head in 1970/71
Sheep	5.9 " " " "
Goats	5.6 " " " "
Camels	215,000
Poultry	14 million

Livestock are traded on the hoof to neighboring countries and are Mali's major export resource. In 1970, FAO reported recorded meat production as follows: beef 8,000 tons; mutton 1,000 tons.

Fishing:
An estimated 90,000 tons of fish are landed each year by Niger River fishermen.

Agricultural policies:
Before the present drought crisis, the Government's major agricultural policies were to intensify agriculture, develop animal husbandry, develop a planned economy based on mineral resources and agro-industry, and to increase agricultural exports. Cooperative farming has been promoted through the establishments of paysannats but has made little progress. The Office du Niger, inherited from the French, has sponsored irrigation and resettlement in the Niger delta, concentrating on rice and cotton cultivation.

Storage:
Storage is limited and food staples are consumed as produced. Societes de Prevoyance maintain a small number of silos where they store the reserves needed to avoid famine (in normal times) and equalize prices. At the household level, storage space usually consists of a circular clay hut covered with a conic thatched roof.

SEASONAL AVAILABILITY OF FOODS

November through January (beginning of dry season) reserves are reasonably abundant. February through April sees the increasing depletion of reserves while field work becomes more arduous. Millet is still available, supplemented by Hibiscus cannabinus. May and June mark the beginning of the hungry season (soudure) while hard work (hoeing and sowing) continues. The women and children go into the brush to kill rats, dogs, and birds, and pick up a variety of legumes. Some manioc can be harvested or bought, but the official caloric intake at this time of year is often below 1,500 per day among certain population groups. By July the rains begin and manioc becomes more abundant while yams and sweet potatoes ripen. The harvest season begins and abundance increases through August, September, and October. The peanut is available on a year-round basis wherever it is grown. In the Niger Delta

fish consumption is seasonal with August being the best month, when intake triples.

DIETS

As in Senegal, diets vary with location, social level, and season. The basis of the urban diet is millet and sorghum. Rice from Bougouni and from the central Niger Delta is becoming more popular. Corn and fonio (type of millet) are secondary staples. Sweet potatoes and manioc are available. Animal proteins come from the cattle and from fish provided by the river fishermen. In the rural areas, the diets are the same but less dependent on budgetary resources and more dependent on the time of year.

The meat ration in Mali is low. Accordingly to a 1971 survey, the consumption of meat in the rice zone amounted to 13.8 grams per capita per day; in the millet zone to 14.8 grams, and in the area under the control of the Office du Niger 15.1 grams. Other surveys have resulted in slightly different figures but of the same order of magnitude. The average per capita consumption of fish per year is higher than that of meat, but averages do not show variations in distribution.

Vegetable proteins of good quality are available from legumes such as the niebe (Vigna sinensis), the Sudan bean (Phaseolus acutifolius), the dolique (Dolichos lablab) which is also rich in vitamin A precursors, the voandzou or Bambara pea (Voandzeia subterranea) and others. Special mention must be made of the peanut which is frequently munched raw when working in the fields. Often it is toasted or boiled in water, then dried or made into a paste (similar to peanut butter) which has a long shelf life.

Sources of fats are varied and include groundnuts, cottonseed and shea butter. Vegetables are cultivated in abundance, in gardens on the outskirts of cities, especially Bamako. A variety of fruits is available in season.

Nutrition surveys conducted in Mali prior to the current crisis showed that while Mali had the potential to adequately feed its population, food resources were not satisfactory in terms of quantity or distribution. The urban population in the Bamako area seemed to fare reasonably well from the energy point of view with 75 percent consuming over 3,000 calories a day. However, between 61 and 73 percent of these calories were derived from carbohydrates and only 15 to 17 percent from proteins. In rural areas, surveys carried out in the middle of the hungry season showed that 70 percent of the people had a daily intake of less than 1,000 calories, of which 50 percent came from carbohydrates, 27.5 percent from proteins, and 22.5 percent from fats. On such a low caloric regime, some of the proteins were undoubtedly burned for energy rather than being used for tissue repair.

Other studies have shown inadequate consumption of calcium, vitamin A and vitamin C and marginal intakes of Vitamin B_2 and niacin.

NUTRITION PROGRAMS

There is a Nutrition Service within the Ministry of Health. A limited school canteen program was active in 1968 and through UNICEF CSM and dried skim milk were distributed to mothers of infants 1-5 years of age.

MALI

ECONOMIC DEVELOPMENT OF ONCHOCERCIASIS - FREE ZONES

Onchocerciasis Vector Control Program Area

Although onchocerciasis is endemic over much of southern Mali approximately 125,000 km^2 in southeast Mali is included in the vector control program. The northern boundary is formed by the Bani River, a tributary of the Niger River, while the western boundary is the Niger itself. The zone includes the Sikasso region and part of the Bamako and Mopti regions. The eastern part of the Sikasso region was included in an earlier FED financed *Simulium* control project. Approximately 1.4 million people, Bambara, Senoufo, Minianka and Dogon live in the program area which has an average density of 13.4 inhabitants/km.

The program zone covers the climatically most favorable part of Mali lying in the Guinean savannah zone with an average rainfall between 900 and 1400 mm. In general the soils in the depressions of the area are sandy or sandy silt loams with organic matter and clay-rich horizons and often hydromorphic. The plateau soils are ferroginous and often lateritic, particularly on the tops of hills.

The farming system of the Senoufo is based on millet, often grown in association with beans, yams, cassava, rice, potatoes, and vegetables. The Minianka, on the other hand, have adopted cultivation of flood rice, and millet is often sold as a cash crop. Practically no formal rotations are followed and when land is exchausted, it is left fallow. Overall both groups have willingly accepted animal traction, and the demand for cattle exceeds the supply.

Approximately one-fifth of Mali's cattle (or about 1 million head) are found in the program area -- half of these in the Sikasso region.

The pimrary road structure of this region which links Bamako to Bobo-Dioulasso and the Ivory Coast is relatively well developed. No information is presently available on the secondary and tertiary road network in the region.

Onchocerciasis-Free Economic Development Zone

Although the onchocerciasis control program should free a number of valleys from the disease constraint, particularly the Baoule above Bougouni, part of the Bagoe, the Ouassoulou and the Faya, in view of the large number of development projects currently underway and the limited population/land pressure in the area, the PAG report recommended that no special onchocerciasis related development projects be considered for the time being. The report proposed additional studies to determine

the relative development potential of the valleys noted above and the likelihood of migration into the valleys from contiguous areas.

Past and Present Development Activities in the Program Zone

There are a number of projects in course of implementation or under study in the area covered by the control programs:

a. Development of rice cultivation in the Sikasso region

b. Establishment of a breeding ranch for N'Dama cattle in the Yanfolila region

c. Rice cultivation to the south of Segou

d. Kenaf production

e. Cotton production

Development Strategy

The Malian government apparently plans no special development projects related to the onchocerciasis vector control program.

Recommended AID Assistance Over the Next Five Years

None

MAURITANIA

MACRO-ECONOMIC ASSESSMENT

I. INTRODUCTION

There are several instances in Africa of a country which, as the result of large public revenues accruing from the exploitation of natural resources, have experienced rapidly rising per capita incomes, but in fact have grown without significant development. Mauritania is such a country. The late opening of rich iron ore deposits in the north of the country have provided Mauritania with substantial public revenues so that when Mauritania's population of 1.2 million is divided into its annual GDP a rather high figure ($150) per capita appears. In fact, this indicative income has little meaning to most Mauritanians whose real per capita GDP, ex-mining revenues, is calculated at less that $50 per year.

Mauritania is a very new country, having been created as an administrative unit over certain remote areas which were brought under French administration only after the First World War. The French arrived late on the scene because there was no particular urgency to control an unpromising area thinly populated by camel and goat herders. Under such circumstances no administration could begin to pay for itself. Indeed the French ruled the territory from St. Louis, in Senegal, as no town existed in Mauritania of sufficient importance that could justify its being nominated capital. This state of affairs persisted until the late 1950's when iron ore deposits, newly opened, seemed to promise sufficient public revenue on which an independent government administration could be fitted out. Such was done. A new capital was created, Nouakchott, and an administration put in place where almost nothing had existed. Mauritania has needed all of its mineral revenues just to put a functioning government structure in order.

The newness of Mauritania suggests that the country is critically weak in virtually every area where a modern government must be strong: staff, equipment, finance. Until independence there were almost no schools, no paved roads, no ports, little administration, little commercial agriculture, almost no tax base, and very little promise of any early change from these conditions. The country moreover remains barely integrated politically, economically or socially. This lack of unity reflects the transitional nature of the territory occupied by the republic. It sits astride the racial frontier between Moor and black, the boarder between desert and Sahel and thus includes both cultivator and pastoralist.

II. OVERALL PERFORMANCE OF ECONOMY

Mauritania is a sparsely populated country (1.2 persons per square kilometer) with 1.2 million people and a per capita income of about $150 to $170, somewhat over the median for all African countries. The sharply dualistic economy is dominated by a modern sector consisting of a fish processing complex and two mining companies, which together account for 85 percent of recorded export receipts. Ninety percent (90%) of the population, of which 70 percent is at least partially nomadic, live and work in the traditional sector of the economy. Traditional activity consists mainly of livestock

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raising, since the harsh Saharan climate and less than ten inches of annual rainfall confine 85 percent of the land area to this activity. Subsistence agriculture and fishing are practiced in the extreme south along the Senegal river.

Recent economic developments have been greatly affected by the drought of increasing severity which resulted in crop failures and large-scale losses of livestock through southward migration, excessive slaughtering and starvation. This situation has reduced the rural per capita income of about $70, which broke even with population growth before the drought. Traditional activities function as a closed economic system relying on the exchange of livestock for cereals and cloth from Mali and Senegal.

GDP at constant prices increased more than five percent per annum between 1964 and 1972. At current prices, a rapid growth rate of 11 percent per annum until 1968 slowed to an annual average of 3.7 percent between 1968 and 1972. (See Table I, Appendix). Almost 90 percent of the increase in value added since independence took place in the modern sector, i.e. mining 58 percent, services 16 percent, and construction 8 percent. Value added by mining accounted for 36 percent of GDP in 1972, while the traditional sector accounted for 31 percent, and services for 29 percent including 10.7 percent for public administration. 1/

A. Sectors.

Livestock is the principal traditional activity in Mauritania, carried out on a subsistence basis by nomadic herdsmen. It is concentrated in the south of the country where rainfall is adequate to support savanah-type vegetation. Prior to 1972 rough estimates based on a headtax, levied on cattle, put cattle at about 2 million heads, sheep and goats at 7 million head and camels around 700,000. With the abolition of the tax in 1972, there remains no basis for estimates.

The drought has had disastrous effects on the livestock population. Many cattle died or were slaughtered owing to lack of pasture. Others migrated southward, but the pastures and wells which fed them before may have disappeared during the course of the drought. Emergency government measures to combat the possibility of extinction include a ban on slaughter, emergency feed for cattle and the establishment of a reproductive herd, with aid coordinated by FAO.

Livestock is a potentially important export industry, with 160,000 heads exported in 1972, of which only 27,000 (17%) were registered. Meat exports are handled by COVIMA, a public enterprise located at Kaedi. Even prior to 1971, COVIMA operated at only 20 percent of capacity, with annual losses of CFAF 10 million ($40,000) underwritten by the government. 2/ Rehabilitation

1/ I.B.R.D., The Current Economic Situation and Prospects of Mauritania, Report No. 234-Mau, 6 May 1974, pp 4 and 5.

2/ IBRD, p. 5 and Appendix Table III and IV.

aside, there is a major challenge in exerting official control over trade in livestock.

Agricultural production is confined to subsistence, cultivation of cereals, vegetables, and dates, the latter serving as a cash crop. Seventy-five percent (75%) of cereal production occurs in irrigated areas. Rough estimates indicate that in normal years, cereal production totals 110,000 MT, mostly millet and sorghum, but also some wheat, rice and corn. The total cereal requirement of 145,000 MT is largely met by this production. Owing to the drought, cereal production in 1971 and 1972 was at 20 percent of normal levels. Emergency food aid made up most of the difference. Long-term projects in agriculture include several rice projects in the Senegal River Valley.

Traditional fishing is relatively undeveloped since consumption patterns favor meat and cereals. Both salt and fresh-water fishing are carried out on a traditional basis.

Gum arabic extracted from trees grown wild are harvested by both nomads and farmers. Mauritania is the third largest exporter of gum after Sudan and Senegal, with exports of 5,410 tons in 1970 amounting to seven percent of exports. In 1972 SONIMEX was granted monopoly purchasing rights, at a guaranteed price, which may slow the smuggling of gum to Senegal.

Modern Sector

Iron ore and copper mining form the basis of the modern sector. Although 36 percent of GDP derives from mining, only about 0.5 percent of employment is related to this sector. The iron ore mining operations are located near Zouerate in northern Mauritania. Iron exports have declined slightly since 1969 to CFAF 18.5 billion in 1972, owing to a strike and to lower quality ore. At current rates of exploitation, mining will last through 1983, unless substantial investments are made. Copper exports commenced in 1971 at CFAF 1,006 million and rose to CFAF 2,017 million in 1972. The ore deposits have an estimated life of about 18 years. 1/

The fish processing industry in Nouadhibou has been supplied by foreign-owned fleets operating in Mauritanian waters since 1969. There are six companies of which two are private French companies. Exports of fish and fish products (salted, dried, canned, fish-meal, and frozen fish) totalled CFAF 700 million in 1972. 2/

Other manufacturing is non-existent with the exception of a recently established match factory employing 28 Mauritanians. A cement factory, sugar refinery and milk-processing plant are under consideration. Other possibilities suffer from a poor and small market.

1/ I.M.F., pp. 8 and 9.

2/ I.M.F., pp. 10 and 11.

B. Balance of Payments

Mauritania's balance of payments was characterized by a large current account deficit until 1970, to an average $46 million surplus in 1970-72 due mostly to exports of copper and fish. (See Table II and III, Appendix.) This surplus was more than offset by the near tripling of the service account deficit. But the trade balance has little meaning in light of the large foreign sector transferring receipts abroad. Only about 25 percent of mining export receipts remain in Mauritania when allowance is made for debt payments, dividends, transfers and imports of consumer goods.

Net public and private capital inflows have broadly covered current balance needs which fluctuate directly with investment needs. By 1972 the country's revenues amounted to UM 440 million ($35 m.), or about eight percent of imports.

The composition of exports reflects the mono-structure of the economy. Mining exports accounted for 79 percent of total exports, and fish for 6.6 percent. Arabic gum is also exported.

Imports were comprised in 1971 of capital goods (31%), foodstuffs (sugar, rice, tea) (225%), and other consumer goods (mostly cloth) (15%).

France is Mauritania's most important trade partner with about 20 percent of exports in 1971 and over a third of imports. The E.E.C. as a group received nearly 60% of exports, and Europe received 85% of exports. Imports are more diversified, with about 60 percent coming from Europe and 18 percent from Africa.

C. Government Finance

The current account budget has drastically improved since independence. The current balance has progressively changed from a UM 280 million deficit ($22.4 m.) over the 1960-62 period representing 35 percent of total current expenditures to a gross surplus of 14 percent of total revenues, or 6 percent after debt amortization in 1970-72. 1/ This would be an outstanding achievement had it not been accomplished at the cost of insufficient budget allocations in important sectors. As a result, economic services are understaffed, project preparation is insufficient and maintenance of some vital infrastructure is neglected.

Government current revenue has quadrupled since independence to $152 million in 1972, reflecting the growth of the modern sector and the increased tax base. The tax/GDP ratio has doubled to 21 percent of GDP in 1972. Two-thirds of the increase in revenues derives from indirect taxes on imports and iron ore exports. One-third is due to increased direct taxes.

1/ IBRD p. 48

The expenditures of the government reflect concerns with the administration of the country rather than its development. Seventy-six percent (67%) of government expenditure were spent on general and social services, while 7 percent were spent on economic services in 1972. This is particularly serious in Mauritania where extension services are not supplemented by specialized foreign agencies like CFDT. Maintenance expenditures are less than 1.4 percent of the budget, leading to a sharp deterioration of infrastructure. Fire breaks, totalling 6,500 kilometers in the early 1960's, have almost totally disappeared.

The 1973 budget reflects the drought emergency. The drought was expected to result in additional costs for food transport and social services. These expenditures are expected to be partially covered by a special one percent business turnover tax; a levy of one day's salary per month for all salaried people; and a grant from Saudi Arabia. 1/

D. Human Resources

The total economically active population can be estimated at about 600,000 persons or 50 percent of the population, of which roughtly 93% are employed in the traditional section, 3% in the modern wage sector, and 4% in the informal modern sector. Of the 41,000 employees in the latter two categories in 1972, 7000 were civil servants, 5000 were employed in mining, 7000 in industry and modern services, 2000 as domestic employees and 20,000 were self-employed as artisans and traders. 2/

The level of education of the rural population is extremely low; most have received no modern training. Primary school enrollment is only 16 percent of the population age group, although 20 percent of recurrent budget expenditures are devoted to education. The situation is better in the modern sector. Mauritanians account for 75 percent of private sector employment, and held about 26 percent of managerial and supervisory position in 1969. 3/ There is an annual estimated deficit of 200 skilled workers (about 50% of needs) while about 3,000 young people leave school to seek work.

The government is aware of the need to bring the school system in line with national needs. A UNESCO/IBRD education project were discussed in early 1973 to address these needs.

III. GOVERNMENT PRIORITIES

Mauritania's Second Economic and Social Development Plan (1970-73) consists essentially of a list of desirable projects in both the public and private

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1/ IBRD, pp. 50 and 51.

2/ IBRD, p. 43.

3/ IMF, p. 17.

sectors. Only 14% of investments were to be in rural development, while 34% were allocated to industry and mining, and 33% for infrastructure. Implementation through 1972 was highest in the mining/industrial sector, (74%), followed by infrastructure (46%), and rural development (35% of target). In other sectors (education, health, tourism, defense, and research), disbursements were under 30% of estimates.

The next Plan begins in 1975. The five priority sectors designated were rural development, industry, infrastructure, finance, and social and cultural affairs, but an industrially-oriented public investment program lies at the basis of the plan.

Previous Plans have reflected a lack of urgency with respect to development. With a presently large resource base in minerals, which is expected to be exhausted within 18 years, Mauritania should allocate the substantial income deriving from this sector to the diversification of its economic growth base. In the past, only 17% of mining revenues were allocated to rural development. Mauritania's potential lies mainly in livestock, irrigated crops, fisheries, and to a limited extent, arabic gum. The public investment program for the Third Plan (1975-79) reflects priorities in capital-intensive industrial ventures which in more favorably endowed countries than Mauritania become prime candidates for government subsidies. This strategy fails to take into account serious constraints such as lack of trained manpower and transport.

Mauritania's capacity to conceive and to carry out development projects is seriously hampered by the lack of basic data and of trained manpower. The government is predominantly administratively-oriented and has not assumed a development role. Basic development planning is deficient in stressing industry and infrastructure rather than the animation of the rural population. Financially, the government presently has sufficient resources to make a substantial effort in diversifying the rural sector and creating a long term growth potential, particularly with donor assistance. Unless Mauritania's priorities are shifted in this direction, the dual-economic nature of the country will sharpen, and growth will be limited, as in the past, to the modern sector.

TABLE I: NATIONAL ACCOUNT ESTIMATES, 1959-72

	(In billions of CFA francs)				Growth Rates (annual)	
	1959	1964	1968	1972	1959/60-1967/68	1967/68-1971/72
GDP, 1969 Constant Market Prices	19.4	34.7	45.8	52.7	11.0	3.7
Adjustment for Changes in Terms of Trade	na	1.3	0.1	-1.7	-	-
GDY (Gross Domestic Income)	na	36.0	45.9	51.0	na	3.5
	Sectoral Distribution (Percent of Total)					
GDP, 1969 Constant Factor Cost	100.0	100.0	100.0	100.0	10.7	3.3
Traditional Sector	61.5	40.6	36.0	31.0	4.2	-
Agriculture	12.8	7.6	4.4	2.1	-	-7.0
Livestock	43.9	30.0	28.4	24.9	4.9	0.4
Traditional Fishing	1.6	0.9	0.9	1.4	7.3	15.0
Forestry	1.1	0.6	0.9	1.0	9.0	5.7
Handicraft	2.1	1.5	1.4	1.6	5.2	7.4
Modern Sector	38.5	59.4	64.0	69.0	18.6	5.5
Mining	-	22.7	30.3	36.0	11.9 1/	7.4
Fisheries and Fish Processing	1.6	1.8	2.1	3.5	13.0	9.1
Other Industries and Public Utilities	0.5	0.6	0.7	1.0	13.0	13.6
Construction	3.2	4.3	6.7	5.5	21.0	-1.0
Transport, Commerce, Other Services	6.4	14.4	12.3	12.3	20.0	2.5
Public Administration	26.8	15.6	11.9	10.7	-	1.2

1/ 1964-68

Source: Table 2.2 Statistical Annex

TABLE II: BALANCE OF PAYMENTS, 1964-1972

(in millions of Ouguiyas)

(annual averages)

	1964	1968/69	1970/72
Exports /1	2760.	4580.	5640.
Imports /1	3040.	5140.	5060.
Trade balance	-280.	-560.	580.
Net non-factor services deficit	-120.	-400.	-660.
Net factor services	-500.	-740.	-980.
Current deficit	-900.	-1700.	-1060
Net capital inflows	820.	1480.	1180.
Change in reserves	-80.	-220.	120.
Level of reserves (end of the period)	540.	60.	440.

/1 Recorded and unrecorded.

Source: Table 3.1 Statistical Annex.

TABLE III: EXPORTS, 1964-72

	1964		1968		1972		Annual Rate of Growth 1964-72
	Ouguiya million	%	Ouguiya million	%	Ouguiya million	%	Percent
Iron	2120.	76.8	3060.	82.7	3620.	62.4	6.9
Copper	-	-	-	-	900.	15.5	-
Fish	80.	2.9	200.	5.4	380.	6.6	17.5 /1
Cattle	160.	5.8	180.	4.9	240.	4.1	5.2
Gum	60.	2.2	80.	2.2	140.	2.4	11.1
Other	340.	12.3	180.	4.8	520.	9.0	5.4
Total	2760.	100.0	3700.	100.0	5800.	100.0	9.7

/1 1968-72.

Source: Table 3.2 Statistical Annex.

MAURITANIA
AGRICULTURE SECTOR ASSESSMENT

The productive base of Mauritanian agriculture is frail. Due to intense human and animal pressure (grazing, farm clearing, cutting for fuel, burning) the original vegetation climax of open woodland (in the south) has been largely replaced by grass steppe and in some areas, man-made desert. In Southern Mauritania, the Sahara is being added to rather than itself advancing. This is an important distinction, as by implication, the "desert advance" can be retarded or repulsed by a new regime of surface management alone; by doing something to reduce the pressure of man and beast on the environment. It is also important to note that while the crude density of population in Mauritania is low (1.2 per sq. km.) it is high in relation to the surface resources. Under present conditions the resource base for food - cereal and animal products - is exceedingly thin. The margin is so thin that small changes in environment (such as a small decline in rainfall) can have severe effects on productivity and thus on the ability of the land to sustain life. Year-to-year variations in the quality of life can be considerable in such circumstances.

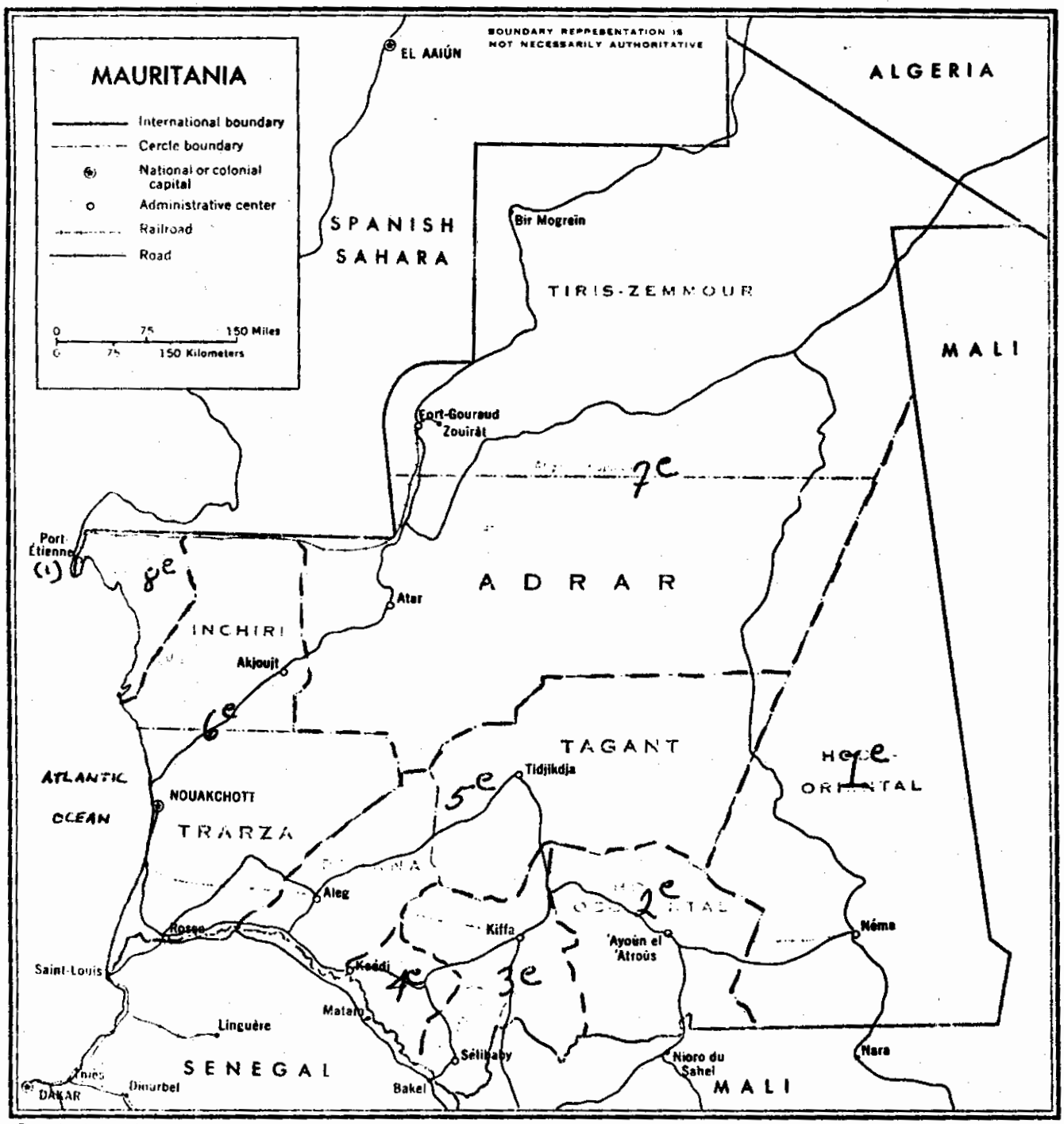
Low productivity per unit of land favors extensive activities - pastoral and shifting cultivation. Under these conditions populations must be mobile and most likely will be poor. Social relations are used to achieve security. The few towns are more the product of trade than production. Yet when a series of poor years occur in succession rural people throng to them for food and water.

This represents a difficult venue for economic development activities. This paper will attempt to identify some opportunities for intervention in the farm sector of the economy. It is important to bear in mind that the severe constraints to development which donors must face up to derive from the particularly stubborn circumstances in which Mauritania is situated. They cannot be overstated and must not be ignored.

II. AGRICULTURAL REGIONS

A recent administrative reorganization has taken place in Mauritania (see Map 1): the eleven former 'cercles' have been regrouped into eight regions. These regions for the most part spread north-south so that they embrace several economic zones. The seventh (Atar) and eighth (Nouadhibou) have no traditional agriculture at all apart from dates grown in the oasis. Only the fourth (Kaedi) is entirely in the cultivable zone. The first and second regions (Nema and Atrous, respectively) have some millet. The four remaining regions share the north bank of the Senegal River. The river bank apart, these regions are very similar, growing the same crops, although somewhat more rain falls to the west than the east. Surface connections within and between regions are poor and high cost. Trade in any commodity is consequently small and towns command an agricultural zone of perhaps no greater than 100 km. and certainly no more than 200 km. in radius.

MAP 1
ADMINISTRATIVE ORGANIZATION



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(1) Now Nouadhibou

— Proposed east-west road

Some exchange of cattle for millet with Mali does take place in the extreme east, which is commonly a cereal deficit area, but the total volume of this trade in cereals is not likely to exceed a few thousand tons annually.

All Mauritania may be divided into three crop zones (Map 2): The northern four-fifths, the southern fifth and the narrow band along the Senegal River. Aside from dates, aracia trees (Mauritania is the world's third largest producers of gum arabic), and some market gardens around Nouakchott, the north grows little. The Senegal Valley, an area perhaps 50 km. wide to the north of the River on the Mauritanian side, occupied by 20 percent of the country's population, grows 80 percent of the cereals, all of the rice and most of the millet. In addition all of Mauritania's cotton is grown here. Near Rosso, the Chinese have prepared 4,000 ha. of polder rice.

Across the balance of the country, a band some 100 km. wide, only millet is grown, under high risk conditions, and some maize near Selibaby. This coarse grain culture is in close association with the quasi-sedentary husbandry culture of the Moors, who are the predominant social group in the country and give it its particular character. Cultivation fades out as one moves north from the river; it is indeed the frontier of the Sahel and Sahara.

III. AGRICULTURE IN MAURITANIA

Not surprisingly, given its physical conditions, Mauritania is finding it difficult to feed itself. Indeed per capita availability of cereals, even with imports, has been in decline since independence: from 132 kg. per capita to 114 in 1972 (about 9 ounces) (Table I). When one considers that 204 kg. per person only allows an adult, about 16 ounces of cereal daily, and this is considered a minimum, the individual Mauritanian must make do on perhaps 12 ounces daily. The total nutritional picture is in some degree relieved in normal years by the consumption of varied animal products available from cattle, camels, sheep, and goats.

TABLE I

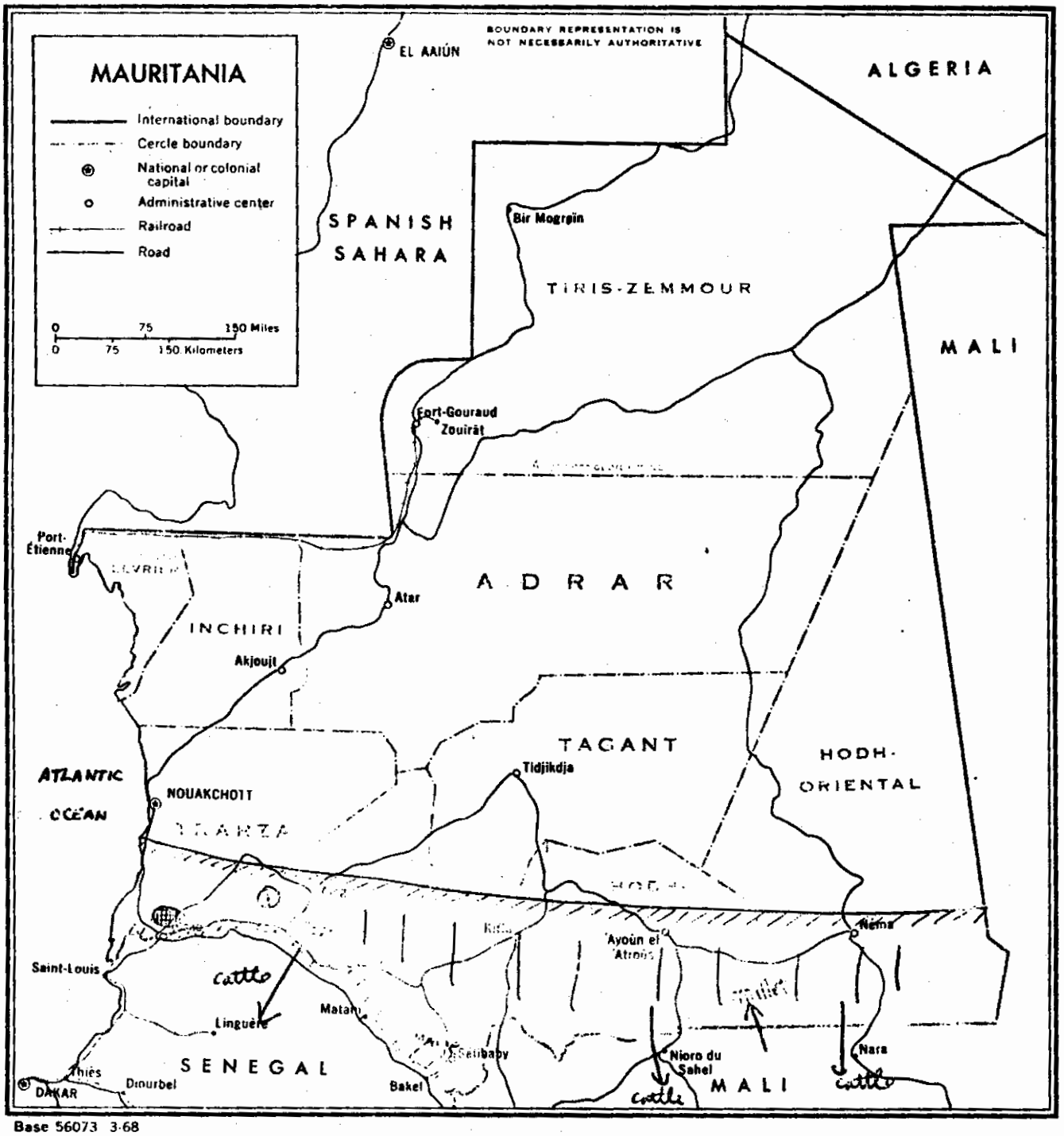
SUPPLY OF CEREALS - MAURITANIA
1961-72 ('000 MT)
(mainly rice, millet, hard wheat)

	1961	62	63	64	65	66	67	68	69	70	71	72
Production	91	93	95	95	115	95	117	55	115	87	85(F)	55(F)
Total Imports (F)	40	48	35	38	43	49	34	60	33	37	65	47
Total Exports (F)	3	3	3	3	3	3	3	3	3	3	3	3
Domestic Supply	128	138	127	130	155	141	148	112	145	121	147	99
Per cap. avail (kg)	132	140	126	126	126	148	132	135	100	127	123	81

(F) Incomplete Estimates Source: FAO Food Balance Sheets

MAP 2

ECONOMIC ACTIVITIES



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① Gorgol Valley

Chinese Rice Product.

Limit of Cultivation

Millet

Associated Cattle Semi-sedentary

Rice

The country has been a cereal deficit area for years. Imports make 40 percent of annual consumption, on the average; in some years it has exceeded 50 percent. Whereas total production of all cerals has remained little changed on the average since independence (with considerable variations about the mean), the population has been increasing at close to two percent per annum; from 970,000 at independence to over 1,260,000 in 1973. There being no check in prospect to the latter's growth, one cannot but be pessimistic as to the near future in terms of Mauritania's ability to satisfy demand for cereal staples. The country depends upon concessional imports now: indeed Mauritania can easily remain an international ward in this regard.

Two quite different farm regimes function in Mauritania. Their dichotomy mirrors the two physical environments present: river and dry hinterland. The peoples who inhabit the rivers edge are black Africans, mainly Toucoulour. The dryland is for the most part occupied by the quasi-sedentary Semetic Moors. The two groups organize themselves along quite different lines.

The Toucoulours make use of the river as their primary source of moisture, sowing millet as the summer flood recedes. In recent years, some paddy rice has been introduced and vegetables. A few modern low-lift pumps aside, virtually no irrigation exists. North of the river, millet is grown under rain-fed conditions, but this is the most rain-assured part of the country. Yields of millet along the river are of the magnitude of 400 kg/ha and 300 under rain-fed conditions. No manure is used and very few draft animals. Some of these people grow cotton and maize.

Unfortunately, this land, which has the most potential in the country, is the most isolated. There exists no usable road linking the river area with the coast or with the major towns. The river is not used for traffic. It is consequently very difficult to distribute supplies to these farmers or collect produce from them. The few pumps that exist commonly lack maintenance, parts, and fuel for this reason. Under present conditions, it is almost impossible to make use of whatever surpluses exist and thus an important source of cash to these farmers is lost.

To some real but unmeasured degree, the extremity of physical isolation is a function of the political isolation of the Toucoulours from the Moorish majority who dominate the government. A proposed road linking the southern zone will be significantly to the north of the river area and will connect the Moorish belt from the coast to Nema with the capital.

Whereas the Toucoulours are a village-oriented people, not greatly different in organization of their economic life from other Sahelian farmers, the Moorish approach to life is essentially pastoralist. Traditionally, they have an extensive exploitation of a poor terrain which precluded highly integrated existence. The Moors diversified their economic base to make joint use of the potential open to both animal and crop culture and so have made the fullest use of a difficult environment.

Farming revolves around a single growing season followed by a long dry spell, which has meant great dependence upon storage and animals. Families keep large numbers of sheep and goats and some cattle. The animals, and in particular the cattle, are moved in a transhumant cycle to take advantage of rain-fed pasture in Central Mauritania during the rainy season. At the beginning of the dry season animals are moved as far south as need be to sustain them, often well into Mali and even Guinea. While parts of families tend the animals the rest maintain semi-permanent encampments where millet can be grown. A pattern of small patches of millet fields spread out across the entire Sahelian belt as moisture permits. The Moors have devised a well-balanced survival economy adjusted to risk and environment, but one coming into jeopardy as human and animal populations grow.

A difficult physical environment occupied by a dispersed poor hard-to-reach human population: No radical breakthroughs seem in prospect with which to ameliorate their condition. Perhaps the best hope in the near future lies in efforts to improve flood retreat cultivation and improve the livestock-pasture crop systems by simple and quickly attainable methods not involving extra risk or cash. The longer term future may offer opportunities for more intensive irrigated agriculture along the Senegal River, aided by the water control and navigation that will be made possible by the delta and Manantali dams. Problems of fully exploiting this potential are discussed below. In addition, the greater market for the produce may be in Senegal rather than the distant cities of Mauritania.

IV. SUPPORT ORGANIZATIONS

There are few African countries more poorly endowed with agricultural support organizations. What does exist is meager in number, weak in organization, poor in training, and lacking in needed support. The agricultural services do not attract the best available school graduates. The agricultural school at Kaedi, for example, seems to get the rejects from alternative educational opportunities. Its output is limited to a few score annually, barely a third of the number needed just to carry out the schemes presently planned.

If a donor is to involve itself in Mauritania it must quickly come to terms with this problem. Any program is going to face the constraint of too few adequately skilled Mauritanians. The production by the schooling system is inadequate on the one hand and misdirected on the other. There are several thousand new school leavers yearly, yet a deficit of skilled persons persists.

The nomadic dispersion of people makes it very difficult to extend schooling to most school age persons. The per unit cost of education is accordingly high (estimated at $180 per pupil per annum in primary school, and $760 at the secondary level). Extra expenditures on education have a much less than

proportionate effect on the output of trained persons. Furthermore, the curriculum is not set up to interest students in rural problems. The problem is recognized, but even with every good intention it will take years to reconcile.

At the present time, the Mauritanian farmer is unlikely to have very close contact through formal institutions with his government. Even where such contacts exist government has little to offer, neither technology nor support. An indigenous farm research system scarcely can be said to exist.

V. PRICE AND MARKET POLICY

The Government of Mauritania attempts to place controls on prices of foodstuffs, however, in practice such controls are of no consequence inasmuch as the Government has no means to administer or enforce these controls. Similarly, no marketing organization exists to store, move or distribute domestically produced cereals. An organization does exist, SONIMEX (Societe nationale d'importation et d'exportation), which among other things attends to the importation of rice.

The Government would like to establish price controls and a market system for cereals. But until adequate staff and facilities can come into being, this must remain a remote hope. Some scope exists for a more decentralized price and marketing policy based on the regional administrative level. This opportunity will be revisited below.

VI. POLICY OBJECTIVES IN THE RURAL SECTOR

The Government of Mauritania seems most concerned about the immediate rehabilitation of its drought-uprooted people. Little long-term thinking appears to have been undertaken, but that which has suggests schemes far beyond the country's present ability to cope, even with donor support and which have more than a few indications of the political flavor of the ethnic division of the country.

There seems little doubt, for example, but what official Mauritania looks upon the Kaedi-Kiffa-Nema axis as the focus of their long-term development. Irrigated areas will be brought into being along the Senegal as the OMVS program proceeds, but the intent seems to be to do this in association with and after the dryland areas begin to make progress. The attempt to build a road along the millet zone axis is a case in point. Part of this thrust seems to stem from a determination to turn away from the former orientation towards Senegal, towards the sea and the Arab world, even at the loss of short-term development.

Present development strategy, such as exists, appears to emphasize a decentralized approach with the emphasis towards the millet belt. The government is calling for donor-support to drill wells in this zone. Some

thought seems to be given but few solutions have been put forward to the problem of human and animal concentration around these new water points. For instance, at present government and evidently herders want to reconstruct herds.

A decentralized approach to programs in the sector makes sense in that what administrative strength exists in the country seems to function at local levels. One or two of the southeastern regional administrations seem particularly strong by Mauritanian standards. The approach also makes sense given the extreme lack of national integration, weak even by African standards. Such programs as can be mounted will have to derive from a regional base and be limited by their constraints. Such an approach will fit in well with any scheme of small locally integrated projects such as are being proposed by other donors, most notably the UNDP.

Although Mauritania is critically short of cereals, this need is not reflected in sufficient effort to develop areas where large early returns could be expected, specifically along the Senegal River. Mauritania will not benefit from the delta dam immediately. However, (and we are speaking five and more years in the future), some 30,000 hectares, double-cropped, are potential. Perhaps 4 to 8 thousand hectares could come in earlier. This, added to the 20,000 irrigated hectares now in production, could provide considerable quantities of rice. In addition, there is some hope of constructing a dam to irrigate some 12,000 hectares in the Gorgol Valley northeast of Rosso. Schemes of this sort separately or in total must give pause when the poverty of means to exploit such projects on the part of Mauritania are considered. Lacking infrastructure and personnel, in fact even lacking enough to meet present needs, how can any expansion be serviced? Worse, there does not seem any appreciation of the magnitude of this problem by the government.

A number of small irrigation projects along the river could be easily brought into being if roads were built. Or, better use could be made of the river area through the installation of various types of low lift water irrigation operations. There does not seem to be any sustained or sufficiently organized interest in such proposals.

Even were the funds and personnel available to put irrigation schemes in place today, it is doubtful whether the present market structure could move the resulting tonnages of cereals, or domestic cash markets rich and large enough to absorb them. Transport costs will have to be brought down but in the meantime efforts must be made to store locally.

In the extensive areas where mixed dryland and animal systems prevail, many simple innovations are needed to buffer production and to increase it. Apart from the provision of wells, some local storage, the supply of seed and provision of draft energy (in those few cases where it is economically supportable) no new investments into a future stream of suitable technology

is being either made or investigated. Truly imaginative interventions by donors are badly needed.

VII. DONOR OPPORTUNITIES

A donor agency such as AID could play a useful role in a large number of developmental theatres in Mauritania - the breadth of need is so great that almost any initiative would serve some purpose. However, several opportunities are salient. These include: 1) training at all levels of government including the provision of facilities and curriculum; 2) cheap lowlift irrigation technologies; 3) applied research in dryland farming; and 4) support in the creation of grain support schemes. Given the dimensions of the Mauritanian problem, it would seem prudent to focus any effort at very local levels in particular areas.

Training is so fundamental that it invites as much effort as can be given by donors. The long-run payoff to training can be large and of long duration. In Mauritania the problem is so basic that it transcends the teaching of skills to a few selected persons to include the evaluation of the entire educational system. For one thing total volume of students finishing school must be enlarged. Second, the utility of what they learn needs to be improved to conform with job opportunities and developmental needs. Third, the payoff to a student's efforts in critical fields such as agriculture must be made clear, prompt and adequate. Status must be given to agriculture as an area of specialization. In addition to students, training should be given all levels of government persons. This can be formal or on-the-job as circumstances dictate and permit. It can be done in short courses, by seminar, or even by example as participants in teams. Finally, farmer training should not be neglected. Simple production skills, ones that produce, reduce waste or improve efficiency, should be taught. Such teaching, however, will be predicated on practical research into farm problems at the farm level and with farmer participation.

Technologies suitable to the extremely low economic level of Mauritanian farmers will have to be developed. It is entirely likely that it will be impossible to devise systems which are technically feasible, profitable, and of acceptable risk levels to satisy more than a fraction of these farmers. Criteria for farm viability have to be prepared. The farm target groups must be identified, their needs and potential evaluated and methods to reach them explored.

It is clear that farmers near to rivers need cheap pumping systems. Just what form these might take is uncertain. Probably the gasoline engine is not viable given its need for fuel, parts and services. Perhaps animal, wind, or even solar-driven pumps may be suitable.

Dryland technology, suitable for the especially rigorous conditions present in Mauritania must be explored. New crops (such as wheat), new rotations, new mositure conserving systems, better crops, all must be studied. It is

not likely that draft power, at least with oxen, will be profitable in the driest zones. This must be measured. Cultivation research must be carried on in concert with environment, and research, with the object of at least preserving what cannot be improved.

If cereal production is to be eventually put on a commercial basis, at least for some fraction of farmers, then a system of buffer stocks and price support must be devised. Given the unintegrated nature of the country, it is possible that local programs around important cereal consuming towns should be attempted. These might center in places such as Nema, Kiffa, Kaedi, Rosso, etc. Until improved transport becomes available, it is not likely that millet could be moved in significant quantities between such points. Local buffer stocks would have to be established. Given the small size of these markets and the likely very inelastic nature of demand for these staples, stocks need not be large. Adequate reporting systems will have to be devised, prices made known, funds made available for year-round purchase and facilities put in place. Related to this, and of great importance, buffer stocks could be part of pre-positioned contingency stocks, which stocks could help reduce the inequitable regional distribution of foods between deficit and surplus areas. At present, the Chinese, FED, the UNDP, and other donors are working along the river in irrigation projects. Project sites however have been small and scattered, except for the Chinese effort at Rosso, raising costs and compounding transportation problems. FED and IBRD are now working to consolidate their projects, starting with areas of 200-400 hectares but at Gorgol hoping to expand to 6,000 over time. Small irrigation perimeters schemes are certainly needed and could have a high return, if properly located and organized. Some important preconditions to their success need to be provided by the government: roads and supporting services. At least at an early date it is believed that political and other considerations might preclude their being made available. This should be the object of attention in any efforts along the river.

MAURITANIA

LIVESTOCK SECTOR ASSESSMENT

Introduction

This section addresses the status and potentials of livestock industry of Mauritania.

Animal production is the mainstay for about 70 percent of the population of Mauritania, accounts for about 75 percent of the value added of the traditional sector of the economy, and produces about 27 percent of GDP. Grazing is carried out on about 300,000 Km^2 of natural pastureland in the southern part of the country; an estimated 60 percent of the rangeland remains unused because of lack of reliable water supply.

Estimated numbers of livestock appear below:

Esimtated Numbers
(1000 head)

Kind of Livestock	1967	1968	1969	1970
Steers	2275	2500	2000	2000 or less
Sheep and goats	6550	6700	7000	7000
Camels	710	720	720	700
Horses/donkeys	280	300	300	

FAO estimates that only 500,000 head of cattle remained as of April 1973. The decline is due primarily to the drought.

It is estimated that in 1971 Mauritania marketed about 130,000 steers, 900,000 sheep and goats and 30,000 camels for both domestic and export consumption. The estimated annual off-take in 1972 was about 240,000 head of all types of cattle, 2 million sheep and goats, 65,000 camels. About 45-50 percent of the above were exported as live animals.

Livestock prices in 1972 were at CFAF 70-80/kilo carcass weight for cattle and CFAF 100-120/kilo carcass weight for sheep and goats. Current prices are slightly lower due to large sell-offs caused by drought conditions.

Stock raising is virtually the only means of support for about 70 percent of the population. Milk produced from the animals enables the herders to subsist between marketing periods both via direct consumption and as a medium of exchange for obtaining millet. Data from 1971 suggest a maximum per family annual income of about CFAF 69,000 from stock raising in Mauritania.

Background and General Program Observations

Although livestock production is significant in the national economy of Mauritania and dominant in the agricultural sectors, the central government has not evolved a firm high priority for either general or specific agricultural development in either crops or livestock. It appears at present that agricultural development is preceded by expansion of the mining industry, construction of a major hard surface road from west to east, expansion of port facilities and securing a dependable supply of water for the capital city.

The share of public funds allocated to agriculture by the Mauritanian government has been nearly constant for the past 7-10 years, 2-3 percent of the national budget. This means that, although the absolute monetary amount to agriculture has increased, agricultural support has not kept pace with support for non-agricultural activities and development.

The Ministry of Agriculture is currently in the process of developing a comprehensive crop and livestock development plan. But, it acknowledges that the first and highest priority is toward activities which will have a rapid payoff in terms of more food, i.e., food grains and vegetables. This priority is represented in the government's objectives of agricultural development:

1. To establish the security of the peasant's income by providing access to new food crops;

2. To develop a system of agriculture not as dependent on random elements of the climate as that which now exists; and

3. To provide for maximum use of underground water to produce more food.

Although national policy in Mauritania does not currently assign top priority to livestock development activities, they are recognized as relevant to balanced agricultural development. There are large areas of natural grazing lands, most of which are utilized in traditional ways by nomadic herdsmen. Other lands near the Senegal River have considerable potential for crops with livestock activities potentially being organized on more marginal lands around cropping areas.

A clear statement of high priority for agricultural and livestock development by the national government is necessary before such improvement can be expected. Associated with such a formal commitment should be a carefully prepared totally integrated national and sectoral development plan. Such a plan does not exist at present. It seems blatantly

premature to initiate long-term projects in the absence of a clear specification relationship of such activities to development programs in other sectors and national development objectives.

Livestock production is currently dominated by nomadic and transhumant production systems. Villages and towns are surrounded by sheep and goats kept for both milk and meat. Cattle owned by more sedentary farmers are seldom kept in close proximity to the village except during periods after crop harvest when crop residues are available for livestock feed.

The central zone of Mauritania has been designated by the Ministry of Agriculture as an area suited primarily for extensive livestock production depending on available water sources. The Senegal Valley is primarily for cereal and fruit vegetable production with livestock being kept on the transitional zones between the crop area and the arid interior. The government does not anticipate livestock development in the date palm zone.

The administrative structure of the government is extremely thin and the supply of administrative personnel inadequate. One individual is often observed to hold several positions of major responsibility. The work load often exceeds the capacity to deliver. The supply of technically trained talent is very low and in many areas non-existent. Consequently, the organizational and administrative capacity is inadequate to absorb, plan and implement any major programs for livestock development at present.

Governmental officials in Mauritania indicated severe limitations in the following areas:

1. trained administrative and technical personnel

2. finance

3. organization infrastructure to efficiently exploit existing financial resources

4. social infrastructure capable of absorbing change.

These limitations have severely hindered continuation of numerous agricultural and livestock development programs which have been initiated in the past.

Several international donors (FED, IBRD, FAC, FAO, USAID) are active in Mauritania. All are concerned with evaluating past efforts and designing livestock programs which will develop into the foundation

for more complex long-term development programs. FED is particularly active in the area near Selibaby, where the AID project is planned. Donors should be continually encouraged to coordinate their activities to prevent wasteful duplication of effort.

The major AID livestock-oriented development activity planned for Mauritania is in the area around Selibaby. The development approach in this area is generally for controlled rotational grazing of natural pasturelands. It is anticipated that major emphasis will be on developing an efficient useable system of range management relevant to existing native species of plants and animals. Of course, other factors are included such as water supply, animal health, etc. Emphasis on native species is appropriate based on the limited knowledge concerning the adaptability of various potentially imported species. However, it must be emphasized that very little is known about potentials of existing species. Demonstration and applied practical experimentation is needed to establish even the most basic understanding of the native environment.

Local village officials appreciate the opportunity to demonstrate the value of well-managed pasture and water supplies to local herdsmen. However, many expressed doubt that the social and governmental infrastructure are adequate to allow for wide adoption of controlled grazing systems. For this reason, AID is proceeding slowly with the Selibaby project, with an extended study and design period focussed on sociological, ecological and technical factors. The results of this study should determine the bases for further efforts in range management and be of value to the GIRM in developing a range policy.

Mauritania supplies live cattle to Senegal and often to Mali (normally over 100,000 head annually). Cattle movements from Mauritania to other countries are often unrecorded (unofficial, illegal, non-taxed). This type of activity is of concern to government officials because of the lack of revenue received from the "head" tax on animals. Mauritania herders continue to be eager to sell their cattle in Senegal because of price differences. Prices in Senegal are typically higher than in Mauritania. (CFAF 30-40 equivalent in Mauritania vs. CFAF 500/kilo in Senegal.) In addition livestock producers indicated they preferred to sell their animals in areas which provided easy access to various necessary consumer goods and services. Such goods and services are generally not available in Mauritania.

Another factor encouraging sale of animals to other countries is the international currency situation. Mauritanian currency (Ouguya) is not recognized in surrounding countries nor are CFA legal tender in Mauritania. This combined with a general scarcity of consumer goods and services provides continued motivation for contraband sales to other countries.

The Government of Mauritania needs to design policies and programs in consultation with producers and traders which would increase the incentive for sale within Mauritania. Price policy may need changing and some provision for reasonably priced adequate supplies of consumers goods and services will be necessary. Market (price) information must be readily available to all in the market system.

Consumers who purchase beef in the market in Mauritania generally face quite high prices especially in the capital city. Beef at one market was selling for about CFAF 450-500 equivalent in October 1974. Prices of meat in rural villages were lower but considered quite high in view of the low income position of most consumers. These price situations result in part from the export orientation of the Mauritanian livestock industries and the government's need for foreign exchange. Of course, much of the meat consumed internally is obtained in a barter economy and cash prices have only modest relevance.

Productivity of the national cattle herd in Mauritania was low prior to the recent drought:

Calving percentage	45-50%
Death loss during 1st year	30-40%
Age at sale	7-12 years
Live weight at sale	300-350 kilo
Dressing percentage	40-50%

There is little doubt that recent drought conditions have caused a decline in these already low productivity indicators. The annual pre-drought off-take was 8-10 percent.

Return of more nearly normal rains may allow reestablishment of basic herd productivity levels in a relatively short time. Some herders indicated in October 1974 their intention to build her numbers back to near pre-drought levels. However, no evidence exists to suggest any basic change in production systems. Of course traditional production systems are necessary at present because of the limitations described here.

The current crisis situation in Mauritania with respect to basic food supply has overshadowed concern for the livestock industry's long-term viability. It is highly probable that activities of USAID over the next five years will of necessity be a series of short run R and R type projects to show up various obvious problems while at the same time

providing the basis for formulating and eventually implementing long-term livestock development programs. Examples of these activities include continuation of support for animal health programs, additional water sources, rebuilding spreader dams and selected small scale research and demonstration programs in livestock and range management and reforestation programs. Support for training of Mauritanian technicians and provision of support for generation of current reliable agricultural statistics and resource information is absolutely essential.

The "state of arts" in Mauritania's livestock industry is low. Detailed information on all facets of activity is inadequate as is the understanding of the social and cultural system to suggest rapid implementation of well-adapted livestock production-marketing systems. Efforts to create such information and understanding should begin now in association with each of the short run activities undertaken given a governmental commitment to livestock development. Assuming these short-term activities are successful and provide the necessary foundation longer-term programs could be developed to provide water sources for more commercialized livestock activities such as feeding by small-holders. Perhaps it may eventually become possible to stratify the livestock industry into breeding areas and growing areas in conjunction with controlled land and water utilization schemes. But, at present too little is known to specify the characteristics of long-term programs.

MAURITANIA
EDUCATION AND HUMAN RESOURCES SECTOR ASSESSMENT

Many Mauritanian officials characterize their country's "enormous" lack of trained personnel as "the big limitation" to rural development, preceding the lack of water, arable land, and capital as Mauritania's prime problem.

Mauritania is particularly hard pressed to find skilled manpower for rural development. Present officials in government generally are too preoccupied to spare time for upgrading in the skills required for peak performance. Supplies of newly trained Mauritanian professionals for rural development are meager. Expatriate technicians of adequate quality are difficult to attract in sufficient quantity to staff even those projects which have been already approved and funded.

Nor did Mauritania's particularly acute shortage of rural development skills appear amenable to resolution in the foreseeable future. Three essential conditions for supplying adequate manpower for rural development are missing.

First, at the time the DAP team visited Mauritania in November 1974, there still had not been declared at the highest levels of government a commitment to take up the challenge of rural development as Mauritania's first and overriding national objective. Rural development appeared to take second place to port and highways expansion and industrial developments, each with their own special demands for skilled manpower. Without an unmistakable resolution to develop the rural areas as the country's top priority, the necessary funds, skills development, and staff motivation would be slow in coming.

Second, and as a partial consequence of the first, planning for rural development is inadequate. No national plans which command an agreed upon level of funding exist for rural capital development. No accepted manpower plan whatever appears to exist. Various planning offices have been established (e.g., the educational planning units in the Ministry of National Education and in the National Pedagogical Center) and expatriate planning officers have been provided (including a Canadian team). But none have enjoyed the full top-level support which is required both to draw up realistic and comprehensive plans for rural development and to have them command adherence. Without comprehensive planning, training for rural development is bound to be disjointed and retarded.

Third, as a concomitant of these deficiencies in commitment and planning, Mauritania's system of education for rural development is extremely thin and ill-adapted. The traditional Koranic system, which is well attended (60 percent of primary age population), has not incorporated modern

knowledge, although the government (with IBRD assistance) is eager to see what may be done to modify or supplement Koranic schools to encourage them to become vehicles for modernization.

At the same time, the formal education system (seven years primary school, four years lower secondary, and the three year lycee) features one of the most narrow-based, costly operations on the African continent. At the primary level, only 15 percent of the 6-13 age group are enrolled, while unit costs are in the neighborhood of $195 per annum (contrasted with about $37 per year in Mali). Primary education is oriented towards white collar occupations. A 1971 UNICEF study revealed that few primary graduates are found in the interior villages of Mauritania.

The only institution in Mauritania supporting crop and livestock production is the Center for Agricultural and Extension Training at Kaedi. The Kaedi Center enrolled 60 students in 1973; 76 students had previously graduated, all of whom have been employed by the Ministry of Rural Development (50 as agricultural agents). Kaedi offered programs at two levels: a three-year program for primary school graduates, and a middle-level extension program, recruiting at the lower secondary school-leaving certificate level.

The Ministry of Rural Development has been keenly disappointed with the graduates of Kaedi, which the Ministry believes to be too young, too theoretical in their approach, too poorly motivated, and too little oriented in their training towards the irrigated crop areas in which the future of Maruitanian agriculture is believed to lie. On the other side, the school's efforts have been hampered by the quality of students sent to Kaedi. There are often drop-outs or difficult students from other institutions whose motivation are questionable. In 1972-73 an FAO expert redesigned the Kaedi program in an effort to meet these misgivings and to reduce unit costs ($2,140 per year). But in interviews with representatives of the DAP team in November 1974, Ministry of Rural Development officials appeared far from confident that the Kaedi Center can produce the mature, practical extension workers which Mauritanian agriculture requires.

No other Mauritanian institution train specifically for rural development, although some schools (e.g., the National School of Administration, the vocational schools, and the National School for Commercial and Family Education) do offer some course work which has direct relevance to rural conditions. Much of secondary education of whatever nature, however, is academically oriented and is devoted to the reinforcement of general skills inadequately grasped at the primary level.

Recommendations

It is recommended, first, that the U.S. assist the Mauritanian government in establishing a regular, annual, out-of-country degree training program designed to provide post-secondary level training in key skills related to government employment in rural planning and development. Training would be conducted at those institutions in the francophone African area -- to include perhaps Hassan II Institute in Morocco -- which are best adapted to provide the skills required, or at out-of-Region institutions (including U.S.), if appropriate. The program should begin at very modest levels, about 3-5 participants per year, until methods and criteria for selection are well established.

In designing this degree training program, Mauritania (with U.S. assistance) should review the advantages and disadvantages of the training of some half-dozen Mauritanian participants already funded by A.I.D. Those designing this training program should also review the kinds of higher education which some 300 Mauritanians receive abroad elsewhere each year (about 50 percent in law and arts subjects). For the purposes of this program, training should be considered in management areas (e.g., financial management, purchasing, merchandizing) as well as in the standard technical areas (e.g., irrigation, mechanics). Of course, training for rural development need not be limited to agriculture alone.

Second, it is recommended that the United States assist the Mauritanian government to consider means of providing intensive short-term training courses for key officials professionally concerned with rural development activities. These courses may be conducted within Mauritania through PAID, CAFRAD or other regional institutions, or outside Mauritania in relation to organizations with special importance to Mauritania (e.g., regional agricultural research institutes).

MAURITANIA

HEALTH SECTOR ASSESSMENT

1. Major Health Problems

The population of Mauritania includes a majority of nomadic herdsmen and a minority of sedentary farmers. This makes the establishment of social services very difficult.

The major health problems of Mauritania include malnutrition, malaria, schitosomiasis, venereal diseases, tuberculosis and leprosy.

Malnutrition: The general state of nutrition in Mauritania, which was never good, deteriorated considerably during the drought. While it is reported that Kwashiorkor and marasmus are not commonly seen in normal times, this must be qualified by the fact that there are only a few people in the country capable of seeing and recognizing such cases. Ordinarily, the milk diet of the nomadic pastoralist may prevent or limit to some degree the extent of protein malnutrition in children; yet, being the child of a nomadic herdsman is no quarantee that milk is always available in sufficient quantities in the udders of cows and goats. Neither is it a protection against the diarrheal diseases which result from drinking unsanitized milk. In areas of sedentary settlements, even in normal times food supplies are scarce. Since the drought, cases of marasmus, kwashiorkor and avitaminosis (especially vitamin A deficiency) have been reported.

In 1974 a U.S. epidemiologist conducted a rapid nutrition survey among nomadic and sedentary children aged 6 months to 6 years, based on height and weight measurements. Using the Stuart-Meredith height-for-weight norms as median reference values, the researcher determined that children with height-for-weight ratios which fell below 80% of the median reference value could be considered malnourished. Rates of malnutrition varied from region to region. Among the nomadic children, the highest rates were in Regions VI, II, and IV and in Nouakchott, while among sedentary children, the highest rates were in Regions I, II, IV and V. On an overall basis, the percentage of children falling below the standard was the same for both groups (10.7%), but compared with the findings of a similar survey conducted in 1973, the status of the sedentary children had deteriorated while that of the nomadic children had improved.

The future of the nomads is not yet clear. Thousands lost the animals on which they depend during the recent drought and hence congregated around fixed settlements where food and water were distributed by the Government. Many seem to have resumed their usual trek as the 1974 rains appeared to normalize. Nothing is really known as to the percentage that have decided to remain in encampments on the outskirts of towns.

To accommodate some 30,000 nomads who have remained around Norakchott, the Government of Mauritania (GIRM) has decided to create an 8th arrondissement in the capital city. Streets will be marked off, water piped in, and allocations of land made to the families involved, who will be encouraged to become truck gardeners.

Malaria: Next to malnutrition, malaria is probably the most important disease in Mauritania. It is endemic along the northern bank of the Senegal River wherever the vector (mostly *Anopheles gambiae*) finds ecologically favorable breeding places. It is rare or absent in the dry areas of the north.

Schistosomiasis: This disease is also prevalent along the banks of the Senegal River and its affluents, wherever conditions are appropriate for the snail intermediate host.

Venereal Diseases: Syphilis and other venereal diseases are prevalent throughout the country.

Leprosy: About 7,000 - 8,000 cases of leprosy have been identified, indicating that this disease is still relatively prevalent.

Tuberculosis: In spite of a BCG vaccination program, tuberculosis is widespread. The exact situation is not known, however, because the nomadic life-style of the population prevents a proper testing of the degree of immunity acquired. Crowding in tents, dependence upon milk from animals who may be infected with tuberculosis and brucellosis, absence of water for cleansing bodies, clothing and household utensils promote the spread of the disease.

Measles: Although recent vaccination campaigns against measles have reduced the size of the susceptible population, the disease is still reported to take a heavy toll of infants. As in other countries where supplies of vaccine fail or where the cold chain is inadequate, the risk of reconstituting a large group of non-immune children is present. The rates of prevalence (cases per 1,000 inhabitants), incidence (new cases per year), and mortality concerning measles and other transmissible diseases are uncertain because of the lack of adequate statistics.

Diarrheal Diseases: The pollution of milk, water and objects used in the feeding of infants causes many diarrheal diseases which weaken the child's system and contribute to the high infant mortality rate.

Other: Skin diseases of various origin, trachoma, and night blindness due to vitamin A deficiency are common.

2. Health Infrastructure

According to the Minister of Health, Mauritania's present health infrastructure covers only 40-45% of the country's population, and this is probably an optimistic appraisal. From all reports, the nomadic population is practically untouched by the delivery system.

Mauritania is divided into 8 regions, each with a circonscription medicale, or primary health center, located at the regional capital (Nouadhibou, Rosso, Atar, Aleg, Kaedi, Kiffa, Aioun-el-Atrouss and Nema). In addition there are circonscriptions in the towns of F'Derick, Akjoujt, Boutilimit, Boghe, Tidjika, and Selibabi, and there are three in the national capital at Nouakchott, making a total of 17 centers. Only four outside Nouakchott are reported to have electricity (Rosso, Kaedi, Boutilimit and Aleg). Each circonscription medicale is said to have at least one general physician and usually three who practice curative medicine and surgery. The chief physician of the region is responsible for overseeing the lesser health posts in his jurisdiction, but supervision is reportedly weak.

Eleven of the circonscriptions have mobile teams which deliver services to the surrounding settlements. These mobile teams number 13 and work out of Nouadhibou, Rosso, Atar, Kaedi, Kiffa, Aioun-el-Atrouss Nema (2), Boghe, Tidjikja, Selibabi and Nouakchott (2). Each is staffed with 1 state nurse, 1 nurse's aid, and 1 driver. The vehicles deteriorate rapidly and the problem of their maintenance is a major one.* Moreover, they need fuel which is scarce and expensive. UNICEF has approved a project to create 13 additional teams but implementation is hampered for lack of personnel to staff them.

The major effort of the mobile teams is to protect the population against transmissible diseases through vaccinations using pedojets supplied by the OCCGE. About one-third of the pedojets are not operating properly, but OCCGE has just provided 13 new ones. Since the drought, the mobile teams have distributed vitamins. During three weeks out of each month they make the rounds of the departments. During the week spent in the regional capital they provide vaccinations to the towns people. The two major problems confronting these mobile teams is the maintenance of vehicles and the conservation of heat-sensitive vaccines. They use an icebox to keep the vaccines cool, but this cannot be very effective since it is unlikely that ice is available along their mobile routes. This illustrates the problem of the cold chain which is vital for "fragile" vaccines. An in-depth study is suggested for each region since circumstances

*In an attempt to solve the maintenance problem, UNICEF has funded a project to establish a vehicle maintenance training center at Nouakchott.

and distances differ. It was suggested that a supply of gasoline-operated small refrigerators be given to the mobile teams but the establishment of a network of fixed stations to resupply the teams seems to be preferred by the authorities, even though electrical power is not available everywhere.

Each region is divided into departments and each department is said to have at least one rural dispensary at the Chef-Lieu (major town), headed by a state nurse. A rural dispensary usually consists of three-to-four rooms, often without windows, generally dirty and in bad condition. The dispensary include general medicine, dispensing of drugs when available, elementary surgery, elementary dentistry. The staff could probably handle 125-150 consultations per day, but due to the lack of drugs, handle only 30-40. Eighty percent of the staff's time is spent on cure and care. Preventive medicine, such as it is, is usually administered by the lowest level nurse. Little medical history is recorded. WHO has a demonstration zone in the southern part of the Sixth Region to promote better record-keeping.

A typical rural dispensary is very sparsely furnished. It has some equipment provided by UNICEF (scales, equipment for giving shots, etc.), but it is not well cared for and must be replaced every 2 or 3 years. Only four are well-equipped and well-maintained. The storage rooms are poorly organized and there is no general bookkeeping with the result that supplies are often depleted before an order is placed for replacements.

The departments are in turn divided into arrondissements, each with a medical post equivalent to a first-aid station, staffed by one practical nurse.

The system of maternal and child health centers (PMIs) is not well-developed in Mauritania due to lack of personnel, primarily midwives. There are 12 MCH centers located in urban settlements (Akjoujt, Atar, Mouakhibou, Nouakchott, Mahsar, Mederdra, Boutlilimit, Boghe, Kaedi, Kiffa, Aioun-el-Atrouss and Nema), but none serve the countryside. The MCH centers are reported to be better run that the dispensaries and are generally cleaner, although smaller. The MCH center is usually headed by a midwife. Few midwives are Mauritanians; some are Senegalese, many are Guineans. The midwife is usually assisted by a nurse, nurses aides, and orderlies. Activities include pre- and post-natal care, distribution of medicines, nutrition demonstration, hygiene education, and some home economics. Consultations generally average 100-150 per day. A system of health cards is sometimes maintained, including vaccination records and growth curves for babies.

There are seven Government-operated hospitals in the country, one each at Nouakchott, Atar, Kiffa, Selibabi, Aioun-el-Atrouss, Nema, and Kaedi. A hospital is being built at Rosso and the Chinese are reported to have agreed to build new hospitals at Nema, Aioun-el-Atrouss, and Selibabi starting in 1975. There are a few private hospitals run by charitable

organizations. The Nouakchott Hospital is appallingly dirty and miserably maintained. It was designed for 125 beds but is now sheltering 250 patients who are tended by their families. There is no isolation ward for infectious diseases, no pediatric ward, and no TB ward. The nursing school is in the same compound. If nursing trainees get their practical experience at the Nouakchott Hospital, it is no wonder that the level of nursing in peripheral hospitals and rural dispensaries is low and inefficient.

The Pharmacie d'Approvisionnement is in charge of coordinating distribution of all pharmaceutical products received or purchased by the Government from all sources. The pharmacy is run by the only trained bio-chemist in the country. There has been no interest on the part of the Government in training other pharmacists, although there is a need for intermediate level personnel who could probably be educated in Nouakchott or Dakar. States nurses do receive basic training in pharmacology and bio-chemistry.

The central pharmacy has a cold chamber, but outside Nouakchott only refrigerators are available. Each circonscription medicale has a gasoline-powered refrigerator donated by WHO. Most medicines are transported by trucks supplied with ice. Sometimes deliveries are made by air.

The central pharmacy tends to allocate anti-malarial drugs equally throughout the country, with the result that the dry areas where no malaria occurs have an excess supply, while the river settlements where malaria is a serious problem, are always short.

3. Personnel Availability

At the present time, there are 413 trained health personnel working throughout the country. These include 108 state nurses, 115 licensed nurses (brevetees) and 151 aides. The rest are probably orderlies, janitors, etc. A state nurse must have completed a secondary education before going to nursing school and must pass a competitive examination in order to receive a diploma. A licensed nurse needs only six years of schooling. Of the registered state nurses, 27 percent are involved in patient care, 25 percent in other curative medicine activities, 1 percent in teaching, 2 percent in preventive medicine, and 46 percent in administration. Some of their duties include abcess incisions, stitching, catheterizing and circumcising.

The School of Nursing, located on the grounds of the National Hospital in Nouakchott, trains both state nurses and licensed nurses. It has been in existence since 1966. Prior to its opening, state nurses were trained at Dakar or Tunis and licensed nurses were trained at St. Louis in Senegal. Every 2 years the school graduates about 20 state nurses and 25 licensed nurses. Practical training is carried out in the mornings and courses are given in the afternoons. In the summer, they intern at the Rosso Medical Center (funded by WHO). After the first and second years nurses spend 45 days in the Service Sanitaire and are taught to do some of the things a doctor is supposed to do in order to be capable of replacing one.

There is a shortage of sanitarians and laboratory personnel and no school for training either type of worker, but there are plans to create a National Hygiene Center at Nouakchott. The Government hopes that China will finance the construction costs and that UNICEF will provide the equipment, but no donor is yet committed to providing assistance with curriculum development and actual instruction. There is a great need for local sanitary agents since the mobile teams visit the villages only once or twice a year. UNICEF has been asked to support the training of laboratory personnel.

The Minister of Health has indicated that he would like to give short-term training to traditional matrones to improve their practices but is afraid of "officializing" them. The DAP team suggested that in view of the dire shortage of trained midwives and the time it will take to work up a satisfactory corps of qualified midwives, it would probably be worth the risk, provided the training were followed up by adequate supervision to make sure that the matrones maintain the desired standard. The Minister was very receptive to this suggestion and said he was prepared to contribute materially to the development of such a project. The government plans to establish a School of Midwifery at the Nursing School with the help of WHO, but the lack of instructors stalls the project.

4. Summary of Sectoral Constraints and Causes

The problems faced by the GIRM in modernizing its embryonic health service are by and large similar to those described for Senegal only more so:

- Inadequacy of the health infrastructure
- Lack of planning capability
- Lack of adequately trained personnel
- Heterogeneity of the existing episodic projects which the Ministry of Health does not really coordinate
- Harshness and hostility of the environment
- Lack of a sage, regular drug supply

5. Government Plans and Priorities

Health plans, if they exist, are extremely fluid and in spite of some insistence could not be formulated in a cohensive fashion by the Minister of Health or his Director of Health. This should not be construed as meaning that nothing can or should be done. At present, the GIRM seems to base its plans on what it can obtain from donors, accepting what is firm, trying to firm up what is vague. The Minister of Health and the Director of Health both expressed concern over the needs of the nomadic population and the rural sedentarists, but they do not seem to have any concrete and systematic program in mind.

The Government is alert to the importance of nutrition. The regional organization ORANA (Organisme de Recherche sur l'Alimentation et la Nutrition en Afrique) has been requested to conduct periodic surveys among the population to enable the Government to keep track of the nutritional status. The Minister of Health concedes that everything remains to be done in the field of nutrition and expressed the wish that a Mauritanian institute of nutrition be created so that there would be a national agency occupied fulltime with the problem of Mauritania rather than having to rely on ORANA. He was not put off by the prospect that creation of such an institute would be costly and would take at least five years, considering that the country at present has no trained nutritionists and few laboratory personnel. He indicated that his Ministry was ready to contribute up to 120 million CFS francs ($550,000) for such a project.

The Minister also wants to establish a system of rural pharmacies, even though transportation and logistical problems have not yet been solved for the pharmacies which already exist.

Agricultural plans impinging on the health sector include proposed projects to husband and expand water resources. As in Senegal and elsewhere, these run the risk of providing the ecological setting for the spread of transmissable diseases.

6. Evaluation of Government Plans

The main criticism that can be made of Health planning in the country is that there seems to be no plan at all. Proposals are accepted or rejected on their prestige merit (with preference given to building hospitals) more than on their adaptability to the country's overall needs and their feasibility. There are, nevertheless, some expressed intentions which are worthy, such as the desire to expand services to the nomads and rural sedentarists and the concern for nutrition, but implementation of these intentions requires some imaginative approaches in view of Mauritania's transportation and environmental problems and the life-style of the population. The plans to develop water resources contain no provision for dealing with the health ramifications of such projects.

7. External Assistance

Coordination between donors should be achieved to lay foundation of a reasonable system of health services. The following non-U.S. assistance is already on-going in Mauritania.

WHO and other donors (mainly FED) are expected to sign a new project agreement, the long-term objective of which would be to train personnel to provide medical health services all over the country. The short-term objective would be the addition of a midwife training school at the present School of Nursing. Midwives would receive state diplomas. In-service training (recyclage) would be provided for graduate nurses. The Government

would train on scholarship each year two Informieres monitrices principales whose role would be to contribute to studies, planning, etc. A Sage-Femme Nationale would also be chosen. The goal of the project would be to graduate 20-30 state nurses, 10-15 midwives and 30-40 infirmieres brevetees every two years. WHO would pay the salaries of the monitrices, provide money for teaching materials, and be responsible for all technical assistance. The Government would provide locales, materials, a National Midwife to teach, transportation, fuel, postage and telephone, offices and furniture.

WHO has had fairly successful vaccination programs (smallpox, TB, measles) by sending mobile teams out to watering holes where nomads camp, and the Organization has established some services in Nouakchott and Rosso. In Rosso medical dossiers have been introduced at the dispensary and codified for possible future computerized analysis and an attempt has been made to develop family dossiers with the help of four French doctors. The maintenance of these dossiers, however, is the responsibility of the nurses and results are generally unsatisfactory.

Overall, WHO's functions are: to keep medical statistics so far as is possible, to contribute to sanitary and nutritional planning, to instruct and supervise the MCH centers. WHO provides vehicles, refrigerators, tents, and medicine for the mobile teams, which it also helps supervise. A close cooperation with WHO might become a fruitful field for USAID activities.

UNICEF has supported a rural health project in cooperation with AID, which is aimed at creating 13 new mobile health teams and strengthening the 13 existing teams. UNICEF will be involved in the formation of the 13 new teams while AID is purchasing medicines, land rovers, and tires for the existing teams. UNICEF has also provided vehicles so that head physicians in the regions can get around to visit their perpheral health posts but the supervision of the dispensaries remains poor. UNICEF supplies equipment for the MCH centers and replaces it when worn out.

Communist Chinese medical teams are working in Regions I, II, and III, operating the hospitals in Nema, Kiffa, Aioun-el-Atrouss and Selibabi. The do everything themselves, supply their own medicines and equipment, and provide little or no training for the Mauritanians. They do not speak French or Arabic and hence work through an interpreter whose command of the local language is said to be inadequate. Language can be one of the reasons for their completely closed circuit type of operation. The Chinese Government has agreed to design and construct the proposed National Hygiene School as well as three new regional hospitals (At Nema, Aioun-el-Atrouss and Selibabi).

The UNDP has been involved in a nutrition program for 10 years which apparently has not been very successful and is currently being reevaluated.

The FED financed the construction of the Nursing School and National

Hospital in Nouakchott and is about to support the construction of an extension to the hospital. The new wing will include a 50-bed TB ward, a 30-bed contagious disease ward, a 40-bed children's ward, a 10-bed psychiatric ward and a 10-bed isolation ward. The FED is also providing funds for construction of the new midwives' school. Drought relief activities of the FED have included the provision of grains, non-fat dry milk and butter oil, trucks and storage hangars. Other FED projects include road-building, forage development, and water resources development. (The FED representative reported that the President of Mauritania has expressed concern over continued food donations from external sources. He is afraid that: a) local farmers will lose their incentive to produce; b) displaced nomads will want to remain around the urban areas where free food is available.)

The French are providing physicians and other technicians for the National Hospital at Nouakchott and the regional hospitals in Regions IV, VI and VII.

8. Possibilities for AID Interventions

It should be accepted at the outset that all constraints will not be overcome. Yet a creditable start can be made in implanting the bases of a health structure in Mauritania. It will be a 10-year project, but after 5 years some significant improvement over the present situation can be expected.

As in Senegal, the U.S. assistance to Mauritania in the field of health should take three major forms: a) upgrading and expanding the health delivery system in rural areas; b) supporting the development of an interstate consultative agency to make the necessary health and sanitary engineering recommendations for water resource and development projects; c) supporting some form of backstopping institution to improve nutrition.

a. Upgrading the Health Delivery System

In Mauritania the upgrading and expansion of the health delivery system requires two somewhat different approaches: one to reach the sedentary population and two to reach the nomadic population.

Fixed Operations: The delivery system for reaching the sedentary population could be developed along the same lines as described for Senegal, that is from the ground up, starting with health men in the villages, rural dispensaries, mobile units, etc. The need to coordinate donor inputs through the offices of the GIRM itself is a necessity. The GIRM should be urged to form a planning committee with a fulltime rapporteur who could work with the U.S. health planner proposed for Dakar to draw up a national health delivery program during FY 76 for beginning of implementation in FY 77. The objective for FY 76 would be to decide which region to upgrade first, taking into consideration other presences (Algeria, China, France)

and encouraging the GIRM to seek other donors' commitments for specific tasks, e.g., UNICEF has already indicated a willingness to provide vehicles and a maintenance training program. It might be apropos for the GIRM to seek fuel from OPEC or some single Arab donor, such as Algeria. The U.S. and UNICEF cooperate in organizing one or more of the mobile teams as a "roving faculty" to provide basic health training to village health agents in addition to their regular responsibilities. This could be done with Peace Corps assistance. Assistance in writing up of a plan along these broad guidelines, assuring the necessary cooperation, assigning sensible priorities, setting realistic calendars for targets, should be the task of the Dakar-based U.S. technician.

Mobile Operations: The nomadic population should be considered from a somewhat different angle. Given the fact that their circuits are well-known and that these are interrupted at specific points at different times of the year, mobile health unit itineraries could be designed to meet their needs at regular dates of the year. These mobile units could be organized as small caravans that would use camels instead of jeeps for the transportation of equipment and personnel and tents instead of cement structures for their operations. Figures regarding this aspect of the upgrading of health services are extremely soft as it is not yet known what percentage of the nomadic population will sedentarize as a result of the drought. The elaboration of a concrete plan to achieve the goal of bringing preventive medicine to nomads and their cattle might also be the responsibility of the office of the Dakar-based technician.

b. Planning Health Aspects of Water Development Projects

In addition to Mauritania's participation in the OMVS plans to develop the Senegal River Valley, at least two strictly Mauritanian water development projects seem to be in the offing: the Gorgol Engineering Project; and the "Operation Flood Plains." The first concerns surveys and studies essential to the Gorgol Basin Development Scheme, and will be financed by the International Development Association ($1.1 million). A survey of health hazards is mentioned in the project proposal but no implementation steps are described. The second involves the reapir of existing dams and barrages and the construction of new ones at a cost of $535,000 to be financed by USAID. This proposal does not include any disposition for the assessment of health risks.

These two projects illustrate the need for the proposal made in the section on Senegal that an agency be established to provide the technical services needed to plan from the beginning for adequate sanitary engineering components in water resource development projects. It must be remembered, however, that the OMVS is interstate in nature and hence should have its own health division which could conceivably be set up in close technical cooperation with WHO. The national water development projects mentioned here should probably use a nationally appointed sanitary engineering resource, funded by national resources or by loans and/or grants intended specifically for this purpose.

C. Supporting Nutrition Backstopping

The creation of some type of nutrition agency in Mauritania could be extremely valuable in supporting an upgrading of health and creating inroads into the life of the rural masses. It seems difficult not to respond to the expressed desire of the Minister of Health to allocate Mauritanian funds for this purpose with an offer to minimum technical assistance. Due attention needs to be paid to the utilization of manpower and the services already available through ORANA. The actual form this project should take would be a matter for USAID/Nouakchott to discuss with the GIRM, with the technical advice of the Dakar-based US health technician.