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AGENCY FOR
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DEVELOPMENT ASSISTANCE PROGRAM

FY 1975

UPPER VOLTA & NIGER

BEST AVAILABLE

DEPARTMENT
OF
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DEVELOPMENT ASSISTANCE PROGRAM

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UPPER VOLTA
MACRO-ECONOMIC ASSESSMENT

I. Overview of Economy

Upper Volta is a poor land-locked country in sub-Saharan Africa with a per capital GDP in 1970 of $59, one of the lowest in Africa. In the agricultural sector, which supports 89 percent of the population and 94 percent of the resident labor force, annual per capital income was only $28, of which $11 constituted monetized or cash income. 1/ Upper Volta's development suffers from serious growth constraints such as poor soil, lack of natural resources including water, remoteness from the sea, a limited domestic market, uneven population distribution resulting in regional over-population, diseases, and a low level of education.

National accounts data for Upper Volta is scanty. Various estimates of GDP showed a real growth rate of 2 percent per annum in the 1960's (3.6 percent in current terms from 1964 to 1970), while non-agricultural GDP increased at 3.9 percent. From 1970 to 1973, it is estimated that GDP increased only 1 percent per annum; non-agricultural GDP increased at 3 percent, therefore the agricultural sector declined 5.5 percent. The future growth of GDP depends on the structure of the economy as it emerges from the drought years.

In 1970, the traditional sector accounted for nearly 70 percent of GDP (See Table I), of which agriculture was 27 percent, livestock and fishing 10 percent, forestry 6 percent, services 17 percent and secondary sector activities nearly 10 percent. The modern sector accounted for 25 percent of GDP, of which industry was 6 percent and services and public administration nearly 10 percent.

In 1970 Public Consumption was nearly 14 percent of GDP (See Table I) while gross fixed investment was 9.4 percent of GDP, up from 8.6 percent in 1968.

A. Sectors

Agriculture accounted for about 37 percent of GDP and 91 percent of exports in 1972. Cotton is the main cash crop in Upper Volta, since the early 1960's. Originally produced in the North, production has shifted in recent years to the western region, which has accounted for three-quarters of production since 1970. Production peaked in 1969/70 to 36,200 MT, dropped to 23,500 MT in 1970/71 and recovered to 32,600 MT in 1972/73. Other cash crops include sesame, vegetables, tobacco and sugar.

1/ IBRD, Upper Volta - Recent Economic Developments, 1973, P.7
The value of the CFA franc has declined in terms of the dollar from $1 = CFA 223 in October, 1974 to $1 = CFA 208 as this went to press in March, 1975.

Over 90 percent of agricultural production is concentrated in traditional subsistence crops. Production of millet and sorghum, the main food crops, declined from 960,000 tons in 1969/70 to 765,000 tons in 1972/73. Groundnuts, the second largest food crop, declined by only 18 percent to 46,000 tons in 1972/73. Rice production averaged around 37,000 tons until 1972/73 when it dropped to 29,000 tons. The demand for rice is increasing in some regions and in middle- and higher-income urban families, as it replaces sorghum and millet as a food crop. The improvement of marketing facilities for rice would probably create an incentive for more production.

In recent years, cultivation of vegetables,particularly green beans, has begun for the European market during the winter months, which occurs in the early dry season in Upper Volta, when vegetables can still be raised. Considerable promise exists for this source of revenue: in 1972 CFAF 191 million worth were exported, or, excluding onions and other vegetables exported to the coastal state, CFAF 118 million. The trade depends on the extreme seasonality of production (58 percent of exported value occurs in 3 months). Further hope exists for the gradual incorporation of such produce in the local diet. (See the Health Sector.)

Livestock is one of Upper Volta's major assets accounting for 11 percent of GDP in 1970, and for 41 percent of exports in 1972. Livestock has been affected by the drought, especially the 1972 and 1973 calf crops, which suffered from low survival rates. In 1972 the national herd was estimated at 2.5 million head. Losses in 1972/73 were estimated at 8–10 percent although higher in certain regions. Recovery will take up to 4-5 years. Livestock exports increased during the drought since herders sold them before cattle were lost to starvation. A substantial number of the estimated 4 million sheep, goats, and pigs in Upper Volta were lost in the drought, but recovery should be more rapid than for cattle.

Although manufacturing has been growing at a faster rate than other sectors it accounted for only 6 percent of GDP in 1970. Voltan industry is concentrated in food preparation (milling), textiles, and in bicycle assembling. Foreign inputs in the manufacturing sector are considerable. In 1968 nearly half of intermediate consumption by the modern sector was imported (47 percent), while only 9 percent of traditional production utilized foreign resources. Furthermore 30 percent of Voltaic modern sector wage payments go to foreign employees.

The mining sector is currently of little importance to the Voltan economy, accounting for less than 0.4 percent of GDP in 1968. Some stone quarrying exists and the rest of the sector is comprised of capital consumption. For the future, there is substantial promise of manganese deposits in the Sahel ORD, but the exploitation of these

reserves, among the world's largest, depend on future manganese prices and the availability of transport: one advisor suggested that while the deposits would cost only $2 million to open for exploitation, extension of the railroad, which is already operating at near-capacity in Ivory Coast, would cost $25 million. Interest in a low grade gold deposit near Bobo-Diolasso has recently been revived by the increase in gold prices.

B. Balance of Payments

Since independence the Voltaic trade balance has been strongly negative, and increasingly so in 1971 and 1972 owing to the drought (See Table II). The services account has also been negative. A large sum of unrequited transfers has traditionally compensated for these deficits, amounting to $59 million in 1971 and 1972. However, due to this foreign assistance component of the exchange balance and a successful austerity program the government has acquired substantial foreign exchange reserves, which have accumulated despite the increase in fuel price (the Voltaic government is currently negotiating with Libya on the matter) and the deteriorating trade balance. In accordance with the conservative fiscal policy of the government, this balance should be mobilized for agricultural and artisanal credit facilities.

The primary exports of Upper Volta are livestock and agriculture (See Table III), with these sectors accounting for 93 percent of total exports in 1968, and even 90 percent during the 1973 drought. On official account, between 10 percent and 25 percent of livestock exports are re-exports. Although vegetable production for the European market shows promise , as stated above, it is of small scale compared to the total resource needs of the country. Overall, exports have remained stagnant, and even declined as a result of the drought, although unofficial exports of cattle may offset this deficit.

Imports, particularly those required by the nascent industrial sector (39 percent, or 58 percent when government and other service sector input of imported goods are included), are continuing to grow. Food and Beverages constituted 24 percent of imports in 1972. (See Table III).

Some recovery of agricultural output is expected during the postdrought period, perhaps helping exports. But the large resource gap is made up largely by the remittances of seasonal, short-term and permanent Voltan migrants to the coastal countries -- formerly Ghana but now primarily the Ivory Coast. These remittances are unofficial, and therefore difficult to estimate, but we have made some estimates using the net clearance between countries of BCEAO banknotes (See Table IV). BCEAO cautions against this approach due to the large volume of unofficial trade and border trade between countries involved,

but our estimates do not deviate from their independant one. Without such remittances, the exports of Upper Volta would cover only 52 percent of merchandise imports in 1968, declining continously to 30 percent in 1973: With them, the rate of coverage has remained stable at about 80 percent. (See Table IV).

C. Government Finance

Upper Volta fiscal performance is described in Table V of the Appendix. A continuous and growing government surplus since 1968 reflects the draconian measures taken at that time owing to accumulated budget deficits amounting to more than a half year's revenue. The military government which assumed power in 1966 gave first priority to the implementation of a fiscal stabilization program aimed at reducing outstanding debts and at balancing the current budget. Government expenditures were reduced by 12 percent between 1966 and 1967, including a 10 percent cut in civil service salaries. Development expenditures, on the other hand, were sharply increased (See Table V) by 71 percent between 1966 and 1970. 1/ The tax reform of 1969 both increased rates and consolidated the collection system, resulting in increased revenue, which has slackened somewhat since 1971 owing to the drought. Development expenditures have not kept pace with the growth of the current budget surplus. Thus the Voltaic government finds itself in a highly liquid position; deposits at the Central Bank amounted to CFAF 7.0 billion at the end of 1974.

D. Human Resources

Upper Volta's population was estimated at 5.4 million in 1972. Nearly 0.2 million Voltans immigrate seasonally in search of employment in the coastal countries. The resident labor force numbers about 2.61 million people, of which over 95 percent are in rural areas. There were about 34,200 wages earners in 1972, of which 18,200 were public servants and 16,000 were in the private sector, including 6,000 in industry. There are very few wage-earners in the rural sector.

The migration phenomenon remains crucial for the development of Upper Volta. Due to pronounced emmigration of the young, particularly males in the active age group, Upper Voltan villages are denied their most productive manpower and an important part of their social insurance system in traditional societies. On the other hand, the BCEAO estimates that in 1972 total repatriations by Voltaic workers in Ivory Coast was 5.5 billion francs. It is tempting to argue that such migration contributes to the development of the region as a whole by redistributing labor forces where its marginal product is highest, but this argument is not valid for one main reason: the implicit taxation of labor as a productive factor in the inland countries.

1/ IMF, Upper Volta, Recent Economic Developments, SM/73/277, December 1973, p. 33

The policy of the government to keep urban grain prices low, often by subsidized imported grain, places an implicit tax on rural factors of production by forcing them to compete with lower than world market prices for imports. Transportation costs for agricultural exports impose a similar implicit tax. This distortion encourages labor to redistribute itself towards regions where it can earn its full marginal product rather than to be taxed by pricing policies.

Voltaics have been rapid to respond to opportunities as they see them, a well-founded resettlement scheme which enable agricultural workers to have a productivity sufficiently high to offset "taxation" due to transport costs and import subsidies will probably reduce migration. Resettlement schemes must take into account the individual's perceived welfare; also, capital must be subsidized (as it currently is, given the low 5 1/2 percent BCEAO rediscount rate which forms the basis for other rates) so that after "taxation" its use is still justifiable to the farmer.

II. Government Priorities

Prior to 1967, Upper Volta had no comprehensive plan. In 1967 the first Plan-Cadre was launched; and in 1972 the new government (elected in 1970) adopted a Five-Year Plan. The former plan was 80 percent financed from foreign sources, mainly grants, while about 75 percent of the second plan is externally financed. Table VI shows a sectoral break of planned and actual expenditures, and of financing, for both plans.

As outlined in the plan document's program of action, the second plan shows no major change in emphasis. Development of the primary sector (in particular, agriculture, livestock, and water control) receives the highest priority and some 30 percent of planned expenditure. The main objective is to increase the production of food crops to achieve national self-sufficiency at an improved level of nutrition and to expand the production of export crops as fast as possible. Attention is to be paid to improving marketing systems, both to encourage production and, in the case of food crops, to even out local shortages and surpluses. The spearhead of the development effort is to be the Regional Development Organizations (ORDs), ten of which are already functioning; the eleventh and final one, that of the Sahel, is to be put in place during the plan. In the livestock the main aim is to improve the quality and productivity of the national herd; the key elements of the development effort are disease control and improvements in water supply and marketing arrangements.

The biggest project in the primary sector is the development and settlement of the valleys of the Volta rivers, at present virtually uninhabited because of river blindness. The necessary first step

in this project, the eradication of river blindness, is being tackled by a major regional project organized by WHO, with funds from national and international agencies. It is hoped that this resettlement will ease population pressure on the Mossi Plateau. This project will take years to offer substantial returns.

The plans do not necessarily reflect government priorities at a policy level; they amount to little more than a shopping-list of projects for outside donor assistance. The present government, as explained by a Rural Development Official, wants to continue the lower-level planning through the system of ORDs, but within a stronger central government coordination framework. Several documents and interviews indicate that there is a problem of lack of coordination between government agencies and ORD extension workers at the village level, while several government ministries felt that they were hampered by the lack of material necessary for functioning. These seem to be interrelated problems, and suggest that development aid should be channeled through existing agencies which need strengthening, rather than by the setting up of parallel institutions.

Foreign aid has been an important source of foreign exchange for Upper Volta, as well as an important source of investment: More than two-thirds of total investment under the 1967/70 development plan were externally financed, particularly by FAC and FED, which together provide 83 percent of Upper Volta's foreign aid. 68.5 percent of foreign aid went to public administration in the 1968 national accounts, and 29 percent to resident private groups directly; except for drought aid, this is not expected to change.

However, Upper Volta presently has substantial foreign exchange reserves as well as government surpluses. Thus, although Upper Volta depends heavily on external resources, the mobilization of these foreign exchange and fiscal reserves for development purposes should be encouraged. Furthermore, the mix of development expenditures needs to be shifted away from operational expenses (which consumed 90 percent of the ORD budget in 1973 and 1974, i.e. 67 percent for labor and 23 percent for operations) to capital inputs. With well conceived foreign assistance in key areas supported by effective technical assistance, Upper Volta could develop its capability to expand its absorptive capacity and to utilize more of its own resources effectively.

Table I. Upper Volta: Estimated Gross Domestic Product[1] and Expenditure at 1968 Prices, 1968 and 1970

	(In billions of CFA francs)		(In per cent of GDP)	
	1968	1970	1968	1970
Traditional sectors	55.67	59.29	71.47	69.35
Primary sector	34.33	36.31	44.07	42.47
Agriculture	(20.51)	(22.75)	(26.33)	(26.61)
Livestock, fishing	(8.64)	(8.70)	(11.09)	(10.18)
Forestry	(5.18)	(4.86)	(6.65)	(5.68)
Secondary sector	7.60	8.14	9.76	9.52
Services	13.74	14.84	17.64	17.36
Modern sectors	18.20	21.47	23.36	25.11
Secondary sector	3.96	5.27	5.08	6.16
Private services	7.07	8.19	9.07	9.58
Government services	7.17	8.01	9.21	9.37
Taxes on imports	4.02	4.73	5.17	5.54
Gross domestic product	77.89	85.49	100.00	100.00
Subsistence sector	(28.77)	(...)	(36.94)	(...)
Monetary sector	(49.12)	(...)	(63.06)	(...)
Import of goods and services	13.04	14.26	16.74	16.65
Total resources	90.93	99.75	116.74	116.66
Consumption	76.86	84.13	98.68	98.41
Private	66.18	72.25	84.97	84.51
Public	10.68	11.88	13.71	13.90
Gross fixed investment	6.72	8.06	8.62	9.43
Private	4.07	...	5.22	...
Public	2.65	...	3.40	...
Changes in inventories	0.80	0.90	1.03	1.05
Export of goods and services	6.55	6.66	8.41	7.79
Resources gap	6.49	7.60	8.33	8.89

Sources: Ministère du Plan, de l'Industrie et des Mines, Comptes économiques de la Haute-Volta, 1968; République de Haute-Volta, Plan Quinquennal de Développement Economique et Social, 1972-76; and staff estimates.

1/ At market prices.

Table 17. Upper Volta: Summary of Balance of Payments, 1968-72

(In millions of SDRs)[1]

	1968	1969	1970	1971	1972[2]
A. Goods and Services (net)	-33.5	-42.9	-38.9	-58.3	-55.9
Imports, c.i.f.	48.6	59.9	54.4	68.1	71.1
Exports, f.o.b.	28.2	26.7	24.6	24.5	27.7
Trade balance	-20.4	-33.2	-29.8	-43.6	-43.4
Transportation	-1.6	-1.6	-1.6	-2.0	-2.4
Travel	-1.4	-1.0	-1.1	-1.8	-2.4
Investment income	-1.6	-1.6	-0.4	-0.8	-0.5
Other services	-8.4	-5.5	-5.9	-10.2	-7.3
B. Unrequited Transfers (net)	40.8	44.9	47.4	59.0	59.4
Private	20.5	24.1	25.1	31.6	31.1
Government	20.3	20.8	22.3	27.4	28.3[3]
C. Capital Flows (net)	2.7	1.7	5.5	1.6	5.8
Direct investments	0.4	1.5	1.0	0.8	2.6
Other private long-term	0.9	-0.2	0.9	1.8	0.8
Other private short-term	1.4	0.7	0.6	--	0.8
Government	0.9	1.0	0.1	1.1	2.1[3]
Monetary institutions	-0.9	-1.3	2.9	-2.1	-0.5
D. Allocation of SDRs	--	--	1.7	1.4	1.4
E. Net Errors and Omissions	-6.0	-3.3	-2.0	-0.6	-6.6
F. Overall Balance	4.0	0.4	13.7	3.1	4.1
G. Reserves and Related Items (- increase in assets)	-4.0	-0.4	-13.7	-3.1	-4.1
Liabilities	-0.2	--	0.1	0.1	--
Assets	-3.8	-0.4	-13.8	-3.2	-4.1
SDRs	(--)	(--)	(-1.7)	(-1.4)	(-1.4)
Reserve position in the Fund	(-0.1)	(-0.3)	(--)	(-1.1)	(-0.6)
Foreign exchange	(-3.7)	(-0.1)	(-12.1)	(-0.7)	(-2.1)

Source: Appendix Table XIV.

1/ SDR 1 = CFAF 246.853 for 1968; SDR 1 = CFAF 258.088 for 1969; and SDR 1 = CFAF 277.710 for 1970-72.
2/ Provisional.
3/ Excludes SDR 7.2 million representing the cancellation by France in November 1972 of FIDES loans to Upper Volta before the time of independence.

Table III. Upper Volta, Imports by Groups of Products

(Unit Million francs CFA) Registered Imports only

	1968	1969	1970	1971	1972	1973*
Food and edible oils	1976.0	2294.7	n.a.	2696.8	3062.3	539.8
(incl. livestock):	(241.6)	(91.5)		(401.4)	(480.9)	(80.3)
Beverages & tobacco	200.4	235.5		468.3	468.3	110.6
Raw Materials	1051.8	950.7		941.5	941.5	242.6
Fuel and lubricants	681.8	851.9		1221.6	1310.5	308.5
Chemicals and related	653.6	825.0		1263.1	1291.4	379.2
Semi-manufactured, mfd.	2983.8	3796.7		3244.2	3951.1	1176.8
Transport & equipment	2001.9	3376.9		3654.8	3537.3	1031.6
Divers manufactured	569.2	599.2		646.3	660.7	182.6
Unclassified: arms, munitions	.6	1.0		57.1	109.2	17.2
Total Imports	10119.1	12479.1		14054.1	15010.8	3989.2

Registered Exports by Groups of Products

Food and edible oils	3056.2	2537.7		2212.2	2636.4	540.1
Livestock	(2525.3)	(1966.7)		(1602.2)	(2099.7)	(221.4)
Cattle	(1588.6)	(1147.1)		(786.7)	(1063.4)	(123.2)
Sheep and goats	(713.1)	(522.7)	n.a.	(470.6)	(633.9)	(33.9)
Poultry, live	(221.5)	(290.9)		(339.4)	(390.3)	(56.3)
Beverages & tobacco	50.5	49.2		23.9	26.7	16.1
Raw Materials	1886.9	2552.3		1905.5	2035.4	695.8
Shelled peanuts	(302.5)	(230.9)		(458.4)	(372.7)	(244.6)
Cottonseed	(123.4)	(105.5)		(76.7)	(94.1)	(15.1)
Sesame seed	(117.6)	(111.5)		(218.8)	(255.3)	(92.9)
Sheanuts	(310.7)	(443.6)		(209.7)	(131.8)	(131.8)
Ginned cotton	(913.5)	(1484.1)		(834.2)	(1020.7)	(235.2)
Skins & leathers, unwork.	(72.0)	(121.1)		(83.8)	(163.9)	(56.2)
All Other Exports	296.7	190.1		266.3	442.5	99.7
Total Exports	5290.3	5329.3		4407.9	5141.0	1201.7

Table IV. Upper Volta. Estimates of importance of migrant remittances

(Unit: billion francs CFA)

Year:	Official Imports	Official Exports	Trade Balance	Net BCEAO banknote Clearance	Independant Estimate of Repatriation	Rate of Coverage (Exp/Imp) Without Repatriation	With Repatriation
1966			-	2.1			
1967				3.0	3.1--BCEAO*		
1968	10.1	5.3	- 4.8	6.4		52.1%	115.8%
1969	12.5	5.3	- 7.1	3.8		42.8	72.8
1970	13.0	5.1	- 7.9	4.2	5.0--UNDP	38.4	71.5
1971	14.1	4.4	- 9.6	5.5	5.5--BCEAO*	31.4	70.2
1972	15.3	5.1	-10.2	7.1		30.1	79.7
1973	4.0	1.2	- 2.8			30.0	

*Estimate made after adjusting for unofficial, border and illegal trade between, in particular, Ivory Coast and Guinea, Ghana, Mali, Senegal, Upper Volta and Niger.

**First quarter.

Table V. Upper Volta: Government Budget Revenue and Expenditure, 1966-73

(In millions of CFA francs)

	Results							Budget	
	1966	1967	1968	1969	1970	1971	1972	1972	1973
Current revenue	8,250	7,826	8,357	9,738	10,490	10,967	11,410	10,822	11,726
Tax revenue	6,950	6,596	7,340	8,592	9,347	9,560	9,972	9,888	10,569
Nontax revenue	1,076	955	870	959	768	931	949	604	777
Unclassified	224	275	147	187	375	476	489	330	380
Current expenditure 1/	7,926	7,008	7,288	8,054	8,614	9,156	9,711	9,876	10,766
Personnel expenditure	4,705	4,190	4,405	4,836	5,458	5,834	6,297	6,477	7,110
Materials and maintenance	1,406	1,421	1,526	1,702	1,685	1,919	1,976	1,803	1,905
Transfer payments	1,404	1,056	1,062	1,153	1,162	1,108	1,172	1,254	1,365
Debt service	411	341	295	363	309	295	266	342	386
Current surplus or deficit (-)	324	818	1,069	1,684	1,876	1,811	1,699	946	960
Development expenditure 2/	484	587	706	1,104	1,137	890	924	946	960
Total surplus or deficit (-)	-160	231	363	580	739	921	775	--	--

1/ Including payments of arrears made out of budgetary appropriations.
2/ Excluding expenditure financed from the French equipment subvention.

Table VI.

Upper Volta: Development Plans, Investment and Financing, 1967-76

(In billions of CFA francs)

	First Development Plan 1967-70					Interim Plan 1971	Five-Year Development Plan, 1972-76 1/					
	Total 1967-70			of Which 1970								Total
	Planned		Actual	Planned 2/	Actual	Planned	1972	1973	1974	1975	1976	1972-76
	Main plan	Optional tranche					Planned					
Investment												
Primary sector	7.8	1.3	4.3	3.0	1.1	2.0	3.2	4.0	4.3	3.6	3.8	18.9
Of which: ORDs	(6.1)	(0.9)	(3.4)	(2.4)	(1.0)	(0.9)	(1.7)	(1.8)	(2.1)	(1.7)	(1.6)	(8.9)
Livestock	(0.9)	(0.3)	(0.3)	(0.3)	(0.1)	(0.4)	(0.6)	(0.8)	(0.8)	(0.7)	(1.0)	(3.9)
Water and rural infrastructure	(0.4)	(0.1)	(...)	(0.1)	(...)	(0.5)	(0.2)	(0.4)	(0.3)	(0.3)	(0.2)	(1.4)
Industry and services	5.5	0.5	4.0	1.3	1.1	1.7	3.1	5.2	2.8	1.2	0.7	13.0
Of which: Manufacturing	(4.1)	(0.4)	(2.8)	(1.0)	(0.5)	(0.9)	(1.3)	(4.0)	(1.9)	(0.8)	(0.2)	(8.2)
Energy	(0.1)	(--)	(...)	(--)	(...)	(0.3)	(0.2)	(0.4)	(0.2)	(0.1)	(0.2)	(1.1)
Economic infrastructure	8.3	3.1	5.8	4.2	1.5	3.7	4.4	3.6	3.8	2.1	4.3	18.2
Of which: Roads	(6.1)	(0.7)	(2.9)	(2.7)	(0.3)	(2.0)	(2.8)	(2.0)	(2.1)	(1.4)	(3.3)	(11.6)
Railways	(--)	(1.9)	(0.3)	(1.0)	(0.1)	(0.3)	(0.4)	(0.2)	(0.2)	(0.2)	(0.2)	(1.2)
Urban development	(1.9)	(0.3)	(0.8)	(0.5)	(0.5)	(0.7)	(0.3)	(0.5)	(0.8)	(0.4)	(0.6)	(2.6)
Social infrastructure	4.9	--	4.1	1.2	2.0	0.6	1.3	2.7	1.9	1.3	1.1	8.3
Of which: Education and training	(3.0)	(--)	(2.0)	(1.0)	(0.8)	(0.3)	(1.1)	(1.5)	(1.2)	(0.9)	(0.8)	(5.5)
Health	(1.4)	(--)	(1.2)	(0.1)	(0.3)	(0.2)	(0.4)	(0.7)	(0.3)	(0.3)	(0.2)	(1.9)
Research and studies	1.0	0.6	1.5	0.4	0.3	0.5	1.1	1.0	0.7	0.4	0.3	3.5
Administrative infrastructure	--	--	--	--	--	--	0.4	0.4	0.1	0.1	0.1	1.1
Total	27.5	5.5	19.7	10.1	6.0	8.5	13.7	16.9	13.6	8.7	10.3	63.2
Financing												
Domestic	4.4	0.3	7.0		2.6	2.9						13.5
Government budgets	2.5	0.1				1.4						8.0
Local borrowing	1.9	0.2	7.0 3/		2.6 3/	1.5						1.3
Other local resources												4.2
Foreign	23.1	5.2	12.7		3.4	5.6						49.7
FAC and special French aid	7.1	0.7	5.3		0.6 4/	1.6 4/						12.0
European Development Fund	9.2	2.2	4.9		2.0	2.0 5/						12.4
UN	1.8 6/	0.2 6/	0.9 6/		0.3 6/	0.7 5/						3.5
Other foreign grants	2.0	--	1.6		0.5	0.7						4.1
IBRD-IDA	...	...	...		...	...						7.5
Other foreign borrowing	3.0	2.1	...		...	0.6						7.1
Private sector												3.1
Total	27.5	5.5	19.7		6.0	8.5						63.2

Source: I.M.F., Upper Volta - Recent Economic Developments, SM/73/277, Dec. 1973, p. 24.

UPPER VOLTA

AGRICULTURE SECTOR ASSESSMENT

I. Introduction

Agriculture, including livestock production, provides 43% of the Upper Volta GNP (agriculture 35%, livestock 10%). It is the source of income for 95% of the population and the only important source of export earnings. Millet and sorghum are the principal food crops grown. In 1970/71 GOUV estimated the combined production of these two crops at 941,065 metric tons. Other important cereal crops are corn and rice, contributing another 140,000 tons. Peanuts are grown primarily as a cash export crop but, especially in years of serious food deficits, considerable amounts are consumed locally. Cotton is the principal export crop, followed by peanuts, sesame and sheanuts.

Food Production Problems

The major problems facing the food crop sub-sector are:

1. Low and stagnant production, with output failing to keep pace with population growth even in "normal" years;

2. Highly variable yields due to erratic rainfall;

3. Low productivity, incomes and levels of living for farm families; and

4. Population pressures leading to serious over-exploitation of land resources and deteriorating soil productivity in some areas.

Becker[1] estimated that in the 1970/71 market year cereal foods available were 175.7 kg per capita. This included 154.4kg of sorghum and millet, 14.6kg of other cereals and about 6.6kg of imported food grains. Meat consumption per capita was 8.6kg per year. While this amount, if equitably distributed, does not suggested a seriously deficient diet, it does approach a minimum acceptable level.

Imports of food grains have increased steadily since 1960, amounting to about 30,000 tons a year before the drought. Of course, imports were greatly increased the last two years. Failure of food grain production to keep pace with the increase in population, even in normal years, reflects the lack of penetration of advances in science and technology to the farmers' fields. There has been no significant adoption of improved varieties

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1. Becker, John A., An Analysis and Forecast of Cereal Availability in the Sahelian Entente States of West Africa, AID/CM, January 1974

or cultural practices and, so, no appreciable increase in yield per hectare. There was an increase in total land area cropped but much of the increase was in cash crops: cotton, peanuts and sesame. Actually, while total area cultivated increased, the area allocated between cash crops and food crops fluctuated from year to year in response to variations in the preceding year's food crops, reflecting farmers' strategies for insuring adequate food supplies.

The situation in the case of cash crops has been quite different. The area devoted to cotton, the principal cash crop, increased more than three times between 1961 and 1970. Yield per hectare increased from 102kg/hectare of seed cotton to 431 kg/hectare during that period. Yields and acreage, of course, were sharply lower during the last few years because of the drought.

There is recognition of the importance of the farm problem on the part of the government. The 1972-76 Development Plan, just as the previous plan, gave highest priority to livestock and crop production (30% of planned expenditures). The stated main objectives were to achieve national self-sufficiency at an improved level of nutrition and to expand the production of cash crops as fast as possible. In the livestock sector the aim was to improve the quality and productivity of the national herd, the key elements being disease control and improvements in water supply and marketing arrangements.

II. Physical Environment

In general, the natural conditions are not favorable to agricultural development in much of Upper Volta. Rainfall throughout most of the country is normally over 500 mm per year. Only a relatively small portion in the Northeast (the future ORD du Sahel) is truly Sahelian. That area, covering 36,870 km^2, has an average rainfall ranging from 400 to 600 mm (30 to 55 days of rainfall within a three-month period). Rainfall in the rest of the country ranges from 600 mm in the north to 1300 mm in the Southwest.. In the northern, central and eastern regions, which include the most densely populated areas, soils are often badly eroded, over-exploited and have very low production potential. Hard pans (lateritic) are common at shallow depths, interfering with drainage and limiting the root zone. The soils are generally low in phosphate as well as nitrogen.

In the West and Southwest, however, soil conditions are generally more favorable and, because rainfall is also more favorable, these areas have quite good development potential.

Throughout the country there are fertile areas where silt and clay have been deposited in the bas-fonds (low-lying areas). When the water

is properly managed, these bas-fonds, particularly in the South, can produce good crops of rice and a second, short-season crop on residual moisture.

There are other large areas, including important broad river valleys, where land resources are favorable to agricultural development. Population densities in these areas are low, with some areas uninhabited, because of endemic diseases, particularly onchocerciasis (river blindness). A large part of Upper Volta falls in the onchocerciasis zone in which several agencies, under IBRD leadership, will undertake an extensive control program. (The development potential of the areas to be cleared of onchocerciasis in Upper Volta is discussed in another section of this report.)

III. Traditional Agriculture and Ethnographic Profile

Subsistence Technology

Despite regional and ethnic differences, there exists among all the farming peoples[1] of Upper Volta an essentially similar basic pattern of techno-environmental adaptation. The vast majority of the people are sedentary cereal cultivators - sorghum and millet are their principal crops. Animal husbandry is an activity of secondary importance. In accordance with a centuries-old symbiotic arrangement, during the growing season most of the villagers' cattle are taken north out of the farming regions by the Fulani. These herdsmen receive, in return, the right to pasture their stock on the farmers' lands after the harvests. They may also receive some grain in exchange for milk products.

Despite the recent introduction in some centers of animal traction, farm carts, and some chemical fertilizers, most of the work on most farms is still done by hand. Before the rains begin in late spring, the soil is worked over with the short-handled iron hoe. Fields are cleared, planted, and cultivated by hand; the harvest is also a manual operation. Depending upon the labor force available, the land is worked three or four times during the growing season. The harvests begin in September and continue on through the first days of December, depending upon the particular crop and upon climatic and geographical variations.

Despite the extensive but superficial spread of Islam, the first months of the dry season that follow the harvest are dedicated to a series of rituals that function to perpetuate the benevolent relationship between the farmers and the supernatural forces they perceive as vitalizing the natural conditions - soils, vegetation, and climate - that vitally affect their material survival.

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1 As true pastoral nomads represent only a small portion of the population of Upper Volta and as most, especially those in the Volta River basin, typically live in a symbiotic relationship to the farmers, the culture of the herders will be described here as it relates to the life of the settled farmers who form the rural majority.

The later months of the dry season are used for the repair of tools and household goods, for craft specialization - in pottery, basketry and textiles. During this period, also, many of the young men migrate south, principally to the Ivory Coast, but also to Ghana, Dahomey and Togo, in search of salaried labor that provides the monetary supplement to their income necessary to pay their taxes and to purchase the increasing number of goods, mostly of foreign origin, that are available in the market.

Economic Organization

Throughout the entire region, farm land is owned collectively by the patrilineage; that is, by all those who are related through the male line to a single male ancestor. Typically, this patrilineage forms the core membership of the compound family households that are the units of common residence. Neighboring patrilineages are usually allied on the basis of a somewhat more tenuous tradition of shared descent from an even more remote quasi-mythological common ancestor. Because of the strict observance of lineage exogamy, most other local lineages are affiliated through marriage.

The right to use particular farm land is determined on the basis of need within the lineage. Land that is not in use or in fallow reverts to the lineage as a corporate entity and can be redistributed among members of the kin group in need of additional land. Every field is under the immediate proprietorship of a particular farmer, and it is he who controls the allocation of whatever the land produces. However, most farm work requires cooperation. The nuclear family unit comprised of a farmer and each of his several wives and their respective children usually structures the work force that cultivates the land. All those who assist one another have a right to share in a portion of each other's harvest. But every adult, female and male, has his own individual storehouses. A man provides food for himself and supplements the grain his wife takes from her granary to feed their children.

Beyond the nuclear and polygamous family, the larger extended family of a man, his wives and children, and his younger brothers and their families provides a supplementary basis for economic cooperation; and, finally, certain fields are held and worked collectively by the entire lineage. The harvest from these fields is stored in separate granaries under the direct authority of the lineage elder. These stores can be drawn upon by any members of the kin group in need; consequently, these lineage granaries constitute a major real and symbolic source of socio-economic security for all members of the family that work together.

In brief, the traditional systems of land ownership, the organization of work, and the syntems of reciprocity and redistribution by means of which most productive goods are allocated, are all entirely enmeshed within

the kinship system. No economic change can be seriously contemplated without taking this major aspect of indigenous economic organization fully into account. Most primary subsistence goods in the rural areas of Upper Volta move within this system and outside the market. The market functions principally for the reallocation of surplus commodities and as a source of the money income necessary for acquiring goods that are still, for the most part, luxuries - bicycles, flashlights, dark glasses, manufactured cloth, etc. as well as staples, such as salt, that are not locally available.

The Scope of the Problem of Change

However modest they may appear to those who would impose them, from the point of view of the Voltaic farmers the changes they face in adjusting to the development of the Volta River valley are radical in the extreme. Ultimately, it is expected that they adapt a profoundly altered means of making a living: a great leap forward from the Neolothic. For traditionally, they are horticulturists. They employ only hand tools. They use neither animal traction nor irrigation. Their means of enriching the soil are limited to the sparse and sporadic spreading of manure in fields close to the homestead and to a system of crop rotation and following that is frequently violated by the exigencies of growing pressure to increase food production.

In contrast, those who will be resettled on the newly developed lands of the Volta River valley may be required to adapt, in a comparatively brief period, to revolutionary changes in their material means of subsistence. Some will be required to adjust to irrigation agriculture, and not only to this new farming technique but also - and probably more important - to a whole array of new economic and social arrangements that are entailed in efficient water management. This is likely to require a particularly delicate adjustment for those farmers who are resettled in "oncho-free" areas among non-kinsmen and people from other communities.

Many will be expected to care for and use oxen, to employ unfamiliar animals in unfamiliar ways and in accordance with rules about rights of use that also will be new. It will be required of them that they collect and utilize fertilizer more extensively than has been their custom.

The changes in economic organization to which they will be required to adjust are perhaps even more radical. Their rights to use the land they work will be determined by an unfamiliar national law and by administrative decree in accordance with criteria that may be just but would be extremely exotic from the farmer's point of view. However equitable the system, he loses what has been, if not an irrevocable right, at least an irrevocable possibility: to hold onto his land so long as he works it (and however he

works it) and to pass it on to his sons. Further, he loses the right to lend his land to others; and to allow it to lie fallow when he sees fit. A larger portion of his crop will be produced for cash sale.

Those who are resettled will lose access to the traditional sources of economic cooperation in planning and planting their fields, in cultivating them, and at the harvest. Instead, they will be required to rely upon unfamiliar and, from their perspective, highly uncertain sources of economic support: the decrees and grants and credit arrangements that tie them to the development project. The marketplace offers an even more uncertain alternative basis for maintaining their economic security. And finally, by accepting resettlement, they risk losing the right to inherit land in their homeland. Or, to retain such a right, the farmer must share with his kinsmen at home a portion of the profits he derives from his new enterprise. In the past, this kinship-based expectation on reciprocity has been thrown out of balance by those who begin to participate in the money economy. For some, this leads to a break with their kinsmen, a painful social cost that many avoid by holding their economic aspirations within narrow limits.

Thus, in summary, however minimal the technological and economic changes required of the farmers resettled in Volta River valley may appear, in the perspective of the farmers affected the adjustments required of them are revolutionary. They must be adquately planned for, if the human aspect of the development plan is to be efficiently realized. If properly anticipated, many aspects of the farmers' traditional way of life can be productively mobilized. But if they are ignored, if an attempt is made to impose change externally without adequately considering traditional institutions and the rural people's quite different but entirely rational concepts of what is good, then these same institutions are likely to be a major obstacle to the achievement of almost any effort at technological innovation or economic change.

It should be stressed that despite the apparent cultural conservatism of the rural population, their ways of life are by no means either static or immutable to change. For the people of Upper Volta only could have survived for so long in such a harsh and unpredictable milieu by possessing a highly flexible set of adaptive strategies. Always open to possibilities that may lessen the burden of their on-going struggle to survive, it can be safely assumed that today, particularly, as a consequence of the traumatic memory of the most recent drought, the rural farming and herding peoples are likely to be readier than ever to accept economic change if they can be honestly convinced that it is to their benefit. Given the unfortunate history of past deception and misunderstanding, comprehension and trust may not be easily achieved.

IV. Agricultural Research

The French "Institut de Recherches d'Agronomie Tropicale et Cultures Vivieres" (IRAT) is essentially the only institution engaged in research on cereal crops in Upper Volta. IRAT has been operating a research network in the country since 1961. It operates three major stations[1] two in the central region and one in the Southwest. IRAT also has several rural stations for localized testing of results. The small station at Mogtedo is used primarily for irrigation research. The stations at Sarya and Faraka-Ba are doing research in varietal improvement on sorghum, millet, corn and cowpeas. Varietal research has followed classical lines. Varietal testing is done using identical fertilizer and cultural practices. Emphasis has been placed on maximum yields under ideal conditions and on development of varieties with short growing cycles. They have made extensive use of plant materials from other West African countries, India and America. No outstanding sorghum varieties have ye. been released. Sorgo 29, derived by selections from local varieties, is the one most widely adopted. Under good conditions, it will yield about 2 tons per hectare. Most promising work is underway, using dwarf materials from the Institute for Agriculture Research, Samaru, Nigeria. Hybrids have been developed which yield over 4 tons per hectare, but this material is not yet ready for release.

Research on millets has so far not produced any outstanding varieties. Two varieties, Dori and Zalla, have been proposed for release, but yields are not much better than local varieties under normal farm conditions.

Work at Faraka-Ba on corn has produced high yielding strains from local varieties. A yellow variety, Jaune de Fo, which seems well suited to drier areas, yields 4/5 tons per hectare; and Massayomba, a white variety, yields 5.0 tons per hectare under good conditions.

IRAT has also done some useful work on farming systems, placing emphasis on the use of animal and green manures. They have done work on cover crops to be used on fallow lands and recommend use of a legume, Stylosanthese, which is also useful as a forage for livestock. Despite the apparent benefits, this practice has not found favor with Voltaic farmers. It appears to be economically unfeasible because of high labor requirements at times when other activities also require large labor inputs.

IRAT/Upper Volta does have linkages with research institutions in Paris, the various French-supported research institutions in West Africa and the various international research institutes, such as ICRISAT, IITA,and

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1 Time did not permit visits to the main research stations,but the DAP Team did visit one of the small rural stations and had discussions with an IRAT official in Ouagadougou. Much of the information was obtained from Merrit Sargent's report, Research on Cereal Production Technology in Senegal and Upper Volta, 1974.

IRRI, and with the Institute of Agriculture Research, Samaru, through the AID-supported project on Major Cereals (J.P. 26). It has easy access to plant breeding materials from all of these organizations. This network could be further strengthened by an expanded program of adaptive research that aimed at developing a package of technology suitable and acceptable to Voltaic farmers in different ecological areas. The revised major cereals project (J.P. 26) makes provision for additional field trials officers. One of these will be stationed in either Upper Volta or Niger and work in both countries.

Research on cash crops is undertaken by two other French organizations: L'Institut de Recherches pour les huiles oleagineuses (IRHO) for research on peanuts and sesame, and L'Institut de Recherches du Coton et des Textiles Exotiques (IRCT) for cotton research and seed multiplication in collaboration with CFAT.

While IRAT has established a basic research network in Upper Volta, it remains an alien organization, staffed at the professional level almost exclusively with nine expatriate scientists. No important steps have been taken to train Voltaic personnel to take over the operation. The shortage of personnel trained to the level of ingenieur agronome and above is a constraint not only in agricultural research but also for planning and administering agricultural development projects.

V. Agricultural Support Organizations

Agricultural Extension

Given the autonomy of the individual ORDs (Organisms for Regional Development, the 10 regional development units covering the country) in planning and implementing rural development programs, it is understandable that there is not a single, uniform approach to agricultural extension. The staffing and methods of operation have been designed largely by each of the Société d'Intervention engaged in managing the programs. CFDT, which has worked primarily in the cotton-producing areas - Kaya, Dedougou and Bobo-Dioulasso, has organized cotton production and marketing well, not only where it operates the ORD but where significant amounts of cotton are growing. CFDT specifies the appropriate seed varieties and cultural practices; procures and distributes seeds, fertilizers, insecticides and spraying equipment; markets and gins the cotton and recovers from the farmer at the time of sale the advances extended for inputs. Top level positions are usually expatriate, but subordinate staff are locally recruited and trained in government institutions.

The level of staffing has been lower and the effectiveness of organization less in the non-cotton ORDs. The basic pattern of staffing provided as a minimum by the national government is essentially as follows: An ORD is divided geographically into several sectors, each headed by a sector chief.

Each sector is further divided into sub-sectors, each with a sub-sector chief who is responsible for directing the Encadreurs (agricultural extension agents). These have been general agricultural extension advisors in the past but we were told that in the future three or four encadreurs in the Unités d'Encadrement would each be trained in a different agricultural specialty. ORD encadreurs are normally recruited from within the ORD from candidates who have a primary education (B.E.P.C. or equivalent). Sector and sub-sector chiefs are normally trained at the national middle school level - Agents Techniques Agricole (ATA). They are recruited from anywhere in Upper Volta. Conducteurs de Travaux Agricoles (CTA) are trained at the associate degree school level. They are employed as sector chiefs or as agricultural extension staff in the ORD headquarters. There are very few persons with university degree level training in agriculture (Ingenieurs de Travaux Agricole (ITA) in Upper Volta and few of them assigned to ORDs; perhaps none below the ORD director level. The institutions for training personnel for staffing the programs at various levels are described fully in the section on education and human resources development.

Regional Organization

The GOUV, in 1965, adopted as a strategy for development the creation of independent and self-accounting 'Organismes Regionaux de Developpement' (ORDs). Since then, ten ORDs have been established and the eleventh, the Sahel ORD, covering the remaining territory, is in the initial stages of being established. The individual ORDs are responsible for planning and carrying out development programs within their geographically defined areas, within the framework of the national rural development policy.

The GOUV provides each ORD with staff, buildings and equipment for minimum operations. Each ORD can recruit additional staff and expand its facilities if it can generate the additional funds. Each ORD is managed by a Director, appointed by a decree of the Ministry of Rural Development. The Director reports to a local steering committee which has been designated by a larger group, the ORD assembly.

Of the ten established ORDs, all except Eastern ORD or Fada N'Gourma have benefitted from external financing. AID has only recently made a commitment to support an integrated rural development program in Eastern ORD. The French government (FAC) and the European Common Market (FED) have been the principal sponsors financing development programs in the ORDs in the past. More recently, IBRD has provided support to three of the ORDs and the Canadian government (CIDA) is supporting one ORD.

The sponsoring agencies, particularly FAC and FED, have normally contracted with foreign companies to provide the technical assistance and manage the development programs in the ORDs they sponsor. Table 1 presents information on characteristics of the individual ORDs (p. D-32).

Failure of most of the ORDs to achieve the pace of development expected has been attributed largely to the absence of a strong policy body at the national level and lack of sufficient coordinating authority in the central office of the Directorate de Developpement Rural. The Ministry of Rural Development has recently been reorganized along lines proposed by the IBRD to resolve these problems.

According to the Permanent Secretary of the new Comité de Coordination du Developpement Rural, the reorganization will permit the coordination of national, as well as local, levels that was lacking in the past. At the same time, he emphasized that the government remains committed to a highly decentralized form of development and hopes for a maximum participation by the people in the villages in determining development priorities. He stated that the government is still studying how this can best be done. Meetings were being held with ORD Directors during the week of October 28th for this purpose. An important new element in the system is the establishment of an evaluation and planning unit at Ouagadougou (with UNDP and IBRD assistance) and the intent to have an evaluation unit in each ORD.

While the individual ORDs will have considerable authority in planning and executing development programs, the national government intends to provide policy guidance and supporting services. In particular, the Permanent Secretary noted that Upper Volta must impose some restrictions on rural land use to prevent encroachment of the Sahel and further deterioration of soil resources. The GOUV has asked for assistance of a land use planner for planning the development of virgin resources (e.g., areas cleared of onchocerciasis). UNDP has agreed to assist. This will be followed by efforts to relocate people from the over-populated areas.

The need for adoption of modern production practices in food crop production, as has been done in the case of cash crops such as cotton and peanuts, is recognized by the ministry. The Ministry intends to make better seeds available through the National Seed Multiplication Project being developed with A.I.D. assistance and proposes to provide other services required for more modern agriculture, such as plant protection services.

One element of the Ministry of Rural Development's strategy for development, according to the Permanent Secretary, is to encourage commercialization of food crops by providing more attractice prices to producers. The first step has been to establish a grain monopoly, with the ORDs the sole purchasers of cereals and with the National Cereals Office (OFNACER) obliged to buy all the grain from them. The prices at which the ORDs buy from the producers are fixed at CFA 22 per kg for the 1974 crop of sorghum/millet and maize. The price at which OFNACER can sell is also fixed by the government, at CFA 37 per kg. The difficulties in implementing this marketing program are tremendous - probably beyond the capabilities of any of the ORDs or OFNACER.

Supply of Inputs

Up to now, no infrastructure has existed at the national level for procurement and delivery of agricultural inputs to the farmer. This has been a responsibility of the individual ORDs. CFDT, which has organized cotton marketing in all the cotton growing areas, undertook to import and distribute seeds, fertilizers, pesticides, and spraying equipment for cotton growers. While most of the 4,000 tons of fertilizers used annually in Upper Volta are applied to cotton, CFDT has been making fertilizer available to other users and is in effect the sole importer and distributor of fertilizers. While it may not be the appropriate instrument for providing these services in the future, it appears to be performing these services efficiently. While current fertilizer use on food crops is insignificant, a substantial increase in chemical fertilizers is essential for economical expansion of cereal production. It is particularly important for rice and maize production. Eventually, it seems, it will also be required for sorhgum and millet, as fallow periods become shorter.

The Directorate of Agricultural Services, under the reorganized structure of the Ministry of Rural Development, has responsibility for assisting the ORDs in plant protection. It has a small trained staff but little equipment. In October-November, 1974, this Directorate was concerned about the damage being done to the millet crops by a "chinelle" and grasshoppers appearing in many parts of the country. They had neither the equipment nor the insecticides to respond. As they move, and they will eventually have to, to a more intensive agriculture, the problems of disease and insects will be intensified. Ultimately, they will need a national plant protection system with good communication with the rural areas, in which extension staff are trained to identify conditions indicating disease or insect outbreaks and in which the Directorate and/or the individual ORDs are prepared to mobilize equipment, materials, and personnel to deal effectively and promptly with it. AID should consider assistance in this area.[1]

Present arrangements are inadequate for field testing equipment, promising new varieties, quickly multiplying the best varieties and distributing seeds efficiently to farmers. The Upper Volta Seed Multiplication Project now being developed with the GOUV is designed to correct this situation.

1. Canada, under its technical assistance program (CIDA), is providing such assistance to Niger. It involves establishing the basic infrastucture of an entomology and plant pathology laboratory and a national system of plant protection facilities linked to the rural areas through the extension work.

There is considerable interest in Upper Volta for developing mixed crop and livestock systems, particularly systems using animals for power. IRAT has done some research on animal traction using oxen as well as donkeys for different farming operations. The various ORDs have attempted to introduce animal traction. With the increase in fertilizer prices, there has been renewed interest in these programs from the standpoint of the animal manure provided. One team of oxen could make a significant contribution in organic fertilizers but the economics of animal traction farming rests more on the contribution to better and more timely land preparation and crop cultivation and on the opportunity for a farmer to expand the area cropped with a given amount of labor; for example, with a team of oxen a farm family may easily crop 6-8 hectares compared with 1.5 to 2 hectares with the traditional systems using only human labor.[1]

Several factors account for the lack of progress in adoption of animal traction. One important factor is certainly a cultural one - the fact that by tradition certain ethnic groups handle cattle and others do not. Perhaps an even more important factor has been the unavailability of capital to make the large investments required for that type of farming.

The lack of credit, in amounts and on terms that will support a transformation from subsistence to viable commercial agriculture, is a major constraint in Upper Volta, as it is in most developing countries. The UNDP project at Matourkou appears to have succeeded quite well in providing the credit needed for an impressive transformation of commercial agriculture. They have undertaken an extension program that now involves 300 farm families in seven villages. The objective of the program is to sedentarize farming and maintain fertility levels to allow permanent farming - continuous cultivation. The program involves introduction of animal traction (oxen) with all essential equipment, improved seed varieties, fertilizers and plant protection. The inputs are provided on credit, and the program is supported by an intensive advisory service. Credit for purchase of the oxen and equipment is provided on the following terms: three years of grace and another five years to repay; interest at 5%. Outside the program, that is through the regular agriculture credit institutions, the terms are 15% down payment and three years to repay - terms quite unrealistic for the kinds of investment required for animal traction farming. The Matourkou experiment might be a useful prototype for an improved national credit system. The National Bank for Development has shown interest in the Matourkou experiment and has arranged to send members of its staff to work in the Matourkou project for in-service training. Afterwards they will be assigned to ORDs as agents of the banks, preparing loan dossiers for submission to ORD Directors.

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1. While full use of the animal manure and good crop rotation, including a legume cover crop, such as stylosanthese, which provides excellent livestock forage, will contribute to soil fertility and humus content, commercial fertilizers will also be required for high yields and will be economical, even at current prices, for export crops and certain cereal crops.

VI. Price Policy and Marketing

Objectives of the Grain Price Stabilization Program

The primary objective of the Upper Volta grain price stabilization program is to decrease the seasonal fluctuation of consumer grain prices between the post-harvest low and the pre-harvest high. Secondary objectives include lower consumer prices and higher producer prices.

Early government efforts at grain marketing involved the use of cooperatives, but were not successful. Later, a scheme was instituted under which traders were licensed and were obliged to buy and sell at officially set prices. This also did not succeed, as traders ignored the fixed prices and only a few light penalties were handed out.

In January 1971, the government created the National Cereals Office (OFNACER) to act as a price stabilizing agency. OFNACER was originally to enter the market and buy from the Rural Development Organizations (ORDs), cooperatives and private traders, but the Office was not to have a monopoly position. In 1974, after the military resumed control of the government, this changed. The ORDs were given a monopoly to buy, OFNACER had to buy all the grain from them, and OFNACER was given a monopoly to sell.

To date, OFNACER has not been able to act as a price stabilizing agent because the drought meant that virtually no cereals were available for purchase. During the 1972/73 season, there seems to have been strains between OFNACER and the Sous-Comité Permanent de Lutte Contre des Effets de la Secheresse that was set up under the Ministère du Plan, du Developpement Rural, de l'Environment et du Tourisme to distribute emergency relief grain. For example, the Sous-Comité appropriated (for free distribution) about 10,000 tons of grain that the U.S. had sent to OFNACER to sell to generate a block account for future OFNACER grain purchases.

Another problem arose over the local selling price of U.S. grain. The U.S. officials felt the price was too low and were able to get it set at CFAF 16/kg. This prompted the U.S. in August 1974 to request that all U.S. grain remaining with OFNACER be shifted to the Sous-Comité for free distribution. This was done with the apparent result that relations are now strained between OFNACER and the U.S. Embassy at Ouagadougou.

Free Market Grain Trading

The grain price stabilization program is intended to improve on the free market trading situation. As in Niger, it is alleged that farmers sell "too much" of their grain in the immediate post-harvest season; that private traders exercise monopoly powers and buy at "too low" a price in the post-harvest season; and that private traders exercise monopoly

powers and sell at "too high" a price in the pre-harvest season.

The only data available are the quarterly price statistics. Table 2 (p. D-33) presents only the extreme low post-harvest price and the extreme high price later in the season. That is, the table shows the widest fluctuation reported for each marketing season[1]. As seen in the table, between 1960/61 and 1969/70, the greatest seasonal price rise was a 46% increase over the post-harvest low. The average maximum fluctuation was 33%. Data on the more recent drought years were unavailable, but it is likely that, as in Niger, they would show greater fluctuations. However, it is very important to note that the grain price stabilization program is not meant to be a drought relief program. Rather, it is intended to stabilize consumer grain prices during normal or near-normal years.

The magnitude of the fluctuations shown in Table 2 should be compared to traders' costs of buying and selling, storing, transporting and raising capital. One can gain some perspective on the reported fluctuations by comparing them with the officially fixed buying and selling prices for this season. The government has set the buying price of sorghum, millet and maize at CFAF 22/kg[2] and the selling price at CFAF 37/kg. With this margin of CFAF 15/kg, some individuals believe OFNACER and the ORDs will break even, while others believe they will suffer losses. The officially set margin represents a 68% increase over the buying price.

Government Grain Marketing in 1974/75

This year, the ORDs have monopoly power to buy all marketed grain excluding rice; they must sell the grain to OFNACER; and OFNACER has monopoly power to sell. However, the government realized that neither organization has the ability to handle all of the grain trade. Hence, each is empowered to license private traders to act on their behalf. These traders must buy and sell at official prices. The ORDs will pay the licensed traders CFAF 1/kg as "collectors' remuneration". OFNACER may sell grain to private traders at CFAF 35.50/kg, and the traders must sell to the consumer at CFAF 37/kg. The "sellers" renumeration" is CFAF 1.50/kg.

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1 See the Niger report for discussion of some limitations of quarterly data.

2 This is the price paid to producers; as discussed below, the team believes that post-harvest consumer prices will be no higher than this because CFAF 22/kg appears to be above the equilibrium price. A similar situation exists in Niger.

The ORDs must collect and deliver the grain to OFNACER which pays them CFAF 30 44/kg. This price is intended to cover the ORDs' costs and provide them with a CFAF 2.50/kg margin[1]. The selling price of CFAF 37/kg is intended to provide OFNACER with a margin of CFAF 3.55/kg; but if OFNACER sells to private traders, this is reduced to CFAF 2.05/kg.

There is one obvious inefficiency in the above system. To the extent that purchases and sales are done by licensed, private traders, the stabilization scheme forces superfluous additional transfers. For example, if the same trader buys and sells, the stabilization scheme forces superfluous transfers between the trader and the ORD, between the ORD and OFNACER, and between OFNACER and the same original trader. If one trader buys and another sells, those two private agents would need only one transfer between them, but the stabilization scheme requires three. Such transfers, of course, cost money.

A potential problem concerns the effect that marketing activities will have on the ORDs. The objective of the ORDs is rural development, but advances toward that objective are often difficult to measure and may be very slow. On the other hand, a successful marketing operation is relatively easy to document (if not to achieve). Thus, the ORDs may place greater efforts in their marketing operations to the detriment of their development activities. Some such reallocation is bound to occur simply because the marketing activity has been added without a commensurate (if any) addition of personnel. Furthermore, the ORDs will probably rely on their extension agents to exhort farmers to market a high portion of harvests (this may be one local criterion of a successful marketing campaign), and to do the actual purchasing. Such activities will probably detrimentally distort the relationship between extension agent and farmer.

These issues appear to be additional problems for the Upper Volta program; over and above the more common major general problems of having government agencies attempt to replace the activities of numerous private traders. OFNACER does not appear to be associated with marketing decision making, even though they are the primary agency. Prices are set by other government offices and OFNACER must abide by them. Some individuals feel that the ORDs will not cooperate with OFNACER. The Sous-Comité is still in existence and there is thus a danger of a repetition of past expropriations. Of course, the general question of efficiency in running the operation is of paramount importance, but we must wait until the season is over before making any judgements.

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1 If they collect the grain themselves and not from traders, the ORDs retain an extra CFAF 1/

Grain purchases this year will be financed by loans from the National Development Bank. The ORDs are presently negotiating such a loan, which is expected to be granted within a month but probably sooner. The government of Upper Volta stands as guarantor of repayment. Interest will be 9½%, with full repayment in nine months. The loans will total about CFAF 1 - 2 million. Later in the season, OFNACER is to negotiate a similar loan for purchase of the grain from the ORDs. This double loan for purchase of the same grain certainly seems strange.

The two figures for the loan to the ORDs reflect different expectations of how much grain they will buy: approximately 50,000 tons or 100,000 tons. Estimated production of sorghum, millet and maize is expected to total about 1 million tons. As in Niger, the common estimate is that about 10% of the crop is marketed in normal years. This year is not normal because farmers' stocks are low; and, on the other hand, farmers have foregone cash consumption for a long time. The outcome in terms of marketed crops is unknown.

OFNACER is said to have storage capacity for 24,500 tons. There are expectations that, by the end of 1974, there will be 46,230 tons of capacity in the country. As in Niger, additional open air storage is possible in the dry season.

Very mixed opinions exist as to the quality of the staff of OFNACER. It probably varies greatly among distribution points, with a low average quality.

The lack of data makes it very difficult to draw any conclusions about the grain price stabilization program. The only available statistics are of quarterly consumer prices between 1960/61 and 1968/69. If the range of seasonal fluctuations in each of those years is compared with the purchase/sale margin of the stabilization program, the latter is seen to be greater than the former.

This analysis leads to the disturbing conclusion that the mechanisms developed, with considerable AID assistance, do not and cannot achieve the objectives of stabilizing cereal prices and supplies as efficiently as the open market. Admittedly, the analysis is based on meager and questionable data. Further study is needed and, if it confirms these conclusions, AID should explore alternative mechanisms, perhaps some that make use of the apparent efficiencies in the existing market structure and reduce the costs of managing the buffer stocks.

VII. Possibilities for Useful AID Interventions

The foregoing assessment suggested some of the needs for external assistance. Some of these needs can, perhaps, be provided more appropriately by other donors - and, at this time, many other donors are looking for investment and/or assistance projects in Upper Volta.

The unique Upper Voltaic organizational structure, in which each semi-autonomous ORD makes its own arrangements with donor sponsors, presents programming difficulties. The recently approved project for assistance to the Eastern ORD avoids this problem since it will operate within the geographic confines of a single ORD.

The proposed National Seed Multiplication Project will have to face the problem of working with 12 ORDs, each with its own existing (or non-existent) arrangements for seed multiplication. This project may have difficulties simply because it is the only major agricultural development program in which the national government will be taking a strong lead. Nevertheless, this is a much needed project and involves the national government in an area where strong central leadership is required. There are other such areas where the national government should take the initiative in developing a uniform, equitable and efficient national system. Following are specific programs requiring national government leadership that AID should consider for support, unless the kind of assistance required is available from other donors.

1. Detailed resource maps are available or under preparation for certain areas scheduled for more intensive development. ORSTOM is preparing additional land capability maps based on recent aerial photos. AID should be prepared to assist in compiling additional data for research maps, on a scale and in the detail needed for efficient land use planning.

2. The soil fertility situation needs to be reviewed with a view to establishing a complete system for maintaining soil fertility. This should include a thorough study of how known phosphate deposits in Upper Volta can be developed and utilized. It should also outline studies needed to establish possibilities for providing plant nutrients through crop rotations or other measures as alternatives or supplements to commercial fertilizers.

3. The Agricultural Credit System needs to be reviewed and reorganized to meet the credit requirements of small farmers in all of the ORDs. AID should be prepared to assist in developing an appropriate national system.

4. The country needs to develop the entire infrastructure for dealing with plant disease and insect problems, including a small laboratory for

identification of pests and testing control measures, and the personnel, equipment, insecticides, and communication network to identify and respond to disease and pest outbreaks. AID should consider planning and establishing such a system for Upper Volta.

5. Perhaps the most important constraint to agricultural development is the lack of sufficient personnel well trained in agriculture. AID should consider a program for providing training for larger numbers of Voltaics at the bachelor and post graduate levels. The program should be designed to provide much of the training, including particularly research aspects of advanced degree programs, within the region.

As indicated earlier, the ORD du Sahel, encompassing most of the area of Upper Volta in the Sahelian ecological zone, is now in the process of being established. AID will be participating in the FAC-sponsored land capability classification studies now being carried out. It is likely that the GOUV will request AID assistance in the development of this ORD. This is an important area from the standpoint of the number of families it supports and its contribution to the country's meat supply. AID should consider this area for a major integrated rural development project.

The expertise and serious attention that is directed to the purely material aspects of whatever plans for economic development are undertaken in Upper Volta must be matched by equally serious attention to engaging the commitment of the farmers themselves to the new enterprises tentatively selected for AID support. This point cannot be overstated.

In addition to other considerations that go into final program selection and design, from an anthropological perspective, certain development strategies appear more likely than others to succeed in Upper Volta. They are those which are small enough in scale to allow for the farmers' anticipation in deciding what is to be done, how, where and when. The Horowitz suggestion that a series of 'seminars' be conducted with farmers to get their point of view seems very promising for maximum effectiveness; these encounters should be structured as informally as possible. Perhaps on another occasion it might be feasible to meet also with scholars presently in the field in Upper Volta. Such a meeting should, of course, include Voltaic scientists as well. Once particular projects have been selected in the Eastern ORD, the valley of the Black Volta, and perhaps the new ORD of the Sahel, then the ethnic identity of the specific populations to be affected can be determined, and what is known of their traditional cultures and of their contemporary situations can be combined with what is known of the probable requirements of development in order to so organize

these meetings that adequate information is acquired on those aspects of development planning that appear to be most sensitive and/or where the risks of failure are particularly high.

It is further suggested that large scale resettlement schemes should be approached with utmost caution. The rural populations of Upper Volta have been quite mobile for centuries; indeed, the processes of their migrations have been extensively studied. But the displacements that have effectively occurred have been at the people's own initiative and in accordance with traditional procedures by means of which strangers can find a secure place in new regions throughout the country. Conversely, past efforts on the part of the government to resettle portions of the populace, as in the case of the Niger Irrigation Project, have been notoriously unsuccessful.

Similarly, capital intensive development projects should be avoided. Requiring as they do the importation and maintenance of complex and costly equipment, they tend to under-utilize the available surplus labor force and to perpetuate reliance upon foreign expertise to keep in operation. Where mechanization is required, it is in the imperative interest of the Voltaics that they participate in the acquisition, installation, and operation of such equipment. As necessary, there should be an explicit plan for them to receive the training necessary for them to run things for themselves. Every experience that increases the technical competence of an expatriate worker robs the people of Upper Volta of the chance to improve their skills and thus gain greater mastery over their own destiny.

Whatever programs are ultimately selected for AID support should first be undertaken on a pilot basis with allowance for program testing, re-evaluation and redesign in response to continuously evolving conditions.

Particular attention should be given to the development of small scale industries, irrigation, agriculture, and public works on such tasks as well-digging and road building that are essential to increasing the productive capacity of the rural sector and, most important of all, that would provide dry season employment within the country for the thousands of young Voltaic workers who presently contribute their productive energies to the economic development of the Ivory Coast and Ghana.

In conclusion, it should be stressed again that no economic development project will succeed in Upper Volta that takes the people for granted, treating them and their traditional way of life as a sort of tabula rasa upon which new patterns of technology and economic behavoir can be imposed on the assumption that they will be automatically accepted - or, if not, that failure will only reinforce the conviction that people in the rural areas are unable to recognize what is good for them.

TABLE 1 Characteristics of the ORD's

ORD	Area Km^2	Population (1970)	Inhab $/Km^2$	Rainfall mm	Sponsor	Management	Potential
Ouagadougou	24,179	755,000	31	750-1000	FAC to 1968	SATEC[1]	Poor
Koudougou	26,324	685,950	26	800-1000	FAC	SATEC	Poor to Mediocre
Kaya	21,578	558,000	26	650-800	FAC	CFDT[2]	Poor
Ouahigouya or Yatenga	12,300	504,000	41	600-700	FED	BDPA[3]	Very Poor
Dedoagou	27,356	545,900	15	800-1100	IBRD was FAC	CFDT	FAIR
Bobo Dioulasso	20,500	269,000	13	1100-1200	IBRD	CFDT, IRHO[4]	Fairly Good
Banjora	18,393	203,600	11	1200-1400	FED ends 1974	was SOTESA[5]	Good
Diebongou-Gaoua	14,488	157,300	11	1000-1200	IBRD ends 1974?	was CIDR[6]	Fairly Good
Koufela	15,657	333,300	21	700-1000	CIDA	CIDA CIDR CFDT	Poor
Fada N'Gourma	43,444	202,750	5	700-1000	AID UNDP	AID UNDP	Mediocre
Sahel	36,870	273,000	7.4	400-700	----	----	Poor

1. Societe d'Assistance Technique et de Cooperation
2. Compagnie Francaise Pour le Developpement des Fibres Textiles
3. Dureau Pour le Developpement de la Production Agricole
4. Institut de Recherches pour les Huiles et Oleagineux
5. Societe Technique pour le Developpement Agricole
6. Compagnie International Developpement Rural

TABLE 2

Consumer Prices of Sorghum & Millet in Upper Volta

Season	Min. & Max. Quarter & Price	Max. Changeover Min. CFAF	Percent
1960/61	Nov - Jan 18 May - July 22	4	22%
1961/62	May - July 16 Aug - Oct 17	1	6%
1962/63	Nov - Jan 19 Aug - Oct 27	8	42%
1963/64	Nov - Jan 22 May - July 30	8	36%
1964/65	Feb - Apr 21 Aug - Oct 30	9	43%
1965/66	Nov - Jan 20 May - July 29	9	45%
1966/67	Nov - Jan 26 May - July 31	5	19%
1967/68	Nov - Jan 24 Aug - Oct 35	11	46%
1968/69	Feb - Apr 24 May - July 34	10	42%

Source: Becker, AID/CM.

UPPER VOLTA
LIVESTOCK SECTOR ASSESSMENT

I. INTRODUCTION

The livestock sector in Upper Volta as in other West African countries serves a number of vital functions. It provides subsistence for a large number of pastoral and sedentary producers and a surplus of meat and milk for urban populations. It is a valuable source of foreign exchange not only from the export of meat, but also animal by-products, particularly hides and skins, for crop producers who tend livestock or make their fields available to the animals of migratory herders. It is a way to help to maintain soil fertility and to improve soil structure. Ownership of cattle and other livestock is an investment and form of savings for pastoral and sedentary producers that assures survival in times of stress, satisfys social obligations, and adds to social status. In normal times, national livestock production activity represents a considerable source of revenue to the government through direct taxation.

Historically, the Sahelian herds,and Upper Volta is no exception, have expanded to exceed the carrying capacity of the range-water system and have been "pruned" back periodically by drought. However, during the 15 years, 1954 to 1968, there was an unusually long series of years with average or above average rainfall, and the herd size almost doubled. This expansion was facilitated by improved veterinary service delivery including the rinderpest campaign undertaken in 1965-66 across West and Central Africa with A.I.D.and other donor assistance.

The response of pastoralists to increased cattle numbers and lowered risk of massive disease outbreaks was to increase herd offtake from about 7 percent in the early 1950's to 11-13 percent in the late 1960's. This expansion proved to be more than could be sustained by the range-water resource in years of below average rainfall from 1969 to 1974. With the decline in rainfall, which is considered to be only a cyclic occurence, herd size and production has stagnated or declined.

Rising salaries and wages, especially in the coastal regions but also in the capitals of the interior countries, have been accompanied by a rise in prices; however, in spite of expectations to the contrary, the meat prices have lagged behind the general price level. In effect, the real (uninflated) price of meat has declined in spite of the fact that the supply has stagnated in most of the markets within the region.

The effect of the recent drought has not been great in terms of the most recently reported slaughter data, i.e., August-September 1974, either in the interior or in the coastal countries. However, there is certainly a decline in the number of calves born in 1974 and in the calf drop surviving from 1972 and 1973. There is some indication that the response of the livestock owners, both pastoral and sedentary, after the satisfactory

1974 rainy season will be to reduce marketings to a minimum,* in order to accelerate rebuilding of herds in regions where losses were serious, e.g., 10 percent or more. This would include the Voltaic Sahel and most of Niger. For these reasons the major effects of the recent drought on the meat supply are probably just beginning to be felt and could last for another four to five years.

Objectives of Livestock Interventions

The objectives of a livestock development program (from a donor's point of view) are likely to be:

- to increase the quantity and perhaps quality of meat delivered to the domestic and export markets with consequent improvement in diets.

- in this process to maximize the benefits to the largest number of people (including the poorest) - producers and consumers.

- through use of draft animals and mixed farming to increase farm income and to help maintain or improve soil fertility and soil structure.

- to improve the utilization of by-products, hides, skins, and abattoir by-products.

- to develop the sector in such a way as to conserve the national resources involved and, where possible, to restore areas which have suffered ecological degradation.

Under the first of these objectives could be included:

- maintenance of veterinary service delivery.

- rebuilding the national herd by actions to reduce calf mortality in areas where losses were severe (say over 20% of the usual cohort of calves). Where losses were not this great such an intervention will only accelerate overstocking of the range land.

- actions to grow young animals that are marketed and would otherwise be slaughtered, producing a low carcass weight.

- actions to increase the carcass weight of mature and cull animals marketed, such as peasant feeding and small feedlots, which serve to add live weight and to distribute the supply for slaughter over a longer period of the year.

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*This will be lower than is usually the case with the suppression of the cattle herd because of the drought.

II. CATTLE PRODUCTION REGIONS: PASTORAL AND MIXED FARMING SYSTEMS

A. Production Regions

Upper Volta lies mainly in the Sudanian zone, with 600 to 1,000 mm of rainfall a year in a four to five month rainy season. About 13 percent of the land area, in the North, is in the Sahelian zone, with an average of 400 to 600 mm of rainfall a year. Another relatively small area in the Southwest has over 1,000 mm a year rainfall and is in the Sudano-Guinean zone. There are thus two major livestock production regions: the northern Sahelian zone and the Sudanian zone covering the major portion of the country.

The Sahelian Zone: This zone corresponds to the ORD of the Sahel and includes the circumscriptions of Don, Goum-Gorum, and Djibo. About 560,000 head (23 percent of the cattle of the country) are grazed in this zone. The range land has an estimated capacity to carry 10-12 head/km^2 but in 1966-69, stocking rates were estimated at 16 head of cattle and 30 sheep/goats/km^2. Even with the estimated drought losses of perhaps 20 to 25 percent, the zone will still be overstocked. The Sahel ORD produces annual surpluses of 6200 tons of beef and 2640 tons of sheep/goats in excess of local consumption. This northernmost region of Upper Volta is the meeting ground of the herds of the Tuareg and Bella, who move northwards in the rainy season and those of the Peul who move into the zone from the south and spend the rainy season here.

The Sahelian zone is a difficult one for successful intervention. In the past, there have been deep wells (e.g. Forage Christine), dissemination of improved sires, sale of calf supplement, sale of mineral mixtures and other attempts to improve the situation. However, many authorities would agree that we have no easy solutions to the livestock problems of an ecological zone such as the ORD in the Sahel which will quickly improve the welfare of the herders or increase production.

Currently the Government of Upper Volta with donor assistance is planning the livestock development of the Sahelian zone. The design of this livestock development plan should incorporate elements of discussion with herders in the region to determine their perception of problems and solutions as well as technical approaches to problems.

The Sahel ORD is of particular importance to Upper Volta as the largest source of ruminants to meet the demands of deficit areas and export markets. Planning for this region will have to take into account livestock development in other ORD's of Upper Volta as well as neighboring countries. The transhumance of the Peul pastoralists links the Sahel ORD to the Fada and Kaya ORDs and so the livestock development programs of the three ORDs will need to be coordinated. Other areas of the country (particularly Dedougou and Bobo ORDs) have considerable possibilities for

livestock production, but the presence of the major part of the breeding herds in the North and East make the Sahel and Fada ORDs the key areas in the next five to ten years.

Because of the rainy season migration of the Tuareg and Bella (undoubtedly with some Peul) into Mali, any significant change in the hydropastoral resources in the Sahel ORD will also result in a change in the utilization of the Malian rangeland.

The Sudanian Zone: It is in the Sudanian zone with over 600 mm rainfall that the better possibilities for increased forage production lie. The population density, 9 to 10 people/km^2, and the stocking rate, 5 cattle/km^2, are both favorable for intensifying livestock production. This is limited in the south by the infestation of tsetse fly. The infested zone in general starts at 12.5 degrees North. Between 11 degrees and 12.5 degrees, crossbred (zebu x taurin) cattle can be kept and south of 11 degrees heavy tsetse infestation can generally only be tolerated by taurin cattle. The rainfall moderates this situation, dryer regions being less susceptible to infestation, and the river bottoms more likely to be heavily infested than the higher ground.

The Fada ORD: Because of its low density of population and livestock and Sudanian climate, the Fada ORD has great potential, together with the rainy season pastures in the Sahel ORD, for an increase in livestock production by the pastoralists and sedentary farmers. However, there are real limits on the extent to which Fada ORD rangeland or dry-season pastures could relieve the pressure on the Sahel ORD rangelands unless some control of access to grazing lands can be exerted by a new and acceptable pastoral code in the Sudanian region. Any relief given by providing more pasture for the Peul transhumant herds to the South would only be temporary, until either the herds that move into Mali in the rainy season used the Sahel ORD rangeland more, or the herds that move into the Fada ORD in the dry season increased in size to stock the Sahel ORD fully in the rainy season, or both.

Kaya and Dedougou ORDs: More dense human population and excessive stocking rates complicate livestock development in these two ORDs. Population densities attain up to and over 50 people/km^2 and the average of 10 cattle and 11 to 12 small ruminants/km^2 is in excess of the safe carrying capacity of the rangeland. In line with GOUV priorities, attempts should be made in these ORDs to integrate livestock and crop production to maintain soil fertility. There is a substantial zone south of the 12th parallel which is little used by people or livestock in the Fada, Koupela, Ouagadougou, and Koudougou ORDs. When this area is cleared of onchocerciasis it will be suitable for grazing and mixed farming within the limits set by areas infested by tsetse. Currently, there does not exist a sufficient supply of trypano-tolerant heifers and cows to develop this zone.

In this area over the medium run, small ruminants, because they reproduce so much more rapidly, will provide the major potential for development. However, for animal traction, as well as milk and meat, trypano-tolerant cattle will be needed; this will involve either cross-breed or taurin cattle.

Since a cow herd of suitable size will take a long time to build, a source of taurin bulls will be needed to cross with zebu cattle. In the short run, young bulls could be obtained from some of the neighboring countries (e.g., although difficult through official channels, from Mali). In the medium run, the herders in the taurin production zone in the Southwest should be encouraged to improve the quality of their herds and to supply the bulls (preferably of the N'Dama breed) for this development. In the zone where crossbred cattle can be kept, it will be necessary to have a supply of crossbred bulls. The Azaouak x N'Dama cattle multiplied in the IRAT/USAID center at Farako-ba should provide the basis to supply this need.

In the West and Southwest (Bobo, Dioulasso, Banfora and Diebougou ORDs) the population is less dense (13-15 inhabitants/km^2) and the rainfall (1,000-1,300 mm) more reliable. In theory most of the zone which lies south of 12.5 degrees latitude, should be stocked by crossbred and taurin cattle. However, in the Bobo region and between Bobo, Sikasso (Mali), and Korhago (Ivory Coast) there are large herds of cattle with over half zebu blood and many pure zebu. Only in the Diebougou ORD and to the east of a line between Bobo and Banfora do the zebu cattle face substantial losses from trypanosomiasis.

In this zone UNDP and USAID have an activity to develop production among the sedentarised Peul. IBRD also has a substantial (35,000 hectares) ranching project proposed for sedentarized Peul. Basic to both of these interventions is the assumption that it is possible to identify the migratory patterns of the herds of the sedentary Peul and to be able to allocate the rangelands to families or groups for their exclusive use. Then, the rangeland/water resource can be improved and the intensity of grazing controlled. CVRS, with IBRD financing, made a survey of the region with these objectives: (1) of identifying mixed farming groups which are likely to accept modern methods of management of range and livestock and of establishing their ethnic origin; (2) and of identifying the basic socio-economic unit which would benefit from such a modernization program, the number of these units, their inventory in livestock, their willingness to undertake speculative activities, the amount of discipline which could be expected, and their attitude to the project; (3) to elucidate the traditional authority of land use rights, its effectivenss, and compliance by the local population, the willingness to relinquish land use rights and the way in which it is done; and (4) to study the degree of compatibility between the farmers and herdsmen.

On the basis of these results, a proposal of the type of ranching that would be most suitable for the local people would be made; the social

unit that should be involved in an individual ranch identified; the attitude of those responsible for allocating land use and the difficulties which arise identified; and the measures to be taken and the means to be introduced to the Peul, who herd cattle throughout all of the country where trypanosomiasis do not prevent it. The Peul range from fully nomadic to sedentary in their way of life. Frequently, other cattle-owning ethnic groups entrust their herds to the Peul for grazing; some Peul herding families gather food, grass seed, and tree fruit. Some of them, especially if their milk production is insufficient for subsistence, raise millet. Others have permanent houses made of banco and farm like the sedentary ethnic groups. The livestock are taken on small migrations during the rainy season.

On the whole, in spite of conflicts especially in the more densely populated areas, the traditional herders and the farmers maintain the usual symbiotic relationships. Conflicts are incurred mainly because of damages to crops by livestock and by competition for water. Many of the four million sedentary farm population also keep livestock, especially sheep and goats. Some of them also keep pigs and poultry. Estimates of per capita annual income (1972) indicate that herders and sedentary farmers have a similar level of income of CFAF 8600 and CFAF 8200 respectively, compared with a national average of CFAF 15,600 ($65).

B. Pastoral Systems

The true pastoralists, raising no crops, are either Tuareg and their Bella associates, or Peul. They number about 600,000. The Tuareg and Bella live as a nomadic herders mainly in the Sahel and have a subsistence milk production enterprise with meat as a by-product. Milk yield in excess of that used by the young is estimated at 19 kg/cow and 6.3 kg/small ruminant lactation; this is either consumed by the pastoralist family or sold or exchanged for food grain.

The herdsmen have an investment valued at CFAF 20 billion in cattle and 8 billion in other livestock. Their annual gross value of product is 31 percent of the inventory value. The livestock sector, in spite of the experience in the recent drought, appears to have a remarkable ability to maintain its per capita production, but seems unable to increase it. The existing regions of ruminant production, appear to be at or above their sustainable production level, except for parts of the Fada ORD. There also remains a substantial potential for increased production in the west. Clearance of trypanosomiasis from the Volta Valleys would make available additional pasture area.

C. Mixed Farming

The traditional farming system include three types of crop land: 1) the garden around the house, which is manured with the household waste; 2) fields near the house, which receive manure; and 3) bush fields, which

are rotated in a fallow system. To these must be added land on which water is controlled, e.g., by small dykes on "flooded" low lands ("bas-fonds") and irrigated land.

It is usually possible to sustain the garden and nearby manured fields in continuous rotation. If this fails the house or village has to be moved to a new more fertile area. However, pressure of population tends to shorten the fallow and the fertility of the bush land declines. The massive out-migration from the Mossi plateau to the west and southwest and their gradual movement into the Gourmantche area in the east is evidence of the inability of the soil fertility to support the population.

In areas where crop land is not too over exploited, there are real possibilities for maintenance of soil fertility by mixed farming. This includes grazing livestock in the bush, and transferring the fertility onto the fields, and gathering bush hay to feed to stock confined near or on the fields. In theory, even greater improvement can be obtained from legume production on fallow lands; this fixes nitrogen in the soil, increases the organic matter and greatly improves the physical structure of the soil, as well as providing feed for livestock. Mixed farming tends to be highly profitable, although it requires additional capital; part of the profit arises from seasonal changes in price, e.g., financing cattle in the dry season as the price rises, and finishing rams for Tabaski.

Forage cultivation, in spite of its promise, is not found in practice for some or all of the following reasons: 1) as now proposed, its cultivation conflicts with demands for labor in crop production; 2) there is no tradition of forage cultivation; and 3) forage crops tried, particularly stylosanthes*, are highly flammable at certain times of year - an added risk. However, in the future some families may be led to produce forage and feed livestock on it after they have satisfied their perceived need for food crops, if forage production appears to be more profitable than export crops and if the "after effects" of forage crops on soil fertility and structure becomes demonstrated and recognized. Seed production may turn forage into a cash crop, further enhancing its adoption.

Forage production, although it may increase the availability of nitrogen in the soil, will not improve the phosphate balance. So additional phosphate must be sought (perhaps from local deposits at Arly and Diapaya) to maintain soil fertility.

With a major part of Upper Volta having rainfall of 600 mm and over and with the relatively high population densities in many areas, mixed farming, with both cattle and small ruminants, must in the future play an increasingly important role in maintaining soil fertility.

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*Stylosanthes probably needs 900 mm or more of rainfall as presently cultivated.

III. LIVESTOCK PRODUCTION AND MARKETING

Sector Performance

The output of Voltaic livestock production comprises that of the substantial indigenous herds, together with imports, legal and illegal, transits and exports. Attempts to stop the illegal entry of cattle, mostly from Mali, tend to result in a shortage of cattle for slaughter at Bobo-Dioulasso. Smuggling of animals into Upper Volta is common because Malian export plus transit taxes exceed Voltaic export tax. It is thus difficult to estimate the real output of Voltaic herds.

The herd sizes, static from about 1960 to the present, are estimated as follows:

Cattle	2,500,000 head
Sheep	1,600,000
Goats	2,500,000
Pigs	150,000
Horses	70,000
Donkeys	200,000
Camels	5,000
Poultry	12,000,000

The value of the output of the sector has been summed up as follows in millions of CFAF:

Intermediate consumption	4,859.6	Domestic Supply	8,365.6
Non-marked consumption	2,165.4	Imported Supply	1,351.6
Increase in inventory	514.9		
Exports	2,177.3		
	9,717.2		9,717.2

SOURCE: UNDP 1972

Export of livestock and meat (CFAF 2,177.3 million) is the greatest single item in the national trade. In 1972, cotton was the second (CFAF 911 million fiber and seed), and peanuts third (CFAF 458.4 million). Livestock comprised 44.9 percent of total exports for the year.

Apart from this, livestock products have contributed substantial tax income to the government. The head tax on livestock has been temporarily suspended and replaced by a FED grant of CFAF 80 million plus CFAF 125 million (replacing the veterinary service charges) for drugs and veterinary action.

There are taxes of 13 CFAF/kg on meat exported to Ghana (almost none) and 2.47 CFAF/kg to Ivory Coast, yielding 5 million CFAF in 1969. Slaughter taxes are charged to cover the cost of slaughter house operation and often also to contribute to the municipal budget.

There are also "patent" fees for merchants (CFAF 9 million) and butchers (CFAF 3.8 million) and local market taxes (about CFAF 5 million). In 1968, a year of high receipts from export taxes, the livestock sector contributed about 7 percent to the national budget and received 1.5 percent of the budget expenditure.

Probable Effects of the Drought: The probable effects of the drought include:

- a lowered survival rate of the 1972 calf crop;
- a smaller 1973 calf crop;
- a smaller 1974 calf crop but with a higher survival rate;
- only small changes in the numbers of cattle 3 years and older; and
- an increase in the reliance of herders on sheep and goats.

It is expected, although data will not be available late 1975, that:

- herders will withhold cattle from the market to build up herd numbers;
- the satisfactory rainy season has provided a good supply of milk and millet for the herders' diet;
- the suppression of cattle tax further reduces the pressure to sell cattle; and
- an increasing amount of the meat supply in the next year or two will come from an increase in the marketings of sheep and goats. However, since it takes 9 or 10 small ruminants to replace a beef carcass, total supply could decline.

Cattle numbers could build up at a rate of over 10 percent a year and the Voltaic loss is believed to be of the order of 8-10 percent of the cattle herd. However, it is not possible to predict how long the herders will withhold cattle from the market or the extent of this action on the supply

TABLE TAXES ON ANIMALS MARKETED, MILLION CFAF

	1968	1969	1970
Import taxes[1]	22.4	4.6	30.2
Transit taxes[2]	14.9	25.2	19.5
Export taxes[3]	265.6	159.6	181.5
	302.9	189.6	231.2

NOTES: [1]Import taxes from Mali was 17.5 percent in 1968, 14.5 percent in 1969 and 28 percent in 1972. From Niger it was only 2 percent.

[2]The national transit tax is CFAF 500 for cattle and CFAF 50 for sheep/goats. There are interior transit taxes also.

[3]Export taxes were 13.5 percent of a standardized value for UDEAO countries and 18.5 percent for other countries (mainly Ghana).

of different types of cattle (immature males, mature males, sterile heifers and cull cows and bulls).

Meat Consumption: Upper Volta's population (UNDP 1972) is estimated as follows:

	POPULATION	ANNUAL INCREASE**
Cities Over 5,000	650,000*	7 percent
Rural	4,600,000	1.4 percent
TOTAL	5,250,000	2.1 percent

*Probably based on 7 percent annual increase since 1966.

**Subject to change from out migration.

The domestic consumption of meat is 451,105 tons or 8.6 kg/capita; to this should be added 20 percent for offals (1.7 kg) plus 1-2 kg of wild animals and insects, and 2-4 kg of fish. This is one of the lowest per capita levels for an "interior" country in West Africa. It is probable that the urban consumption, especially in Ouagadougou and Bobo-Dioulasso, is about 3 times the average.

The trend in per capita consumption varies with the price and the supply. There is no evidence of short supplies in the major urban markets. Projection of the trend in consumption on the basis of facts is impossible. In the towns it appears to be declining, on a per capita basis, over the long run. The stagnation of the sector since 1968 has clearly led to a decline in per capita meat consumption nationwide. This must be viewed against the traditional use of meat in the diet as a flavoring and reinforcement of sauces eaten with carbohydrates and the alternative sources of protein such as pulses, peanuts, and bambara nuts.

IV. LIVESTOCK MARKETING

The commercial circuit operates in the traditional manner. The producers visit markets to exchange news and to find out conditions of the area and prices. They may or may not deliver their animals to the market, often selling to a "collecteur du brousse" who collects animals here and there and delivers them to market.

The decision making rules on what animals are sold, when, and why are not well understood. The cattle marketed can be classified as follows:

Females	Males
Calves	Calves
Young heifers	Young bulls
Sterile heifers	Immature steers
Cows with calf	Mature steers and bulls
Cows	Breeding bulls
Cull cows	Cull bulls

The offtake mainly comprise sterile heifers, cull cows, immature and mature steers and cull bulls. Mature steers and bulls predominate in export sales.

The young heifers, sold for whatever reason, tend to be presented seasonally in special "producers" markets. A herder may take some males and return with some females to increase his herd size. There is little evidence of any general slaughter of breeding heifers or cows. Since the late 1960's the reported slaughter of cows, often gestating, has increased; but attempts to salvage these animals have shown the herders to be selling only cull animals, particularly cows that do not lactate.

At each market there are butchers seeking their own supply, but most animals go to terminal markets (e.g. Ouagadougou and Bobo-Dioulasso) for the supply of the large towns, or to an exporters' market where they are grouped into convoys for export.

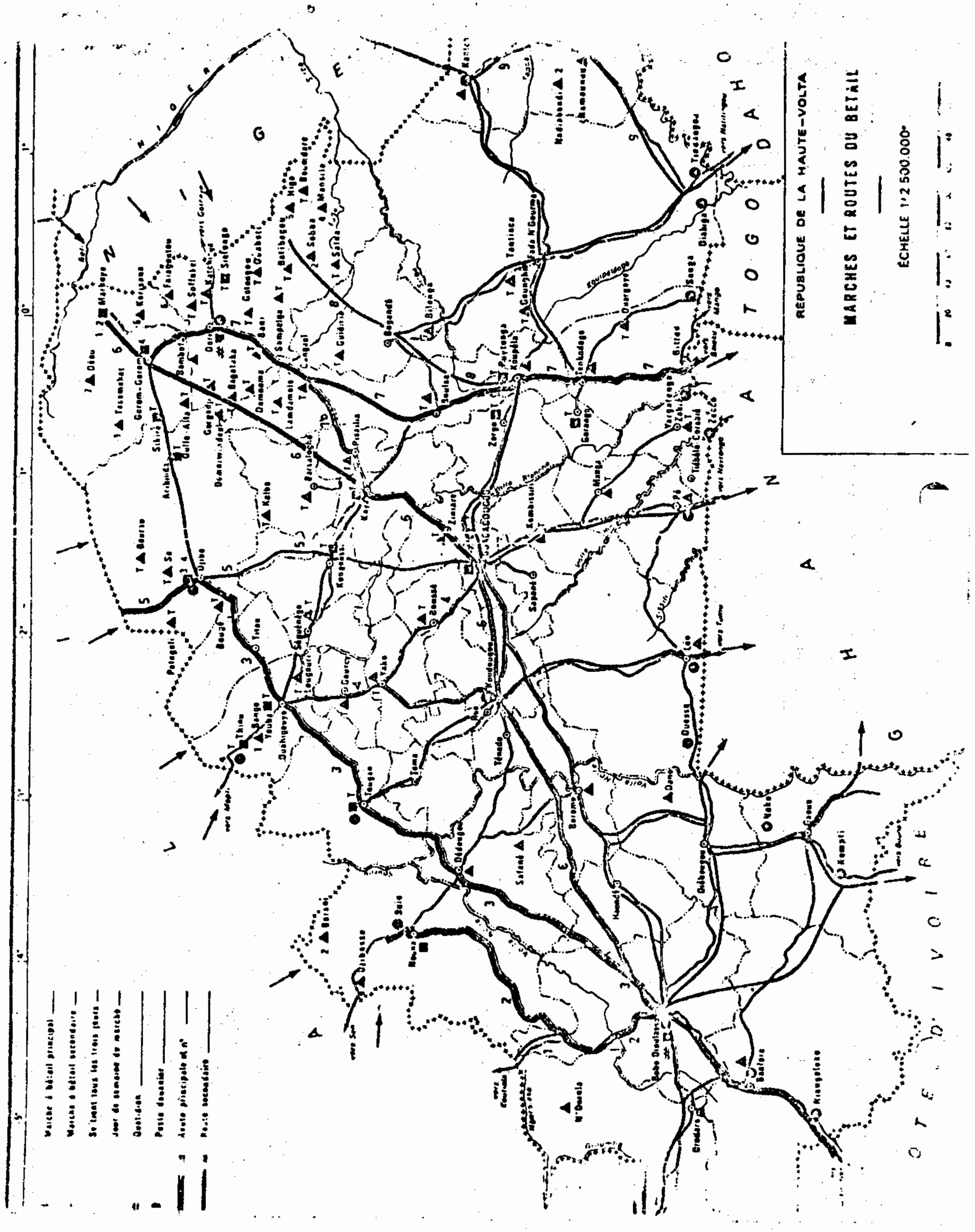
With few exceptions the livestock markets take place in an open field or the bush. However, in spite of governmental wishes to change this, there is no indication that the efficiency of marketing, or the ability to collect the taxes and record the number of animals presented, suffers. The taxes are paid by the seller.

The markets have no scales and animals are sold by the head. However, at the final destination the animals are bought by butchers, who obviously know quite well what they can expect the yield to be.

Cattle Trails

Cattle and, to a lesser extent, small ruminants move towards their final destination on the hoof. The major routes are show in Figure 1. As they are driven along the trails the cattle are grazed and watered. The problems associated with trekking depend upon the season of the year. Attempts to pursuade merchants to purchase supplementary feed from stations along the trek routes have been largely unsuccessful. However, drovers often pay for water, at a rate of CFAF 100-200 for the entire herd if the drover draws it and CFAF 5-25 per head if the villagers draw it. Occassional shortages of water make dependable watering en route problematic.

FIGURE 1


REPUBLIQUE DE LA HAUTE-VOLTA
MARCHES ET ROUTES DU BETAIL
ÉCHELLE 1:2 500 000

The trails are often separated from the fields by live thorn fences in the North. However, crop damage by cattle is quite common and the farmers attempt to collect compensation for it (usually CFAF 500-1,000, but sometimes as high as CFAF 10-15,000). These damages are settled directly and thus the relations between dealers and villagers are better than between herders and villages.

To improve the trekking system will require a regular supply of water along the trail, a regular movement of cattle to avoid delays at terminal markets or loading points, and a waiting area at these places. It is common for animals to wait 1, 2, or even 3 months to be loaded on the train. If the cattle have to be held in an agricultural zone for loading, damage to crops is almost bound to occur during the cropping season.

It is difficult for the administration to provide an adequate source of water close to rail loading points (Ouagadougou, Koudougou, or Bobo) and to reserve a substantial area around it for grazing thereby excluding settlers who want to farm in the area. This is especially true since, at least at Ouagadougou and Koudougou, the pressure of population on the land does not permit the correct length of fallow.

Prices

The prices vary seasonally and according to the weight of the animals. Although animals are not sold by weight, it is obviously a major consideration by the purchaser. Feeder cattle fetch less per kg live weight than fed cattle, because the butcher is concerned with the amount of carcass meat that the animal will yield. This places a premium on finishing the animal. The seasonal change in price is illustrated in Figure 2.

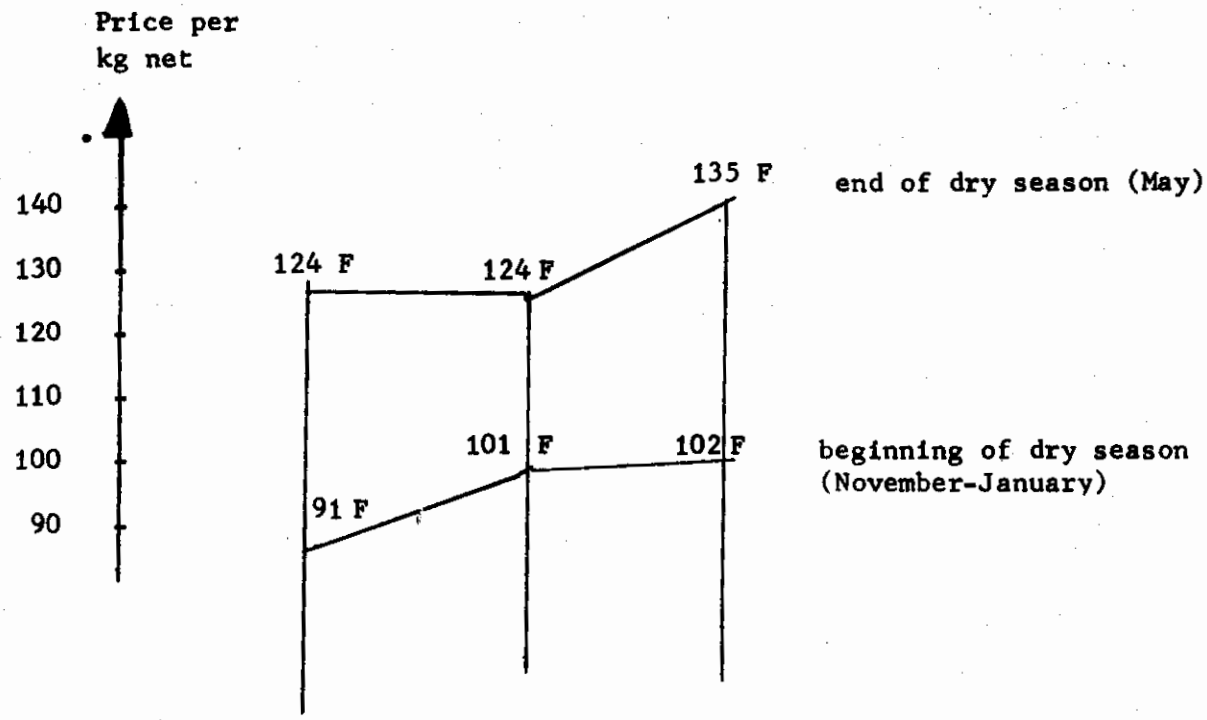
In 1969-70 (SCET 1972) it was reported that the cattle fetched CFAF 35/kg live in the north and 50/kg in the south. This will change with the season of the year. At Puytenga (near Kanbeer) in October 1974 when seasonal prices should be coming down, cattle were priced at CFAF 85-95/kg. In 1969-70, the butchers meat prices were reported as follows:

	CFAF/kg
Puytenga	88
Fada	97
Ouagadougou	101
Bobo	107

Source: SCET 1972

Sheep and goats at Ouagadougou were CFAF 75-100/kg liveweight and pigs 40-50/kg for the rustic type and 70-80/kg for the improved. Chicken prices ranged from CFAF 125-175 each.

FIGURE 2
SEASONAL CHANGE IN PRICE
CATTLE



V. ANIMAL HEALTH

The state of health of the herd is rather better than what would be expected, considering the operating budget and equipment of the veterinary service and the porous international boundaries. Upper Volta has livestock entering from Mali and Niger along a long frontier. In 1974, cattle are also moving northwards from the Ivory Coast and Ghana.

The statistics for rinderpest and CBPP indicate an increase in the immunizations. Presumably this is partly due to the effort of the veterinary service to protect the herd, already weakened by the drought and partly due to donor support to the service. Other diseases are also important but less serious in their morbidity and mortality. The number of doses of prophylactics against trypanosomiasis is insufficient to provide conventional protection for the number of zebu cattle in zones of infestation.

Trypanosomiasis

The area of the country infested by trypanosomiasis and the species of tsetse fly involved is difficult to establish and it changes with the season of the year. In general, any significant infestation of G. morsitans and submorsitans inhibits zebu cattle production but the presence of the riverine glossina do not. The area inhibiting zebu cattle production even in the dry season appears to be that to the south of the line Diapaga, Fada, Kombissiri, Bobo, Fanfara. There are undoubtedly major infestations north of this line in the rainy season because the generally accepted boundary is the eleventh parallel. Between 11° and 12.5° crossbred cattle are supposed to be used.

The substantial area to the west of Bobo appears to be similar to neighboring areas in Mali and Ivory Coast in being quite suitable for zebu cattle production with small migrations within the area during the rainy season. There is some use of veterinary prophylacsis and trypanotolerant cattle but in neither case at a sufficient level to account for the success of the production.

The action on control of trypanosomiasis in the region to be cleared of onchocirosis is not yet defined. This decision will determine the type and extent of livestock production possible in the area. The riverine tsetse flies which predominate are a serious threat to farmers who will want to settle the bottom land but not to the cattle and the herders.

The possibilities that exist in the trypanosomiasis zone area can be summarized by breed:

1) with zebu cattle;

- to manage herds now being done with little prophylaxis but with small migrations.

- to provide a prophylaxis campaign and to maintain a sufficient level of protection. After some years of prophylaxis an animal develops a level of tolerance.
- to control the tsetse fly either by spraying or by changing the habitant.

2) with taurin and crosses;

- to establish a good taurine breed (probably by buying Malian or Guinean N'Dama).
- to provide just "protected" zebu bulls (with prophylaxis) and then crossbred (zebu with taurin) bulls (e.g. from the AID supported multiplication center) to use on the existing very small cattle in order to improve them. It will be necessary to maintain about 50 percent taurin blood to obtain trypano-tolerance.

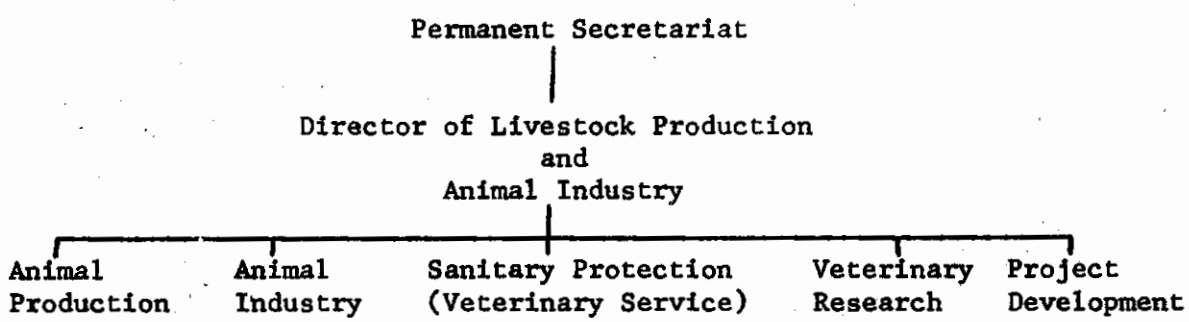
With the taurin cattle, it will be necessary either to train the local ethnic groups to herd them or to introduce Peul herding families into the area.

There is good evidence that meat production per hectare with smaller taurin cattle can equal or exceed that with zebu. However, the existing taurin cattle in the tsetse infested areas of Upper Volta are of poor quality and small size and need to be upgraded.

VI. GOVERNMENT SUPPORT OF THE LIVESTOCK SECTOR

Government Services

The livestock service has recently been reorganized within the framework of the Comite Nationale de Coordination du Developpement Rurale. The present organizational structure is:



The livestock service will have a division in each ORD. Currently, planning for the ORD in Sahel is centered in the livestock service. In 1968 there were 47 veterinary posts with 12 sector headquarters and 7 district headquarters. There are now 8 circumscriptions, 15 sectors, and 63 posts. The livestock service maintains a veterinary service with a central dispensary and a small diagnostic laboratory. In addition, there is a production, research and animal feed department and a livestock industry department.

The staff (UNDP 1972) includes 10 veterinarians (3 located in the field), 8 French advisors, 30 veterinary assistants, and 160 "infirmiers." There have been three experimental units: the ranch at Markoye specializing in range management and breeding, the Farako-ba station where trypano-tolerant breeds are developed, and the intensive feeding unit at IRAT-Saria.

In 1969 there were 60 cars and 70 mobylettes in the transport pool with 6 freezers, 8 refrigerators, and 6 ice making machines, mostly left from the JP-15 rinderpest campaign.

The part of the national budget for livestock has declined both as a percentage of the national budget and in absolute amounts for the last decade. This is in spite of the substantial contribution of the livestock sector to the national budget. National budget support provided in 1970 for:

personnel	CFAF	118,500,000
equipment	"	11,000,000
telephone	"	500,000
miscellaneous	"	5,000,000
missions	"	2,500,000
	"	137,500,000

To this must be added CFAF 8 million from local government sources, mainly as a contribution to the maintenance and fuel supply for vehicles.

Since independence in 1960, Upper Volta has been divided into eleven regions managed by a Regional Development Office (ORD). During the past 14 years, the ORD system has seen limited success. The original single crop and then crop rotation approaches have given way to an attempt to identify rural development problems at the village level and to raise agricultural, including livestock, production.

G.O.U.V. Objectives and Procedures in Rural Development

The recent reorganization of the ORD system under a coordinating committee and permanent secretariat has not yet been completed. The coordinating committee assisted by UNDP and IBRD, charged with the

responsibility to define medium and long term objectives for the integrated development of the agricultural sector, will not present its first report until February 1975.

At the present, the concept of sedentarizing farmers and farms has been accepted. The goal in the long term is to give every Voltaic farmer access to farm land inputs and credit. The coordinating committee and the secretariat are convinced that land use planning is essential to accomplish the goal of sedentarizing large numbers of farmers. An important constraint on accomplishing the goal of sedentarization is the intensive movement of population to the South and West that may exceed the supply of rainfed farm land. With irrigation, the limits imposed by the supply of rainfed farm land would be ameliorated. Considerable potential exists for increasing the areas under irrigation in the Vallee du Koo in Djonkole (west of Bobo), in the Komoe area, in the Bourjouiba ORD, in the Volta Valley, and elsewhere. From the State's point of view, allocation of irrigated land is simpler than settling the land problems that arise when a migrant population moves into an area with traditional rainfed crop production. The GOUV is interested in promoting mixed crop and livestock farming. This could include a small village collective ranch with a well, raising cattle for draft and for milk production. This could exist alongside the traditional nomadic system. GOUV recognizes the importance of training "animatrices" in each village with a "monitrice" for every five to six villages. Only women can teach the extension program to women. This represents a change. At the same time of design of the Fada ORD project (May 1974), the role of women in extension was deemphasized. The program should include health, nutrition, use of resources and agriculture. The extensionists can be trained in the centers that train the men.

The secretariat is very concerned with the problem of increasing cereal production. Price policy is the instrument required to accomplish increased production. It is agreed that the cereal price must be high enough to stimulate increased production while at the same time not discouraging the production of cash crops. An attempt is being made, currently, to maintain a minimum price of CFAF 22/kg on cereals; the price of sesame and peanuts is 34 f/kg and cotton, 40 f/kg.

Marketing is a serious constraint in any attempt to increase the output of cereals. It is generally admitted (although not publicly) that the ORDs do not have the means to act as the exclusive original purchasing agents, and OFNACER (the AID supported grain marketing board) does not have the means to act as the wholesaler of a major part of the market supply of cereals.

The possibility of introducing mechanized cereal production at Orodala and Sideradougou in the southwest is being contemplated. This might be in the form of a village machinery pool using tractors to prepare and cultivate say 100 hectares oriented towards cereal production, but attempts to do this in the Banfora region have proved unsuccessful. This approach has been used elsewhere, for example in the North of Ivory Coast, with same success but farmers there are not able to pay the full costs of custom services and a subsidy is required.

G.O.U.V. Objectives and Plans for the Livestock Sector

The goal of the GOUV for the livestock sector continues to be to satisfy the demand for meat of the domestick market at as near current prices as possible and to increase the export of live animals and meat. The 1972-76 plan has five key programs for the livestock sector within this goal:

1) for transhumant production - progressive modernization of the means of production, processing and distribution of the product.

2) development of a true integration of livestock and crop production that goes beyond their present state of juta-position.

3) starting the Volta Valley Development Program with integrated livestock and crop production, including draft animals and livestock fattening.

4) design and implementation of a livestock development scheme for the ORD du Sahel.

5) obtaining additional donor support to implement the program of the ORD de Fada N'Gourma with emphasis on the evolution of traditional herding towards a sedentary mixed farming type of production.

VII. EFFORTS TO MODERNIZE THE LIVESTOCK SECTOR

Major interventions in Upper Volta in the past have included:

1) Improved veterinary service delivery, and provision of drugs, something that has to be maintained but that, of itself, cannot further increase production.

2) Development of water supply in some range areas. When done with temporary supply roughly matching the range capacity this has lead to increased land utilization; but where done with permanent supply and supplies in excess of the capacity of the range and during drought, this has resulted in large scale death of cattle.

3) Construction of abattoirs and skin/hide processing facilities which have assured a supply of meat of acceptable quality and have maintained and increased the value of the hides and skins as a by-product.

4) Promotion of animal traction with finishing of the oxen for butchery. In 1972 there were 10,000 work oxen bought at about 3-4 years old and sold after 4-6 years, often with a doubling of carcass weight. The value of the manure produced by draft animals must also be considered.

Minor interventions have included:

1) Selection and dissemination of improved sires and females, e.g., of Azaouk cattle and Maradi goats at Markoy. The value of this intervention has not been assessed, but the Maradi goat has certainly helped a number of sedentary farmers.

2) Production of supplementary calf feed and its distribution (sale) to Sahelian herders.

3) Distribution of emergency feed to the Sahelian herd (3500 tons of cotton seed on the basis of one feed unit/cow/day during 1973-74).

4) Distribution of mineral supplements, probably emphasizing use in the dry season. Minerals are most needed during the period of active growth (the rainy season) and are little needed when growth is very slow or negative.

5) Attempts to develop a feasible system of cultivating forage legumes as a soil building crop on fallows.

New interventions now proposed or under way include:

1) Organization of an ORD for the Sahel with study of the range land capability in the dry season pasture of the Fada ORD. AID assistance includes a range management specialist in the planning team and could include pract

4) Equipment of a deep well, Forage Christine at Tui Arkachen.

5) Provision of drugs and operating cost for the veterinary service.

6) Cooperative and private ranches in the west on a 350,000 hectare area, a proposal now being evaluated by IBRD.

7) Dry season holding areas for cattle awaiting.

8) Slaughter or export by rail at Ouagadougou, Koudougou and Bobo to reduce weight losses and to reduce damage by stock to crops.

9) Improvement of cattle trails in the central region to reduce dry season weight losses.

10) Growing or finishing ranches using natural or improved pasture for 10,000 head a year on 25,000 hectares (estimated 100 kg/head live weight gain) at Diefoula (Banfora ORD) and Kassou (Koudougou).

11) a CBPP/Rinderpest vaccination campaign requiring re-equipment of the veterinary service proposed by the Entente Livestock Community.

VIII. PROGRAM RECOMMENDATIONS

The evidence available in 1974 supports the conclusion that Voltaic livestock losses during the 1972/73 drought do not justify a program for rebuilding the herds, a major preoccupation of the GOUV. The number of animals in the Sahelian zone is still equal to or greater than the number that can currently be supported without damage to the environment.

A. To further the government's goal of increased meat production for both domestic and export markets and the real integration of livestock production and farming, it is necessary to make a substantial effort:

1) to promote growing and feeding of immature cattle for draft purposes and for the meat market; and

2) to promote the production of small ruminants.

Both of these activities should be in the Sudanian zone where rainfall is adequate and pasture and feed are potentially available.

The technical package needs to be demonstrated together with its economic feasibility. Surveys will need to be made to establish the

availability of feed and the willingness of the different ethnic groups to take care of cattle. The program will not be effective, nor meet the GOUV goals for true integration, if the farmers buy the cattle and entrust them as at present to the Peul. Regions for such activities could be identified in the Fada ORD as a result of the FAC sponsored range land classification project; and land use classification for the country as requested of AID by the GOUV would identify other suitable areas.

In the zone where Zebu cattle cannot thrive because of trypanosomiasis, production of a good strain of taurin cattle (e.g. N'Dama) should be encouraged. Export of the females from Mali is illegal but it would be possible for the cattle merchants to obtain a substantial nucleus of females somewhere in the region for installation in a suitable area in the tsetse zone.

These interventions can best be started in clusters of villages where the resources are available and implemented through the formation of village associations which can obtain credit. Experience in Upper Volta has shown that guarantee and repayment of loans requires a village organization that will keep track of the animals and an insurance scheme to replace those which die through natural causes. A strong veterinary service delivery is also needed in each project zone.

Until surveys are made, the extent of an activity to promote farmer cattle fattening cannot properly be evaluated; but of the 150,000 to 175,000 males marketed each year, about 30,000 are 2-4 years old and a further substantial group are under weight and could be finished. If the demand for immature males increases sufficiently the program could expand to include a campaign to reduce the mortality of calves. This assumes that the demand to sell immatures and the increase in their price will stimulate the herders to "destock", i.e., increase the offtake and so make room for growing the additional calves without over loading the pastures.

The small ruminant program will require extension, veterinary service delivery, especially parasite control, and perhaps credit. Small ruminants already provide a substantial part of the red meat supply and are an important factor in the export market. This ruminant package, together with the consequent program for reduction of the mortality of calves could very well be the major thrust of the GOUV in the ruminant livestock area in the medium term, the next 8-10 years.

B. A necessary part of the intensification of ruminant feeding and finishing is a land use survey, including range land, of Upper Volta made to a scale of 50,000:1 or less. Mapping of a large area (Sahel ORD and much of Fada and Koupela ORD's) is already being carried out with FAC assistance. Additional areas in the Volta Valleys will be mapped by UNDP and FAC as part of the onchocerciasis-free area development program. Any

additional mapping should be done in a way that is comparable with the mapping under way, but will have to be done in a less costly way. It is possible that the U.S. Soil Conservation Service might provide a suitable low cost method. In any event, economies of scale would reduce the cost of mapping if agricultural (cropping) land use were an integral part of the survey.

Together with this survey is needed a tsetse survey of the South and West, especially as progress is made in controlling onchocerciasis. Many areas in the tsetse zone are carrying zebu cattle in good health. These and other areas where zebu cattle can thrive should be defined. Since much of this area is in the West Volta region under study by the IBRD, it is possible that the Bank would consider making this survey as part of the livestock phase. Such surveys will identify "wet" areas, such as "basfonds" and "cuvettes" not yet needed for food crop production, but which could serve village groups as a dry season forage source for cattle feeding.

C. The expected shortage of work animals in the zebu zone will be mitigated by a cattle growing program of the kind recommended above. However, in the zone where zebus do not thrive, a settlement of taurin and crossbred herds will need to be made, both for mixed farming and for extraction. The Vallees du Volta land-use maps should identify the areas suitable, but a study will have to be made to see where the ethnic groups are who are prepared to buy and herd cattle.

D. The livestock development program for the Sahel ORD needs to be carefully considered. There are already several reports on the problem. However, these reports and the make-up of the design team give the impression that once again the design will be made by experienced expatriates with little discussion with those for whom it is mainly designed, the pastoralists.

It is not too late in time, although it may be difficult politically, to introduce a completely new phase into the design by holding a series of discussions with the pastoralists and farming groups in the region in order to establish their conception of their problems as herders and farmers. This approach should lead to the establishment of priorities and the discovery of methods of solution that should be tried. It will be necessary to define the respective roles of both the government and what the GOUV will do and what the producers will do for their part.

This process of involving participants at the beginning should lead to a rather different project from the typical conception of what will solve the problem as seen in expatriate eyes. It will lead to a joint GOUV - producer committment to a process for development, hopefully with flexibility for adjustment as the best path becomes more clearly visible.

E. The operation of the Matourkou, IBRD West Volta and the Fada ORD

projects, which all include activities with the sedentarised Peul, should be observed and their wider application sought in other ORDs when the technical packages which they propose prove to be feasible. This will further integrate the livestock-pastoral systems by helping the Peul to make more effective both halves of their system.

F. The decision has been made by the Direction de l'Elevage that agricultural by-products should be reserved mainly for non-ruminant animals (except, of course, the sugar cane by-products). These can form the basis with detoxified (degrossypolized) cottonseed cake and peanut cake free from applaturin, for a poultry and egg industry. Manoic might also be grown and processed for feed. Again the village cooperative concept, particularly in areas near the by-product supply (Bobo and Banfora), would seem to be a suitable vehicle for extension, input distribution, and credit. In such a region, where some of the feed may be local by-products, a portable feed mill and mixer might be suitable.

G. A series of livestock activities, including the establishment of a veterinary service delivery, will be needed in the development of the Volta Valleys when cleared of river blindness and trypanosomiasis. Recommendations need to be based upon the program conceived for the valleys in discussion with farmers and the local administration involved.

H. There will be a need to assist in the veterinary service delivery (cost of drugs and operating cost) as has been done by the FED and FAC and in emergency, AID. Perhaps FED will continue to support this activity. It is not expected that a massive campaign, like the JP 15 Rinderpest campaign, will be launched against rinderpest and CBPP but rather that, with assistance to CILSS if necessary, the existing veterinary services with some donor assistance could do the job. These campaigns should be supported on the understanding that within the intermediate term, the livestock producers will pay the direct cost of delivery of the services used.

I. Some assistance*with the diagnostic lab at Ouagadougou would be appreciated by the GOUV. There is also need to reduce the loss of meat caused by inadequate water and feed supply on trek routes and when awaiting transport by rail for export.

J. Training . In general, the lower level technicians are being trained and will continue to be trained in sufficient numbers. However, the major problem lies in specialists in disciplines other than veterinary medicine. These include:

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*Additional equipment and enlarging the facility.

1) animal production and nutrition

2) range management

3) agricultural economics of production and marketing.

The lack of trained people with these skills is a problem common to the region and needs to be discussed on a regional basis.

UPPER VOLTA
EDUCATION AND HUMAN RESOURCES SECTOR ASSESSMENT

The areas of expertise represented on the DAP team have paralleled closely areas of major concern identified by GOUV in their rural development efforts. In the education sector the most innovative approaches are being tried out in rural education which, under a recent governmental reorganization, has been transferred from the Ministry of Education to the Ministry of Agriculture. That is not to say that GOUV is placing the largest share of its resources in rural education. GOUV spends almost 28 percent of its operating budget on education which is distributed as follows: 65 percent on primary, 20 percent on secondary, 6 percent on post secondary, and 9 percent on Nonformal Rural Education. Yet in spite of this effort, only about 10 percent of primary school age children are enrolled in the formal school system. In 1970/71 GOUV spent a total of 173,571,000 CFAF on Rural Education and 980,050,000 CFAF on the formal primary school system. Therefore, the fact that the focus of this report is on rural education -- what is termed nonformal rural education in Upper Volta -- is not meant to imply any disregard for the formal education structure. It is, rather, simply a reflection of the concern shared by GOUV and AID about human resource development in rural areas.

One of the problems in the rural education sector is, however, the profound donor presence illustrated by the fact that donors expended 699,050,000 CFAF in this sector in the 1967/70 period as compared to GOUV budget expenditures for 1970/71 of 173,571,000 CFAF. The problems inherent in this level of foreign participation are self-evident. Given the fact that 91 percent of GOUV's education budget (980,050,000 CFAF in 1970/71) is spent on formal education, and assuming that the educational budget will continue to be heavily weighted in favor of the formal structure for political, prestige, and other factors, the ruralization of the formal system is obviously of profound potential importance. Furthermore, the DAP team was repeatedly told that reform of the formal school system was under serious consideration by GOUV.

If a reform is actually being formulated and if GOUV requests AID's assistance in the planning process, AID should give serious and sympathetic consideration to the request. On the other hand, if GOUV finalizes a reform of the formal educational system it will undoubtedly require such things as the design of new curricula, of new educational evaluation procedures, and hopefully of new multi-media teaching techniques. In all of these areas the U.S. has the kind of expertise which will be required, and AID should again sympathetically consider requests for assistance in these areas(a) if asked, and (b) if it is determined from studying the approved reform proposal that the approach being taken is indeed a promising and viable way to reform and ruralize non-urban schools. If the goals desired cannot be achieved following the GOUV's reform proposal,then obviously AID should not become snared in attempting the impossible. However, reform of the formal educational

structure, especially of the primary school levels, would be of critical importance because it is the largest, most costly, and touches a larger portion of the population than any other government sponsored educational effort. AID participation should, however, be selected and targeted -- objectives should be clearly identified.

I. Rural Education Development Models

There are a number of rural education development models functioning in Upper Volta which offer promise and must be considered in the context of rural development activities. Two of these models deserving special consideration, the CER (Centre d'Education Rurale -- Rural Education Center) and the GPS (Groupement Post-Scholaire -- Post-School Cooperative Group), figure importantly in the developmental assistance programs of FAC (Fonds d'Aide et de Cooperation -- French Fund for Aid and Cooperation), FED (Fonds Europeen de Developpement -- European (Community) Development Fund), and the World Bank. Those ORD's (Organismes Regionaux de Developpement -- Regional Development Organizations) in which the World Bank will be concentrating its efforts are Dedougou, Koudougou and Kaya while those in which the FED is the primary donor include Yatenga and Banfora.

A. Centre d'Education Rurale (CER):

The CER's were first established in 1961 with technical assistance from FAC to provide rural youths with basic literacy plus a knowledge of handicrafts (artisanat) and practical agriculture. By 1969/70, there were 337 CER's with an enrollment of 26,364 students who had 435 hectares of land under cultivation, an average of 3 acres per CER. The crops being raised included cotton, groundnuts, sorghum and rice. By 1970/71, the numbers of students in CER's has increased to 30,006 but by 1971/72 it had fallen back to 27,048 of which 10 percent were females. The declining enrollment continued in 1972/73 when it dropped to 24,164.

CER's were to provide 3 years of education equally divided between practical training (including improved farm methods with special courses in health and home economics for girls) and basic general education in French. French was not to receive much emphasis during the first year but would constitute a major curriculum subject during the last two years. Roughly speaking, the general education component of the program is equivalent to the first three years of primary school. No certificate was or is issued at the end of the course. To prevent the CER's from being operated as a system parallel to the formal education system, it was originally intended that students would be admitted at age 15 if they had not attended primary school. Enrollment at this age would mean that (1) the students were too old to be able to continue with a formal school system program once they had completed the CER; (2) they would be old

enough and strong enough to carry nearly an adult work load in the CER's practical agricultural activities; (3) upon completion of their CER program at 18 years of age they would be more likely to retain their agricultural knowledge and to apply it a few years later when they would be farming in their own right. (This occurs for the most part at approximately 21 years of age.) It was anticipated that this type of educational program would prepare the students for productive and satisfying rural lives whereas formal primary education, with its purely academic orientation, divorces the child from his environment and leads him toward the increasingly limited white collar employment opportunities in the largely urban areas. (See the table below).

Table 1

Annual Average Growth of Urban Population and Salaried Employed.

1965/1970	Average Annual Rate of Growth of the Population in Cities	Average Annual Rate of Growth of the Salaried employed in Cities	Elasticity
Ivory Coast	8.3	5.5	.66
Dahomey	7.7	2.1	.27
Upper Volta	8.4	-0.2	--0.02
Niger	9.1	4.0	.44
Togo	6.6	7.8	1.18

In Upper Volta 50 percent of the population is in the age group 0-19.

Source: Structures et Statistiques de l'Emploi pour 14 Etats Africains et Malagache, Secretariat d'Etat aux Affaires Entrangeres. No.1, Evolution des Structures de l'Emploi en Cote d'Ivoire 1965-1971.Jan,1974. Annexe 5,p.85.

The IBRD has stated that the CER system is also a more economical way to provide basic education because: (1) teacher salaries are lower, resulting in an annual cost per student of CFAF 5,000 against CFAF 12,000 in primary school; (2) the shorter course reduced the dropout and repeater rates so that the total cost per output from the CER is five times less than that of a primary school leaver (with or without certificate); and (3) in view of their age and training, the students are less likely to exert pressure for access to further formal schooling. (IBRD Report, Appraisal of an Education Project Upper Volta, June 5, 1973, Report No. 102a-UV. Hereafter referred to as IBRD Report, 1973).

There have, however, been serious probelms related to the CER concept as it has been implemented:

1. Although it was originally decided that students under 15 years would not be admitted, GOUV (Government of Upper Volta) did not enforce this restriction; it is estimated that over 50 percent of CER students are presently under 13 years of age, and that the majority

of entering students are 6 to 7 years old -- the same age as those entering the formal primary school stream. Therefore, the CER has tended to become a second-rate substitute for elementary schools. We found that at one of the Matourkou pilot village sites, the villagers refused to have a CER established. They felt they would be better off if they waited and tried to get a regular elementary school which they might not get if they already had a CER in their village. The classical consequences of a dual education system have obviously been functioning.

2. With the students younger than anticipated, it has been physically difficult for them to participate meaningfully in the practical agricultural program. The young age of the children has also meant that following completion of the CER it will be years before they are in a position to practice any agricultural skills they might be learning at the CER. The time lag between CER and actual farming also made it very difficult to determine if they were ever becoming innovative farmers.

3. The CER school year runs from May to February rather than from October to June as does the formal school system. However, this has caused severe problems for farming families. Preparation of the soil and planting normally begin during May and heavy labor requirements continue through the harvest time until about the end of November. The most idle period of the year is from December through April -- or just half of the time the CER is closed for vacation. Careful anthropological-sociological studies should be conducted to determine how the CER might be scheduled to fit the production cycle of the rural population more satisfactorily While in theory the CER is supposed to have the kind of flexibility which the formal school does not, people interviewed declared that in practice this was not in fact the case. Consideration might be given to addressing subject matter which does not require agricultural practice for three or more months prior to the beginning of the rainy (start of the crop) season. Since the schools should be directed toward practical agriculture, this could then be conducted during the regular planting and harvest season, but on an abbreviated basis so as to provide minimum conflict with the demands of the parents for their childrens' labor in the family fields. It appears that one of the reasons that younger rather than older children have been allowed into CER's is in order to fill them -- parents have not been willing to release their more mature children to work in CER's on a full-time student basis, especially during the crop growing and harvesting period.

4. The practical agricultural component of the CER's does not have qualified teachers or agricultural extension agents (encadreurs) to instruct the students, nor adequate or appropriate materials to make this component as meaningful as it should be. The average acreage under cultivation does not represent a viable agricultural unit. Furthermore, the students and parents appear to be dissatisfied with how the money

derived from crops is spent. While the understanding is that it should be used to improve the school, the report repeatedly heard was that the teachers appropriated the funds (or goods) derived from crop harvests for their own purposes. If this is true, it obviously increases the cost of CER operations. If it is not true, then a careful program should be prepared to inform the parents and students about how the funds are being used. That the suspicion exists is illustrative of the fact that the farmers are not adequately involved in the CER's management and decision making processes; that the existing CER structure is not integrated into -- does not belong to -- the community.

5. The content of the school curricula was not seriously adjusted to the rural environment except for the inclusion of the practical agricultural component. Moreover, there has remained a constant problem regarding the use of French as the CER's language of instruction. Often French is hardly understood by students and they have little opportunity or need to practice it beyond the school environment. While the majority of CER students will go into GPS's prior to becoming independent farmers, a few will, under the new IBRD scheme, be able to enter a new 2 year post-CER upgrading course. These will be offered at CPR's (Center de Promotion Rurale -- Rural Development Training Center) one of which will be established in each of the 5 IBRD/FED ORD's. Each ORD CPR will enroll about 60 CER graduates. CPR graduates may then go into farming or may take an examination to gain admission to the CFMER (Centre de Formation des Maitres (or Monitrices) d'Education Rurale -- Rural Education Teacher Training Center for males or females) where, after a 1 or 2 year course, the student will learn to become a CER teacher. These students must be able to teach in French in the first instance and must be able to write reports in French in the second instance if employed either as an agricultural extension agent or as a teacher. Given these circumstances, the decision was made to teach French in the CER's,but even this limited level of French competence appears to be a major factor in aggravating the student hemorrhage toward the urban areas in Upper Volta and toward migration southward, especially toward the Ivory Coast.

6. Teachers in the schools have often been recruited from elementary teacher training programs and they have imposed upon the CER's the standard approaches appropriate for the first three grades of elementary school.

The students have been made aware of the teacher's disregard (a) for a second class school system (and perhaps of the teacher's distaste at having to teach in it), and (b) for students who have little chance for continuing on in the formal system. The teachers have not introduced or taken advantage of the kind of flexibility which was intended to apply in the CER program. Furthermore, the teachers in CER's although mostly trained in the same system as were formal school teachers, do not have the same pay and civil service status formal school teachers do which creates a built-in morale problem.

7. The cost factor has been a major selling point in favor of the CER's as indicated by the IBRD Report's figures quoted under A above (p. D-61).

However, AID Intern Peggy McGehee pointed out in September 1973, that: "The program's cost per pupil year is greater than anticipated. In 1970/71, the Voltaic government spent CFAF 5,785 per CER pupil on supplies and the salaries of administrators and instructors. To this sum should be added the CFAF 6,738 spent per pupil that year by outside donors. The donor aid went for construction of the centers, materials for Post Graduate Groups (GPS's), farm equipment, technicians and program analysts. The total cost per pupil for the year 1970/71 thus reached CFAF 12,523, or CFAF 3,132 more than the primary school system spent per pupil that year." Obviously there is a serious question of what should be included in the per pupil cost computations. However, it definitely appears that the IBRD figure is an indication of a cost substantially below what the total costs are, or some day will be, for the Voltaic Government. This needs clarification.

Prospects for any significant increase in national resources available to education are not favorable and perhaps should be discouraged on the basis of the nation's overall economic development needs. Both FED and IBRD have accepted as most practical those projects directed toward a qualitative improvement in secondary level science education and a major expansion in the field of non-formal education.

The IBRD non-formal education project proposes to increase the number of CER's from the present 696 for boys with an enrollment of 24,088, to 733 in 1977/78 with an enrollment of 29,320, and an increase in the number of CER's for girls from 87 with 2,960 students to 141 with 4,668 enrolled. Thus the total number of Centers would increase from 783 to 874 with enrollment increasing from 27,048 to 33,988. At the same time GOUV is committed to make major reforms in the CER system:

1. entrance will be limited to boys at least 15 years of age and to girls of 13;

2. 15 centers will initiate an experimental program in the national languages using teaching and follow-up materials provided by the Bureau of Pedagogy; if the experiment is successful, teaching in French in the other centers will be gradually discontinued;

3. revised curricula would be prepared allowing more time for practical farming and placing more emphasis on the teaching of health and hygiene, rural handicrafts, practical arithmetic and bookkeeping. During the rainy season, no more than one-third of the weekly timetable would be devoted to classroom instruction as against two-thirds (about 22 hours per week) to practical field and shop instruction; it would be half of both during the dry season;

4. in-service training would be provided for teachers already in service, and candidates for the rural education teacher training (CFMER) program would be recruited on the basis of maturity and rural

experience, without excluding CER leavers. Eventually the graduates from the CFMER's would begin to be graduated to become CER teachers; and

5. management of the rural education system must also be improved through closer coordination with the rural development and extension services of the Ministry of Agriculture at the national, regional and local levels. At the national level this was to be institutionalized by the transfer of the Directorate of Rural Education to the Ministry of Agriculture, which occured this year, and at the regional and local levels rural education and agricultural development were to be coordinated by the ORD's. Since the rural education teacher (MER) and extension agent (encadreur-animateur) both work on programs of rural production, both were to be placed under the supervision of the ORD's. Under these circumstances, the rural education supervisors (conseillers d'education rural) would also be integrated into the ORD structure and would supervise both the CER instruction and the cooperative activities of the GPS's. ORD offices would also administer the credits for the cooperative activities performed by the CPS's.

Given these changes, it was agreed that IBRD/IDA would:

a) support the improvement of science teaching (secondary level);

b) upgrade the facilities in selected existing CER's;

c) support the gradual establishment of GPS's and post-CER training centers (CPR's); and

d) evaluate the impact of such a plan.

While this World Bank action would be directed toward three ORD's, FED would be engaged in a similar assistance program in two other ORD's.

B. The Groupements Post Scholaire (GPS) -- Post Graduate Groups:

This concept was devised to overcome the relative isolation of the CER from organized farm life and to bridge the age (and authority) gap between CEP completion and adulthood. Under GPS arrangements CER graduates cultivate a communal field, applying the techniques taught in the CER and using tools and livestock provided by the government, which also gives occasional technical advice. The GPS's appear to be a hybrid of two traditions prevalent among the Mossi and still functioning in the northwestern part of the country. The nam is an informal association of village boys and girls of about the same age, and the songsongtaba is a cooperative in which several concessions (or family groups) agree to cultivate their fields in common. In 1967 Bernard Ouedraogo, a CER advisor in Yatenga, launched the first GPS in Bam, Kongoussi. In a program structured to last three years, 42 mature

graduates of the CER at Bam worked with a rural education instructor and two agricultural technicians. The success of the Bam GPS led to the establishment of similar groups in other villages. Because the association established in the CER is thus continued beyond the normal three years, the IDES reported that GPS members retain their CER training far better than the average CER graduate. Otherwise it is not unusual for CER graduates to revert to illiteracy within six years.

A GPS group begins to farm cooperatively a separate plot of land in addition to continuing to work on their families land. Students are encouraged to apply what they have learned in the CER's to their GPS plot. The additional money they earn from the GPS plot helps members to accumulate capital prior to establishing their own land-holdings independent of their parents. The adaptation of the traditional organizational structures meant that the land was willingly made available by the Chief of Land to the GPS, and that it was managed by the GPS group but patronized by village elders. Ideally an itinerant instructor/extension worker (encadreur-animateur) provides technical, credit and marketing advice and services. In this way it is anticipated that the GPS can become an innovative and realistic instrument for bringing about an agricultural transformation. GPS's are not yet cooperative organizations per se with defined statuses but they could evolve into such institutions as their members acquire more skill and experience in the management of commercial farming. However, it should be pointed out that such an evolution would not be necessary -- any GPS group could also dissolve after its member had reached maturity. Their options would be to continue to farm as members of the family unit, to establish their own farms or to evolve into a collective arrangement on a more permanent basis derived from or inspired by the GPS experience.

By mid-1973 it was estimated that there were a total of 64 GPS's operating in Upper Volta and of these Voltaic officials noted there were 16 in Yatenga which were operating well. Nevertheless, the approved plan is that by 1977/78 there will be 269 operating in the two FED ORD's and 510 in the three World Bank ORD's for a total of 787, including 8 known ORD's functioning in non-FED and non-IBRD areas. It is estimated that each GPS would have approximately 15 members working on a minimum of six hectares. It is also estimated that of the 15,000 who have left CER's between 1963 and 1973 about 4,500 would be interested in forming into 300 GPS's. It is further projected that of the 20,000 expected to complete CER training between 1974 and 1977 about 7,500 would seek to participate in another 500 GPS's. Out of these two pools of potential GPS's, it is planned to identify and select 150 (or 50 percent) from the earlier group and 360 (or 73 percent) from the second and to help these to organize and establish themselves as regular GPS's, and thereafter to equip them and provide them with continuous advice and services.

The GPS's would require assistance from the ORD's for the provision of credit, extension facilities and marketing possibilities. The World Bank plans to provide up to CFAF 16.2 million channeled through the ORD's to the GPS's as credits in the form of basic capital requirements (draft animals and farm equipment), reimbursable over a five year period; plus initial supplies of seeds, fertilizers and insecticides reimbursable annually. The 30 instructors (encadreurs)-agriculture agents (animateurs) felt needed to assist the first 150 GPS's are to be recruited from the graduates of the agricultural agents school at Matourkou or from rural education teachers (MER). After this system was started, the ORD's alone would recommend the number of additional GPS's to be created annually based on their management/credit processing/extension capacity.

It must be noted, however, that this GPS approach has only been in operation a short time and credit for its success in the Yatenga region are repeatedly attributed to a Voltaic, Mr. Ledea, who has exceptional dynamism and organizational ability. GPS's have recently been started outside of the northwestern region, but DAP team members were advised that they were not yet functioning well -- it wasn't worth visiting the two or three near Ouagadougou because "there was nothing to see." There is, at this point, a serious question as to whether or not this model can be successfully transferred either beyond the greater Yatenga area and the influence of one or two dynamic leaders, or beyond those Mossi tribal areas where the nam and songsongtaba traditional bases for the groupings still exist. If this scheme can be generalized, it could be a critical link between the CER, or formal school graduate or dropout, and becoming a viable innovative farmer.

C. The 4 C Club Program:

Developed in 1972 on the 4H Club Model, this organization has sought to introduce innovative practices while demonstrating to youth the positive aspects of rural living. Membership is open to young men and women between the ages of 12 and 21 who promise to strive with body, heart, brain and cooperation (corps, coeur, cerveau and cooperation) for the development of the club, the village and the country. The organization seeks to promote programs which will develop skills not only related to plant and animal production on the farm but to the development of handicrafts and of methods for the commercialization and modernization of rural areas. The clubs are organized at the village level on a democratic basis with elected officials (President, Vice-President, Secretaries, Treasurer, etc.). In addition to the practical training program the clubs work to promote functional literacy. At the same time members pledge themselves to promote citizenship training by stressing the rights and duties of members at all levels from local to national. The club also incorporates a parental association with its efforts through the establishment of a Liaison Committee made up of both parents and village leaders. In addition to business, managerial and practical matters, this committee is also involved with recreation and leisure activities affecting the whole village.

Organizationally each club has three other major committees:

1. a sub-committee for production, which concerns itself with plant and animal production as well as handicrafts;

2. a sub-committee for social activities which coordinates and organizes village level functions for club members; and

3. a sub-committee for civic and cultural activities, which is concerned with functional literacy, sports activities, the development and evaluation of club activities, and overseeing relations with adults and with other clubs.

Clubs try to hold themselves to 20 members each, and it is possible to have more than one club per village.

Each club divides its activities into two major categories: collective projects where one works in animal, plant or handicraft activities and where it is hoped that one will receive guidance from government extension workers or technicians as well as the minimum tools required, and individual projects in which one works on his father's land perhaps on a small "demonstration" section. The money the members derive from the collective projects goes into the club treasury but at least a part of what is earned from the individual project would go to the individual (this agreement is reached with the parents in advance).

At present there are 162 clubs functioning in 8 ORD's with a total membership of 3,000 children. There are clubs for boys, clubs for girls and mixed clubs. One problem is that girls don't remain in the clubs as long as might be desired because they marry usually by age 17. The clubs have recently been placed under the supervision of the Direction of Agricultural Services in the Ministry of Agriculture.

These clubs have experienced an impressive growth in a relatively short time. They appear to have made good use of small contributions to promote their expansion, e.g., one grant of $10,000 from the U.S. was used to found 50 clubs in Ouagadougou ORD. They have also established a revolving fund from the old clubs to help with the establishment of new ones. While they have not thus far received any money from the central government, they are counting on receiving loans from the ORD's both to buy seeds and basic tools and to assist with starting new clubs. Once the clubs begin to market their agricultural produce they can repay the ORD loans. The clubs will also depend upon the ORD encadreur/animateur assigned to their areas to assist them with agricultural advice, guidance and techniques. Since the 4C clubs have no assured external donor-sponsorer, they are much more dependent upon the ORD's human and material resources to provide the backstopping/infrastructural support that they need than are the institutions to which

donors have made commitments, such as the CER's and the GPS's. While ultimately the institutional capabilities of the ORD's will substantially influence the success or failure of all of these rural development models, the 4C Clubs are immediately required to deal with this factor on a short-term as well as a long-term basis.

While there are linkages between the non-formal rural education institutions (CER's, GPS, etc.), the 4C Clubs have no such connections with any formal or non-formal educational components. Anyone between the ages of 12 and 21 is invited to become a member providing he will abide by the rules of the organization -- there are no educational or experiental qualifications required. Although in principle there should be no competition between the GPS's and the 4C Clubs, it appears that cooperation or competition between them in the rural areas depends upon the personalities of their respective local directors. By pulling the 4C Club organization into the Department of Agriculture it was hoped to avoid such competition and to promote cooperation.

Recommendations: The reforms being instituted by GOUV in the Non-Formal Education structure, especially with assistance from the World Bank and FED, are obviously aimed at increased agricultural production and rural community development. It is probably too early to determine the effectiveness of these efforts in part because the original project implementation schedule has been considerably delayed. Since the ORD structure ties these development regions to a major donor it is difficult, impolitic, and perhaps unwise for any donor to intervene directly in another's ORD area. Therefore, recommendations taken under advisement by AID should, perhaps, be directed toward the Eastern ORD (Fada N'Gourma) where AID will apparently play the major donor role.

1. Pilot Projects/Evaluation: CER's, GPS's, 4C Clubs

As these programs for rural development are expanded, reforms, and/or initiated it would appear that a careful means of conducting formative as well as terminal evaluations on their progress and development would be essential. This procedure would provide immediate feed-back which in turn could lead to modifications and improvements through a system analysis approach. This would provide a constant assessment of whether or not the rural education components were achieving their goals and would also provide a basis for an analysis of the effectiveness of any modifications attempted. Regional variations of the models could also be tested and evaluated. It is recommended that AID work with the establishment of the rural development models on a limited pilot project basis first and then attempt to expand them only after the model is truly operational and demonstrates its potential capability to function and flourish once outside intervention ceases. This will obviously take time but a grandiose failure would also not only waste time and money but would result in nothing of lasting value.

On a pilot project basis it should be determined what roles could best be played by different institutions in different environmental situations -- the GPS's as opposed to the 4 C Clubs -- the CER's as opposed to a truly non-formal multi-media training program, etc. Where there are CER's in the Eastern ORD, the GPS model should be tried and evaluated (including the area to be opened up by the Oncho control campaign) with special regard for the socio-anthropological characteristics of the Gourmantche people inhabiting this reigon which will influence their participation in and response to these various models. Where there are not CER's it is recommended that the 4 C Clubs model be assisted and that it be determined the extent to which it can serve as the framework within which the Club's broader education/community development goals can be achieved or assisted by radio, demonstration projects, phamphlets, basic literacy, printed materials, etc. Only after results have been achieved from pilot project evaluations of these various models (or combinations thereof) should consideration be given to the feasibility of any capital development assistance in support of promising models. Meanwhile, these pilot projects should be fundamentally human (technical assistance) oriented, avoiding any commitment to building institutions until the models have been proven to be compatible with and viable within the regional culture. Finally, even where the CER-GPS model is followed, Radio Clubs or 4 C Clubs (depending upon the age of participants) might be used as instruments for maintaining literacy levels acquired through formal or non-formal educational efforts. The reversion to illiteracy over time because of a failure to exercise the literacy acquired must be stopped.

2. Training of Women:

It is also recommended that special attention be given to the training of women in the formal schools, in the CER/GPS centers, and through the 4 C Club/multi-media training facilities. Thus far, and even considering the World Bank/FED development plans, the training of women outside of the formal education structure has been substantially inferior to what has been accomplished even within the formal structure. In 1971/72, 36 percent of the primary school enrollment (total 112,463) were females, while in the rural education system only 10 percent were women (of a total 27,048). At the general secondary, technical, and teacher training institutions female enrollment was 28 percent of a total of enrollment of 12,244. A major emphasis of recommended pilot projects would be to find programs which would encourage the participation of women, married or single, separately or with their husbands. Since women in Upper Volta generally share equally in rural production responsibilities with the mean, it is essential that they receive equal training opportunities if rural development objectives are to be achieved. The women's role may even be of greater importance than that of the men since women migrate to the cities slower than do

men and usually remain behind when the men (estimated to number from 500,000 to 1,000,000) migrate to the coastal states in search of employment. Rural production in Upper Volta thus becomes significantly more dependent upon what women are able to accomplish -- in many instances alone.

Once again the influence of traditional practices must be considered for the point was clearly made in discussions related to women's roles in Upper Volta that the distribution of the crops women produced made a significant impact on their willingness to cultivate new or cash crops or to adopt methods increasing production. A women essentially cultivates three fields: her own, her husband's and the family field which provides food (generally vegetables) for the family table. In the Po Region the women are permitted to keep whatever they earn from crops produced in their own fields. In most Mossi areas the women must give whatever she earns to her husband and he decides how the family income will be used. In the Banfora area a women works for 4 days for her husband (including the family's field) and then one day for herself. Such societal practices greatly influence the activities and approaches rural development agents and organizations might take to encourage production and community development efforts. AID should carefully analyze these societal factors prior to adopting developmental strategies: PCV's and missionaries with substantial experience in these rural areas are a ready initial source of such information. There should also be a careful search and analysis of relevant anthropological and sociological sources in country, in Europe and in North America.

3. Training of Cadres:

a. ORD Administrators: Another area of critical concern which requires careful on-the-spot analysis, certainly for AID in the Eastern ORD, is an evaluation of the ORD's operational capability (in human and material terms) to perform the critical tasks required of it within the GOUV's decentralized regional development structure. Can the ORDs handle the administrative burdens and responsibilities which accompany a multi-sectoral regional development program with the manpower presently (or projected as being) available? Tailored on-the-job training programs and Peace Corps counterpart assistance might become desperately needed. The ORD's have increasingly become the major developmental arms of the government, but they are new bureaucratic structures which are receiving increasing administrative and operational responbilities. Because they are new, because they are critical to the developmental processes in Upper Volta, and because their chances to serve as effective developmental channels in the future might be most impressively shaped now while these new branches of government are still flexible, it is recommended that AID consider how the human resources requirements might be satisfied and

the organization structure of the ORDs improved. While this would apply fundamentally to the Eastern ORD, AID might wish to consider developing training and organizational models which could be applied elsewhere in Upper Volta in conjunction with other ORD donors. This activity should be regionally located and oriented; it should not be accomplished through building new institutions in Ouagadougou.

b. Rural instructors/extension workers (encadreurs): It also seems that there is a substantial need to expand the capacity for preparing qualified rural instructors/agricultural extension workers. Matourkou presently has no additional capability to undertake this mission and it would appear that training facilities located in representative regions, to serve the needs of one or more ORDs which share common cultural and geographical characteristics, would be desirable at least for positions requiring short-term training. Again such institutions should have formulative as well as summative evaluation processes built into their operations. This kind of evaluation should also include the instructional materials obtained or developed to be used by instructors and agricultural extension workers in their rural education/extension programs.

4. Radio Education:

As indicated above in connection with the 4 C Clubs, radio education appears to have considerable promise in the area of non-formal rural education. It has been estimated by Mr. Zongo, Chief of Programming for Radio Rurale, Ministry of Information, that there are already from 150,000 to 200,000 radios in Upper Volta and 300 radio clubs have been started with another 350 planned. Radio Clubs are formed for "supervised" listening under the guidance of a moniteur (male) or monitrice (female). About two-thirds of the broadcasts are in French with the remainder in More (Mossi), Dyoula (Bobo Dioulasso), Gouroussi (Gourmantche), and Peul (Fulani), plus Lobi and Dagki. The plan is to increase the vernacular broadcasts at the expense of the French. Broadcasts occur five days per week from 7:00 to 7:45 a.m. and from 5:00 to 5:45 p.m. On Sundays there is a broadcast from 3:00 to 3:30 p.m. which is used as a control broadcast to examine listeners on the materials covered during the week. During the weekly broadcast there are special 15 minute Radio Club sessions. The Radio Club's "listening posts" members assemble, hear the broadcast, then turn off the radio and discuss the materials covered in the broadcast. Some programs are taped in the field and then broadcast on timely and pertinent topics. Radio Rurale is attempting to place "correspondents" in the field as representatives to keep in touch with the radio clubs in the ORD areas and to provide personnel who will maintain contact with club members and provide a feed-back channel.

Foreign assistance has come from Germany (which has provided a 100 kw middle wave transmitter during 1974), to make the radio powerful

enough to reach the entire country, although the strength of Radio Niamey is stronger than that of Ouagadougou in the eastern part of the Eastern ORD. The German Government also provides a resident technician and programming advisor. UNESCO provides a principal technical counselor who is involved in an experimental program to promote equal access to education for women and young girls which depends upon radio clubs, but which, unfortunately, has no budget to support the activities of the counselor. The GOUV hopes to be able to include a radio education project in its second five year plan, but so far this project has remained undefined.

Without exception GOUV and donor personnel working with human resources programs felt radio was not being adequately employed and that its promise was significant and realizable. There should be coordinated effort on the part of those individuals, agencies and donors involved in rural radio. Beyond that the programming should be incorporated into the goals and objectives of national and project plans. Follow-up evaluations, better feed-back mechanisms, and perhaps a multi-media approach needs to be considered and evaluated to see how and if radio could be more effective if supported by pamphlets, slide tape presentations, newspapers, etc. Consideration should be given to serving the needs of the people not only in terms of educational and informational content, but for amusement and cultural purposes as well. This must be built into the development plan or it will continue to be relatively ineffective both in terms of content and personnel because the present national budgets leave no room for the support of unbudgeted expenditures. This development of radio education could have substantial impact and pay-off for relatively small investment and it is recommended that AID at least consider providing this assistance in the Eastern ORD on a pilot project experimental basis. It should be integrated with the efforts of other national and foreign organizations already committed to the improvement of rural radio. AID and U.S. institutions have already had substantial experience with radio education efforts elsewhere in the world, especially in Latin America, and these insights could be relevant inputs in working with the development of an effective viable rural radio system in Upper Volta.

II. Advanced Research and Training Capability

All members of the DAP team were concerned over the present lack of a capability in Upper Volta for training agricultural and educational researchers. Furthermore, there has not yet been developed a Soudanian-Sahelian regional institution readily available to serve this function. For the higher levels of expertise which this region must now import from foreign sources, it is recommended that consideration be given to the establishment of an institutional capability in the region to satisfy these needs so that high level human resources can be prepared within the cultural and geographical environment of this Soudainian-Sahelian region and oriented academically and experientially towards addressing its needs. Regional institutions which might be developed to serve this purpose are the University of

Ouagadougou and the University of Niamey. The University of Ouagadougou might develop the education/communications/ technology components needed, while the University of Niamey might further develop the agricultural and scientific skills which it has already begun to establish with considerable French assistance. This proposal is spelled out in more detail in the Education/Human Resources Development portion of the Niger DAP.

UPPER VOLTA
HEALTH SECTOR ASSESSMENT

INTRODUCTION

Upper Volta is a country of 274,000 km^2 with a total of 5.4 million inhabitants (1971), only 5.1 million of whom are actually present, owing to marked seasonal and in some instances long-term movement of Upper Voltaics to the plantations and coastal towns of the Ivory Coast and Ghana in search of employment. The population growth rate is approximately two percent per year and the average family consists of 9.4 people. Overall density is 18.6 inhabitants per km^2 and in certain localized areas it reaches 100 per km^2. Over 95 percent of the population lives in rural areas.

1. Major Health Problems

The major health problems of Upper Volta are similar to those of the other countries of the region: malnutrition, transmissible diseases, gastro-intestinal disorders in children, post-natal infections, etc.

Malnutrition: The main food crops of Upper Volta are millet and sorghum, with corn and rice as complementary foods, and roots and tubers taking the place of the main dish in some areas. In normal times these foods supply an average of 1,850 calories per capita day and 61 grams of protein, of which only 5 grams are derived from animal sources, however, resulting in a probable deficiency of essential amino acids. Starchy foods and cereals provide 73 percent of the calories, pulses and nuts 18 percent, and miscellaneous products 5 percent. The balance of the diet is procured from fats, which are consumed in very small amounts in spite of the fact that the country is located between the groundnut belt to the north and the oil palm belt to the south. Against this common base, tribal diets vary according to the diversity of ecological factors.

As a result of the drought, the figures given above for calorie and protein intake are undoubtedly lower now. Health officials indicate that while until recently kwashiorkor was rare, the incidence is increasing and marasmus has become common in villages of the Sahel. Both the Director of Health and the WHO consultant in nutrition consider malnutrition as indicated by low weights in relation to age to be an extremely important problem.

Transmissible Diseases: Onchocerciasis is a serious problem in the river basins. The disease has been described as hyperendemic in the area south of a line from Dedougou to Ouagadougou, to Fada-N'Gourma where the infectious rate has been known to vary from 10 to 25 percent and has reached 70 to 80 percent in some villages. Trypanosomiasis, which was once widespread, now seems to be under control, but constant surveillance is required. The incidence of smallpox and measles has decreased significantly as a result of the vaccination program, but as in other countries of the region, new populations of unvaccinated susceptibles are appearing. Upper Volta has the greatest number of cases of leprosy of the French-speaking countries of West Africa. Trachoma is endemic in the northern half of the country.

Malaria cases in 1972 numbered 588,541.

2. Health Infrastructure

The urban medical infrastructure in Ouagadougou consists of a national hospital, four maternity institutions (one in the national hospital), 20 dispensaries, a municipal hygiene service and a medical inspectorate for schools. At the hospital, most specialized positions are held by expatriates and it is the declared policy of the Government to seek specialization of Upper Volta physicians in order to avoid the necessity of sending abroad persons in need of specialized service.

There are regional hospitals at Bobo-Dioulasso, Fada N'Gourma, Gaoua and Ouahigouya. While minor surgery can be performed in some of the rural health centers, none of these has personnel specialized in surgery. Evacuation to the regional hospitals from rural health centers within reasonable distance is, of course, possible; but for large parts of the country, little higher level hospital service is available. In Bobo-Dioulasso there are three maternities, one of these in the hospital, seven dispensaries, a municipal hygiene service and a medical inspectorate for shcools. Half of all medical supplies are utilized in Ouagadougou and Bobo-Dioulasso.

The cornerstone of the rural infrastructure is the Medical Sector Center, placed in the main city of each of 10 medical sectors. Such a medical center includes a small maternity, an MCH unit, a dispensary for out-patients and a small hospitalization unit of 20 to 30 beds where emergency surgery can be performed. The center is staffed by a physician (in rare cases two), three to five nurses (two of which may be state nurses), three to four midwives and some administrative personnel. There is generally a microscope available, but laboratory equipment is primitive and reportedly little used. A station wagon is available for inspection tours, for evacuation from lower level institutions, and, where possible, to the regional hospital. However, at times the roads are in such poor condition that evacuation is impossible.

The sector center supervises a number of subcenters and health centers. There are a total of 28 of the first and 155 of the second. In a few cases, the subcenter is supervised by a physician, but generally both types of centers are run by state nurses. Where state nurses are not available, auxiliary nurses are in charge. There may be three to five nurses at a subcenter with a varying number of midwives when there is a maternity attached. The subcenter may in theory have a vehicle available, but more likely it will have a motorcycle or even two for itinerant personnel assigned to the center. There are 23 rural maternities attached in most cases to the subcenters and health centers.

There are 124 rural dispensaries staffed by auxiliary nurses and matrones (traditional midwives) and 20 mobile units, but as far as could be ascertained a large number of these are in poor repair. Gasoline is

in scarce supply so that only a comparatively small number of the units function at any one time.

As seen from the above, the role of the state nurse at the subcenter and health center is actually that of a medical auxiliary. The nurse is in fact the "physician." According to all informants in the Ministry, measures are taken in the on-going reorganization of nursing training to ensure that a graduating nurse is capable of diagnosing the most important diseases, able to treat them, and aware of the circumstances under which the patient will have to be evacuated for expert medical handling of a case (something that often may not be possible). While evacuation from the subcenters and health centers is possible though often difficult, it is generally not practical from the outlying dispensaries, which may be connected to the "outside" by mere trails. Flooding may, at certain times, make all movement impossible.

The following table summarizes the health infrastructure in Upper Volta.

TABLE 1

HEALTH INFRASTRUCTURE-UPPER VOLTA FEBRUARY 1974

SECTOR	Regional Hospital	Med. Center	Health Center	Sub-Center
1. Ouagadougou	–	–	3	13
2. Fada N'Gourma	1	1	4	18
3. Gaoua	1	–	1	8
4. Ouahigouya	1	–	3	10
5. Koudougo	–	1	4	25
6. Dedougo	–	2	2	23
7. Bobo Dioulasso	1	–	2	9
8. Kaya	–	2	3	14
9. Dori	–	1	1	6
10. Yako	–	1	1	6
11. Manga	–	2	2	7
12. Banfora	–	1	1	16
TOTAL	4	11	27	155

3. Personnel Availability

As of September 1974, the following Upper Voltaic health personnel were available.

Upper Voltaic Nationals in the Government Health Service as of September 1974

Category	Number
Physicians	25*
Pharmacists	6
Dentists	7
Housekeepers	2
"African" midwives	14
State midwives	60
Technical health agents	37
Laboratory technicians	1
State nurses	
Male	162 (plus 37 to graduate)
Female	65 (plus 8 to graduate)
Specialized nurses	
Male	139
Female	15
Auxiliary nurses	
Male	580
Female	239
Sanitary agents	8

*There are about 55 French physicians working in Upper Volta and a number of other expatriate doctors are working with voluntary agencies.

The above figures would give one physician per 91,400 inhabitants, using a population of 5,120,000. Figures for 1974 give a total of 87 physicians, of which only 16 are nationals. The 1974 figures for total physicians would give one physician per 55,000 inhabitants, using a population figure of 5.5 million.

There are about 70 Upper Voltaics studying medicine abroad. A recently graduated Upper Voltaic physician will earn 69,000 CFA per month, giving him a net income of 60,000 CFA or $255. At the specialized level, salaries are slightly better: a surgeon will earn about 87,000 CFA or $370 monthly. Principal Medical Officers may earn 150,000 CFA monthly or $638. While these rates are inadequate under present economic conditions, what is

particularly annoying to young physicians is that a number of older personnel are still serving under pre-Independence French conditions whereby an African mid-wife earns 80,000 CFA or $340 month. Housing is generally not provided and, if it is, 20 percent of the salary is withdrawn.

A School for African Medical Assistance was organized in Ouagadougou and in 1968 was changed into a National Nursing School giving a state diploma. The training is of three years duration and the requirement for admission is completion of secondary school. Since 1971, when the first class of state nurses was graduated, 132 have been trained. As of 1974, a three-year training program for social assistants has also been provided at the nursing school. Eight were graduated in 1974 and 17 are expected to complete the course in 1975.

The development of health personnel is one of the highest priorities of the country, but it is clear that the economic resources for this task are insufficient. It is considered that some increase in personnel in urban areas will be needed because of a trend towards urbanization, but the greatest need is in the rural areas. It is estimated that at least 283 additional health personnel are needed for the rural areas. The Government's objectives are as follows:

ESTIMATED NUMBER OF HEALTH SCIENCES STUDENTS - UPPER VOLTA 1973-76

Category	1973-74	1974-75	1975-76
State nurses			
-1st year of study	50	50	50
-2nd year of study	41	49	49
-3rd year of study	39	40	49
Social Assistants			
-1st year of study	12	12	12
Auxiliary nurses	50	50	50
TOTAL	192	201	210

In addition to continuing to train nurses and auxiliary nurses, in the future the Government wants to train state midwives, sanitarians, auxiliaries in health statistics and demography, and eventually health administrators, medical secretaries, and other specialists. To accomplish this, the Government plans to reorganize the present National Nursing School into a National School of Public Health. This will be a progressive long-term change with the intention of creating a Centre Universitaire des Sciences de la Sante - CUSS (University Center for Health Sciences).

At the moment the Nursing School is housed under highly unsatisfactory conditions with insufficient space and materials even for the present purpose.

It will be necessary, therefore, to construct a new building which is calculated to cost CFA 100,500,000 ($428,000). Materials and equipment for the School of Public Health will be provided partly by the Government and partly by external donors.

At the moment, a revision of the nurse training programs is being undertaken. General objectives of the training have been defined and specific objectives are now being worked out. There is general agreement that in the rural infrastructure it can be expected that services below the level of Centres Medicaux (Medical Health Centers) will for a long time to come be in charge of nurses. The larger institutions (Centre de Sante de Sous-prefectures and possibly Centres de Sante d'Arrondissements) will be headed by state nurses and the lower level health posts by auxiliary nurses. It is therefore necessary that the Upper Volta nurse receive a training that goes beyond general nurses preparation so that he or she will have the ability to recognize and treat, as far as possible, the ten most common diseases. There are still a number of the old Medecins Africains working but they are considered as fully trained physicians and the Government, as far as could be learned, has no intention of training a new class of medical assistants.

4. Sectoral Constraints and Causes

As in the other countries of Central West Africa, Upper Volta's health sector suffers primarily from inadequacies in facilities, personnel, supplies and equipment, and transportation. As already mentioned, only about half of all available medical supplies and drugs go to the rural institutions, which therefore for long periods may be without even the most essential medicines. This is true even for the medical centers at medical sector headquarters. That this situation is likely to worsen may be seen from a distribution of the budget. It is evident that over recent years the distribution of the budget has increasingly gone to the payment of salaries (now 85%) with decreasing amounts being available for material and supplies. It is clear that the rural areas are the first to suffer from this lack.

While the national budget almost doubled between 1960 and 1972 (an increase of 91.5%), the health budget rose only 27% in the same period. If we undertake to deal with "constant CFA" it becomes evident that the amount allocated in 1972 is even lower than indicated below. It should be noted that while in 1960 the health budget represented 11 percent of the national budget, in 1972 it represents only 7 percent, a steady decrease since 1961, when it reached a high of 15 percent.

Health Budget Compared to National Budget - Upper Volta 1960-1973
(in CFA 1,000)

Year	Health Budget	National Budget	Health as % of National	Gross Domestic Production	Growth Rate Health Budget	Growth Rate National Budget	Growth Rate GDP
1960	669,372	5,650,554	11	-	-	-	-
1962	880,523	8,401,777	10	-	+3	+48	-
1964	865,000	9,973,100	8	63,365,000	+7	+33	-
1966	811,252	9,136,700	8	63,645,000	-1	0	-2.5
1968	794,053	8,563,610	9	70,727,000	+3	+2	+8.1
1970	897,423	9,756,861	9	80,140,000	+5	+8	+5.8
1972	852,355	10,822,300	7	-	-9	+2	-
1973	941,355	11,726,170	8	-	+9	+9	-

If we examine the distribution of the health budget we find that the allotment for salaries (personnel) represents 85 percent in 1973 against 66.6 percent in 1960, while the allotment for supplies has gone down both in relative and absolute value. In this area it is largely the medical supplies and technical equipment that has suffered, decreasing by 40 percent over an 11-year period (1961-1972). This decline in the funds for supplies and materials has to some extent been compensated through foreign aid, particularly from the French.

5. Government Plans and Priorities

The Government's Five-Year Economic and Social Development Plan 1972-1976 cites the following priorities for the health sector:

- The development of programs for the control of communicable endemo-epidemic diseases is considered the highest priority, demanding continuation of control programs already underway and the study of others urgently needed.

- The development of a basic health service infrastructure with particular emphasis on mother and child health services (MCH) is considered a high priority over the next ten years. While prevention must be emphasized, there is an urgent need for improvement of curative services particularly in the rural areas.

- The training of paramedical personnel, particularly for the rural basic health service.

- The improvement of nutritional status, particularly of children under 5 years of age, pregnant women and nursing mothers, through nutrition recuperation centers and health education with special emphasis on nutrition.

In addition to the training programs outlined above under Personnel Availability, specific objectives include:

At the hospital level

- An improvement in services for the patients.

- An improvement in certain key services (pediatrics, blood bank laboratories).

- An avoidance of the necessity to send patients abroad through the improvement of the existing specialized services and the creation of new services.

At the level of dispensaries and maternities

- An improvement in the provisions of drugs and medical supplies.

- The creation of a medical inspectorate.

At the level of health education

- An improvement in the means of effecting an acceptable education in preventive medicine and public health.

- Active participation of the (National) Information Services in health education.

- The collaboration of the Army, Public Works, the Communes and the Youth Movements in a number of sanitary improvements.

6. Evaluation of Government Plans

While the health priorities outlined in the 1972-1976 Plan are laudable, they will be difficult to implement if the health budget continues its decline in relative and absolute terms. It is apparent that the stagnation of the health budget is linked not to economic stagnation, since both gross domestic production and the national budget have progressed much more markedly than the health budget, but rather to the favoring of other priorities.

With regard to allotments within the health budget, it is evident that those expenditures which could possibly be reduced (equipment and supplies) have undergone the greatest possible reduction, while what might be regarded as "obligatory" expenses for "functioning", i.e., personnel, have been maintained at the same level or have even been slightly increased.

The above raises certain very important questions for future possible aid. It is doubtful that the present personnel are being utilized effectively given the lack of needed equipment and medical supplies, and it is therefore probably inadvisable to contribute to any enlargement of the present infrastructure without a detailed survey of the utilization of what is already available.

7. External Assistance

The World Food Program (WFP) has a school feeding program in Upper Volta. It deals with government and private secondary schools in Ouagadougou and Bobo and the intermediate rural areas. A daily ration has been established made up of bread made from wheat and corn flower. According to the WHO nutritional adviser, Dr. A. Stabile Wolcan, sorghum is generally not available. It is expensive and is exported. Peanuts are supplied with the above, as well as either canned fish supplied by WFP or dried meat supplied by the government. Coffee with sugar is also supplied by WFP.

The program was started in 1972 and has been enlarged since. The Section d'Equipment Scolaire of the Ministry of Education has a section with four to five persons in charge of the distribution of materials to the teaching personnel of the schools.

A second WFP program is concerned with the hospitals in Ouagadougou, giving a similar diet to the in-patients. This program is directed by the Ministry of Health.

The World Health Organization (WHO) has several programs in Upper Volta. An Inter-country Nutrition Project concerning Upper Volta, Niger, Mali, and Mauritania is designed to train nutrition personnel, nurses, midwives, teachers, and the cooks in the WFP program. The training is in general nutritional practices and lasts one month for groups of 25. There are also refresher courses of shorter duration. Until now the courses have been only been given in Ouagadougou.

Training courses are also provided for the staff of the 16 mobile units provided by UNICEF for the Sahelian area of Upper Volta (nurses, midwives, etc.). The training given is in applied nutrition and nutrition rehabilitation. The unit personnel also distribute anti-malarials and give emergency medical care. The training, which is paid for by UNICEF, is of two-and-a-half weeks duration. They are also being taught vaccination for measles, tetanus, polio and BCG. Vaccines are provided by UNICEF. The 110

persons who have been participating in the training course so far have all worked in rural dispensaries before. Training is also given in the distribution of CSM to children, pregnant women and nursing mothers. This program will be discontinued within the next 12 months since UNICEF does not intend to continue financing it.

The WHO project "Development of Basic Health Services" was originally designed to assist the Government in developing its infrastructure. During 1973, the team of this project was largely dealing with Sahel drought problems and the cholera epidemic. However, the need for reorganization and improvement in the infrastructure was kept in mind and the project staff and the WHO Representative collaborated with the Government in the preparation of a plan covering the estimated needs. All medical sectors were visted and a "Plan of Action to Combat the Health Effects of the Drought in Upper Volta" was drawn up. The proposals contained in the plan come under two headings:

a. Improvement of the existing structure of the health service and insuring its rational utilization: This will call for norms to be established, availability of increased 'means' (finance, material), retraining of personnel, and supervision.

b. New institutional structures to be provided, adapted to concrete problems. This will require the setting up of new mobile teams which will integrate a service for potable water and a network for the surveillance of the nutritional situation and a network of nutrition rehabilitation centers. It will also require the strengthening of the fixed infrastructure.

Since 1962, WHO has had a program in Upper Volta for the development of nursing education and nursing service.

Bilateral donors active in Upper Volta include France (which, among other things, maintains a sizeable medical technical assistance program) and Canada which has agreed to finance through UNICEF the new building for the National School of Public Health).

8. Possibilities for AID Interventions

As mentioned earlier, in view of the Government's diminishing budgetary allocations to health, any U.S. assistance to Upper Volta in this sector should be planned carefully with the absorptive capacity of the present infrastructure in mind. AID assistance could probably be most effective in the area of nutrition. Several possibilities could be explored, including a) supporting an expansion of the WHO Inter-country Project on Nutrition; and b) supporting the development of a low-cost nutrition rehabilitation network (similar to that developed for Haiti) which could be tied into the existing infrastructure.

Upper Volta
Nutrition Profile

Population

Total: 5.5 million approx.
Growth rate: 1.8% (5.1% in urban areas)
Rural population: 95% of total
Major tribes: the two major ethnic groups are the Mossi and the Mande which break down into over 160 subgroups.

Mossi (50% of total) - the Mossi homeland includes entire central part of the country. The Mossi are hard-working farmers, many of whom accept seasonal employment in Ghana and the Ivory Coast due to the overabundance of the domestic agricultural labor force.

Gourounsi (200,000) - live around Reo and Koudougou. Many specialize in vegetable gardening.

Bobos (300,000) - inhabit the areas of Bobo-Dioulasso, Dedougou, Orodara, Banfora, where they live in large villages and practice a kind of familial socialism.

Lobis (100,000) - found around Gaoua and Diebougou where they are hunters and farmers.

Mande - major subgroups are:
- Samos (100,000) - Tougan area
- Markas (80,000-100,000) - Nouna area
- Boussanas - Tenkodogo
- Senoufos (50,000)

Peuls (200,000) - nomadic herdsmen

Tuaregs - nomads found mostly in Dori

Hausas - travelling traders

Agriculture

Major crops:*

Sorgum is the main food crop: Corn is a hut culture. Rice is becoming more popular. Cowpeas, niebe and voandzou beans are grown in vegetable gardens throughout the country. Groundnuts are primarily a cash crop, exported to France.

* Figures from FAO Production Yearbook 1971

Millet and sorghum	973,000 tons in 1971
Corn	42,000
Rice	37,000
Cowpeas, other pulses	165,000
Cotton	15,000
Peanuts	68,000
Sesame seed	63,000

When other crops are poor, larger amounts of groundnuts (peanuts) are consumed locally. Sesame seeds are a relatively new crop and about 1/3 of the harvest is exported.

Livestock and poultry:

Cattle	2.9 million in 1970/71
Sheep	2.0
Goats	2.6
Poultry	10.0

Upper Volta has more livestock per sq km than any other state of former French Africa but as elsewhere in the region, herdsmen look upon their herds as capital and do not commercialize their animals. Taxes on livestock represent an important source of revenue for the government. Sedentary farmers who own cattle entrust them to the care of Peul herdsmen. There has been an emphasis on poultry development supported by a Poultry Center at Bobo-Dioulasso.

General:

Farming is primarily subsistence of the slash and burn shifting type, with land assigned to families by the tribal chief. Under this system, only about 10% of the arable land is under cultivation at any one time, but the soils are generally poor and are further impoverished by the laterization caused by burning. Main government agricultural policies in the past have aimed at intensification of food production and improved management of water resources.

Storage:

Traditional village storage techniques are used and losses to insects and rodents are high.

Fisheries

There is substantial fishing potential in Upper Volta. The reported catch from all sources combined amounts to approximately 3,500 tons per year, of which about 900 tons are dried and smoked. There are over 26 fishing centers along the Volta Noire but this is a zone of tsetse fly infestation. Important centers are also found in the Tangrala Lake near Banfora, around Bobo-Dioulasso, in Bam Lake and Goubre Pond near Ouahigouya, in Deni and Sian Lakes near Kaya, and in barrages near Ouagadougou and Fada N'Gourma. There is an ex-

perimental fishing station near Banfora and a program of establishing Tilapia ponds has been undertaken.

Seasonal Availability of Food

Millet, rice and beans are planted in June and harvested in November. Peanuts are also ready in November. Corn is harvested in August or September and serves as the staple food until the millet crop is ripe. Voandzou beans are harvested in September. Manioc is available year-round since it stores well in the ground, but is a poor food.

The main food crops are millet and sorghum, with corn and rice as complementary foods and roots and tubers taking the place of the main dish in some areas. These foods supply an average of 1,850 calories per capita per day in normal times and 61 grams of protein, of which only 5 grams are derived from animal sources, however, resulting in a probable deficiency of essential amino acids. Starchy foods and cereals provide 73% of the calories, pulses and nuts 18%, and miscellaneous products 5%. The balance of the diet is procured from fats, which are consumed in very small amounts in spite of the fact that the country is located between the groundnut belt to the north and the oil palm belt to the south. Against this common base, of course, tribal diets vary according to the diversity of ecological factors.

Diets of the Mossi:
Millet is the staple food, with corn replacing it between August and November. Rice is a prestige food eaten only with meat. Yams imported from the coastal areas to the south are available but expensive. Beans are of considerable importance to the Mossi diet. Over 25 varieties of wild plants are known to be gathered by Mossi women and used in cooking. Peanuts are both a food and cash crop, eaten roasted, boiled and dried, or raw. Manioc, taro and other tubers are eaten by some. Game is scarce and commercial meat expensive, hence meat is uncommon in the diet. Fish is appreciated but scarce. Milk is purchased from Peul herdsmen. Hen's eggs are not eaten but hatched and chicken is primarily a sacrifical or ritual meat.

Diets of the Bobos
The Bobo diet is similar to that of the Mossi except that fish is more available, although still in small amounts.

Diets of the Peuls
Milk is an important, sometimes the sole, component of the Peul diet. Millet or corn is obtained from sedentary farmers in exchange for milk. Wild foods such as baobab leaves and hibiscus seeds are gathered. In normal times, the average Peul diet provides a daily caloric intake of 1,264-2,642 per person. The animal protein intake is higher than amoung other ethnic groups but is still inadequate,varying from 3.9 grams to

15.6 grams per capita per day. Moreover, it is likely that the proteins are consumed primarily for energy. Fat intake is also inadequate. Calcium intake is low and so is the consumption of vitamin A.

Nutrition Programs

In 1968 an Interministerial Committee for Nutrition existed and plans were under consideration for the establishment of a technical nutrition section in the Ministry of Public Health. At that time, the Government expressed an interest in conducting a nutrition survey of the Upper Voltan population with the help of outside donors (see Proceedings of the West African Conference on Nutrition and Child Feeding, page 161). In 1967 a food distribution program for school children and "health groups" was initiated and the World Food Program undertook to supply foods to secondary schools for a 4-year period.

UPPER VOLTA
WATER RESOURCES

Strategy for USAID participation in Water Resource Development for the Republic of the Upper Volta

Water resource development and utilization is necessarily tied to the needs and habits (cultural imperatives) of the users and the particular structure of the physico-hydrologic environment. It is the dynamic interaction of these social and physical parameters that will ultimately define the extent, degree, and success of water resource development projects. Upper Volta lies primarily in the harsh Sudan climatic zone where water is a sparse commodity, soils are largely infertile, villages are small and dispersed, disease vectors are prevalent and industrial/economic development is miniscule. The government's developmental plans must be designed to be flexible enough to adjust to short term local level needs and variations, long term national water management design and the desires and requirements of the various donor nations from whom technology and capital is required. The majority of the Upper Volta land area lies in the region programmed for Onchocerciasis eradication (only 16 percent of the nation lying in the Sahel, in the northern part of the country, is exempt). With the eradication of the vector new areas will be opened and resettled placing greater requirements on developmental strategy.

There are at least six (6) areas of concern for USAID input. Three are concerned with the building and/or construction of tangible, visible resources; (1) Barrage and Small Dam Development; (2) Lowland Development and Agricultural Extension (irrigation); and (3) Well Construction. The three remaining areas focus on programmatic regimes and basic research usually of marginal short term benefit but important mid to long term implications. These areas are; (4) Basic Climatic Research; (5) Erosion Control and Abatement; and (6) Reforestation and Anti-Desertification Programs.

The first three areas are generally of short to mid-term impact. Barrages and small dams presently constructed usually result in minimal agricultural extension into adjacent land. Part of the problem was due to inadequate micro/macro-drainage basin planning, and part due to more immediate human alimentary needs. USAID's emphasis on the rural farmers and his direct needs necessitates our concern with micro-basin studies and development (local basins, drainage areas, bas-fonds, marshes, valley floor utilization, terrace development, hillside cultivation, etc.). Development at the macro-level should handle large scale irrigation and to a lesser degree electric power production. (Present study suggests that few good exploitable sites exist.) USAID's emphasis needs to be at the micro-basin level, particularly bas-fond and small dam design, location, and maintenance. Extension programs should be developed for teaching and expanding bas-fond development and rice agriculture. There must be developed a Voltaic cadre capable of surveying, designing and managing these projects. Deep well resource potential should be analyzed for exploitation as a medium term developmental project. Present constraints are the lack of geologic

data, high cost of site location and development, and the limited extension and utilization of the resource.

The second area of concentration deals with basic climatic and topographic research and aid in development of technically trained Voltaics. An ERTS center at Ouagadougou would give the region significant academic status and validity though its immediate utility in micro-basin studies would be virtually non-existent. Erosion research should be delayed as a programmatic concentration until additional basic regional climatic, geologic and topographic analysis is made. Present methods are not very beneficial and have experienced only limited acceptance with indigenous people. Reforestation programs appear to be presently more feasible in the southern portions of the country, especially south of Ouagadougou where the projects have a better chance at success. The issue of reforestation to combat desertification has yet to be resolved. The solution lies in the collection and analysis of the available basic climatic, geologic and topographic data.

Upper Volta Geography

The Republic of Upper Volta, located near the geographic center of the West African francophone nations is the second smallest of the Sudano-Sahelian countries. Upper Volta is notoriously dry and lies primarily in the Sudan climatic zone, therefore, its water budget exceeds that of its northerly neighbors, Mali and Niger. Of the Republic's 105,971 square miles (273,970 km^2) the major proportion is covered by impermeable crystalline Pre-Cambrian rocks and scattered out-cropping granitic tors. The majority of the 5.7 million people (1972 estimate) is concentrated in the southwest, central and northern regions where urban populations sometimes exceed 125 persons per square mile (48 people/km^2). In recent times the intensity of land use has become a greater problem as higher demands upon land and reduced fallow periods dominate land utilization schema. The availability of water, soil fertility and detrimental disease vectors are the primary obstacles to a more accelerated development of the human and economic sectors of the country.

All of West Africa is plagued by the same problem . . . too much water and too little water. The Sudano-Sahelian climate is characterized by violent rainfalls over short period of time. This intense rainfall reduces the effective time rain water is available and increases erosion and stream siltation. The normal stream flow is either flood level (characterized by fast flowing high stage flow) or dry bed flow (minimal intermittent water) and rarely is there any sustained predictable flow.

Upper Volta, approximately 10 to 15 degrees North latitude and 5 degrees West to 3 degrees East longitude is located entirely within the tropical climatic zone with the character of the Sudan in the south and central regions and the encroaching Sahel in the north. The Sudan climate is typified by two hot seasons (15 February through 15 June and from 15 September through 15 November) separated by two cool seasons.

[1]The weather is very hot, with an average daily maximum of 103.1°F (39.5°C) and minimum 70.7°F (21.5°C) at Ouagadougou and maximum of 91.0°F (32.8°C) and minimum 70.2°F (21.2°C) at Bobo-Dioulasso.

The average rainfall varies from less than 16 inches (400 mm) in the North near Goram, just over 39 inches (1000 mm) in the Southeast near Pama, to greater than 51 inches (1300 mm) near the Ivory Coast border. One should not be misled, however, by these averages since the primary concern with rainfall as a water resource is duration, intensity and number of raindays (e.g. rainy days increase southward: 90 at Dari, 107 at Ouagadougou, 135 at Leo, 150 at Garoni, etc). Since the rainfall is mostly torrential and spotically localized, any prediction plan will have to be developed probabilistically, similar to flood forecasting methods.

These rains have a large yearly variation with the largest variance being in those regions having the smallest yearly averages. The seasonal duration of rainfall is from 3 to 5 months. Usually the rainy season begins more slowly and irregularly than it ends. This irregularity causes problems with planting time tables and agricultural management. During this 1974 planting season, starting in mid-May, many Voltaic farmers have had to replant their fields two or more times. Were it not for the peculiar rainfall distribution and the rapid evaporation one could easily develop double cropping of any necessary foodstuffs. It is for this reason that most of the population looks to small irrigation prospects and dams as the solution to the food problem.

One of the major restraints to water resource development and utilization is the high level of the sun's insolation (in excess of 6 calories per cm^2 per hour). This high value of insolation suggests that the potential evapo-transpiration is extremely high during the periods at the end of the dry season when ambient temperatures are also high. The high isolation, hence, desiccation, the general thinness of the soil and the abundance of laterite (duricrust and hardpan) make the countryside look dryer and poorer than the above rainfall averages suggest.

Voltaic water resource development is not only limited by the climatic regime but is in part controlled by Upper Volta's topographic form and geology.

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[1]These dates are only averages; actual starting and finishing dates depend upon the local climatic effects of the various regions.

[2]This high temperature and potential evapo-transpiration causes problems with soil tilling and harrowing. At the end of the dry season, the land is simply too dry and hard to be adequately prepared for seed. Many times farmers are forced to prepare their soil just after harvest when the soil moisture is high and the land is easily broken.

Upper Volta's landscape is dominated by peneplaned surfaces. There are two primary surfaces. One is slightly inclined southward at an average altitude of about 980 feet (300 meters). This flat region, covering most of central and southern Upper Volta has little relative relief. This limits the number of optimal sites for typical, western large scale dam and irrigation projects, since reservoir storage capacity is greatly reduced by topography, while evaporation is accelerated in shallow reservoirs and low slope limits the extension of gravity flow irrigating systems.

The most impressive physical feature lies in the West, the Banfara escarpment. It rises above the plain at an elevation of about 500 feet (150 meters). The plain at the top of this southeasterly trending escarpment dips slightly to the north-west in the direction of Mali. The headwaters of the Black Volta, the Gomoe and the Sourou Rivers drain this sandstone region.

The low relief is due to the regional geology which is dominated by the Pre-Cambrian crystalline basement complex. These basement rocks have been only moderately deformed and subsequent lava intrusions form the residual hills and tors (or "Kapjes") found throughout the region. The region behind the Banfora escarpment is covered by sedimentary strata which is past Pre-Cambrian in age. Its southern limit is the Sindow-Banfora line and it reduces in area near Ohiohigouya and is more significant in the extreme north of the country where its width increases to 25 or so miles (40 km).

The sedimentary layer is an excellent aquifer since it is composed of fractured sandstone with dolomitic intrusions. This water resource is tapped in the region from Bobo Dioulasso to Banfara and probably has a much greater potential for well development. At present the potential output for the region is unknown. Studies of well hydraulics and flow rates are necessary before one can make a projection as to how much water could be withdrawn from the aquifer. The minimal developmental goals should include:

1. A geologic study and mapping of the zone including the location of faults and fractures and estimation of the porosity and permeability of the various formations. (Preliminary work is being completed by the U.N. and ORSTOM.)

2. Location of existing water wells in the zone (producing or not) and the construction of water level contours. (CIEH has shown interest in this area.)

3. Determination of water quality in wells already drilled in the aquifer. Construction and mapping of quality contours.

4. Evaluation of the socio-economic and agricultural conditions prevailing in the region and their demand for water.

Another significant problem arises on a landscape dominated by a plateau of basement rock and laterite on which torrential rain falls. Since porosity and permeability are low there is little ground water recharge and surface flow is inordinately deep and fast moving causing large scale erosion and denudation. Gully erosion and lateral sapping within marigots leave the landscape with typical traces of scabland topography, which is normally difficult to develop for agricultural purposes.

The region is drained by three primary river systems whose drainage divides are hardly recognizable. The Comoe and its tributaries drain flood waters of the south southwestern Goroual, Ferdegase, Yali, Fago, Sirba, Gaulbi and Tapon Rivers of eastern Upper Volta. The Black, Red and White Volta Rivers drain the central and northwestern regions of the country while the Panjari, Ouale and Nauhao Rivers drain the Southeastern region. Normally the valleys of the above rivers would represent great resources for human habitation were it not for the Similium fly vector which causes Onchocerciasis. Once these regions have been cleared of the vector considerable land area will be made available for man's use.

Presently the development of water resources within Upper Volta is under the aegis of the DHER (Department of Hydraulics and Rural Works) whose primary goal is presently to develop the infrastructure necessary to augment agricultural productivity and extension. This is done through a network of ORD's (Regional Development Organization) which individually deal with the local farmer by purchasing his produce and selling him seeds, fertilizer and new ideas. Some of the ORD's are being assisted by individual donor nations, e.g. the Kaupela ORD by the Canadians, the Fada ORD by the United States, etc. This practice has resulted in organization variations in each region. Though the government does "intend" to manage the agricultural regions the majority of the management and decision making is through the donor nations. Government officials are familiar with the local problems and have found that at this stage the major impasse is not the lack of a general plan for water resources (one does not presently exist) but the lack of adequate funds for development. One observation is that there is also a serious lack of Voltaic personnel who have been trained to work with and remedy some of the small scale problems that the small farmer has. The available technicians are usually foreigners.

It would appear, then, that if the U.S. is to send aid to Upper Volta, for the expressed purpose of aiding the rural farmer, there are six general areas where a limited amount of aid would be most beneficial. Three are concerned with the building and/or construction of tangible visible resources:

1. Barrage and Small Dam Construction (irrigation and water utilization).

2. Lowland (Bas-Fond) Development and Agricultural Extension (irrigation).

3. Well Construction (human and livestock watering).

The three remaining areas focus on programmatic regions and basic research (marginal short term benefits but handsome long term benefits).

These areas are:

4. Basic Climatic Research

5. Erosion Control and Abatement

6. Reforestation and Anti-Desertification

It will be necessary, however, that Voltaics be involved in each and every step of any national development plan. If this is not the case, any U.S. investment will only be worthwhile as long as U.S. personnel are in control of the project. The ultimate goal of U.S. A.I.D. is effective indigenous water resources management and development. This process is long term, but it is necessary for Voltaian development and stability. The following is a cursory analysis of the above mentioned areas.

Barrage and Small Dam Construction

Dams are the most logical way of managing surface water in regions where water is available but there is a great loss due to runoff through streams and rivers. In the United States three out of four water facilities use surface flow (ground water resources are becoming more important). Most of the year Upper Volta has a severe water deficit. Most of the rivers are semi-annual and have limited sustained flow. The terrain is flat with little relative relief. The insolation is high and potential evapo-transpiration is greater than two meters per year. These factors indicate that the development of reservoirs and dams is not advantageous. The primary limiting factor is storage capacity. The low topographic relief allow few basin areas which have the necessary depth to provide enough water to last an extended period.

A flight over the region reveals large area reservoirs. This large area is misleading since in many cases the depth of the reservoir is less than four meters, further suggesting limited capacity. The wide area and shallow depth also increases the evaporation rate.

The rains, usually violent, occur over short periods, filling the reservoirs to capacity and applying great stress on spillways and canals. Of the few existing dams of meaningful capacity, many are frequently breeched and washed out. This places stress on both construction supplies and the human sector (which supplies labor to reconstruct the dams).

Other sites along the Black Volta will be assessed by UNDP starting in 1976. This pedologic, hydrologic, agronomic and geomorphic research will last for at least two years.

Large scale dam development is a long-term investment. The planning and location of a site may take three years, engineering design and construction another two years, and agricultural irrigation projects may take over five years to develop and manage efficiently.

The utility of dams usually falls in four areas: (1) household uses; (2) agricultural/livestock enterprises; (3) industrial use, and (4) electrical power. Though each of the areas is interrelated it should be clear that the top priority is placed on household and agricultural uses. With emphasis on the rural user and considering the geomorphic/topographic implications of electrical power production it seems obvious that the last two are of minimal concern for the U.S.'s frame of reference.

Human needs sometimes conflict with agricultural/livestock pursuits. Due to limited reservoir capacity and high evaporation many reservoirs are functional for only a month or two into the dry season. After this period there is very little water left behind the dam. Numerous examples indicate that most of these dams are needed only for human use into the dry season. This would be a greater hazard than the loss food resultant from the agricultural lands not used. [1]

There remains a lot of basic research to be done in the development of design and use parameters for both large and small-scale dams. Most research needs to be done in the field of climatico-geomorphic parameters and their effect on design and storage criteria. Most of the breeched dams visited failed

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[1] There are a whole set of problems associated with the development of the reservoir perimeter land. For example, as the water is used and evaporated the perimeter shrinks moving the water source farther away from the fields, eventually the water source is too far from the fields to supply sufficient water without pumpings.

because of a design fault (e.g. inadequate size or wrong location of the spillway, inadequate height for drainage area controlled, improper materials used in dike construction, etc.) Communication with Peace Corps Volunteers and local encadreurs indicated the need for repair crews to repair dams and dikes. A few bags of cement could many times serve to repair dams and make water available for extended use into the dry season. This would be curative and not preventative. Such a program for dam repair could be administered through the ORD infrastructure and/or through Peace Corps channels with USAID.

Lowland (Bas-fond) Development and Agricultural Extension

The term "bas-fond" as used in the field is misleading. It has been applied to stream terraces and flood plains, to mild depressions and troughs or to fields adjacent to and beneath a dam or other water retaining structures. The main similarity is that these areas are being used in rice agriculture. In the U.S. we would probably refer to it as low land or bottom land, referring to fields not traditionally used for growing because of various reasons (poor soil, excessive water, inaccessibility, etc.). In reference to Upper Volta the word "bas-fond" will apply to land which is usually moist or submerged (marshy) and has not been traditionally used for the cultivation of traditional cereals.

The hydromorphic soils in the bas-fonds came from the eroded colluvium of the plateau or surrounding depressions, and are usually deep and generally unexploited. The indigenous cultures have only recently used submersion agriculture for rice cultivation (primarily as a cash crop). Bas-fond or terrace farming requires a large investment of human labor even though the deep soils do lend themselves to mechanization. A one-half hectare plot planted in Yourga with the aid of a single family (eight people)and the layout plan designed by a Peace Corps Volunteer should yield about 1.5 metric tons of rice with the input of about 6,000 man-hours of labor. The supplies used were:

12 kg. (C-74) rice	45 CFA @ ($ .20)	540 CFA
50 kg. fertilizer	200 CFA @ ($ .88)	10,000 CFA
1 shovel	-300 CFA @ ($1.54)	350 CFA
1 pick	-750 CFA @ ($3.50)	750 CFA
1 iron packer	500 CFA @ ($2.20)	500 CFA
		12,140 CFA (U.S. $ 53.41)

These data are only rough estimates taken from field personnel.

Most of the man hours were spent constructing the 12-inch (30 cm) dikes which are designed to retain flood waters from the torrential rains and to keep the soil bed submerged during the preliminary growth period. Bas-fonds also lend themselves to mechanization and animal traction but there is still a great deal of mechanization required for effective management during flooding and drainage operations.

Bas-fonds soils are best for rice, some variety of beans, and other cash crops like tobacco, if properly drained. With the resettlement of the Volta valleys, bas-fond development will become an indispensable source of food if they are properly designed and managed.

In addition to the research into optimal design parameters, there are certain problems associated with bas-fond development--social and psychological problems concerned with the production and preparation of such projects. Historically many projects have been done with marginal success. The primary causes of unsuccessful projects were:

1. Total mechanization without participation of the local farmer who must manage and maintain the fields.

2. Declining interest in projects after a year or two. Actual reasons vary but are usually the result of low yields or labor intensity.

3. Preference for traditional cereals over rice.

4. Management requirements either poorly developed or understood.

5. Erosion and gullying of land.

USAID could be extremely beneficial in the development of low lands in a number of ways. It is clear that bas-fonds have a large agricultural potential especially in the areas of resettlement of the evacuated Onchocerciasis zones. Technical assistance in the form of developing drainage basin design parameters for characteristic micro-basin areas is needed. This data would give some insight as to how one must make dikes and design spillways for small-scale individual farm plots. Additional work needs to be done from a technical standpoint on soils, and topographic and hydrologic analysis. A number of projects need to be designed to assess the effect of farming bas-fonds and the accompanying ecological change which is likely to result.

Since Peace Corps Volunteers are involved in such projects with local encadreurs U.S. aid could also go toward the procuring of supplies (cement, picks, shovels, etc.) and the extension of surveying into various regions for bas-fond design. It is feasible and advantageous to give Peace Corps Volunteers access to a vehicle during the dry season to aid farmers in laying out the dikes needed for their submersible agriculture plots. A more important program would be to set up surveying schools in various ORDs which would teach the

fundamentals of mapping and designing terrace plots for and by Voltaics who could more effectively dispense this service to farmers. One of the major constraints would be leveling instruments for surveying. It is not necessary to have a surveyor's transit to lay out a field. A more economic means could be readily developed using a spirit level, a tripod and several stakes. This school extension project, when united with suitable research would enable facile productive management of land/water resources.

Well Construction

Water use in Upper Volta first comes from surface flow. Traditionally wells have been dug only when surface water is not near by. Wells are necessary and in many cases preferable to surface water supplies. It should not be mistaken, however, that well water is necessarily more potable than surface flow. There is so little known about ground water flow and recharge in this area that there can be little done insofar as predicting well water quality or well flow potential.

More important than water quality, there is a tremendous need for water, whatever the quality. It would not be difficult nonetheless to provide chlorinators to wells and pumps to reduce the danger from bacteria. Additional research is forthcoming on the nature of the crystalline basement and its water storing fractured zones which would enable a better and more rational location of wells. Present practices by Peace Corps and the Genie Rural are to dig where the well is wanted without knowing about the basement substructure (in many cases three wells are started and the one that goes the deepest is the one finally fully developed).

During the 1960's, the French Aid and Cooperation Fund financed, in the central region of Upper Volta, an operation covering 1,100 wells. Though the project was started by SATEC direct control was taken over by the Upper Volta Water Engineering Department (DHER). In the Red and White Volta Valley project, it is expected that by 1976 over 60 village wells will have to be constructed to service 1,800 families averaging three wells per village. The preliminary plan for the Black Volta calls for 1,100 families in 12 villages with 36 wells. Special care needs to be taken in these resettlement areas since population density is high and expansion space relatively low. Increased water usage and population will cause a decrease in already poor water quality. Studies need to be conducted and well logs and records need to be kept in order to determine well ecology.

As a primary goal, well construction is necessary. The SATEC project adopted three principles:

1. Construction of a large number of low-cost wells, avoiding expensive survey work and using elementary techniques;

2. Volunteer participation of the local population in well construction and subsequent maintenance;

3. Obtaining an average water yield sufficient for the needs of a scattered population and within the limits of possibilities offered by barely permeable soils.

These goals are amiable and should be adopted for any new wells developed in the regions. There should be the addition of chlorinators included in the price of construction especially in the more densely populated regions. Present well cost is between 1.5 and 2 million CFA ($6,600 to $8,800) and supply water for between 100 and 150 persons each.

Basic Climatic and Topographic Reasarch

Presently climatic and weather data is being collected and analyzed by ASECNA (French Meterological Society). Even though some data has been collected over the past 70 years there is still not enough data available to analyze and forecast weather, predict and assess the significance of the movement of the intertropical convergence zones or to determine the periodicity of drought phenomena. The significance of a climatic study is found in its relationship to man and his use of the land. It is a delicate study of rainfall and topographic restraints on land use. Some of the basic studies needed would be related to cloud distribution and thickness, storm cell movement, precipitation and evaporation, morphogenetic regions, etc. Many experts feel that there is little relationship between local land morphology and the depth of water resources. There is little data available to uphold this opinion since so little is known about ground water sources. Research is sorely needed in these areas. It is known, for instance, that much of the surface is impermeable (due to laterization) and therefore ground water recharge is thought to be minimal. Projects have been advanced suggesting that dams be constructed to recharge ground water reserves. This is folly in absence of basic climatic, geologic and topographic data.

The Inter-African Committee of Hydraulic Studies (CIEH) has been working to unite the member nations together to exchange information and documentation, aid in technical pursuits of the member nations and pursue topics of general interest to the regions. Its activities cover studies in climatology, hydrology, agricultural hydraulics (irrigation), water utilization, public hygiene,

etc. CIEH's present chore is the collection and classification of available data on the region. The center at Ouagadougou has a depository for this purpose. It is suggested that much of the data desired by CIEH and its member nations could be obtained by establishing an ERTS (Earth Resources and Technology Satellite) Center in Ouagadougou. It should be expected that such a center would provide much needed prestige to both CIEH and Upper Volta. Basic purposes include the operations of a regional practicing and training center in remote sensing techniques in the Sahel, establish a remote sensing data bank, develop an adequate managing system to determine and distribute land use data, to collect and analyze "ground truth" information needed to coordinate remote sensing data and to provide training in remote sensing data interpretation. Though it is suggested that this center would serve to open up the virtually closed book on Sahelian natural resource inventory, resource management, resource monitoring and early warning, land use monitoring, etc. It should be realized that much of this data will not be detailed enough or available for short-term planning needs. The data would be useful in the long-term through giving insight into the total picture of the Sahelian ecosystem. The development of such a program would require heavy U.S. aid which would be beneficial both for CIEH and Upper Volta.

Erosion Control and Abatement

The study of erosion is necessarily tied to study of climate and topography since we are concerned with how water (sometimes wind) moves and organizes soil. Uncontrolled erosion destroys farmland, bas-fonds, roads, bridges and waterways in Upper Volta. Roads are poorly designed to handle the large volume of water flowing under bridges and along longitudinal drainage ditches. Often roads are built in such manner that they rechannel flood waters and define a new stream bed along their surface.

The cost of road maintenance is high because of poorly designed construction. It is necessary to understand and define the topographic depressions and the rainfall intensity before roads are built (unless designs are made with a much larger capacity than is presently available). Erosion in bas-fonds, under mining dikes and spillways discourages the farmer and causes him to be skeptical about the "newer technologies". Studies into erosion destruction and soil aggradation must be undertaken on the micro-level and used in conjunction with the developmental technology and training in agricultural (bas-fond and dry-land) management. USAID should invest funds in this area of research since it has both general and specific applications to land use criteria.

One erosion abatement project in Ouagadougou was doomed to failure since the project implementors did not explain to the farmers why they were ditching the land or making the dikes for water control. Once again plans must be developed through Voltaic counterparts who understand the purpose for such projects and communicate this to the people. Each project designed should have as an integral part a training sector which will involve Voltaics at all academic levels.

Reforestation and Anti-Desertification

Many scholars have suggested that modifications in vegetation will entail climatic modification especially rainfall. Part of the problem with this view is because one does not know the precise relationship between climatic variation and vegetative change. In this area of the Sudano-Sahel we cannot presently define precisely what the "normal" variation is of the climatic variables, rainfall especially. We have a minimal understanding of how the traditional food cereals grow relative to varying climatic parameters. In most cases, the effects that man is able to make through growing additional trees or flora would result in a minimal change in the water table of the region. It is quite wrong to think that rainfall may be increased by planting trees in the desert, indeed it is difficult to see how most varieties of trees could survive there. There have been cases where the water table has actually been lowered as a result of reforestation project causing wells to go dry, and adjacent grasslands to recede.

In Upper Volta there do exist regions where reforestation is a realistic endeavor. The land south of Ouagadougou could support tree plantations or tree farms. The orientation should not be toward careful tree farming management. Trees for building and firewood are sorely needed in urban areas. USAID should not be concerned with anti-desertification projects until more climatic data is available. There is evidence which suggests that this desertification and ecological fluctuation is a normal, natural occurrence. Many regions will be regenerated as soon as rainfall increases. The U.S. should consider aid to reforestation and tree farming plantation in regions which can support trees with the presently available water resources. A tree farming project should be designed in conjunction with villages resettled in the Volta valley management project.

In conclusion, Upper Volta has most of the problems characteristic to the Sudano-Sahelian region. Present research suggests few exploitable natural resources. Its future will be determined by the development of its human resources. Its economic base is agriculture. The largest impasse in the field of water resources is the technological hurdle. If skilled and unskilled Voltaics are pressed into service as water resource planners and technicians, water resource utilization and supply will be sustained, and development will

become independent of donor influence. USAID should attempt to develop adequate training programs to run concurrent with any research or construction project undertaken. Voltaics must be involved at every level of development. USAID must make a long-term commitment to Upper Volta if any of its projects are to work.

UPPER VOLTA
ECONOMIC DEVELOPMENT OF ONCHOCERCIASIS - FREE ZONES

I. Onchocerciasis Vector Control Program Area

Upon the DAP team's arrival in Upper Volta, the Secretary General of the Voltaic Ministry of Plans, Lt. Kalmogo, stated the government's first development priority was the economic development of the regions of the country where onchocerciasis prevents exploitation of important natural resources. These regions which contain approximately 10% of the land of Upper Volta are severely under populated or completely uninhabited valleys along almost all of the nation's major rivers - the Black, Red and White Voltas, the Sissili, the Kimpilaga and the Leraba rivers. Approximately 25% of this land, (approximately 27,000 km^2) is assumed arable and much of it is blessed with rich soils. With proper land and water management, this area should produce very significant quantities of cash crops (especially cotton, rice, sesame), food crops (sorghum, millet, possibly corn) and livestock.

The valleys of the onchocerciasis program contrast sharply with the Mossi Plateau to the north where population pressure on the land is severe. If one assumes that 40 inhabitants/km^2 is the maximum density for an area receiving under 900 mm of rainfall, 33% of the Voltaic farmers in 1970 lived in areas that were overcrowded. By 1990, at present population growth rates, 48% of Voltaic farmers would farm overcrowded areas. The most populous areas, found in the northwest and central regions of the country (ORDs of Ouagadougou, Ouahigouya, Koudougou, Koupala and Kaya) have been the points of departure for many of the 600,000 - 1 million Voltaics now working in the Ivory Coast (and Ghana to a much lesser extent) and have been the cause for much of the extremely rapid growth of urban centers such as Ouagadougou (growth rate of 34% between 1963-1969; 24% from 1969-1972)* and Bobo-Dioulasso. Because of the presence of onchocerciasis migrants from the Mossi Plateau have stopped short of entering the relatively fertile valleys of the program area in substantial numbers. At present rates of population growth (approximately 2.4%) in 20 years the above mentioned densely populated ORDs will contain about a million more inhabitants than at present. Thus one can estimate that at least one million persons will have to be relocated over the next 20 years, if land pressure on the Mossi Plateau is not to worsen; and substantially more must be relocated if land pressure

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* Les Quartiers Spontanés de Ouagadougou

is to be eased on the Plateau and soils allowed minimum fallow periods to regenerate fertility. It is believed that proper development of seven zones in the onchoceriasis area of Upper Volta could provide settlement opportunities for 600-700,000 Voltaics over the next 20 years. While detailed economic and financial evaluation of projects in the seven regions have not been made at this time due to lack of key data, it is clear that considerable benefits will be realized in the form of increase in food supply, production of considerable surpluses for sale to more deprived areas, increase in labor productivity and development of an integrated livestock and cropping system. In the Red/White Volta areas where more study has been done, physical targets by 1990 include (1) total production of 60,000 tons of cereals and pulses per annum of which 40-50% should be available for marketing, (2) cotton production rising to 21,400 tons per annum, and (3) 15,600 cattle available for slaughter per annum. In the Black Volta region annual agricultural production should total 51,000 tons. It is estimated that family income in this area could be increased from approximately $272 to $700 per annum over 20 years.

Thus development of the onchocerciasis zones of Upper Volta provides a tremendous opportunity to improve the lives of over 15-20% of all Voltaics, to slow and eventually reverse the decline of soil fertility in the plateau regions, and to provide a solid agricultural basis for economic development of the country through increased production of cash and food crops. Yet the exploitation of the great remaining virgin resource of Upper Volta will require: careful planning, the availability of large numbers of skilled people to ensure proper management of land and water resources in the area, and significant financial investment - $120 million over 35 years, most of which must be provided by donors.

The major development problem which must be confronted by the Voltaic government (with donor assistance) is how to promote settlement of the regions to be cleared of onchocerciasis in ways that:

- ensure proper exploitation and maintenance of the agro-potential of the valleys for production of food crops, cash crops and livestock.
- ensure proper development and utilization of the hydrological resources of the area.
- guarantee a minimum of government services to support the social and economic development of the population of the onchocerciasis valleys of Upper Volta.
- promote social harmony and minimize social/cultural conflict.

<u>The Voltaic Development Strategy</u>

Planning for economic development of the onchocerciasis-affected regions of Upper Volta began in 1971 with the arrival of several FAC advisors who were integrated into the Cellule d'Appui Technique (Technical Asst. Unit) of the Ministry of Plan and Agriculture. These French advisors - agronomists, pedologists, hydrogeologists, economists - conducted a pre-feasibility study of the development potential of the valleys of White and Red Volta (97,000 ha) and have already completed detailed design for some areas of the proposed project zone. Pilot

*Additional numbers, 20-50,000 might be settled if major irrigation projects are made possible by construction of 1-2 large dams on the White and Black Voltas.

settlement schemes have begun in four areas even prior to initiation of the WHO onchocerciasis vector control campaign.

On September 5, 1974 after considerable debate within the government, the "Authority for Management of the Valleys of the Volta"(referred to hereafter as the Volta Valley Authority) was created by decree #74/364. The Authority, which enjoys financial autonomy, is charged with developing uninhabited or under-inhabited zones of the valleys of the Volta Rivers (Red, Black and White) and their tributaries. The Authority will "study, promote, coordinate, execute or contract for the execution of operations necessary for the economic and social development of these areas." The organization clearly has been given full responsibility for the development of the Volta Valley areas, and has in effect taken away the power of the existing ORD structures in these zones. However, two proposed development zones in Upper Volta, along the Leraba River in the SW corner of the country, and Konpienga rivers in the SE corner, are not tributaries of the Volta river. It is not yet clear whether the Volta Valley Authority or the existing ORDs will be responsible for development of these zones. Also, conversations with the Authority clearly indicate that priority attention will be given to development of three zones: (1) the Red/White Volta area, (2) the Bourgouriba zone along the Black Volta,and (3) the Poni zone along the Black Volta. At least three other recommended development zones identified by the FAO/SEDES study of the onchocerciasis region - the Sissili zone, the Boromozane and the Dedougou zone - apparently will not receive Volta Valley Authority priority attention.

The VVA has been given full authority for development of areas along the Volta river and their tributaries. This includes the allocation of un- or under-utilized lands in the project regions under a 1963 law which returns ownership of such lands to the State. VVA will allocate land to settlers who will assume ownership except under circumstances where the State determines that the land is being underutilized.

A National Control or Selection Commission will be established to choose among candidates who present themselves as potential settlers in the Volta valleys. Selection will be based upon factors such as number of active family members, ages, level of education or training, agricultural competence, etc. While the Commission will in general be favorable to repopulation of zones by former inhabitants of those areas, settlers will not be selected on the basis of ethnicity. The Authority believes the Volta valleys should become "Melting Pots" encouraging integration of the several Voltaic ethnic groups.

Aside from the above, it appears that development methodologies in the various project zones of the Volta Valleys will be influenced by the development strategy proposed by the donor which may agree to work in a specific area. However, it is fair to say that the VVA may be strongly partial to the methodology established by the French for the White and Red Volta scheme (to be further described below).

The VVA will receive an annual budget of CFA 50,000,000 (approximately $200,000) which may be supplemented by outside assistance. Annual work plans will be approved by the Minister of Planning and Authority; financial records will be periodically reviewed by the Minister of Finance. The VVA, headed by M. Simeon Sorgho, an energetic young Voltaic, will be administered by an Administrative Council composed of the Minister of Planning, the Director of all of the major government services, and the Director of the affected ORDs. The Council will meet at least twice a year and will make decisions based upon a majority vote when a 2/3 quorum exists. The VVA is centered at Ouagadougou and in 2-3 years will have regional offices in Bobo and Tenkodogo.

The VVA is particularly charged by the Ministry of Planning to :
- elaborate management plans for land use, infrastructure, etc.
- assure studies necessary prior to implementation of new farms
- carry out or coordinate studies and research (human and animal water, applied research, irrigation, forestry, etc.)
- by intermediary of a National Control Commission, present candidates for colonization, and take away land if poorly utilized
- promote directly or indirectly the supply (approvisionement) of the installed families (consumer goods, equipment, factors of production)
- assume the training of staff and farmers or confide such action to competent organizations
- assure the maintenance and functioning of installations transferred to the VVA or created by them
- participate in the construction/hydroelectric and other dams; exploit fishing potential
- install agro-industrial industries to increase the value of agriculture products or other industries such as tourism
- exploit and develop livestock
- participate in the diffusion of agro-credit in liaison with and under the control of the BND or other organization
- concern itself with housing and urbanism.

Although the VVA will have to coordinate its activities with the local ORD structure and the various national "Services", in sum it has been allotted autonomous powers over a land area equal to 10% of the country.

Strategy of development along the Red/White Voltas

Studies financed by FAC indicate that approximately 175,000 people can be settled in 275 villages over 15 years in the 970,000 ha. area making up the Red/White Volta project zone. Approximately 25% of this land is considered arable. Settlement has already begun in four pilot areas (Lingohen, Kaibo, Mogtedo, Bane) and 212 families were installed between January-May 1974. VVA leadership indicates that these people can be protected from onchocerciasis by chemo-therapy without serious residual effects to their health until larvicide spraying decreases fly incidence in the region. Families (with at least three active members) who have been relocated are given a one hectare plot in a planned village area for their family house and vegetable plots, etc., and approximately 6-7 ha. of land within a short distance from the village for crops. They are given seed

for the first year's planting, food from the World Food Program and low interest medium term credit (the Caisse Central is presently negotiating a credit program for the Red/White Volta areas with the Banque Nationale de Developpement (BND)). Preliminary information indicates that medium-term credit (3-4 years repayment) will be made available for the purchase of bulls for traction (4 animals/farm), along with short-term credit (1-year) for annual agro-inputs (fertilizer, insecticide, seed, etc). Terms are not yet known although they may be similar to credit terms of the Matourkou project.

The FAC plan envisages an encadreur/family ratio of 1:20 during the first years of the program. The encadreur now receives field-training from VVA personnel after selection through competition. This will continue in the future with the possibility of some training of encadreurs at Matourkou. If successful in their work, the VVA encadreur will receive 4-5 times the annual salary of government encadreur with a top salary of approximately $5,000/year. The VVA believes that the encadreur can, in effect, replace the traditional village and land chiefs as arbiters on crucial village and other (e.g. social) decisions. The program hopes to take advantage of the break in tradition which relocation implies to change traditional farming practices to more modern techniques immediately after settlement. Eventually, it is hoped that pre-cooperatives or associations can be developed in each village providing a common guarantee for credit.

Physical and social infrastructure for the Red/White Volta areas will include two primary axes across the Red Volta, one primary axis across the White (630 km.), a secondary road network of 1600 km., and a tertiary road network of 3,100 km. Each village of 600 inhabitants will have one well, one school, one 100 m^2 hangar (for marketing or protection of machinery, perishable food storage, etc.). There will be one dispensary for each 14,000 people and one maternity per 40,000 people. The VVA hopes to resettle 175,000 people in the Red/White valleys over the next 15 years.

Considerable land use capability and hydrological studies have already been carried out in this area as a basis for settlement. Aerial photography and mapping at 1:20,000 has been completed. Morpho-pedological, hydrogeological, and topographical maps are superimposed to form a map of constraints used for selection of village sites. Mapping is progressing at approximately 50,000 ha/yr. with approximately 1/3 of the mapping now completed. Based on hydrogeological studies of 70,000 ha during 1973-74, approximately 180 drillings have taken place and over 40 wells were built using American drilling equipment. Pre-feasibility studies are being carried out for a dam at Bagre on the White Volta which might irrigate 30,000 ha. of land (primarily for rice production) and allow for settlement of an additional 20,000 families in the White Volta region.

With the assistance of IRAT, IRCT, and IRHO, the VVA has begun agronomic research of four field trial stations in the Red/White Volta area selected by the similarity of their soils to major soil types found in the region. Research is being carried out on (1) species and varieties

of crops (sorghum, millet, cotton, sesame, corn, peanuts) which might be used in the region; (2) fertilizer utilization; (3) rotation cycle including food and cash crops; (4) means to improve fallow; (5) basic management techniques to protect against erosion (tree planting, ditches, etc.). The 4 stations - approximately 30 ha. each - will later be used as demonstration plots for settlers, and one (Manger) will become a seed multiplication center in 1975. Expatriate agronomists believe that the following mean yields are possible in the northern (600-800 mm rainfall) and southern (800-1200 mm rainfall) zones of the White/Red Volta region without irrigation but with use of animal traction.

	North	South
Cotton	1000 kg/ha	1200
Sorghum	1100	1250
Sorghum Hybrid	?	?
Millet	1000	1100

Settlers will be encouraged to also raise a small number of cattle for commercial sale. Although tsetse is not a major problem in the White/Red Volta area, the VVA hopes that a mixture of N'Dama and Azawak breeds will produce an animal partially immune to tsetse which can be raised in all of the Volta Valley area (the Black Volta has a much more serious incidence of animal trypanosomiasis).

Financial Requirement

While the program in the White/Red Volta zone has been funded in the past by the French, the VVA is soliciting additional monies from FAC and other donors for the following activities:

Short Term

-procurement of heavy equipment
-studies and construction of primary road network

Medium-Term

-completion of pedological and hydrogeolocial studies (6 man years)
-agronomic reach
-funds for installation of 1200 families at rate of 20 Villages/yr; secondary and tertiary roads, programs in livestock, forestry
-construction of Bagre dam (apparently the IBRD has expressed some initial interest)

The Black Volta

Two major project areas along the Black Volta have been selected by the VVA for priority attention: the Bourgouriba zone in the ORD of the same name; and the Poni zone along the Poni River, a tributary of Black Volta. The VVA estimates that 9,500 families can be settled on 500,000 ha in the Bourgouriba zone and 2,000 families on 150,000 ha in the Poni zone without irrigation. The UNDP is presently undertaking basic mapping, morpho-pedological and hydrogeological studies in these areas at a cost of approximately

$1.7 million. The VVA believes that dam construction for irrigation and in some cases possibly hydroelectric power might be feasible along the Black Volta or its tributaries and is soliciting funds for studies of dam sites to be initiated after the UNDP completes its studies.

The project zone includes the whole of the ORD of Diedougou-Gaoua. Its eastern boundary is formed by the Black Volta and the west by the Bourgouriba and its tributaries. This zone was selected due to the good valley soils along depopulated areas of the Bourgouriba and Black Volta rivers and the proximity of dense population adjacent to these valleys particularly to the east of Diedougou. Soil and climatic conditions are relatively favorable for agriculture (1000-1200 mm rainfall) and the zone is near the main center of the Voltaic agro-processing industry at Bobo-Dioulasso. It is also an area of considerable movement of livestock and produce between Upper Volta, Ghana and the Ivory Coast.

The population of the Diedougou-Ghana ORD, 343,000 people, is highly unevenly distributed. In some areas density reaches 93/inhabitants/km^2 while many river valley areas are completely uninhabited. Four major ethnic groups are found in the ORD, the Dagari, the Lobi, the Birifora and the Bobo. Increasing numbers of Mossi are now moving into the area. However, strips of land 10 km. wide on both sides of the Bourgouriba system and 7-10 km. long on the Black Volta are almost completely uninhabited.

At present approximately 80% of the cultivated land is placed in cereal crops. Although CIDR has worked in part of the region since 1963, no real breakthrough in agricultural production has been achieved and use of material inputs is low. However, the development of precooperatives for the marketing of produce has been started: Present yields average 500-600 kg/ha for cereals; 450 kg/ha for groundnuts and 400 kg/ha for cotton. In dry years in areas where population pressure is high, cereal yields are seldom higher than 400 kg/ha and may fall to 200-300 kg/ha.

Trypanosomiasis is common in the region and local cattle are of the Mere breed, a small tsetse resistant type. No zebu cattle are found in the area.

The main development constraints in the valleys, apart from the presence of the Simulium vector, are: a) the heterogeneous nature of the population with 3-4 major ethnic groups; b) presence of Glossina ssp. and a consequent danger of the spread of trypanosomiasis to both the human and animal population; c) absence of infrastructure serving not only the relatively empty valley areas but also much of the populated area, particularly roads and water supplies; d) topography, particularly in areas of good, medium textured soils, with steep slopes requiring careful soil

conservation methods; e) traditional land tenure system combined with the heterogeneous population.

Preliminary sociological studies indicate that repopulation of abandoned villages in the riverine areas should receive first priority since: a) the densely populated territories along the Black Volta to the east include many people who have retreated from the river and who have a strong desire to return to their former villages, b) the advantages of the return to and development of onchocerciasis-cleared river valleys would be demonstrated more quickly and easily to the people both inside and outside the pilot zone, than through more complicated settlement schemes. However, over the longer run, settlement in the area should be seriously considered.

The PAG report estimates that some 210,000 people can be relocated on 210,000 ha of unoccupied farm land along the Black Volta and in the Bourgouriba valley. The report proposed an initial pilot project in the Bourgouriba valley based on repopulation with the aim of repatriating 3000 families over 5 years. Eventually 10,000 families might be settled in the valley. Annual family output is projected to increase after relocation from $272 to approximately $700. Cost of the pilot project is estimated at $1.86 million and cost of the total Bourgouriba valley resettlement scheme placed at $14.72 million.

Supplementary Economic Development Projects in Upper Volta

Aside from the two major development zones in Upper Volta (White/Red Volta and Bourgouriba zones), the PAG report identified five other major "supplementary" economic development project areas: 1) the Dedougou zone on the Black Volta; 2) the Boromo zone on the Black Volta; 3) the Sissili Basin; 4) the Pama-Konpienga zone on the eastern ORD; 5) and the Comoe-Leraba Basin zone. These five areas account for approximately 1/2 of the arable land (13,700 of 27,000 km^2) which will be available for exploitation following the onchocerciasis control project. Development of these areas is essential if overcrowding on the Mossi plateau is to be alleviated (at least 1 million persons will have to be relocated over the next twenty years if population/land pressure is not to worsen; and substantially more must be relocated if pressures on the land is to be eased and soils allowed minimal periods of fallow). It is believed that proper development of all of the seven project zones could provide settlement opportunities for only 6-7,000 Voltaics over the next 20 years.

Rather than describe the development potential for each of the five supplementary project zones, we will describe the Pama-Konpienga Valley

project zone in the Eastern ORD where AID has already begun a major rural-integrated development effort.

The Pama-Konpienga Valley project area covers an area of 3000 km^2 on the southern end of the Eastern or Fada ORD. Only about 3000 people live in the area mostly along the western edge of the region and near the town of Pama. Population density averages 1 inhabitant/km^2. The areas near the Konpienga valley are practically empty. Gourmantche and Mossi people live in the area.

The whole area receives 1000-1100 mm of rainfall annually over a seven month rainy season. The Konpienga flows only from May to December. Fertile soils cover about 1/5 of the area and average soils cover an additional 1/2 - 2/3 of the zone. These are leached or impoverished ferruginous soils, some of which could be considerably improved. The development of the land along the Konpienga is governed above all by the frequency and duration of the annual floods. It would appear to be possible to use this land by carrying out some minor improvements.

The area is served by the Fada-Pama-Dahomey road which may be paved by FED in the near future. In the area itself there are no tracks that

which has been given unusual power and autonomy, Upper Volta has attempted to create an efficient centralized unit which can override localized political interests and coordinate development planning with access to the highest levels of government authority. The VVA is literally a state within a state, created much on the model of Mali's "Office du Niger". One of the VVA's major tasks will be to attract and coordinate the use of donors' funds for settlement in and development of the onchocerciasis free valleys. To date, the VVA has been largely a French organization staffed by 12 French professional (hydrologists, geologists, agronomists, etc.) and one Voltaic, the Director, Mr. Sorgho. It has worked almost exclusively on plans for development of the White/Red Volta area which will continue to receive major French funding. Mr. Sorgho hopes to eventually add qualified specialists from other countries to his staff. Such positions might be most properly filled by UNDP-funded specialists although limited AID technical assistance to the VVA should not be excluded. UNDP has already agreed to carry out basic mapping, hydrogeological and pedological studies of the Black Volta area.

Although his plans are not yet fully developed, it appears that within the general guidelines of the VVA, Mr. Sorgho will allow donors a substantial degree of influence in the final design of geographic-specific settlement projects. Thus the Germans have been requested to design a project on the Poni River, a tributary of the Black Volta; and the French, of course, are continuing to carry out detailed planning in the Red/White Volta area. The IBRD has recently signed an $8.0 million loan to Upper Volta for an integrated rural development project in the Bourgouriba area near the Black Volta and may be interested in extending their activities into the nearby river valleys.

AID should consider providing major assistance to Upper Volta through two kinds of programs. First, AID could provide capital assistance to the VVA for: a) rural road construction and/or b) development of basic village infrastructure - wells, schools, dispensaries, etc., for use in a number of projected areas. This last activity might be structured so as to provide material and equipment for construction of facilities if local communities were willing to provide much of the necessary labor - possibly in exchange for PL-480 food and limited wages.

Secondly, AID could provide major capital assistance for opening the Pama-Konpienga zone in the Eastern ORD to settlement as an extension of the USAID Eastern ORD integrated Rural Development project. This action would be predicated upon prior studies which would determine the degree to which migrants would be attracted to the area from areas of the Mossi Plateau. Should the Pama-Konpienga region remain outside the purview of the VVA, AID could provide technical assistance to the Fada ORD for planning and initial management of a settlement scheme.

On a broader international level, as noted in various other portions of this report, there is an urgent need to create a mechanism to facilitate coordinated planning of hydrological works in the Volta Basin. Voltaic plans for major dams on the White and Black Voltas may have deleterious effects on the functioning of the Akosombo Dam in Ghana. Creation of a Volta River Basin Commission should be considered to deal with these and similar issues. In addition, AID should, probably through the intermediary of the Economic Development Unit of the Onchocerciasis Control Program at Ouagadougou, encourage close Ghanaian - Voltaic cooperation in planning development of the White/Red Volta project in Upper Volta and the northern Ghana resettlement project. These project zones are contiguous and early agreements on road networks, migrant flows and marketing regulations, for example, would diminish the possibility of conflict between the countries.

UPPER VOLTA
POPULATION AND FAMILY PLANNING

The national five-year plan for 1972-76 identifies rapid population growth as a fundamental problem of development. Key areas of concern are employment, technical training, general education and government services and the lack of financial resources to meet the demands of a population which is growing at an estimated annual rate of 1.8%. It is recommended in the plan that the government envisage the adoption of a national population policy to control internal and external migration and births, but only after the demographic base for this policy has been well established. Semi-official public statements by several government leaders, principally the Minister of Interior, have endorsed a pro-natalist attitude based on the drain on the male work force caused by job opportunities in neighboring African states and the accelerated migration to secondary cities in the past decade which has resulted in the depopulation of large areas of the country. This opposition to a policy of limitation has been expressed as "the need for hands to develop the nation's resources", which are almost entirely agricultural.

Demographic data used by the government is based on the 1960-61 national census, and the projections to 1985 made by INSEE based on early corrections of the census results are the figures used in the present plan (Table II-A). The 1960 census did not include the two main urban areas of Bobo Dioulasso and Ouagadougou, but in 1968 a 1/5 sample survey of Ouagadougou and its administrative region produced a crude estimate of age/sex distribution (Table II-B). There were no urban/rural differentials assumed in the rates derived from the 1960-61 census and these rates are still assumed to apply. Preparations for the second national census under the African Census Program are underway; pretesting of the basic questionnaire (approximately the same ten questions asked in the first census--age, marital status, occupation, etc., plus one question on migration) was scheduled for December, 1974. Difficulties still exist in organization (i.e., supervision and training) and political disagreement over the kinds of information to be obtained in the follow-up surveys, although reportedly all materials have been printed. It appears likely that the original target date for the enumeration, Spring 1975, will be postponed until at least the following dry season in the last trimester of the year. The government has submitted a proposal to participate in the World Fertility Survey to support the demographic portion of the study. Apart from the above references, population charateristics are not applied in the government's planning process.

Migration is presently a grave political concern to the government. Following independence, the GOUV entered into agreement with the Ivory Coast to control the flow of seasonal and semi-permanent migrant workers between the two countries. The economic prosperity in the Ivory Coast

and the high demand for laborers has slowly eroded this control over the past ten years. Uncontrolled internal migration from the marginal edges of the Sahel to the more fertile south-central and western regions and the movement from rural areas to secondary cities has also been given increased attention by government officials intent on the development of the country's agricultural potential. A research project on non-seasonal external migration has been carried out by the Office for Overseas Scientific and Technical Research (ORSTOM) for the government; the results are presently being processed in Paris and the report should be available, if accepted by the GOUV, in early 1975. According to the ORSTROM project manager in Ouagadougou, government estimates on permanent emmigration based on official figures obtained at border crossings are grossly understated. According to the findings of the ORSTOM study which covered 35,000 households in an area slightly larger than that inhabited by the Mossi (about 2 million people at the time of the 1960 census), approximately 60% of the male working-age population has migrated to the Ivory Coast for what appears to be of semi-permanent (6-7 years) to permanent relocation. With no foreseeable decline in the demand for Voltaic laborers, ORSTOM predicts an increase of entire families migrating, robbing the country not only of its manpower but also of the remunerations that have been an important source of foreign exchange. According to ORSTOM's ethnologist, "virtually everyone on the Mossi Plateau lives in expectation of migrating to the Ivory Coast for work or to join their families." For the past year, the Voltaic Center for Scientific Research (CVRS, formerly IFAN) has been engaged in a sociological study of internal migration. The two-part study will first seek to determine why people are migrating to the secondary cities, and secondly their place of origin. CVRS confirmed that emmigration was general throughout the country, although the Mossi are probably the most advantaged. Internal migration, in part encouraged by the government (e.g., Kou Valley Resettlement), is also becoming more permanent, leaving vast areas of relatively uninhabited land. Migration to the primary cities is not considered as rapid as the movement to the secondary cities. Although the CVRS study is principally sociological, the results, which are scheduled for 1976, should provide data for demographic inferences.

A civil registration system exists; but is largely underutilized. Vital statistics used by the Ministry of Health are based on the 1960-61 census. The U.S. Communicable Disease Center Vital Statistics project in Upper Volta for the past two years has been registering vital events in an area of approximately 100 kilometers radius from Ouagadougou (Mossi Plateau) on a recurring basis. The present sample covers 6,346 registrants in 20 villages (population 58,264). Provisional cumulative results as of May 1974 indicate a crude birth rate of 41.6/000, crude death rate of 33.0/000 and fertility rate of 224.7/000. National figures based on 1961 data give these rates as 50/000, 32/000, and 220/000, respectively. CDC records an emmigration rate of 98.8/000 and an emmigration of 139.8/000.

The Ministry of Health is officially opposed to birth control or the government provision of modern contraceptive methods. Orals are available in urban pharmacies and can be obtained without prescription but at a relatively high cost. Sterilization is done on medical grounds but vasectomy is unheard of under any circumstances. The Minister of Health advocates the reinforcement of traditional concepts of child-spacing with traditional means (i.e., abstinence) but has also endorsed the formation of a private organization to disseminate family planning information and provide services. The private organization has grown out of the Voltaic Women's Association mainly through the efforts of its Secretary General. At the request of the MOH, the new organization will not carry any reference to family planning in its title. A proposal to establish a free standing birth control clinic in Ouagadougou for information, education, services and eventually training of government personnel, has been submitted by the organizers of the association to the International Planned Parenthood Federation. Depending on IPPF's response, the clinic could begin operations as early as the first quarter of 1975.

Sociologists and social service officials are concerned about the dissolution of traditional family ties and practices. Within this tradition, they claim, existed an ethic that demanded an interval of 3 years between births. Cultural taboos against intercourse during breast feeding and extending to the time when the child is semi-self-sufficient are still observed in traditional society. There is a widely-held belief that women understand the value of child spacing for their own as well as their childrens' health, and evidence is given in an old saying that "a woman who has her children too close is a murderer." With education, adoption of "modern" practices (e.g., bottle feeding, abandonment of polygamy) and increasing economic opportunities for women outside the home, officials note an accelerating change in traditional practices. Upper-class urban women and professional (i.e., government-employed) women in the rural area are creating a demand for contraceptive services; but, for the mass majority of the population, high infant mortality rates (50% under the age of five) and the cultural and economic incentives for large families are considered to be strongly contrary to the acceptance of a family planning philosophy. Women in the rural society, especially in a polygamous situation, gain social status from the number of children they produce. The extended family system of obligations, the pervasive animist element in all religions, and the early introduction of child labor into agricultural production, are but a few examples of the complexity of this problem. Infant mortality in rural areas is related to nutritional practices (prolonged breast feeding without the introduction of supplements and a high regard for small infants) and complicated by the prevalence of childhood diseases. In the urban areas, "neglect" is becoming an important factor in the cycle. Without the advantage of the extended family, working women are forced to rely on other small children to care for the newborn. Bottle feeding is introduced almost immediately but with no understanding of sterilization or other sanitation needs.

The "foyer feminine" (women's centers) program of the Ministry of Agriculture is in the early stages of developing a program to instill good nutritional and childcare practices in the rural population. Profiting from the drought relief effort which introduced fortified supplements, the program is aimed at inducing mothers to grow and reserve part of their home garden crop (traditionally a cash crop used for household expenses) in indigenous legumes which can be used to supplement breast feeding. By promoting nutrition, sanitation, and preventive health practices, and encouraging adherence to the traditional spacing concept, the designers of this program hope to break the "vicious cycle". But, all of this is based on one dubious assumption, that the theoretical traditional concept of child spacing is in actuality the practice and that this tradition is not already on an irreversible course of abandonment.

SUMMARY AND RECOMMENDATIONS

The former Planning Directorate had shown interest in the use of demographic/socio-economic modeling approaches to national planning (GE TEMPO) and had manifested some concern for the influence of the population growth rate on the country's development potential in the first five-year plan. With the change of administration and the disruption of continuity in planning, this momentum has been lost. The demographic pieces of the planning puzzle that the former planners demanded for the formulation of a national population policy are beginning to fall into place and should be for the most part available by 1977. Migration will be a key and highly sensitive issue in any future planning exercise. The 1975 census will not capture the dynamism of this movement, and the government's acceptance of ORSTOM's results is questionable. In conceptualizing long-range development projects that require self-help commitment and labor-intensive implementation, regard must be given not only to the physical movement of the population but also to their changing attitude towards traditional land ties. There appears to be little that the GOUV can do to turn the tide of emmigration: physical force is impractical, and without a substantial change in Ivorian policy (not completely an impossibility if civil disruptions caused by large Mossi communes become increasingly preceived as a threat to the GOIC), the loss of the most productive element of the Voltaic labor force will continue to grow for some time to come. As this relocation becomes more permanent, the already inequitable remuneration from this exodus, i.e., the repatriation of salaries earned in the Ivory Coast, will diminish. The population will age and in the time required for rural development projects to demonstrate their worth to the people, the age structure that remains to implement them may be considerably different than the age structure for which they were intended or that is needed for implementation. If internal migration from outer areas into the more fertile regions is not directed toward the land, but to secondary cities (which might also be serving as staging areas for migration to urban areas and the Ivory Coast), then

traditionally-oriented agricultural programs, especially those with the objective of creating foreign exchange through the export of unprocessed products, might be destined to failure. In the transition, crude birth rates would decline (extended absence of males) while the crude death rate might remain the same or rise (high infant mortality and low life expectancy) which, even if the flow were stopped, would cause significant changes in the growth and structure of the population for some time to come. Efforts should be made to reinstall the former interest in the government for a Tempo-type approach, bearing in mind the sensitivities of the government on the subject of the declining work force. Discussions in this area should be on a non-limitation objective basis and should be approached slowly and cautiously, recognizing that the baseline input is still two years in the offing.

The government should not be considered opposed to family planning; but public recognition of a positive attitude even on health principals will not be acknowledged. The Ministry of Health has chosen to use the private organization to test the political wind of a program and to eventually provide evidence of a popular demand for contraceptive services. The Voltaic Women's Association, which appears to be politically secure, is probably the right sponsor for the project and their support through private funds is almost mandatory. Even with government endorsement of the private association, at the present time bilateral assistance to family planning efforts in Upper Volta would appear to be unwise. The government's acceptance of the traditional child-spacing concept does provide an opening for official approaches in the future. Efforts could be directed here in the meantime in promoting research to determine what differences exist between the desired birth interval and the actual practice, and the changing social state that would adversely affect the continuance of traditional practice, with the eventuality of persuading the government to gradually introduce modern methods of contraception.

II-A. THE POPULATION OF UPPER VOLTA

Population (000)	5 Yr. Plan 1960	1972	BuCen	5 Yr. Plan 1985	BuCen 1987
Theoretical Population	4372	5535	5702	7347	7838
Male	2171	2771	2774	3706	3834
Female	2201	2764	2928	3641	4003
Resident Population	4372	5410		7047	
Male	2171	2688		3507	
Female	2201	2722		3540	
Permanent Population	4220	5221		6802	
Male	2041	2526		3297	
Female	2179	2695		3505	
Permanent Migrants since 1960	0	128		300	
Resident Rural	4232	5161	5473	6602	6950
Permanent Rural	4088	4981		6369	
% Resident Active	53.5	51.7	54.5	50.3	52.6
% Permanent Active	51.8	50.0		48.3	
Theoretical School Age	964	1223	1125	1472	1658
Permanent School Age	856	1087		1231	
% Permanent Urban School Age	9.03	11.86		16.18	

Rates	Range from Sources Other than BuCen	BuCen
CBR	48-53	49.8
CDR	30.5-36	
TFR	5.3-6.5	6.7
GRR	3.2	3.3168
e^o male	32.1	34.9
e^o female	31.1	37.5
NRR	1.43-1.56	

II-B. POPULATION SAMPLE, OUAGADOUGOU ADMINISTRATIVE REGION

(May 1968)

	Male	Female	Total
Less than 1	1,426	1,390	2,816
1-4	5,233	5,261	10,494
5-9	4,864	4,890	9,754
10-14	3,058	3,124	6,182
15-19	2,817	3,026	5,834
20-24	2,431	3,315	5,746
25-29	2,793	3,178	5,971
30-34	2,169	2,291	4,460
35-39	1,882	1,764	3,646
40-4	1,530	1,292	2,822
45-49	1,101	928	2,029
50-54	689	578	1,267
55-59	484	366	850
60-64	296	388	684
65-69	240	275	515
Over 70	310	519	829
TOTAL	31,323	32,585	63,908

NIGER
MACRO-ECONOMIC ASSESSMENT

I. OVERALL PERFORMANCE OF ECONOMY

Niger is among the poorest and least developed countries in West Africa, with a per capita GDP of about $90 in 1970. Forming a vast land-locked plateau north of Nigeria, 75 percent of Niger's land area is desert and unsuitable for cultivation. Only an estimated 4 percent of the country is cultivated presently. The harsh natural environment can be modified only to a limited extent. Furthermore, tremendous internal distances and long, unpatrolled borders limit severely the economic and administrative integration of the country. Finally, the handicap of long distances to the nearest coastal outlet at Cotonou, which is 1,000 kilometers from Niamey, and Lagos, add considerable cost and delay to external trade.

Official estimates of GDP growth rate at current prices shows relative stagnation between 1967-69, followed by a 4 percent growth rate in 1970 and a 7 percent growth rate in 1971. Translated into real terms, per capita income appears to have declined in the last six years, especially since drought conditions were particularly severe in 1972. Agriculture accounted for about 47 percent of GDP in 1970, while manufacturing accounted for 11 percent, commerce for nearly 16 percent, other services for about 8 percent and public services for 21 percent.1/

On the whole the last decade was one of slow structural change in Niger's economy, with very moderate growth in output, and with improved handling of fundamental difficulties in public finance and external trade. However, both public foreign aid and technical assistance remain essential to the functioning of Niger's public administration and economy.2/

A. Sectors

Niger's agriculture and livestock sectors are and will remain the most important sectors for employment, exports, and for domestic product and income. Crop cultivation is confined to the southern part of the country where annual rainfall exceeds 800 mm (31 inches), although in the predrought years cultivation had progressed into northern areas; it is affected by the length of the growing season as well as by total rainfall. The extreme variability of each has two main consequences. First, the potential for the use of fertilizer to increase yields is nearly limited to irrigated lands, due to the risk that too much or too little rainfall will produce a cash crop insufficient to cover the financial costs of this input. Second,

1/ I.M.F., Niger--Recent Economic Developments, SM/73/170, 26 July 1973, p. vi.

2/ I.B.R.D., Niger--Economic Report, R72-125, 1 June 1972, p. 8. The value of the CFA franc has declined in terms of the dollar from $1 = CFA 223 in October, 1974 to $1 = CFA 208 as this went to press in March, 1975.

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manpower is concentrated, particularly in labor-bottleneck periods of sowing and weeding, in subsistence crops rather than in cash crops.

The agricultural sector (including livestock) provided a gross product of 51.9 billion francs in 1971, or 47.6 percent of estimated GNP; this is a decrease from 1967, when the estimate was 53.7 billion francs (55.1 percent of GNP), due primarily to the drought.

Recent adverse weather conditions caused a decrease in agricultural production. Despite an increase in cultivated area, millet and sorghum output declined by about one-fifth between the 1970 and 1971 harvests, and further in subsequent years, though a slight improvement was registered in 1972. Primarily due to donor assistance in seed grain, large areas were planted this last crop year to sorghum and millet, and with a season of adequate rainfall the harvest appears to be good, judging from observed new village graneries in the Niamey area, although locusts and caterpillars have caused extensive localized damage, according to Nigerien authorities.

Cotton and peanuts are the two principal export crops of Niger. Production of both of these crops was affected directly by the drought (ginned cotton exports fell from 4.9 thousand tons in 1971 to 1.3 thousand tons in 1972 and 678 tons in 1973, while peanut exports declined from 93.3 thousand tons to 40,922 tons over this period; 1974-75 peanut exports are expected to be minimal), and indirectly by the unwillingness of farmers to raise cash crops in periods of food shortages. Further, it should be noted that the price paid by SONARA to peanut producers rose only 7 percent between December 1962 and December 1973, while the food price index in Niamey (representing largely millet and sorghum) rose 91 percent during this period. It is reasonable that farmers who were still able to produce agricultural surpluses were inclined to produce food grains for the local market rather than crops for export.

While the future of cotton depends much on internal demand from the country's textile industry, and hence on demand for textiles, and on the world prices of fertilizer, an increase in production of both cotton and peanuts may be expected in the next crop year now that graneries are again full and subsistence is not the first concern of farmers. In particular, SONARA's decision to increase its purchasing price of peanuts from 24 francs to 55 francs per kilo (a 129 percent increase, making the total increase since December 1973 equal to 144 percent) should encourage farmers to produce peanuts rather than market crops, although the extent of Nigerien farmer price response of output is unknown. While contributing to Niger's balance-of-payments position, this may create severe urban food problems during the coming crop year, as well as problems for the foodstuffs marketing office, OPVN.

Niger has the least developed industrial sector of the Entente countries. The high external and internal transport costs together with limited market size and lack of investment funds restrict the promise of this sector, and, barring discovery of oil in the country, the increase in delivered oil product prices are likely to continue to restrain development. Most industries are engaged in processing domestically-produced agricultural products, particularly the shelling of peanuts, oil-pressing, processing of paddy rice, and cotton ginning. The processing of livestock products is becoming an increasingly important economic activity. A textile complex has been in operation since 1970, but functions only with tariff protection; in other areas, cement, building materials and metallurgy firms are relatively important, as are several small firms in the manufacture of plastics, matches and soap, and a brewery and bottling plant. SONARA, the national peanut commercialization organization, must supply peanuts for its oil mills at a discount of 20 percent from the price for export peanuts, by regulation, while the product commands an effective premium only eight percent over that of peanuts in the world market.

In 1971 manufacturing accounted for 10.9 percent of GNP (estimated), and provided employment for 2,180 persons, or 19.9 percent of total private sector employment and 10.1 percent of total employment. This employment was unaffected by the 1968-69 drought, so it appears reasonable that the 4.4 percent private sector growth rate from 1967 to 1971 (largely accounted for by industry, commerce and transport) will be continued throughout the 1975-1980 period.

Mining, which was unimportant before 1971 (18.5 million FCFA of tin ore exported 1971, 13.3 million FCFA in 1973, according to the Statistical Bulletin), became important with the development of uranium mines in the country. Despite a declining world uranium price during the period, uranium concentrate exports were 2 billion FCFA in 1971, and 5.4 billion francs in 1973, or 18.7 percent and 42 percent of total official exports of those years. Uranium exports largely filled the resource gap caused by drought-related decreases in agricultural exports; while future world demand for uranium is uncertain, they should provide a large part of post-drought export revenue. Employment possibilities are limited in this sector, however, and much of uranium's gain to the economy is lost to imported inputs to the extractive process.

Phosphate deposits are known to exist in the southwest of the country, but their extent and potential for profitable exploitation remain in the realm of conjecture at this point; while useful for Niger's export earnings they would not contribute to the agricultural development of the country's phosphate-poor soils without a processing plant which, given Togo's experience, may be unviable for Niger unless exports of fertilizer are considered. Conjectural also are the possibilities for manganese in the region near Upper Volta's manganese deposits and oil. Since oil exploitation to date has not produced results (although one company is preparing to drill rather than give up its exploration rights), we assume for the immediate future that petroleum will not be available to aid Niger's development.

The service sector provides 18 percent of GNP (1969) and 1/3 of private employment - although these figures are probably underestimated, especially when unofficial commerce is included. This employment has been unnaturally swollen during the drought, both by probable petty trading of peasants pushed from the rural areas and by increased income and employment in the transport and marketing sectors, particularly OPVN, which handled most relief supplies. Marketing of the principal cash crops is controlled by a fixed price offered at selected marketing points by various parastatal organizations--SONARA for peanuts, CFDT for cotton, and OPVN for foodstuffs. COPRO-NIGER handles other import and export commodities. Purchases from farmers are done directly, via middlemen, or through UNCC, a credit and cooperative institution which specializes in commercialization of production in competition with the private traders and with the marketing offices. While SONARA has provided a useful marketing service, as has CFDT, OPVN has been in operation only since 1970, and is over-capitalized from its drought relief role. It lacks funds to buy the total harvest offered it in 1974-75. There is also a question whether it is really a stabilizing office, or rather, destabilizing.

The government sector is the largest sector, even excluding public and mixed enterprises: 1964 employment was 8,793, or 45.6 percent of total salaried manpower, rising to approximately 14,000 or 49.3 percent, in 1969. Despite the austerity program of the current military government, the sector is unlikely to decrease in importance in the immediate future: for the first three months of 1974 current expenses on personnel occupied 46 percent of current expenses, increasing from 39.6 percent in 1972 and 1973, while expenses on materials for current functioning declined from 19.3 percent to 14.5 percent of the current budget. The investment budget of the government increased from 1972 to 1973 from 1.3 billion francs to 1.7 billion, but this increase is more than explained by external aid for investment: from nothing in 1972 to 476 million francs in 1973. No 1974 data are available.

B. Balance of Payments

It is difficult to estimate the trade balance of Niger due to the large amounts of unofficial trade, particularly peanuts and in cattle, and primarily with Mali and Nigeria. Table 1 indicates the official BCEAO estimates of exports and imports of goods and services, followed where possible by their estimate of uncontrolled imports and exports. It should be noted that uncontrolled exports vary between 11 percent and 22 percent of total exports, while uncontrolled imports vary between 9 percent and 17 percent of total imports; the two series do not move together. Unrecorded exports consist chiefly of live animals and food crops produced in the border areas, principally with Nigeria. Since the establishment of a payments agreement between the two countries there has been a sharp reduction of such exports, due to the difference between the official and unofficial rates for the Nigerian Niara and the CFA France which encourage exporters to use the official channels--Nigeria received 14.9 percent of Niger's

official exports in 1968, but 25.6 percent in 1971. The border trade is still important, however, and more important in unofficial imports, principally manufactured products, kola nuts and some peanuts which are re-exported. (This latter has diminished with the increase in the Nigerian peanut purchase price, although the increase in the SONARA price may re-establish this traffic.) The IMF suggests that border trade imports have decreased significantly since 1970. The composition of imports and exports are given in Tables 2 and 3.

According to BCEAO data, peanuts and peanut oil accounted for nearly two-thirds of official exports of Niger in 1968, a drought year, but beginning in 1971, they declined both in absolute and in relative terms due to drought, despite a 114 percent world price increase during this period. Peanut exports for 1974 are expected to be negligible, according to information given us by SONARA and other agencies in Niamey. It is already noted above that this year's satisfactory harvest of cereals and the large price increase to farmers guaranteed by SONARA this year may greatly increase exports of peanuts, perhaps exceeding their pre-drought level. The longer-run projection to 1980 is not as favorable, however. The UN price forecasts for major primary commodities suggests that world peanut prices, after reaching an index of 139 in 1974 (1967-69=100), will decline to 134 in 1975, and 83 in 1980. The SONARA price may not be maintainable in a declining world price situation despite temporary maintenance of the price by the price stabilization fund, CSPPS: reversion of land into food crops is likely under such circumstances, to the detriment of peanut exports.

The 20 percent discount received by oil mills hurts SONARA and leads to the disturbing conclusion that Nigerien resources are being taxed by this low price to subsidize the consumption of industrial states. According to World Bank estimates, peanut oil will drop to a price index of 96 (1967-1969=100) by 1980, while peanuts themselves fall to 83, or the margin will rise to 16 percent in a declining overall market; thus, a policy of local conversion, beyond its saving in transport volume, will become less unprofitable.

Live animals, Niger's second export product during the 1970-72 period, are an unknown for the immediate future, while farmers rebuild their herds. This is discussed in the livestock sector report. Due to the time required to rebuild herds, it cannot be expected that livestock exports will contribute much to the balance of payments during the period to 1980.

Onions are also produced, largely for export, as are other vegetables. Although exports of the former declined as a result of the drought (112 million francs in 1973, versus 192 million francs in 1971), the latter, while small (24 million francs exported in 1973), is growing rapidly. These exports are primarily to the coast, although potential exists, as in Upper Volta, to produce vegetables for sale in Europe during the period

October to May Exports of Niebe beans, however, has declined from 385 million francs to 37 million francs over this period, largely due to the drought. The interest of OPVN in this crop and its usefulness in rotation with other crops suggests that a return to higher levels of production and exportation may occur.

Uranium is the primary non-agricultural export, and in 1973 became the largest single export of Niger, with an estimated value of 5.4 billion francs exported. The industry relies on expatriate capital and personnel, and imported inputs, so its contribution to employment and domestic income is slight: 466 persons were employed in 1970. Uranium assisted the balance of payments during the drought-induced decline of agricultural exports, but the future price trend for this mineral, which has been faced with oversupply in the past few years, is unknown.

Nigerien imports have grown at 7 percent since 1968, despite the drought. Food products are strongly represented, 11 percent of imports, but equipment imports have been greater in all years, growing from 2.2 billion francs in 1968 to 4 billion in 1973 for industry, and from 404 million to 459 million francs for agriculture. Primary material imports for agriculture are negligible, while industry demands about 400 million francs of imports each year, 2.6 percent of total imports. Given the requirements of industrial processes, particularly uranium mining, it is unlikely that these imports can be reduced by policy means during this period. Rather, implementation of current government policy increased irrigated agriculture and grain storage facilities will require increased imported inputs into the agricultural sector, which currently absorbs only 5 percent of imports. To maintain a positive balance of trade, the government of Niger must, therefore, promote exports, even though this is done by taxing domestic resources in terms of the price paid to them for their produce, and these exports will for the immediate future be largely peanuts and peanut products, the only crops which can be produced without excessive nitrogen depletion of the soil on the introduction of new techniques on a vast scale.

While exports covered only 67 percent of imports in 1968, 88 percent were covered in 1971 and 83 percent in 1973, despite the drought. These rates compare favorably to Upper Volta (52 percent declining to 30 percent over this period), except that Niger does not have substantial wage repatriation from abroad to assist its balance. Net foreign assistance (8.7 billion francs CFA in 1972; see Table 1) covers this resource gap, and accounts for the increase in net foreign exchange reserves of Niger of 2.3 billion francs in 1972 after larger increases in previous years, to a total of 9.9 billion francs at the end of 1972, or almost 7-months' import requirements.

This reserve is difficult to evaluate in light of the country's terms of trade. Although the World Bank price forecasts for primary commodities have been unduly pessimistic in the recent period, they provide discouraging

indications of the terms of trade for Niger in the period 1975-1980, while the world price index, representing Niger's import mix, will increase 19 percent. This could be offset by large increases in quantities exported, but such an increase would have to be on the order of 65 percent just to purchase the present import basket, and this in a regime of declining primary commodity prices. Future uranium prices and output could improve this picture, and the discovery of oil reserves, as yet unfound, would completely relax the foreign exchange constraint for Niger. In the meantime, unrequited transfers are likely to remain crucial for maintaining the country's foreign exchange reserves. Grant aid in particular will be important, for reimbursements of official capital transfers have reached nearly 10 percent of the flow of unrequited transfers, and are twice the net flow of official capital itself.

C. Human Resources

Niger's population in 1970 was estimated at 4 million with more than half under the age of 19, and about 67 percent living in urban areas. Annual population growth was estimated at 2.7 percent before the drought, and has declined to about 2.3 percent. In 1969 the labor force was estimated at 1.9 million. Salaried manpower has almost doubled since independence, but represented only 1.6 percent of the labor force in 1969. Since 1964 the growth rate of employment has been about 59 percent in the government sector, compared with 36 percent in the private sector. In the private sector, the construction industry employs the largest number of workers followed by domestic workers, industry and commerce. At the end of 1968, about 38 percent of Niger's private sector workers had not professional qualifications, and about 23 percent were foreigners from African coastal countries and Europe. This general picture obtains in the public sector, as well. Thus, a major constraint for Niger's development remains a shortage of skilled native manpower in all sectors of the economy.

No statistics are available on international migration in Niger, although it is felt that migrations are not as important as in Upper Volta. BCEAO banknote clearings in favor of Niger tend to support this.

II. GOVERNMENT

The ability of the government to carry out its programs is an essential parameter of the development of Niger. From FY 1967 (calendar 1967) to 1975 the budgeted direct tax receipts have increased 44 percent, from 9 billion FCFA to 13 billion, despite the 1973 abolition of the cattle head tax as a drought-relief measure. Indirect taxes have increased over this period by 101 percent, to nearly 3 billion francs in 1975, while customs duties remain the most important revenue source (44 percent of all revenue) at 5.6 billion francs, increasing 41 percent since 1967. Income from public domains and state enterprises has diminished because of the drought,

but will probably increase with the return of normal agricultural production; such revenues, and those of customs duties and statistical taxes, may diminish in the coming years with the worsening terms of trade for Niger's main agricultural exports. Exceptional resources, especially external aid, are important to the government. (The series represented in Table 4 is not strictly accurate in that foreign aid has not been pre-budgeted in all years). Service of public debt has remained constant at approximately 4-5 percent of government outlays, while the character of the debt has been shifting recently from internal to external debt: 54 percent of the debt repayments in 1974 were to the outside world, while only 21 percent in 1969 were so directed.

Within government services, a large part of the budget is devoted to personnel rather than to directly-productive work. While the productivity of this personnel cannot be estimated, it can be noted that in 1974, 56 percent of the budget of the Ministry of Rural Economy was devoted to personnel, and 45 percent of the budget of Development. Vehicles absorbed 21-22 percent, a figure which will rise with the increase in petroleum prices, while material to complement manpower accounts for only about 19 percent of the Rural Economy budget, and about 26-30 percent of the Development budget; these proportions have been stable over time. Material is necessary to help existing institutions function better, in preference to the establishment of parallel programs: this problem was signaled in Upper Volta, but is no less true here. This overview does not signal the optimal resource mix for effective government service; indeed, there remains the problem of the capacity of the government to administer donor programs.

In Niger, while the French aid mission (FAC) complained of the lack of absorptive capacity of the government due to lack of management capacity, the director of the Nigerien Office of Budget suggested that government activity is constrained as much by the inappropriateness of donor projects to the economy or to the government's priorities as by lack of absorptive capacity. Eventual Nigerienization of administration will lead to project formulation by Nigeriens, a goal of the military government. There is evidence that Nigerien government officials are aware of the rural need of their country, but particularly given the high government priority given to irrigated agriculture, it is not certain they are capable of delivering programs to the rural population. No manpower budget can be prepared for the economy, or for the demands by donor projects, due to the externalities of such projects in the manpower field--manpower trained for a position cannot be kept in that position--but the assistant director of SONARA suggests that more lower-level manpower training should be performed on the job rather than at a general level, to develop job-specific skills that are less transferable elsewhere. Otherwise, training (particularly stages in Europe or elsewhere in Africa) creates a class of highly mobile functionaries who are alienated from their position and from their clientele. A.I.D. should keep in mind the need for training within the government: an example of this would be the extension workers necessary for agricultural credit and rural production advancement, who should be trained in the environment in which they are to function for the skills directly necessary to their work.

The government priorities as described by a Canadian counsellor charged with cooperation are the following:

A. Self-sufficiency in Food Crops

Niger is normally a food-exporting country, and the experience of the drought has led her to invest resources to make the economy more resistant to drought. Further, population pressure onto marginal land may be making her less self-sufficient even in normal times, so the need has increased for improved agricultural production.

B. Mining Resources

The importance of uranium to the balance of payments have already been noted. If phosphate deposits in the Southwest of the country are exploitable, further gains will accrue, if the means are available to export these minerals. Some deposits of mobdylinium may exist.

C. The Road Structure

The road structure, to improve internal communications and internal markets.

D. Diversification of the Economy

Despite any such attempts, for the immediate future, peanuts will provide much of the country's cash income and foreign exchange, in a period of peanut price decline.

E. Energy

Barring discovery of oil, energy remains a large problem for the Nigeriens. If the Niger River is made navigable, energy can enter the country more cheaply by river. Impressive work has been performed in Niger to exploit solar energy. Reforestation, although desirable, has not had necessary popular support required for its success.

Among the other donors, the Fonds Europeans de Developpement (FED) has worked within the previous government's plan, in: (a) road infrastructure (11 billion francs to date); (b) rural development (8 billion francs); (c) education (3 billion francs); and (d) public health (2 billion francs). The director of FED in Niger feels that his organization is best suited to large capital-intensive development projects, like roads and irrigation. In the fourth FED it is likely that the accent will remain on such projects.

FAC, the French assistance, concentrates its aid in "Economic and Social Equipment of the State," with subsidiary attention to expenses of temporary missions of government officials, expatriate experts, training and education, primarily abroad, educational staff and material, and certain development expenditures in rural economy, health, and rural hydrology; further, it supplies technical assistance. The total cost to France is on the order of 1.3 billion FCFA per year, not including direct subsidies to Nigerien administration. In research, France funds IRAT in varietal testing, CFDT in cotton, and IEMVT in minerals, plus ORSTOM in socio-economic research and in soils. Much of this research is directed toward French overseas commercial interests.

UNDP, another large donor, is working in industrial development and in integrated rural development, although the government has expressed a lack of interest in the latter, as it has in an IBRD rural development project which has been cancelled in Niger. Substantial roles remain for A.I.D. in livestock and agricultural development, in training and in health, as can be seen in these sector reports, in which other donors are not currently engaged; neither is there a problem in this case of competing with other donors for scarce Nigerien manpower, if care is taken to direct programs toward the true clients of these programs, the rural citizens.

TABLE 1: Balance of Payments of Niger, 1968 to 1973

(Unit Million CFA francs)	1968	1969	1970	1971	1972	1973
Exports Merchandise	8517	10268	12960	16161	15412	
Official exports, FOB	6637	7828		13648	13712	12698
Uncontrolled, estimate	1880	2440		2513	1700	
Imports Merchandise	12781	16188	19119	18339	19126	
Official imports, CIF	10791	13353		16612	16576	15281
Uncontrolled, estimate	1990	2835		1727	2550	
Commercial Balance	- 4264	- 5920	- 6159	- 2178	- 3714	- 2583
(Rate of coverage)	66.6%	63.4%	67.7%	88.1%	80.6%	83.1%
Net services	- 2827	- 1890	- 2183	- 836	- 2140*	
Unrequited transfers:	5962	6415	8312	7672	8750*	
Private	29	- 259	- 24	- 94	50*	
Official	5933	6674	8336	7666	8700*	
French Aid	(3836)	(4534)			(5771)*	
FED	(1290)	(1077)	(1392)	(1460)	(2250)*	
UN and assimilated agencies	(581)	(402)			(650)*	
Others, net	(226)	(661)			(29)*	
Net private capital	1558	2870	4745	537	420*	
Net Official capital	781	1337	780	1666	437*	
utilization	(1194)	(1805)	(1133)	(2153)	(1304)*	
reimbursements	(413)	(468)	(353)	(487)	(867)*	
Net total operations in capital	2339	4207	5525	2203	857*	
Allocations SDRs	-	-	466	386	383	
Variation net for. reserv. (- signifies increase)	183	1484	2222	3894	- 2270*	
Errors and omissions:	- 1393	- 1322	- 3733	- 3248	- 1870*	

*UN estimate, based on tentative BCEAO 1970 and 1971 data which greatly overstated the commercial deficit. Table above uses definitive BCEAO 1970-1971 data. A.I.D. figures do not agree with BCEAO tables of foreign assistance published elsewhere.

TABLE 2: Niger, imports by group of product (unit = million FCFA)

	1968	1969	1970	1971	1972	1973
Food products	1124.5	1335.4	1562.3	1376.6	1971.4	1644.6
Energy	413.2	417.2	520.2	986.6	1280.8	1245.7
Primary materials:						
for industry:	211.2	208.7	552.9	246.1	473.6	396.5
for agriculture:	-	-	0.1	-	-	.02
semi-finished:	493.7	582.6	970.5	874.2	1109.7	1057.9
Equipment:						
for industry:	2193.1	3674.4	3739.4	3883.9	3545.6	4034.7
for agriculture:	403.9	191.6	457.9	309.5	393.3	459.1
for households:	550.9	551.0	688.0	825.0	795.0	860.7
Other products:						
for industry:	3448.8	4235.8	5854.6	4666.0	5442.6	3892.1
for agriculture:	73.1	114.1	152.6	69.4	71.5	306.0
for households:	1071.6	1070.2	1398.1	1339.8	1419.0	1094.0
miscellaneous:	-	188.9	317.0	337.8	193.3	289.6
	10237.2	12569.9	16213.4	14974.7	16575.7	15281.0

* Provisional figures
Source: Bulletin de Statistique, 1971 & 1974

TABLE 3: Niger, Exports of Principal Products (unit = million FCFA)

	1968	1969	1970	1971	1972	1973
Cattle	778.5	771.2	1232.4	1703.2	2209.1	1873.0
Other live animals	84.1	119.5	157.6	270.4	307.5	437.7
Fresh, frozen meat	-	-	-	133.8	110.4	120.0
Fish, fresh & preserved	16.5	28.4	33.9	31.0	86.9	81.0
Peanuts, shelled	4512.8	3720.6	4934.2	3412.9	4614.7	1844.0
Peanut oil, crude & ref.	329.6	190.9	565.9	967.3	1525.5	1165.7
Peanut husks	78.2	62.6	193.0	265.0	355.7	261.9
Onions	46.4	125.7	326.0	192.7	181.8	112.1
Beans, niebe	384.8	115.5	318.3	91.0	37.4	0.9
Other legumes				13.0	18.8	24.2
Millet and sorghum	0.9	-	-	-	2.9	-
Leathers and skins	88.3	190.7	190.4	346.8	431.3	289.2
Bulk cotton, ginned	393.3	296.9	159.9	560.6	194.1	87.8
Cotton tissues	-	-	-	5.5	65.0	1.7
Uranium concentrates	-	-	-	1996.6	2369.5	5427.8
Other Products	1197.1	626.5	683.5	584.7	1164.3	968.2
TOTAL	7124.8	6249.5	8795.1	10670.0	13711.5	12697.6

TABLE 4: Anticipated Government Receipts, Niger National Budget

SOURCE: National Budget, various years. Unit = million FCFA

	1967	1968	1969	1970	1971	1972	1973	1974	1975
Title I:	8962.0	9223.8	9364.3	10144.8	9681.6	10031.5	10991.0	11435.5	12939.0
Direct taxes	3410.1	3722.6	3581.8	3993.6	3812.0	3925.5	3988.0	3885.0	4195.0
Indirect taxes	1290.0	1123.0	1323.4	1716.7	1716.0	1817.0	2050.0	2145.0	2603.0
Customs duties	3978.0	4071.0	4214.5	4107.3	3872.5	3973.5	4564.0	3960.0	5638.0
Registration etc.	227.0	246.0	213.6	296.0	247.5	284.0	375.0	435.0	501.0
Miscellaneous	52.9	61.2	31.2	31.2	33.6	31.5	14.0	10.5	-
Title II: Public domaines, misc.	290.8	337.0	569.0	612.7	730.8	1026.9	1323.9	794.5	n.a.
Title III: Exceptional res. (ext. aid)	12.4	9.4	20.3	48.6	523.1	828.0	783.2	2037.5	n.a.
TOTAL	9265.2	9570.1	9953.6	10806.1	10935.5	11886.4	13098.1	14267.6	n.a.
Expenditures:				10806.1	10935.5	11886.4	13098.1	14267.6	
Title I: Public									
Debt	276.7	239.5	449.4	596.5	622.4	395.0	438.8	379.6	663.1
External	n.a.	148.9	150.5	129.8	176.1	n.a.	282.9	207.5	n.a.
Internal	n.a.	90.6	298.9	466.7	446.2	n.a.	155.9	172.1	n.a.
Title III, IV, II:				10809.6	10313.2	11491.4	12659.4	13888.0	14652.8
Presidence (incl Human devel)				364.6	504.1	500.8	473.5	622.6	457.8
Development & Cooperation Min.			121.0	138.0	150.6	114.8	177.9	94.3	223.6
Rural Economy Ministry				781.6	868.1	935.0	981.9	1039.6	1116.7
Division of Expenditures: (%)									
Rural Economy:									
Personnel	75.4%	60.6%	58.3%	56.4%	54.3%		55.6%	56.3%	
Material	17.2	18.4	17.7	19.8	21.9		20.9	18.8	
Vehicle Maint:	7.3	20.9	23.9	23.8	23.9		23.6	20.5	
Development & Cooperation:									
Personnel		53.0	50.8	48.6	49.7		49.4	45.0	
Material		31.2	27.3	24.6	25.0		26.1	32.9	
Vehicles		15.8	21.9	26.8	25.3		24.6	22.1	

NIGER
AGRICULTURAL SECTOR ASSESSMENT

I. INTRODUCTION

Niger has been among the Saharan countries worst hit by the recent drought. Never a buoyant economy, six years of deficit rainfall, and the last three comprising the most serious drought in living memory, have caused the government and foreign donors to concentrate their attention on increasing the production of staple food crops. Although Niger has sustained a good year this past season, the effects of the drought upon livestock and crop production, which are closely related in the economy, will be felt for several years. Efforts to ameliorate the numerous technical constraints to increasing farm production in an arid environment will be constrained by the extreme poverty of the country on the one hand, its rising population, small resource base relative to its human burden, and its poor overall economic prospects.

It is difficult to gain more than an impression of the state of agriculture because official figures are scattered, tend to be out of date, and, except for the export crops, likely mis-stated. The government, for example, uses two annual per capita availability figures for cereals (177 kg and 300 kg) depending upon the office. Population is probably underestimated: one finds both 4,468,000 and 4,220,000 in common use as the present figure. This reflects two differing growth estimates which, when projected from the common baseline of 1960, yields differing estimates (CEF gives 2.7 and IMF is 2.5). Similarly, there appears to be a systematic over-estimation of cereal production (795,000 and 840,000 tons are variously used to measure cereals actually available for human use in 1973-74). Meaningful price data is very hard to come by and is difficult to compare as individual enumerators report at differing times and use varying measures in their reporting. As a result, price trends can only be said to be generally up, likely over 30% on the average for African urban consumers in the past five years and sharply up this summer.

The rural sector generates an average income of about CFAF 17,000 per capita (US $60, base 1970), of which some 32% or US $19 is cash income. The sector directly supports about 95% of the population (agriculture 75% and livestock rearing 20%), and contributes about 50% of GDP (55% in 1967 and 48% in 1971). In terms of value, 80% of the sector's output is food crops, most of which are consumed by the farm families that produce them. Agricultural exports amounted to 81% of total exports in 1968, but because of the drought, declined to 48% in 1972. Conversely, livestock exports increased from 13% to 20% during the same period; unfortunately, this increase was also a consequence of the drought which induced the distress sale of livestock. Agriculture and livestock exports accounted respectively for CFAF 6.6 billion and CFAF 2.7 billion in 1972.

A series of good rain years following independence through the latter Sixties afforded Niger sufficient cereal production to cause some complacency

in this regard. On the assumption that self-sufficiency was assured and having surplus cereal resources, Niger opted for a rapid expansion of cash crops: in particular, peanuts, but cotton as well where soil conditions permitted. This program of expansion continued throughout the Sixties and up to the recent past, when it became evident that the drought was not a year or two setback but a prolonged problem. A number of farmers in the Maradi area had seriously extended themselves into peanuts to the point where they were unable to meet self-sufficiency needs. These persons doubtless have suffered more proportionately in the last three years.

The drought has affected the sector profoundly. Whereas the country was self-sufficient in food in the early sixties, imports of 120,000 tons of cereals in 1972/73 and 250,000 tons in 1973/74 were necessary in order to avert widespread famine. To offset low yields, farmers have been expanding the area under cultivation both by cultivating fallow land and by cropping areas in the north previously used solely for grazing; and, as usual in drought conditions, farmers have been giving highest priority to their food crops with the consequence that export cash crop production has declined rapidly.

There is good reason to believe that Niger could supply itself in cereals in the short-run at least, if rainfalls were to return to the normal prevailing in the early sixties. In the longer run, however, and assuming no change in farm technology, acreage under crops must grow proportionately if per capita cereal production is to be sustained (say, at 250 kg per capita per year). This would be possible if marginal lands were of equal quality. In fact, this is very unlikely and there is some indication that per hectare yield may already be declining in part as the result of the use of land of poorer than average quality. Becker has calculated the trend of annual yields for millet and sorghum and the two combined to be minus 1.56, minus 3.73 and minus 2.08 respectively. The equivalent trends in annual crop area for these crops are plus 2.96, 3.02 and 2.98. The estimated compound trends (1960-1971) for these crops are plus 1.36, minus .82 and plus .85. The time parameter was not found to be significant and it can be concluded that over the most recent twelve-year period in Niger there has been no sustained growth in actual cereal output.

If the present rate of population growth (say, 2.7%) were to continue unchanged, Niger's present population of 4,100,000 (which is likely an underestimate) will double by the end of the century. Urban growth is even greater, and the rate itself seems to be accelerating. From its present level of 350,000, urban dwellers and city consumers are expected to increase to 624,000 by 1982 and certainly will double again by the end of the century.

If agriculture is the dominant activity in Niger, precariousness of food production is the dominant fact of that activity, which is made yet more serious by the unrelenting growth in population without corresponding increase in productivity. When drought strikes, farmers turn away from

cash crops and give priority to food crops to sustain or replenish food stocks. Thus the effect of the drought has been two-fold. One, to decrease per capita availability of cereals even as farm resources have been strained to the limit to produce these crops. Two, to greatly reduce area under cash crops, which provide two-thirds of Niger's foreign exchange income. As a result, farm incomes have fallen, real incomes to non-farm people have fallen, national income has declined, and Niger has become even more of a debtor nation than is normally the case.

As a consequence of the drought, government has reordered its agricultural policies by moving away from past emphasis on export crop production to pursue new priorities. In order of importance, these are to:

(a) Increase food crop production;

(b) Conserve natural resources and proof against drought; and

(c) Accelerate the systematic use of water resources for agricultural production purposes.

The thrust of the new policies is sound and in accord with A.I.D.'s and the World Bank's assessment of the needs of the situation.

These new policies have been translated in practice to promoting integrated rural development projects which cover specific areas and which include all economic and proven means of bringing about production and productivity increases. Two such projects were started in 1971, at Badeguicheri and in Zinder District, and are financed by FED. In order to obtain the quickest and highest returns from the investment of scarce resources, government is carrying out its rural development projects in areas of highest agricultural potential. Badeguicheri lies in the fertile valley bottoms of Ader Doutchi Maggia, and Zinder produces with the Maradi District 30% of the country's groundnut crop. More recently, the government has become disillusioned with certain aspects of on-going and proposed integrated rural development projects (especially autonomous management structures), which limit direct government control over development decisions in the project region.

Present government plans place first priority on the exploitation of available water resources to production of food crops in order to provide "insurance" in case of future drought. Government officials have indicated that eventually (apparently after rain-fed agricultural yields are substantially boosted) irrigated lands would be used for production of cash crops. Irrigated potential is estimated as 20,000 hectares for basin irrigation and 25,000 hectares of terrace land, most along the Niger River. About 2,500 hectares are presently under irrigation. For the Nigerien Government, 15-20,000 hectares of well-managed, irrigated land is the long term goal.

The GON, through its cash crop marketing agencies, has encouraged cash crop production by considerable technical help and the provision of needed inputs, especially fertilizer. An incentive price was announced at planting time. By the late Sixties, however, Government became concerned at the lack of progress in cereal production and, in particular, the considerable fluctuations in price, to both producers and consumers in the latter months before harvest price. Typically, when governments are insensitive to prices, this can have unpleasant political implications in urban areas where civil servants are often the largest and best organized pressure group in a country. Niger is not an exception.

II. THE PRODUCTION SYSTEM

A. An Ethnographic Profile

Three fundamental patterns of technoenvironmental adaptation characterize the traditional ways of life of Niger's rural populations. The peoples of the South and Southwest, the Djerma, Songhai, Gourmantche, the sedentary Fulani, and the Hausa almost all practice mixed farming.

Millet and sorghum are the principal crops cultivated during the short growing season from June to September. Melons, onions, cucumbers, manioc, yams, maize, cotton, tobacco and peanuts are also extensively cultivated; the latter three as cash crops. Traditionally, all farm work is done with the hoe. Fallowing and crop rotation are practiced wherever population pressure allows it. Animal fertilizers and well irrigation are used in small fields close to the homestead. More extensive irrigation is found in the Niger River Valley, where rice is widely grown; and also at Maradi. The peoples to the north, first, the pastoral Fulani and then in the Sahara itself, the Touareg, are all Nomadic herdsmen. Cattle, sheep, and goats are held in large numbers; there are also some donkeys, horses, and camels. The means of making a living of both the Fulani and the Touareg is strongly affected by constraints imposed by the natural environment - arid savannah grasslands and desert and by a difficult climate. Temperatures are high. Rainfall is sporadic to non-existent. Most of the cereal cultivators of the southernmost regions of Niger hold their farmland collectively. Final rights to the land are vested in the tribal chief or, as among the Gourmantche, in the earth priest. But land "belongs" to the patrilineage as a corporate group and is apportioned out to individual members of the kin group on the basis of need. Patrilocal extended family dwellings are the unit of common land proprietorship, work, and residence. The tasks of preparing the soil that begin before the first June rains, planting, cultivation, and the harvest are all organized on the basis of kinship, with authority for making decisions and for directing particular tasks allocated in accordance with individual need within the kin group that holds and works the land together.

Farther north, as livestock raising becomes an increasingly important adjunct to farming, some animals, mostly sheep and goats, are tended by the sedentary farmers while their cattle are taken away still further north during the growing season by Fulani herdsmen - in accordance with a symbiotic arrangement that prevails throughout some of the Sahelian region of West Africa.

Farthest to the north, throughout the largest part of the land mass of Niger, the Touareg population is entirely nomadic, maintaining its delicate ecological balance by near constant movement of its herds and household in response to the shifting availability of water and pasture.

It should be stressed that this nomadic pattern is highly flexible but never random. It is structured by complex rules of territoriality that are principally regulated by kinship. Partially as a consequence of a past tradition of predation, of the conquest and exploitation of settled farming groups to the south, the Nomadic peoples of Niger generally have an hierarchically ranked socio-political system in which both personal rank and class affect importantly the life of both the individual and the community. The social orgarization of most of the farmers further south, particularly the sedentary Fulani and the Hausa, is also marked by social stratification. There is an hereditary nobility, free commoners, and various groups reportedly descended from "slaves". However, the relatively low level of the productive technology of most farmers makes it difficult for particular individuals or groups to acquire sufficient surplus wealth to elevate their material position much above that of their fellow cultivators. While craft work is usually only a dry season specialization, it allows for some internal technoeconomic specialization.

Among both farmers and herdsmen authority is based upon seniority within the patrilineage, the corporate group that works the land and/or holds the herds collectively. Centralized political systems prevail among most sedentary peoples, with the exception of the Gourmantche, and are particularly complex among the Hausa. Among the pastoral Fulani and the Touareg political authority is derived from the segmentary, unilineal system of descent and the sociopolitical policy is generally comprised of several ranked groups.

Commerce is everywhere an important activity and functions to redistribute local surpluses and the product of craft specialization throughout all inhabited parts of the country. However, despite the prominence of marketing in Niger, it is important to remember that most subsistence goods - land, food, and household equipment - are allocated outside the market system, on the basis of reciprocity and redistribution within the kin group.

With the exception of the Gourmantche, most sedentary and all nomadic peoples in Niger are Moslem, with the range of adherence to Islamic tenets running from very superficial observance to near fanatic devotion.

Islam is socially important in several ways. It sanctions the traditional structure of the socioeconomic system, defining the religious rightness of customary rules and regulations about land use, work organization, the distribution of goods, and inheritance. It provides a basis for common identification and for cooperation among peoples of differing ethnic origins. And Islamic tenets importantly affect people's world view, the manner in which they perceive cause and effect relationships, and their attitude toward the future in this life and in the hereafter. This magico-religious basis of perception should be taken carefully into account by those who seek to understand the rationale that motivates and explains the behavior of both the sedentary and nomadic segments of the Nigerien population.

However modest they may appear to prospective donors, any changes in technology or economic organization that are likely to increase the productive capacity of the portions of Niger's rural populations most in need, will entail, from the perspective of farmers and herdsmen alike, quite revolutionary changes in their traditional patterns of subsistence. The introduction of new techniques of irrigation, the more extensive use of fertilizers, animal traction and other changes in animal husbandry, experimentation with new crops, to say nothing of the proposed alteration of patterns of migration and resettlement will require a major effort at adaptation. Both traditional patterns of land use "range management" and the accompanying changes in economic and social arrangements will all be substantially altered. Despite the best efforts of those who sponsor these innovations, the burden of adjustment will fall almost entirely upon the rural people themselves.

If the scope of the problem the Nigeriens face in adjusting to technological innovation and economic change is anticipated and properly planned for, the requisite transitions can be made with minimal risk of failure. But if the problem of cultural adjustment is ignored, the objectives of development can be seriously jeopardized.

So far, with the possible exception of the Niger Cereals Project, every program affecting the Niger River basin and/or agricultural development appears to be deficient in two important senses. First, there is as yet virtually no evidence of planning for the effect that proposed innovations will have upon the target population, beyond the general assumption that if such changes are affected they will increase productivity and improve the farmer's lot. There is, for example, too much naive, loose talk of "spontaneous" resettlement. Planners appear to have been content with far too vague assumptions about the Nigerien farmers' ways of life and about indigenous concepts of economic "good". Second, no accounting has apparently been made of the potential of traditional Nigerien cultures.

The indigenous systems of all of the rural populations, both sedentary and nomadic, are marked by the presence of a number of institutions which can facilitate the implementation of techological innovation and economic

change. Among these are kinship-based systems of land use that provide for maximal flexible adjustments to shifting ecological circumstances, cooperative work organization that allows for the coordination of labor necessary for the national exploitation of large farm units, autochthonous savings institutions that serve as a major source of capital information and investment, and a variety of associations that assure the maintenance of inter-ethnic accord. If these institutions are ignored and new structures are insensitively imposed, the people's continued adherance to these national bodies can function as a major obstacle to the achievement of the goals of the assistance programs.

Nearly every project proposed for A.I.D. support in Niger is marked by a lack of balance between the level of expertise that has been directed to the material, scientific, and financial aspects of development planning and the total lack of attention that has been directed to the behavioral sciences dimension of the problems of project implementation and on-going evolution. Typically (one is tempted to say almost without exception), there is noone professionally assigned at the project level to this major aspect of the development task. As a result, one must ask those who are in charge, generally highly trained specialists in quite alien fields, for their impressions of how project implementation is to be accomplished vis-a-vis the rural population. And typically, the response one receives is that the problem is a major one. But there is nothing like a professional level of opinion available concerning the dynamics of the interface between traditional patterns of technoenvironmental adaptation and those innovations that are proposed or already in effect. In terms of the needs of the rural population of Niger, this is the most serious defect of all projects under consideration. It is an information gap that need not exist and that can be readily rectified.

B. <u>The Production System</u>

More than 95% of all agricultural production is from small farms with less than five hectares per family in cultivation annually. Because land tenure is mostly based on use rather than outright or titled ownership, the acreage of cultivators is determined by the size of family, availability of animal power and the need for fallow. The first concern of the farmer is to produce his food supply. In nearly all areas, millet is the first priority of crops grown and is planted before anything else on the upland areas. The lower wetter areas are planted to sorghum as the second priority of crops grown. Traditionally, cowpeas (niebe) and peanuts are intercropped with the grain crops. Peanuts, especially in the development zones, are often grown also in pure stands as a primary cash crop. Cotton is grown in some areas as a cash crop, but it is usually planted last, after farmers feel that they have sufficient food crops. Rice is the most profitable cash crop where irrigation can be practiced, but the acreage planted is much less than that of the other grains. Few farmers specialize on any particular crop, but nearly all produce a combination of grain and cash crops,

the mix being determined by the usual rainfall pattern. Most farmers do not keep cattle, and most cattlemen do not farm. Less than one percent of the farmers use animal traction, thus farming is done mostly by hand. Surplus grains are sold by most farmers at harvest time to pay off debts and taxes.

A typical small Nigerien farm size would include a man and his wife who can together cultivate approximately three hectares. Under normal conditions, two of the three hectares would be planted in a cereal grain; the third hectare would probably be planted with peanuts. Under the present drought conditions, however, the farmer is limiting cultivation to millet, sorghum and niebe to assure an adequate food supply for personal consumption. A typical medium-sized farm household would include four or five young males who also farm. Each man can cultivate an additional two hectares, with young girls able to cultivate a small garden plot. Most of these households do not hire farm labor under normal circumstances. The family probably would own several goats and donkeys, but no livestock. On the higher income farm, additional labor can be hired for the planting season. Hired farm laborers are usually paid CFAF 200 per day including two meals. Middle-income farmers can also afford to keep livestock as well as goats and donkeys. Members of the household might also earn additional income from trading or a vocational skill. Enough grain would be cultivated to feed the family, and additional hectares would be planted with a cash crop.

Most cultivators use traditional varieties of millet and sorghum seeds, plant their grain too far apart and tend to weed later than is most desirable. While a large percent treat their seeds, there is evidence that their treatment is not effective. During ordinary times, when moisture conditions permit, cultivators plant millet or sorghum following a planting of groundnuts to rely on the residual fertility of the phosphate application and the nitrogen buildup. Cowpeas is intercropped with millet with rather poor results due to the lack of insecticide treatment. Because most cultivators rely on hand labor, weeding and cultivating techniques are the bottleneck to increased acreage and to the conservation of rainfall moisture.

The agricultural implements commonly used by the subsistence farmer include an axe, a long-handled hoe for planting, a curved hoe for cultivating and weeding, and a knife for harvesting. This farmer prepares the land by burning the brush and all refuse from the field, plants after the first rain, and then cultivates and weeds the field twice before harvest.

There is widespread appreciation of the value of manure as evidenced by the practice of inviting herdsmen to bed their cattle on land after a harvest. But much of the benefit is dissipated by exposure to air, wind and sun. Relatively few farmers make compost. Any serious attempt to make and use compost would require animal power to transport the relatively large tonnage required. Relatively few farmers ever use chemical fertilizer on the cereals, with the exception of rice.

The most significant cost of production is labor at critical points in the growing cycle. These critical points are immediately after the first and second rain and at weeding time. The use of animal power would make it possible for a family to more than double its coverage and to do a more adequate job. A team of oxen makes it possible to prepare the land for planting before the rains and, at the same time, makes it possible to plant a larger area. (Animal power can permit more prompt, thorough, and frequent weeding and cultivation.)

The three primary factors which inhibit farmers from adopting new technology are lack of contact with extension workers who teach an improved package of practices, lack of available farming inputs, and limited knowledge of animal traction practices. Also, an important inhibiting factor against the adoption of P-3 Kolo has been the poor moisture conditions of recent years. Apparently P-3 Kolo does no better, if not worse, than traditional varieties under conditions of moisture stress. According to one authority, where rainfall is 250 mm or less, P-3 Kolo does consistently worse than traditional varieties. With regard to sorghum, the varieties presently available to farmers have been limited in their potential. Non-familiarity with the use of oxen, combined with poor moisture conditions, has limited the use of procedures that could increase the acreage under cultivation and conserve moisture. The high cost of purchasing oxen and animal traction equipment also inhibit the spread of this practice. Without oxen, farmers do not have enough time to weed and cultivate at recommended intervals, and they are handicapped in making compost. Tradition may also hinder some farmers from planting with the recommended seed density. A lack of physical strength or lack of psychological motivation to plant a large farm are secondary inhibiting factors. Lack of surplus income and fear of drought also hinder some farmers from purchasing fertilizer.

The cost of production for the subsistence farmer is minimal because he and his family can provide the farm labor themselves. His only costs are for seed, basic farm implements and food supplements for his family. For the middle-income farmer, the following is a conservative estimate of budget costs for farming one hectare of millet: land preparation - CFA 200; seed purchase - CFA 100; seed planting - CFA 400; cultivation and weeding twice - CFA 3,000; harvesting - CFA 800. The total estimated cost of production on one hectare of land, therefore, is CFA 4,500.

The planting season begins with the first rain which is expected in mid-June. Millet is planted immediately, followed by peanuts and sorghum after the second rain. Cotton can next be planted and, by late July or early August, the farmer may plant cassava. Cassava will not be harvested until the middle of the next rainy season.

Non-farm employment opportunities on the village level are generally limited to the following job categories: butcher, tanner, weaver, blacksmith, tailor, leatherworker, mat weaver, and firewood chopper and vendor.

Some traders are following in the family tradition, and others are ambitious villagers. The wage rate for the common laborer is approximately CFA 200 per day.

III. The Institutional Structures Serving the Agricultural Sector

Several Nigerien institutions assume primary responsibility for the agricultural development of Niger: the Ministry of Rural Economy, Environment Climate and Population Assistance; the Union Nigerienne de Credit et de Cooperation (UNCC); and National Fund for Agricultural Credit (CNCA). The Niger Development Bank (BDRN) was established in 1961 as a commercial and development bank for all economic sectors, and for private as well as public sectors.

The Ministry of Rural Economy

The Directorate of General Agriculture is one of the four directorates of the Ministry of Rural Economy, the others being: Livestock and animal industries, water resources and forests, and civil works. The functions of this directorate are defined by Decree No. 8/MER of June 22, 1966:

- to organize, improve, and increase production;
- to perform the technical preparation of agricultural development plans, and supervise their execution;
- to protect crops through phytosanitary inspection, and control of packing and storing of agricultural products;
- to teach farmers modern agricultural techniques;
- to work with cooperative and marketing agencies to improve the quality of agricultural production.

The directorate staff totals 179 and includes 4 engineers, 12 agricultural advisors, 29 'conducteurs de travaux agricoles', 23 'agents techniques d'agriculture' and 111 'moniteurs'. The directorate is decentralized in seven 'departments' and 30 'arrondissements' of the country, and in 148 agricultural units headed by a 'moniteur' (extension worker) at the village level. Each unit serves about 20,000-30,000 people or 3,000-4,000 farmers.

The results of this very low ratio of extension workers to farmers have been poor. The main achievement to date has been farmer acceptance of fungicides for seed dressing. Some 17,000 tons of fungicides were sold in 1972, enough to treat about 50% of available groundnut seeds. The use of fertilizers, however, is practically non-existent (435 tons in 1971 and 680 tons in 1972).

Union Nigerienne de Credit et de Cooperation (UNCC)

UNCC is a parastatal organization, with a board of 20 directorates and a managing director who is appointed by the Council of Ministers. It was established in 1962 and reorganized in 1967, when its banking and credit activities were transferred to Caisse Nationale de Credit Agricole (CNCA). Its financial position is weak, as short-term liabilities exceed short-term assets and are far in excess of equity and long-term borrowing.

UNCC's functions as defined by the law of September 20, 1967 are:

(a) to promote the establishment of cooperatives and train their representatives;

(b) to assist cooperatives in marketing their production and in providing farm inputs;

(c) to provide cooperatives with technical assistance; and

(d) to manage irrigation schemes and other Government projects.

UNCC employs 384 people, including 112 extension workers. Less than 15% of the staff have civil servant status; the remainder have been hired under UNCC terms of employment. There are a total of 16 French technical assistants financed by the French aid program.

UNCC has three divisions: administration, cooperatives, and production. The cooperative division is responsible for the creation of new cooperatives and, together with 'Animation' and 'Alphabetisation', for training farmers. It keeps accounts for the cooperatives and supervises the cooperative education and mutual guarantee funds. It arranges financing for crop marketing, partly using cooperative savings deposited with it and is the middleman between cooperatives and marketing agencies.

The production division is responsible for cotton production in the country. Compagnie Francaise des Textiles (CFDT) has provided it with technical assistance since 1964. In 1974 UNCC had 41 extension agents in cotton areas, for 405 villages and a total population of 293,000 people. Virtually all cotton-growing areas are covered. Cotton production increased regularly until 1971, when it reached 9,000 tons of seed cotton. Since then it has decreased every year to 4,900 tons in 1973. The country's production potential is estimated at about 20,000 tons.

Caisse Nationale de Credit Agricole (CNCA)

CNCA is 100% government owned. It has a Board of Directors of 20 members (the same as UNCC's): the Ministers of Rural Economy, Finance, Interior, Economic Affairs, Economic Development; the President - Director General

of BDRN; the Directors of BCEAO and Credit du Niger, three deputies at the National Assembly, seven representatives of cooperatives, and the President of a government import-export corporation. The Director of CNCA is appointed by the Council of Ministers. CNCA accounts are kept in accordance with commercial banking practices. The Ministry of Finance carries out an audit on the GON's behalf.

CNCA has a staff of ten at headquarters in Niamey and is represented by UNCC agents in the seven districts.

CNCA has no share capital; its permanent resources are government grants totalling CFAF 170 million (US $680,000) at present. Another source of financing has been current and short-term deposits by government-owned corporations, which reached a peak of CFAF 400 million (US $1.6 million) in mid-1972.

CNCA operations have included (a) medium and short-term loans to finance agricultural production development; (b) short-term advances to UNCC to finance primary marketing of groundnuts, cotton and rice; and (c) short-term loans to other government and semi-public corporations to finance the marketing of different agricultural products.

IV. AGRICULTURAL RESEARCH

The French-sponsored research organization, Institut de Recherches d'Agronomie et Cultures Viviers (IRAT), which operates a network of agricultural research stations throughout West Africa, carries out the principal agricultural research programs in Niger. Its research program is conducted at two principal research stations at Tarna (near Maradi) and at Kolo (near Niamey) and at four sub-stations at Magaria, Kawara, Kale-Pote and Sumiri. Also, it carries out field trials at 30 locations in the various departments: 8 in Niamey Department, 4 in Bosso, 5 in Tahoua, 4 in Maradi, 5 in Zinder and 4 in Diffa, thus giving a broad geographic distribution of the tests in the major ecological zones.

IRAT also cooperates with the West African Rice Development Association (WARDA) in its program. It has established liaison with other French research organizations working in West Africa and with the various international research institutions: IITA, ICRISAT and IRRI, as well as with the A.I.D. and OAU/STRC-sponsored Major Cereals Project at Samaru, Nigeria.

The research program covers a wide range of activities, including climatology studies, soils and soil fertility studies, irrigation, and plant breeding and cultural practices for the following crops: millet, sorghum, corn, wheat, rice, niebe (cowpeas), peanuts, forage crops and sugar cane.

The research facilities are well staffed, primarily with expatriate scientists, and suitably equipped.

The work at the Kolo station has emphasized irrigation studies. These include studies on the economic use of water in relation to different soils and crops and varietal testing for selection of suitable varieties of principal irrigated crops. Reports published by IRAT show several varieties of wheat yielding over 6 tons per hectare and 11 of 38 rice varieties tested gave yields of over 5 tons per hectare under good conditions. Fertilizer trials have also been held at Kolo but the reports available do not provide sufficient information to indicate response to different levels of major nutrients under typical farm conditions.

The work at Tarna covers all the major dry land cereal crops, with emphasis on millet, and sorghum. The station also has important research programs on niebe (cowpeas) and peanuts.

The millet program is centered at Tarna but with work at 17 substations to determine adaptability under a wide variety of rainfall conditions.

The millet breeding program has followed two main tracks: one track has been the development of "synthetic" varieties. The other has worked on development of an adapted hybrid. A parallel program has been undertaken for development of a dwarf variety for Niger.

The variety P3 Kolo has so far proved most productive and adaptable. It yielded 1765 kg/ha at Kolo with 414 mm rainfall in 1973. At Tarna, with 296 mm rainfall it yielded 1837 kg/ha.

The sorghum breeding program at Tarna has concentrated on development of high yielding hybrids. Several crosses have showed promising results in the extensive testing carried out at Tarna, Kawora and Kolo. Several varieties produced over 4 tons/ha in 1973. Two hybrids introduced from Samaru produced over 5 tons/ha (fertilizer levels not indicated).

The other important research facility is the Canadian(CIDA) sponsored laboratory for research on plant insects and diseases located at Maradi, adjacent to the Tarna research station of IRAT. This well equipped facility has a small expatriate staff in entomology and plant pathology. Some Nigerien staff has been selected for advanced degree training abroad to takeover the operation. The research program, which is just getting under way, is maintaining close liaison with the plant protection unit at Niamey, also being sponsored by CIDA. The Maradi station is collecting and studying specimens of the insects which were most damaging to this year's millet crop (head worms and stalk borers) which are estimated to have reduced this year's millet crop by at least 15%. The station conducted short courses for extension field staff to acquaint them with the insects of economic importance and symptoms indicating disease of pest outbreaks so they could alert the Niamey unit of situations requiring prompt control measures.

The existing research system has produced results which, it appears, would, if adopted, increase cereal yields substantially and make more effective use of resources. Rate of adoption of the recommended varieties and practices has been low, however. This may be partly explained by ineffective extension work, lack of credit or other constraints. In the opinion of some, more effort should be put on adaptive research to rapidly evaluate the complete package of plant materials, cultural practices, soil fertility improvement, pest control, etc., as the basis for seed multiplication, field demonstrations and extension programs 1/. The Niger National Cereals Production Project (NNCPP) now being developed by USAID in cooperation with GON is expected to develop this aspect UNDP is considering a proposal for contracting with ICRISAT to provide stronger linkage with the research organizations in Niger and other West African countries and to expand and improve the field testing of potentially better varieties and practices. If UNDP undertakes this program A.I.D. should determine how the activities of the NNCPP and the Major Cereals Project can best complement the effort.

V. EFFORTS TO INCREASE YIELDS IN RAINFALL AGRICULTURE

The problem of rising population pressure on the land is being handled through a number of vectors: (1) specific, intensive programs and projects usually delimited geographically and temporally; (2) general extension activities; (3) provision of rural credit; (4) improvement of marketing facilities; (5) research campaigns; and (6) the provision of new inputs. Each of these is discussed separately below.

Specific Programs and Projects

The following programs and projects dealing with rainfall agriculture are either presently on-going or are proposed: (a) Rural Development Project for the Zinder Region financed by the RED and presently in operation; (b) Maradi Integrated Rural Development Project to be financed by the IBRD and at the proposal stage; (c) Rural Development Project for the Department of Dosso financed by the Fonds d'Aide et de Cooperation (France) (FAC) and currently on-going; and (d) the National Cereals Production Project to be financed by USAID and not yet in operation.

(a) Rural Development Project for the Zinder Region - The first phase of this FED-financed project began in early 1973 and was to run for six years but was compressed and is now to end in February 1976. At that time, negotiation will begin for a second phase. The project covers the three southern Arrondissements of Zinder, which straddle the 600 mm isohyet, and which contain about 120,000 farms growing cereals, cowpeas and groundnuts. The project's objective is to combat extensive methods of farming with three successive phases, increasing yields while maintaining or restoring fertility; development of cattle fattening; establishment of forest plantations for firewood.

1/ Unpublished report on applied research component of Niger National Cereals Production Program, by Howard Sprague.

The first phase is attempting to meet its objectives through the following means: dissemination of established techniques, which include fungicides, selected seeds, seed density, weeding, corrective fertilizer use, maintenance dressings; construction of 55 km of feeder roads and 60 cemented village wells; organization of farmers, experimental work and trials in preparation for subsequent phases. In the original projections, the sixth year of Phase I would have seen yields of 1500 kg/ha for both cereals and groundnuts as compared to initial yields of 460 and 480 respectively. After only four years, total output of cereals was to have increased by 16,000 tons and groundnuts by 23,000 tons.

Development personnel were to be allocated as follows in the project area: one farmer-demonstrator in each of the 418 Groupements Mutualistes Villageois (GMV); one extension assistant in each of the 43 farming cooperatives responsible for literacy and training in new techniques; a team of officials from the UNCC and the agricultural, extension and literacy services under UNCC management at each of the nine Associations Locales de Cooperatives (ALC); a similar team in each of three arrondissements; a project manager, a deputy for on-farm extension services; an agricultural instructor and an agricultural economist at the project level. The UNCC is responsible for the project under an agreement with the Ministere de l'Economie Rural (MER).

The cost for the first phase is to be CFAF 826 million of which CFAF 521 million is to be provided by an FED grant.

The FED is optimistic that 700 to 800 kg/ha is a reasonable target yield to aim for. This level might be achieved with the following techniques: seed treatment, great seed density, better timing of planting, selected seeds. The project is not promoting fertilizer on cereals, but only on groundnuts.

The most valuable part of the program is the brief, intensive training of about 600 farmer-demonstrators. They are given a seven to ten-day course on a few specific techniques and then sent home to plant a demonstration lot.

The project also includes a training program for 90 pilot farmers per year. They attend a school for one whole growing season and are given donkeys and cultivation equipment upon graduation. They have two harvests within which to pay for this.

(b) Maradi Integrated Rural Development Project - This IBRD proposed project would affect about 500,000 people on 80,000 farms cultivating 430,000 hectares between the 350 mm and 650 mm isohyets. The project would run five years. The Government of Niger rejected the original proposal and the IBRD is considering whether it would try to reopen negotiations with a modified document. The following is based on the original, rejected proposal.

The overall objectives was to counter the problem of extensive farming by raising yields. The project would have also included animal husbandry, irrigation, training, health, road development, and cooperative development. The major effort, to increase yields in rainfed agriculture, was to focus on promoting the adoption of so-called "well tried" techniques.

Development personnel were to include the following: one extension officer for every three villages (475 individuals); ALC chiefs with two assistants (25 + 50 individuals); arrondissement chiefs (6 individuals); one project director, one agronomist and one assistant at the project level.

The project was to be implemented by an ad hoc agency under the MER. Project management personnel were to be reinforced by six permanent expatriate technical assistants. In Niamey, some individuals believed that one reason for rejection of the project was that the Government of Niger did not want the project control to be in the hands of an ad hoc agency strongly influenced, if not dominated by expatriates. Another opinion (not necessarily contradicting the first) was that rejection reflected the low priority the government places on rainfed agriculture.

(c) Rural Development Project for the Department of Dosso - This FAC- financed project is designed to cover the whole department, which contains about 500,000 people cultivating millet, sorghum, groundnuts, cowpeas and cotton on 573,000 hectares between the 400 mm and 900 mm isohyets. The project objectives and methods seem somewhat similar to those of the Zinder project. One difference is that there may be a potential for irrigation of 15,000 to 20,000 hectares from ground water.

The first stage, covering six years and 30 development zones of 10,000 to 20,000 people each, was begun in 1972 with FAC-financing. The initial phase of this stage covers the 1973 and 1974 crop years and 14 development zones. This phase compromises: further basic research of the area by aerial photographs; the training of a farming elite; raising food productivity with nonsophisticated measures; and introduction of cowpea monoculture, improved groundnut varieties, the development of cotton in the south, and animal husbandry experiments. The second phase of stage one is for expansion and formation of the remaining development zones. The total FAC grant is CFAF 428 million, of which CFAF 145 million is for the first phase.

(d) National Cereals Production Program - This USAID proposed project is now being reexamined by a team of technicians. It is not clear the extent to which their work will lead to changes in the current proposal

paper. That paper calls for the following components: adaptive research to develop improved millet; seed multiplication; accelerated introduction of animal traction; expansion of the UNCC coverage area for extension and cooperation; five experimental cooperatives in Dosso department; training extension and cooperative personnel; exploitation of rock phosphate. Total U.S. contribution was estimated at $9,478,780.

Since the program is being reexamined, and since the current proposal paper is available, it does not seem worthwhile to develop further details here.

VI. GENERAL EXTENSION ACTIVITIES

Extension activities are carried out by the Ministry of Rural Economy (MER), the UNCC, the Ministry of Human Promotion, and the Ministry of National Education. The first two have traditional extension agents while the latter two operate "animation" and "alphabetization" programs, respectively, with strong extension components. The four agencies' extension activities are not always coordinated, but in some areas UNCC does play a coordinating role.

1. The MER's Directorate of General Agriculture

As of 1973 the MER's Directorate of General Agriculture had 111 moniteurs, who are the farm level extension agents. Each of these headed a unit (38 more units each a moniteur) that served 3,000 to 4,000 farmers. The moniteur's main achievement has been the very wide (almost total) acceptance of using fungicide to treat seeds. There do not seem to be other major successes, as might be expected with such low coverage. The Directorate's staff also included 23 technical agricultural agents, 29 conductors of agricultural works, 12 agricultural advisors, and 4 engineers.

MER extension activities are well organized at the local level in at least one area, in the Madarounfa arrondissement, where there are 304 villages with 105,780 people. These are divided into seven districts, each served by one moniteur but at present there are only 3 moniteurs in Madarounfa. Each moniteur is supposed to have a "peasant - vulgarises" working with him.

Each moniteur is to choose about 20 villages to work within his district. He sets up demonstration plots in each and invites people from that village and surrounding ones to observe his work. Two or three villages are chosen for very intensive work and the moniteur concentrates on these.

In addition to extension, the moniteur also has the task of collecting annual agricultural statistics and checking for insect attacks on the crops. These would seem to be quite time-consuming. To gather statistics

the moniteur chooses three villages in his district and three farms in each of these, presumably the same ones year after year, since the national statistics are formed by noting year to year changes from a base line study by SEDES in 1963. At each farm the moniteur takes a 10 m x 10 m sample harvest (of millet and perhaps other crops, but we are not sure) to determine yields. He then surveys the total land area planted by each farmer.

The agricultural officers are trying to promote the following techniques for groundnuts: animal-drawn harvesting, new varieties, and greater plant density.

Other extension agencies were supposed to work under the coordination of UNCC, but this coordination is not always easy. The MER also carries out extension activities under its Directorate of Livestock and Animal Industries.

2. UNCC

As of 1974 the UNCC had 235 extension agents called "agents d'encadrement' of 'encadreurs". In 1972, 41 of the agents were in cotton areas and had technical assistance from the Compagnie Francaise pour le Developpement des Textiles (CFDT). They covered 405 villages and, thereby, virtually all cotton areas.

The UNCC operates 52 training centers for peasant vulgarisers. In the 1973/74 season, 2,052 farmers received three to seven days of training to become vulgarisers.

Extension is only one and possibly a minor activity of UNCC. It also aids the development of cooperatives, participates in agricultural marketing, coordinates the several extension services in some areas, and supervises some irrigation projects. According to the IBRD, UNCC has achieved significant results in irrigation supervision, cotton production, development of groundnut marketing cooperatives. It has done well in promoting the use of new inputs or providing fertilizers or insecticides to farmers.

3. Animation

The Ministry of Human Promotion's animation program now covers about one million people with a heavier concentration in the south. According to the IBRD, animation personnel first study an area; second, organize meetings with traditional leaders and governmental representatives to determine rural development problems, list potential solutions, and investigate possible government aid; and, third, train local personnel to implement local development programs. The most common programs focus on health, cooperatives, water resources and forests, and civil works.

4. Alphabetisation

The Ministry of Education's Service de l'Alphabetisation et de l'Education des Adultes operates functional literacy programs geared to the training of cooperative personnel and recently, as part of large agricultural development projects at Zinder, Badéguicheri, Dollol Maouri and Tillaberi. In 1972 there were 359 alphabetisation centers covering all districts. Between 1962 and 1972 about 40,000 adults were reached, but 9,300 of thess were reached in 1972. About 20% of those reached are now entirely literate and can do arithmetic. Instruction is in one of the five local languages. According to the IBRD, finance has been the major constraint on more rapid expansion of alphabetisation.

5. Agricultural Credit

Agricultural credit has been extremely limited in Niger, there is no explicit government policy toward such credit, and there is no coordination among the agencies involved. The Caisse National de Credit Agricole (CNCA), the UNCC and the Banque de Developpement de la Republique du Niger (BDRN) are all involved in agricultural credit. There is said to be a system whereby a village as a whole stands as guarantor of any individual's loan; however, several individuals expressed skepticism as to the effectiveness of this system.

(a) CNCA - The CNCA has been the major agricultural credit agency since 1968. The CNCA has headquarters in Niamey and is represented by UNCC in the seven districts. According to the IBRD, CNCA was to be esta- absorbed into the BDNN after 1972, but this does not seem to have happened.

The CNCA provides credit to cooperatives, to young farmers, Training Center Graduates; other individuals (lately to government officials near Niamey); to UNCC to finance marketing of groundnuts, cotton and rice; and to other government corporations. As of September, 1973, CNCA had received 75% of loan payments that were due.

In 1972 CNCA resources consisted of $680,000 of government grants and $1,600,000 of deposits by government-owned corporations. These latter were withdrawn in mid-1972, creating a serious problem and giving cause to believe that CNCA would be absorbed by BDRN.

(b) UNCC -- The UNCC acts for CNCA in organizing loan applications and, in some areas, collecting repayment. The UNCC also figures importantly in agricultural credit because they sell and set prices for the inputs and equipment that credit will purchase. In 1972 there was no coordination between UNCC price policy and CNCA interest and repayment policies.

(c) BDRN - The main activity of the BDRN is commerical banking. However, in 1968 it established an Agricultural Development Fund which has been used to finance cowpea seed development, to introduce sesame cultivation, and to help Young Farmer Training Centers buy oxen and implements, and to rehabilitate several irrigation schemes. The BDRN has permanent officers in Niamey, Maradi and Zinder, and has semi-permanent officers in Dosso, Magaria and Tassaoua.

6. Marketing

Food marketing has been discussed at length above. However, one objective of the OPVN program is worth emphasizing here. In addition to stabilizing prices, the government hopes to elicit greater cereals output by paying a higher price to the producer. Success in eliciting significant increased output will depend in part on the price for groundnuts, the cereal farmers' main cash crop. This year the groundnut price is CFAF 40/kg of nuts with shell, and the millet price is CFAF 25/kg. Groundnuts usually have a slightly higher yield per hectare than the cereals.

VII. CEREAL PRICE AND MARKETING POLICY

In 1969-70, steps were taken by the GON to moderate consumer price fluctuations through the establishment of a self-supporting buffer stock and stabilization program to be managed by the Office des Produits Viviers du Niger (OPVN). OPVN has as its basic mandate to: (1) reduce cereal price fluctuations; (2) maintain cereal stocks to affect prices and act as a reserve for contingency; (3) encourage cereal production. The assumption was made that farmer production decisions would be significantly affected if some floor price was to exist and that, as a result of this, farmer incomes might, to some degree, be stablized. The drought delayed this attempt.

A price policy can play a modest role in Niger as a mechanism with which to accelerate capital formation in the target sector. It can do this by providing farmer producers with a stream of income from cash and cereal crop sales which are of sufficient reliability (that is to say, minimum fluctuations over some minimum level) such that farmers can plan saving and investment programs. The extent to which resources can be transferred through the price system from the urban sector is limited in Niger by the very small and relatively poor urban market. There simply is not much resource value available to be shifted to agriculture. Furthermore, the extent to which resources can be produced from the sale of crops is also limited by political constraints. Consumer prices, for example, will only be allowed to rise within strict limits. The range to which price can of itself transfer resources from the urban sector, therefore, is limited on a number of accounts.

Of great importance is the opportunity to stabilize farmer incomes. However, it must be made clear that those farmers who have excesses to sell are those who are the more efficient, prosperous and likely better situated. Equity considerations would not be directly served by stabilization of farm incomes. Smaller units which sell little would be barely affected. Stabilization could possibly affect lower income urban persons to the extent that a sufficient supply of cheap staples were forthcoming. An equity trade-off exists.

The basic incentive for improving production will be provided only when a new technology permits declining per unit costs. Under such conditions, prices would fall, once again affecting larger farm units and consumers for the most part. Cost of production should not be an implicit basis for determining support costs because decline in per unit costs should be the incentive, not some "high" price which would hurt low-income consumers, on the one hand, and affect sales of excesses by large producers on the other. Only when a technology becomes available that is divisible to farms of all scale of operations will equity production criteria be satisfied. In this instance, prices will affect income levels more than production decisions, which is the unique aspect of subsistence agriculture compared with a commercial agriculture as regards price policy: Western price policy assumes equilibrium pricing at the margin in a fully commercialized sector.

Nevertheless, a cereals price policy can play a role, albeit a modest one. It can act to help reduce rural debt. It can have some impact on capital formation. It can be a tool to give government both a buffer stock and a reserve. In this last regard, prices can have an important distributive and consumption effect. But the allocation effect is unlikely to be great as regards the major subsistence staple.

There is a commonly believed, naive notion that economists set prices. In fact, the situation is that prices are set as a result of a consensus among political forces. This is particularly true where consumer staples are concerned. In the OPVN case, an inter-ministerial group meets and selects a price, often quite different from what OPVN needs to cover its operating expenses. Indeed, the sale price for coarse grains has been sufficiently low that these cereals of themselves (millet and sorghum) cannot cover costs to the agency, and profits for niebe and rice sales have been used to cover the deficit. Lately, even this has been insufficient. The official buying price has been 25 CFA/kg, and GON has allowed grain to be sold at the same price, so that OPVN has to absorb storage and transport costs. Imported grain sells for as little as 10-15 CFA/kg. In buying grains, the OPVN must compete actively with the traditional traders and grain dealers, the commercants, who play the role of marketing, storage, arbitrage, and who provide consumption and production credit. There is every reason to believe them to be competitive.

Consumption credit, especially for foodstuffs, is very scarce in rural Niger. In a normal, or better than average year, farmers would typically be able to produce enough grain to see them through the buying season. If, however, rains fail, reserves will reflect the lesser yield such that numerous farmers would find themselves unable to get through the hungry season comfortably. In such a case, commercants would sell some of their holdings to farmers who, typically, lack cash. In lieu thereof, commercants offer credit, taking sufficient standing grain to cover the loan plus interest. This is likely to be high, as both food and credit are scarce. In the event several bad years come in a row, many farmers can fall deeply into short-term debt to cover food needs.

Commercants handle this business quite efficiently. They commonly keep the harvested grain in the farmer's store on their own account. Resale to farmers involves only a transaction; often no transport is required at all. This economizes on two scarce goods - transport and off-farm storage. Loss due to movement is also minimized. The ill effect is that farmers can find it very difficult to emerge from debt unless a good series of harvests come along, when total output might offset debt and also cover reserve needs. To the extent farmers are unable to emerge from debt, savings and investments are difficult.

The result of all these trends, in the context of the drought, has been that rural living standards have fallen markedly in recent years for farmers, who make up some 75% of the total population of Niger. They have fallen into short-term debt (one estimate suggests that 100% are in this condition). In addition, farmers have had to give up cash crop production just to be able to feed themselves, and have, consequently, due to poor harvests, suffered declining levels of food production and nutrition. Even the increasing off-farm search for cash incomes does not appear to have offset farm production losses. The granaries are seriously depleted, as is the entire market network for grain. It may take several good harvest years to make up the gap so that farmers can emerge from debt and have a surplus to sell.

A rising price for basic commodities adversely affects lower income groups more than proportionately. It is not at all uncommon for lower income groups to have an income elasticity for basic cereals of from 0.5 to 0.8. With respect to the price elasticity of demand for cereal staples, and given the homogeneity condition and what appears to be a reasonable assumption about cross-elasticity (no close substitution outside of the classification), one can assume that price elasticity is the same as income elasticity but with signs reversed. This would suggest that price does play an important role in consumption. In Niger, where cereals have an unusually important place in diets (in excess of twenty ounces per day), and where cash incomes are typically very low, the higher figure may not be far out of line. Price increases in an economy such as the Nigerien not only cut against the lower urban groups but mainly help larger, better-located and perhaps more efficient farm units, which typically have some excesses to sell.

Demand for cereal in Niger must certainly increase proportionately with the average increase of population and more than proportionately from urban growth. If the present rate of population growth (say 2.7% per annum) were to continue unchanged, Niger's present population of 4,100,000 (which is likely to be an underestimate) will double by the end of the century. Urban growth is even greater, and the rate itself seems to be accelerating. From its present level of 350,000 urban dwellers and city consumers, the urban consumption population is expected to increase to 624,000 by 1982 and certainly will double again by the end of the century.

Pressure on supply is certainly going to lead to real increases in price and, given the likely shapes of supply functions, much more than proportionately to extra quantity produced. Experience elsewhere suggests that urban consumption in absolute per capita terms is significantly greater than that of rural persons, which reflects higher urban cash incomes. Part of this demand will be deflected toward superior cereals such as wheat (for bread) and rice. However, absolute demand for millet will increase as well. When it is recalled that African agriculture is typically labor short and that a very large share of this urban growth is likely to come from the ranks of young male farm people, it seems likely that the pressure on supply may be greater yet, in particular if technologies do not change.

In addition to an adequate and regularly updated data base, an effective price stabilization program will have to develop some reserve capacity, a good administrative cadre and the agreement that OPVN can set prices such as to be self-supporting.

Given the small proportion of total cereals produced which are marketed, perhaps 15%, a very small regulatory buffer stock, would have to be kept. OPVN estimates this stock at approximately 20,000. In addition, a reserve stock would be needed to give Niger some margin in the event of sudden adversity. Clearly, a year's reserve is beyond the financial means of the country, even assuming adequate supply was available from which to build. The Conseil de l'Entente estimates that such a reserve would have to be about 25,000 tons now and over 30,000 tons by the early 1980's. Such a stock would afford urban areas a three-month reserve. Imported materials could be used to build up the stock, which might allow these goods to be put to good use without destabilizing prevailing prices to the extent that they discouraged farmer marketings.

If the necessary support were available, Niger could attempt a buffer stock operation managed with an open market system but offsetting shortfalls through price regulation and even rationing (perhaps on a zonal basis). In such a system, urban "poor" needs could be satisfied by a levy taken from farmers at some "normal" price and sold on a rational basis at some "fair" price. Such a scheme would ameliorate the effect of a small crop on low-income persons. Farmers could sell the balance of any "reserve" into the free market; as a result, grain prices would become both higher and lower than would prevail under equilibrium conditions. To the extent

that additional surpluses were sold freely into open markets, the effect would be to shoot up prices higher than without the levy. The consequent shortage would therefore be concentrated in the urban higher-income group.

A further ramification could be to identify grain surplus areas and to procure in these zones. These surplus zones would then be quarantined from free-market movements, at near or equal normal market prices (by limiting aggregate demand through inter-zonal trade restrictions these prices would be lower than otherwise). This would economize on administration by allowing concentration of effort. But it does make for a more complicated distribution system.

A very useful additional activity open to government is to reduce market imperfections and, in particular, ignorance-induced local price variations. Continual and current price reporting over public radio on grain would greatly improve farmer vs commercant bargaining. If a government alternative price was to exist during the time when farmers pre-sold grain to commercants and this were duly published, farmers' bargaining would be greatly improved. Niger would be very ill-advised to attempt to replace the role of the commercants. It would do better to introduce a new competitive element which will assist farmers by reducing uncertainty on the one hand and raising farmers' prices on the other. Commercants play an important role in gathering produce and shipping it to market, often at a fairly cheap price. Government would have to undertake part or all of their activity were commercants to be too effectively replaced. Furthermore, usual risk may play an important role in the gathering of excesses in the first place. In the absence of doubt, farmers might be reluctant to sell in any but the best of years.

VIII. EVALUATION AND RECOMMENDATIONS

In the face of evidence that is fragmentary and often contradictory one must be extremely cautious in forming judgments and proposing recommendations. This is especially true when, as in the present DAP exercise, one cannot be certain that all relevant data have been obtained nor that contradictions have been resolved to the maximum extent possible. However, having been requested to do so, we proceed. Most of our comments concern grain marketing and extension.

Evidence available to us does not provide strong justification for a grain price stabilization program. The OPVN presently has a 40% difference between its millet buying (from farmers) and selling (to consumers) price and believes it needs 60% to break even. But it is not clear whether a margin as wide as 60% would be needed to break even if OPVN's costs related to its emergency food distribution requirements were excluded from stabilization operating costs. Under private marketing in the past, the variation in consumer prices from post-harvest low to pre-harvest high has usually been less than 40% except during years of sharp production

shortfalls. Comparison between OPVN's buying/selling margin and consumer's low/high prices is valid to the extent that the post-harvest price to farmers is close to consumers' post-harvest buying prices. We found this to be the case in Maradi and Madarounfa.

Seasonal price fluctuations may reflect traders' costs of collection, storage, transport and selling, more than they reflect speculative profiteering. There is no known effort to study whether this is the case. If observed price fluctuations under private marketing do not reflect excess profiteering, then OPVN can consistently dampen the fluctuation either by operating more efficiently than private traders or by operating at a deficit (i.e., with producer purchase prices set so high and sales prices set so low that the margin does not cover expenses). We do not think it likely that a government marketing board could operate more efficiently than do private traders. Given the above indications, there is room for serious doubt as to whether OPVN can both significantly dampen seasonal price fluctuations during nonshortage years and cover costs.

There remains a serious need to improve distribution of cereal supply within the country. Some consideration might be given in this regard to merging the grain price stabilization program and the emergency grain storage program. Decisions regarding the storage program must rely heavily on humanitarian and political considerations. And, if such a program is instituted, it may also serve as a modest price stabilization progam. As noted, a storage regime requires yearly rotation of a fraction of the stock. For Niger, that fraction may represent 13,000 tons, which is probably about one-tenth of the marketed grain output. This may be a sufficient amount for stabilizing prices in selected locations.

The 13,000 tons would probably have to be sold at a discount since it would be 3 to 5 years old and hence less desirable than fresh grain. Although this discount probably implies losses for the storage program. It may also mean benefits to the poorest strata of grain buyers. They will have available to them a cheap grain that will not be readily purchased by wealthier consumers. Thus a storage program alone may not only provide emergency food relief in a drought, but it also may slightly dampen price fluctuations and provide low-cost grain to poorer consumers in non-drought years. However, such a program is unlikely to be self-financing.

The Nigerien extension services seem to lack coordination and personnel. As noted above, extension activities are carried out by two separate Directorates within the Ministry of Rural Economy (Agriculture and Livestock), by the UNCC, by the Ministry of Human Promotion, and by the Ministry of Education. In some cases the UNCC has been given responsibility for coordinating the work of its agents and of the MER's agents. We did not learn of any efforts to "coordinate the 'animation' and 'alphabetization' programs" with the work of MER or UNCC agents.

During our visits at the ministries and in the field, we repeatedly asked about the main extension goals and methods. We did not obtain a picture of a consistent, clear-cut program. There was not agreement on which were the most important techniques to promote. Nigerien agriculture may be able to benefit from a single strong extension authority that could clearly define methods and objectives for each region and could also coordinate and perhaps even control all the groups presently engaged in extension activities.

Insufficient field staff is a problem that Niger shares with many developing nations. The MER Agricultural Directorate's coverage is about one agent per 3,000 to 4,000 farms. The UNCC coverage would average out similarly; however, a disproportionate share (37%) of their agents work solely in the few Nigerien cotton areas so that UNCC coverage over most of the country is very thin. There is an obvious need for more extension field agents.

In general, we have the impression that there is a relatively thin base of new methods and inputs that the extension agent can draw upon. Our few visits to research facilities did not uncover much adaptive research (research to determine the benefits of a few new methods or inputs applied under average peasant-cropping conditions). The USAID-sponsored National Cereals Program is to contain a large research component, which we strongly support.

Programmatic Recommendations

1. The proposed Niger cereals project now being negotiated with the GON is comprehensive. It is designed to provide all the essential elements of a national program for quickly introducing the results of agricultural research into the farming system of Niger's small cereal farmers. The team endorses this as a conceptually sound approach and recommends A.I.D. support.

2. All but a small part of Niger is in the Sahel ecological zone with rainfall averaging less than 600 mm per year and with wide variations from year to year. While high priority is being given to major irrigation projects, particularly on the Niger River, the team believes that more modest investments in intensive development of the dollols offer good opportunities. A.I.D. should cooperate with GON in studies of soils, hydrology and engineering aspects to determine the feasibility of their development and assist in their development for irrigated agriculture if this proves feasible.

3. Niger soils are nearly universally deficient in phosphorus. Promising deposits of phosphate rock have been reported. A.I.D. should provide help in assessing the quality of the deposits and the feasibility of exploitation and, if feasible, assist in developing the mines and facilities for producing phosphate fertilizers.

4. Long-term support is recommended for basic and applied research on the cultural aspects of technological innovation and economic change in Niger. Specifically, this would entail support for the Institut de

Recherches en Sciences Humaine, that will allow for the improvement of the University of Niger's capacity to undertake the basic and applied research necessary to the success of future large scale economic development programs. This support should include assistance that would allow for the amelioration of existing research facilities, bibliographic and archival resources, and for research support for Nigerien scholars, whose work can contribute both to their own professional growth and to the economic development of Niger. An obvious major benefit of such support would be the better identification of indigenous sociocultural factors that facilitate or seriously impede the realization of economic development objectives. It would also decrease the wasteful tendency to retain scientific and technical expertise within the impermanent expatriate community, a practice that annually costs Niger thousands of man hours of work experience.

A.I.D. should explore the possibility of establishing a working relationship between the University of Niger, the CNRS, and expatriate and local scholars who are specialists on the peoples of the country, in order to evaluate what is known of them and to build a library of duplicate copies of ethnographic data at the University or CRNS.

This library could serve as an archive for relevant ethnographic data to be drawn upon in developing further assistance projects where an understanding of the traditional culture of the Nigerien group to be affected by proposed change is a relevant variable to consider in planning and in project implementation. Such a resource could serve as a base for mounting pre-planning ethnographic investigation and/or feasibility studies, and for the recruitment of appropriate research personnel. It could be used as a repository of research findings and could serve also as the obvious place to conduct on-going project re-evaluation.

A model of this general type might be developed for both Niger and Upper Volta; the development problems and the target populations in both countries are quite similar. This could foster in both host countries an awareness of the benefits of regional cooperation across national frontiers. If successful, such a research strategy might also be applied to the other Entente states.

NIGER
LIVESTOCK SECTOR ASSESSMENT

I. INTRODUCTION

Niger, with almost the whole country in the Sahelian and Saharan zone, suffered probably more than any other country in the recent drought. The livestock sector has been one of the country's most important resources, contributing 12 percent of the GNP, 23 percent of the value of the primary sector, and about 50 percent of the value of exports.

Although estimates of the herd sizes have been static, the increase in reported slaughter and exports indicates that the cattle and goat production, and to a lesser extent sheep, increased from 1966/67 to 1972/73. Cattle numbers, which almost certainly exceeded the official estimate of 4.1 million before the drought, are at least 3.0 million (perhaps 3.25 million) now. The output of the goat herd does not seem to have dropped significantly.

There is some indication, which will become clear in the statistics of last quarter, 1974, that the herders will hold cattle and sheep off the market after the satisfactory 1974 rainy season to rebuild the herds.

Whatever the losses, it is clear that a substantial number of individual herders lost so many animals that they are unable to continue to subsist from their livestock production. The basic cause of the severity of the losses was overstocking of the Sahelian zone, because too many people were trying to subsist on the limited and fragile resources. Therefore, to return, as far as possible, all of the herders to the Sahel, with a nucleus of livestock to rebuild their herds, will accelerate the overstocking and lead to further problems.

On the other hand, politically it is very undesirable to have a substantial number of ex-herders congregating in the cities. The solution would appear to be to attempt to get them started in farming; this is the traditional course of action of a pastoralist family which has suffered losses making it impossible to continue to subsist from herding.

The GON policy priority to save calves, multiply them and return them to the herders, and to multiply sheep and return them to the herders is unlikely to be successful. Herders will most quickly restore their subsistence base with goats, which are in good supply. It is expected that few heifer calves and breeding cows (as opposed to sterile heifers and cull cows) and few ewes will be sold in the next few years. Furthermore, some herders who left the region to find pastures in North and Central Nigeria and Dahomey will have returned for the 1974 rainy season and more will return in 1975. The traditional practice would be for these herders to lend breeding animals to their impoverished relatives. In this way, the situation is, to a considerable extent, self-correcting.

Interventions likely to be successful in Niger include:

1) Mixed farming programs including animal traction (little developed probably because of absence of a profitable technical package) and farmer cattle and sheep feeding. The USAID, IBRD, and FED programs cover these needs.

2) Introduction and multiplication of the Sokoto Gondali cattle (FAC at Dosso).

3) A sheep breeding and demonstration center (UNDP Tahoua should develop into this).

4) Tsetse fly control in the Say and Dallol Maori regions, although the rate of return may be small.

5) Improvement of the standard of living of the Sahelian nomads and farmers (UNDP with further donor assistance needed in the livestock area). This involves continuous dialogue with the population on their perceptions of the problems and solutions.

6) Mineral supplement manufacture (FED).

7) Training more Nigerians at the DVM and University Degree (through third French System) levels.

II. THE LIVESTOCK SECTOR

A. The Milieu

Niger has the most favorable milieu of any of the Sahelian states except Mauritania. Only 8 percent of the land area has over 500 mm of rainfall and this is mainly in the Southwest. There is a thin tongue of land in the Sudanian zone running along the southern boundary from the Dosso district to Maradi, 48 percent of the country has under 100 mm average annual rainfall.

The major crops are millet and sorghum (2,500,000 has.) and peanuts (360,000 has.) with some cotton and cow peas (600,000 has.). There is some irrigated rice production along the Niger River. There are considerable quantities of agricultural residues from the crop land available for dry season forage for ruminants and for peasant finishing of sheep and cattle, which has been a tradition.

The soils are generally low in fertility, short of phosphate of which there may be a workable deposit near the Dahomey border. The country suffers from periodic droughts, the rainfall, being low, is also very variable. Fortunately, Niger is sparsely populated (only a few regions with

a relationship between number of animals slaughtered in controlled abattoirs and the total number slaughtered. Many rural areas have no abattoir at all, yet, meat, particularly sheep and goat is readily available. It is proposed that although the relationships between the total and the reported data may change, it does so gradually overtime.

In two studies for 1966 and 1971, Sedes has estimated the total slaughter and export figures for each species of ruminant. However, these are based upon an estimated offtake multiplied by an estimated population. The population estimate for cattle and for goats shows little change in the five years (+2.5% for cattle and +6.3% for goats) but a much larger change (+28.6% for sheep). The offtake rates are assumed to be the same for the two years. This assumption makes the situation for cattle and goat production appear static while sheep production increases modestly.

From 1966-71 the official slaughter of cattle showed a decrease (76,353 to 60,892 head) but the official export rose from about 60,000 to 140,000 head a year. The reported data, while showing a doubling of the official export plus slaughter of cattle from 1966/67 to 1972, and a 40 percent increase for goats, only shows 6.5 percent increase for sheep.

D. Effects of the drought

The Direction of Livestock Production has estimated the loss of cattle at 47.6 percent, which is close to that reported in the survey by ELC (Garcia and Arnal 1974). If these estimates are correct, the cattle herd now numbers 2.2 million.

The estimate of the offtake obtained from studying the 1974 statistics (not corrected by use of the Nigerian import data) gives a drop in the offtake (based on official export and recorded slaughter) of about 25 percent below the 1972 level, back to the level of 1970. The number of cattle presented in the markets in 1974 is running at 62 percent of 1972. The 25,000 head of cattle which normally enter Niger along the river from Mali has been reduced about 90 percent, with no apparent effect on the supply of beef in Niamey where a substantial number of these cattle are usually slaughtered.

The survey of cattle losses made toward the end of the dry season would have included the herders remaining in the region who would be expected to have suffered greater losses than those who left the region. It has been reported that 200,000 Nigerien cattle have remained in the North of Dahomey and there must be an even greater number in Nigeria. But the northward migration back into the Sahel from Nigeria in spring 1974 was an all time record. Therefore, we assume that, during the rainy season, a large number of cattle returned to Niger. This is supported by the behavior of the

Nigerien market which maintained meat delivery at normal levels well into the rainy season. It is also probable that the number of cattle present before the 1973/74 dry season exceeded the 4.1 or 4.2 million estimate by the Direction of Livestock Production.

It is interesting to note that while in 1973 reported slaughter was higher than in 1972, there was no sign of a devastating liquidation or of an extraordinary number of cattle officially exported and presentations at markets were only about 10 to 11 percent above 1972 figures.

What the statistics do not show is the size of the surviving cohort of the 1972 calf crop, and of the 1973 and 1974 calf crops. It must be assumed that these three age groups are smaller than usual and that this will have a depressing effect on production and offtake starting quite soon. The best way to overcome this gap would be:

1) to reduce calf mortality in the 1974 and subsequent calf crop;

2) to encourage finishing of cattle marketed; this involves peasant finishing and merchants with small feed lots; and

3) to encourage growing of immatures appearing on the markets; this will involve credit to farmers in cooperatives who are prepared to do this.

It is expected that after the satisfactory 1974 rainy season with a large amount of crop residues for use in the dry season, and with fewer livestock, herders will reduce the number of cattle marketed in order to rebuild the herds. They will be helped in this by the suppression of the cattle tax, which has reduced their need for money. This situation if it occurs will lead to a shortage of meat on the Nigerien and the Nigerian markets. Above all, it seems that the customary small number of heifers and breeding cows sold will be greatly reduced, if not almost eliminated. Therefore, attempts to purchase females to distribute among herders that have suffered losses are likely to fail because of the short supply of females.

It will be much more practical to aid the herders who are to return to subsistence herding by provision of milking goats or even sheep, both of which are in good supply. The sheep herd is officially reported to have lost 35.7 percent of its numbers. The reported slaughter plus the official exports for 1974 are 22 percent below the 1973 level, but is about equal to the 1969-1971 level. The number of sheep presented in the markets in the first nine months of 1974 was 26.1 percent lower than in 1972 and 27.5 percent below that in 1973. The loss which this implies could be overcome in about three years, allowing for the poor condition of many of

the ewes at the end of the 1973/74 dry season.

Losses of goats are officially estimated at 16 percent. However, the estimate for 1974 of reported slaughter plus export indicate an increase over 1973 and continuation of the rising trend since 1968. Presentations reported in the markets in the first nine months of 1974 are 6 percent below those in 1972 and 16 percent below 1973. If this is in fact true, the goat herd, having suffered only small losses and with great capacity to recover, could supply the milk needed by herders who have lost so many animals that they cannot support their family by milk production.

It must be remembered that overall losses are no indication of individual losses. The underlying cause of the problems resulting from the drought was too many people trying to subsist on the hydro-pastoral resources. Each family requires a certain per capita level of milk production for subsistance and to exchange for grain. With the unfavorable change in the comparative prices of milk and millet, and a shortage of milk, herders were forced to sell animals. Animals also died from lack of feed. However, although some of the animals liquidated were slaughtered, a large number must have been bought for use in herds by other pastoralists and farmers. Some of these animals may have been illegally exported to Nigeria.

E. Domestic Meat Consumption

There is good evidence that urban per capita consumption of meat is declining. Sedes (1969) reports for Niamey the following per capita meat consumption.

	Beef	Other Meat
1950	62 kg	
1957	60	
1961	49	
1966	40	8
1971	26	
1973	22	11

These figures underestimate the amount consumed because consumption of offals is excluded. In 1966 the rural population was estimated to eat about 13.4 kg/capita carcass meat, almost half being beef. There is, thus, a trend among urban consumers toward the consumption levels in rural areas that is perhaps caused by a reduction in urban per capita income as

people of relatively poor means migrate to the cities.

Meat Export

Niger is at a disadvantage as a meat exporter viz-a-viz its neighbor Upper Volta because Nigerien meat must be flown to the market (Abidjan for example) while Voltaic meat can move on rail at about one-fifth to one-sixth the transport cost. A state company, Soneran, is charged with the export of meat. Limitations on exports are imposed by either competition in the market or, as in the case of Libya and Algeria, by the health condition of the herd.

The Nigerian meat market is also attractive to Niger; however, Niger does not have easy access to this market. Until very recently Nigeria would not issue an import permit and, when this was relaxed, it levied a prohibitive duty on the meat. In November 1974, the duty has been suspended. Transport costs are such that it is not expected that Niger could export much meat there, through official channels. So the traditional method of export on hoof, perhaps to be picked up by a truck on the Nigerian border, is likely to continue as the major form of export.

Historically exports of refrigerated meat have been between 400 and 760 tons/year, with an average of about 400 tons a year of beef. This is not an impressive quantity and there is little economic reason to expect it to change greatly in the next 3 to 5 years.

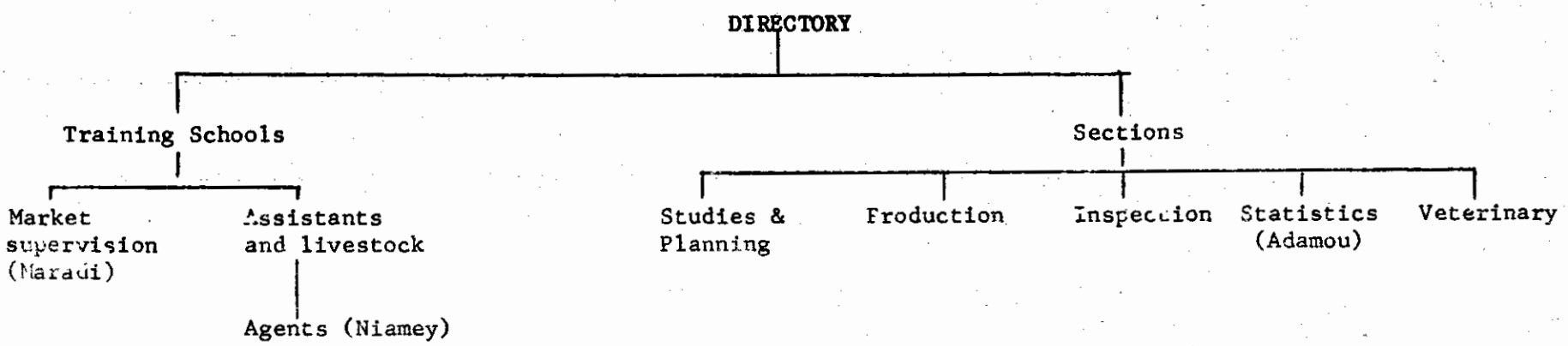
F. Health Status of the Herds

The health status of the herd is generally satisfactory according to available statistics. There is some variability from year to year but little in the way of a trend. The 1973 data indicated some rinderpest and CLPP in the first quarter. Surprisingly, an increase in trypanosomiasis in the cattle which spent the dry season further south than usual, in the tse-tse zone, was not reported up to August/September 1974. The 1973 immunizations are all lower than the 1972 data, perhaps indicating that the cattle were not present in their dry season pastures at the time of the immunization campaign for rinderpest and CLPP 1973 numbers (respectively 68.4 and 72.2% of 1972). The other immunizations are not given on such broad basis.

III. GOVERNMENT ACTIVITY AND POLICIES

A. Organisation of the Service de l'Elevage and of Animal Industry

The livestock service is administered by the Ministry of Rural Economy and includes the following divisions:



7 Departments
34 Local Units
14 Livestock Posts

The livestock service maintains six research and demonstration stations:

Toukonnos - Azewak Breeding
Kirkissoye - Cattle feeding
Maradi - Poultry
Mirriah - Poultry
Niamey - Poultry
Maradi - Goats

There is also a laboratory, a clinic, and a pharmacy at Niamey.

The service is manned by the following trained staff:

Veterinarians: 3 Nigerien
10 French
1 Libyan

Ingenieur des travaux elevage (ITE)* - 8
Assistant Elevage - 23 (livestock assistant)
Technical Assistants - 33
Vaccinators - 144
Supervisors - 14
Agents - 68
Office Manager - 1
Biologist - 1
Lab Technicians - 2
Lab Assistants - 7
Instructors - 2
Specialist in Hides - 1

Typically in a deparment, the veterinary service has five or six local units. It is headed by an ITE (or perhaps an expatriate veterinarian), with 3 livestock assistants, 5 technical assistants, about 20 vaccinators, 2 supervisors, and 11 agents. There may be a secretary, 3-5 chauffeurs, a guardian and some laborers. Four DVM's are employed in other branches of the government service. Five more DMV's are expected to graduate this year, 2 from Dakar and 3 from Maison Alfort (Paris). An ingenieur-agronome is expected to finish a course at the University of Zaria shortly. Three men are expected to return from the four year (post BAC) course at Katiboyau, Mali. The output of the school for assistants at Niamey is 14 a year and from the market supervision school also 14.

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* A qualification below the "agronome" level, with two years of general and two specialist training above BAC.

B. Efforts to Modernize the Sector

Adjustments proposed (before the drought): The GON, about five years ago, recognizing the problem that they faced in increasing livestock production, requested that FAC underwrite a series of studies on modernizing the livestock production in the pastoral zone. This request resulted in a report by SEDES (July 1973) on the modernization of the pastoral zone. The SEDES study reached the following conclusions:

1. The economic development of Niger is intimately associated with the intensification of agricultural production. Cattle production, being the key to this intensification, is the pivot for the agricultural development of Niger.

2. The livestock industry is still, for the most part, based on a subsistence activity. The extent of its potential is great but cannot be realized without integration in a market economy.

3. Intensification of livestock production involves specialization, based on physical and socio-economic factors, and will assume a sectoral or regional character based upon the type of production characterizing each of the zones.

4. The development of cattle production is not possible without a sufficiently large cow herd. It follows that priority must be given to the improvement of the productivity of the cow herd in the pastoral zone.

5. This specialization of production does not diminish the absolute necessity to integrate the actions necessary to assure smooth development of livestock production.

6. The application of the results of the analysis assumes a certain number of changes in the organization of production and marketing. Without these changes it is a waste of time to attempt any real development of production.

The principal options proposed are:

- development of hydrologic resources.
- organization of utilization of the natural pastures.
- producing complementary forage resources.
- organization of the use of the pastoral zone in the light of allocation of resources and means of production.

- rationalization of the production process including the function of pumping and use of water by herders; a rotational system of using range land and formation of reserves for seeding; specialization of the herds in the pastoral zone as cow herds; and motivation of producers by financial "stimulants," or incentives.

- establishing a suitable training system and creating an organization for management of the pastoral production with the participation of the herders.

- organization of a modern system, better integrative pastoral production with the agricultural economy assuring the flow of young cattle out of the pastoral zone at remunerative prices.

- sale in the production area itself.

- rationalization of the marketing system, to control the economic effect of export of animals on the hoof and to increase the export of meat.

The actions recommended are:

- creation of intermediate production units in the form of semi-intensive ranches for growing cattle at the south edge of the pastoral zone to permit early removal of immatures from the cow herd and provide a regular supply of feeders for feed lots.

- creation of feed lots for each growing ranch, located in areas of intensive agriculture.

- creation of a modern system of very intensive meat production (baby beef) beside a river in an area with good control of water for agricultural use.

- maintaining the traditional marketing system to buy the young stock but integrating the cattle growing and finishing phases, with marketing of finished animals - under the direction of the State Corporation, Soneran.

- maintenance of the private trader in the retail meat market.

A special report on the veterinary conditions makes recommendations on veterinary service delivery.

The whole development would be coordinated by a national office for the development of livestock production. It should be pointed out that somewhat similar schemes are being proposed in Senegal and Mali and have not been adopted there.

C. GON Priorities and Current Program

The President of Niger in a statement to Mr. Parker, the Administrator of AID, expressed two priorities for the livestock sector:

1) establishing the six "centres de multiplication," a number of centers (or ranches) for salvage of calves, growing them, and maintaining a herd of cows to help reconstitute the herds by their offspring; and

2) buying animals on the market and supplying them, as gifts or on credit, to herders who are unable to subsist.

Both of these proposals are replete with socio-cultural, technical and economic difficulties and the lack of experienced staff will further complicate implementation. However, Niger will not proceed with other livestock projects until satisfied that sufficient efforts are being made along these lines. Some donors have already accepted to finance projects that fall within the priority areas. IBRD will finance the six calf salvage stations (Appendix 1) and FED is expected to finance a "multiplication" center at Tahoua. Germany, Canada, and France may also finance multiplication centers. Multiplication centers are discussed in Appendix 2.

The GON is attempting to pursuade FED to divert funds from other projects to provide 400 million f cfa to finance restocking the pastoralists herds. Earlier, FED had planned a constructive livestock program which included: 1) peasant cattle feeding near Dosso, Niamey, Zinder, and Tahoua (Madoua might have been better); 2) a station for sheep production research and extension; 3) a small factory for making mineral supplements using local salt and phosphate; and 4) financing drugs for the veterinary service.

The GON has been seeking ranch sites and hopes that IBRD or the West African Development Bank will finance one at Nord Dakoro and one at Nord Goure. FAC will fund a multiplication center near Dosso, in effect a ranch for multiplying and selecting the Sokoto Goudali zebu from Nigeria.

Mixed farming and animal traction programs are included in the: 1) AID Millet Program; 2) IBRD Maradi area agricultural development project; 3) FED peasant livestock finishing.

UNDP is also involved in livestock sector activity. The UNDP/OTE project on improving the standard of living of the nomads in the Agadez region is described in Appendix 3, and its center for multiplication of sheep for herders who are unable to subsist is described in Appendix 3. In addition, there is a UNDP proposal for control of tsetse fly in the Say region. In the past, German aid has financed this program and, presumably, might undertake the $500,000 proposal prepared by UNDP. (Appendix 4)

FAC with IEMVT is undertaking a project for aerial photography of three areas near Ekrafane and Toukouns at 1:5000 and attempting to associate

the results with the yield of the pasture. There are 1968 and 1969 photo series but those due to be taken in September 1974 were delayed because of the military take over. Yield studies were still made. It is intended, subsequently, also to use ERTS data for correlation with the aerial photos and the yields. The laboratory for Applied Remote Sensing, Purdue University, is supplying enhanced imaging from ERTS at its own expense in order to see whether images can be used and to obtain the groundtruths and yields of pasture.

D. Appraisal of the Interventions: The SEDES proposal for development or modernization of the livestock production in the pastoral zone appears to have the following problems:

1) it assumes a static situation for the output of the livestock sector, which, judged from the change in reported slaughter and official export, is probably not true.

2) it assumes that it will be economically feasible and acceptable to pastoralists to destock their male cattle at a younger age. This is financially and technically unacceptable to the pastorialists.

3) it assumes that state or parastatal ranches can grow animals at a price which is competitive with the traditional sector, which has not previously been demonstrated as possible.

4) it recommends irrigated forage production for commercial cattle production which has not been demonstrated as feasible economically or socially.

5) it requires a rotational system of using range land with a reserve for seeding, which has not been feasible or workable in any of the previous attempts.

6) it involves creation of growing ranches and industrial feed lots, which are unable to complete with the private sector.

7) it involves reorganization of the marketing system, which has been unsuccessful wherever attempted in West Africa.

The program of the centers of multiplication, a series of six 20-50,000 hectare ranches, does not appear to have either the administrative structure, the supply of animals, or the operating budget to enable it to succeed. Under the present circumstances, after a good rainy season, it is doubtful if it can perform useful function. The FAC proposal to

introduce and multiply the Sokoto Goudali cattle, at the center of multiplication they are financing, will be a useful project. Perhaps it is possible to reduce calf mortality by avoiding the taking of young weaned or near weaning calves on transhumance. However, under the circumstances, it is by no means clear that the pastoralists will sell or entrust their calves to salvage centers.

Restocking for herders who are unable to subsist is a difficult problem. Clearly, these people are not to be kept without means of support in camps. On the other hand, very few of them did remain in the camps during the 1974 rainy season. However, since the basic problem is too many herders with too many livestock for the hydro-pastoral resource, little will be accomplished by returning to the 1973 status as quickly as possible. Future drought losses will be great and the probability of causing permanent damage to the ecology will increase.

The FED program of mixed farming and peasant livestock feeding, as well as the provision of a plant to make mineral mixes, is basically sound. The finishing of cattle and sheep in the southern part of the country, with access to the Nigerian market and transport from the frontier to the city markets, ensures a ready sale for the finished product.

A sheep research and breeding station could, if well set up, be helpful to the livestock sector as a demonstration and extension center and as a source of improved stock. However, as a supplier of stock on credit to herders who are unable to support their family, it has the same problems as have been pointed out with cattle.

IV. PROGRAM RECOMMENDATIONS

A. Limitations on Livestock Development

1. Niger is extremely short of trained personnel. There are only three veterinarians, no people with advanced degrees in non-veterinary specialties, and only eight with the equivalent of a B.S. A critical problem has been the lack of recognition of any university level degree in livestock specialties other than the DVM; as a result there are no such people currently working in Niger. It is clear that the livestock program cannot be effectively carried forward with existing staff.

2. The milieu is difficult. Rainfall is low and variable. The herd increases in size until it exceeds the carrying capacity of the hydro-pastoral resource base and then suffer losses which temporarily restore a tenuous ecological balance.

3. There is a fundamental lack of understanding of the basic problems of the nomadic herders and of their perceptions of solutions to these problems.

4. Along with a lack of understanding of the herders' problems, there is an inability on the part of the administration and the donors to make sound hydro-pastoral developments without damage to the environment. Most areas remaining to be developed need drilled wells, yet there is no effective way to control their use.

5. Animal traction has made a poor start. It has not been incorporated into a profitable technical package for mass adoption by farmers. Experience so far indicates that larger farmers buy draft equipment and hire it out to others rather than use it on their own farms.

Recommendations

In Niger, it appears that the programs of other donors cover the major needs in the field of calf salvage, provision of mineral supplements, drugs, and peasant finishing of livestock. In addition, the AID millet program includes a significant animal traction activity. Nigerian livestock sector planners agree that we know of no effective intervention in the Sahel and feel that too many donors attempt to impose projects upon the pastoralists but fail to determine what the pastoralists perceived their problems to be and how they thought they might be solved. This leads naturally to the following sequence in which to plan livestock sector development:

1) what do the herders see as their major problems?

2) what do government livestock planners consider to be the major problems?

3) obtain agreement on the interrelationship between these perceptions of the problem; and

4) develop: a) list of priorities from the herders and livestock planners; b) methods that might be tried to resolve the problems; c) understanding of the comitment that herders and planners are prepared to make the solution; and d) to reach a feasible program of intervention

Execution of this sequence will require the joint participation by herders and planners in livestock seminars, with technicians in attendance to facilitate dialogue and to assist in defining issues, establishing priorities, and selecting approaches.

The zone near Agadez inhabited by the Tuareg, where preliminary work has been done by the UNDP, would be an ideal location for initiating livestock seminars. This approach has the support of the Director of Livestock

Production, the Minister of Rural Economy, and the expatriate advisors in the Ministry and in the Livestock service.

A two year preliminary project in the Agadez region has been completed and a three year follow-on project costing $1 million has been proposed. The project has had some interesting results in soil and moisture conservation and in promoting irrigated vegetable production. However, the interventions in livestock production - improved herd management, rationalisation of pasture management, followed by improvements in organisation of livestock marketing - have been undertaken without consulting herders and without incorporating their perceptions of problems and solutions in project activity. A second approach to livestock development activities involves establishing a demonstration and extension center at Sud Tamesna, near Tahoua. A financial dossier has been prepared on this project which also could involve participants in design and implementation.

A possibility exists to set up a peasant livestock feeding project at Madoua. Feeding projects along the Nigerian border have the possibility of export and transport of the finished animals by truck from the Nigerian border to the terminal market. This is probably the only feasible location not already included in the FED project. Moreover, it would be quite possible for A.I.D. to participate in the FED peasant finishing project, and there are obvious advantages to this kind of multi-donor approach to project implementation.

APPENDIX 1

STATIONS FOR CALF SALVAGE - ATELIERS DE SAUVETAGE DES VEAUX

INTRODUCTION

In a normal year, calf mortality in the nomadic and sedentary herds is of the order of 30 to 40 percent. This is mainly caused by malnutrition (in part competition between the families of the herders and the calves for milk) which leads to a low level of resistence to internal parasites and diseases. In a serious drought, the milk supply is diminished and calf losses are even greater. The competition for milk between the children and the calves leaves little milk for the calves from the smaller number of cows and the diminished milk yields. As a result, because the calves cannot stand the migration to the rainy season pastures many of them have to be slaughtered or sold. Establishment of simply constructed calf salvage stations could play a role in reducing this loss, which with the present state of the national herd, would be important.

OBJECTIVE

To establish a pilot station for salvage of 1,000 calves purchased at the end of the dry season or at the beginning of the rainy season and after six to seven months to return them to the breeding herd.

DESCRIPTION

The station would be in a good pasture area in the wetter part of the Sahel, with 400 to 450 mm rainfall, close to a major cattle market where there would be a considerable passage of herds and supply of agricultural by-products. A sealed or lined well for a supply of clean water is necessary.

The extension and livestock services would carry out a campaign to inform the herders of the possibility of sale of their calves to the station and the possibility of repurchase on their return from migration. Ideally, purchases would start in March for calves which have had stress in weaning and would be concentrated in the early part of the rainy season (June). This would include calves born at a time when the milk supply is the lowest. Calves would have to have a minimum state of health to avoid abnormal losses in the station; losses should be kept to five percent or less.

The calves would be kept in pens of 25, with 50 m^2 (500 sq ft) area. Pens would be made of local posts and thorn bushes, with straw shades, and mangers of wood or of half oil drums. Calves would be individually fed in the first few days with reconstituted milk in buckets or calabashes. After that they would be fed as a group. The calves would be fed reconstituted dried milk, cotton seed, straw, and, in the rainy season, pasture. The pasture would be grazed in rotation to reduce the problem of internal parasites. The calves should weigh 50 to 60 kg at the outset and about 140 to 150 kg when they are ready for sale. The buying price will average 3,500 f and the selling price slightly over 11,000 f.

BUDGET:

ITEM	CFAF
Structures (capital investment) and mangers for 1,000 calves	3,000,000
Scales	300,000
Straw shed	200,000
Other buildings	500,000
	4,000,000
Purchase of animals (revolving fund) 1,000 calves X CFAF 3500	3,500,000
Purchase of feed (revolving fund)	6,500,000
Labor (revolving fund)	1,000,000
Total Cost (excluding capital)	11,000,000
Sale of 950 calves at CFAF 11,500	11,000,000

EXECUTION

The Animal Husbandry and Extension Section of the Direction of Livestock Production will have the responsibility of operating the station. This section has requested (unofficially) Peace Crops assistance in construction and operation of the center.

BENEFIT

This pilot station, apart from its direct effect in saving calves, is to serve as a model for a project to be started in FY 1975 or 1976 with six other stations. The impact of the whole program is expected to affect annually a number of calves equal to almost 10 percent of the calf crop.

APPENDIX 2

MULTIPLICATION CENTERS FOR CATTLE-AUGUST 1974

Because the cattle herd losses in the 1972/73 drought are estimated at 50 percent, and as high as 80 percent in the pastoral zone, herders were forced to liquidate large numbers of young males to try to limit their losses and to preserve a nucleus of breeding animals. The remaining herds comprised in the best situation adult cows, heifers and year old calves. Given favorable pastures these herds should theoretically be able to serve as the foundation for rebuilding the herd. However, many of the pastoralists and farmers were forced to sell the calves and heifers and even the cows in order to obtain food. It is essential to recover the heifers and heifer calves which are presented on the markets and remove them from the traditional circuits, where the chance is high that they will be slaughtered or exported and place them where they can be guaranteed a life in a breeding herd.

In the short term, the centers will receive the young females that the herders are forced to sell and permit them to be saved to form the essential basis for rebuilding the herd. Later the Centers will be used for selection of stock for improving the qualities of the herd. They will also serve as a basis from which other operations can be launched, such as extension, reduction of calf losses at weaning, forage reserves, centers for dissemination of supplementary feeds for milking cows, and better marketing of the offtake.

OBJECTIVE

The project is to provide the infrastructure for centers to hold cattle for building cowherds of traditional producers. The first phase will be to recover the heifers and a few young bulls being presented on the market for slaughter. The cattle will be grouped in the Centers and held from March to August, and then redistributed to the impoverished herders to enable them to start again. Meanwhile, the Centers will gradually build their own herds to be ready to start the second phase: The management of a permanent herd which with performance testing will provide superior lines. These lines will be used to multiply cattle to be introduced into the national herd and result in real progress in traditional cattle production.

Each center will have about 2500 herd of 1 to 3 year old cattle, of which most will be redistributed among the herders. Later such centers will produce 300 selected bulls and 300 selected heifers for dissemination with extension to the herders.

The centers will be located in each of the major cattle producing districts: Dosso, Tahoua, Ouallam, Maradi, Zinder, and Diffa. They will be preferably in the 400 to 450 mm rainfall zone to reduce problems from drought on pasture production and to offer the possibility of rainfed forage

production. They should also be close enough to the millet and cowpea production to be able to graze the stalks at the end of the dry season.

Being in zones where there are many herders, the centers can also serve an active extension function. Since they will be distributed throughout the zone, this effect will be widespread. They will also be able to act as centers for other activities, such as saving young cattle at the end of the dry season, collecting young males for the cattle feeders, peasant, commercial, or industrial. For this reason they should be located near a large cattle market.

The center will consist of about 20,000 ha with a capacity for 2,000 tropical (250 kg) livestock units, with seven ha/unit with supplementary feeding at the end of the dry season. The area will be enclosed by a barbed wire fence. Each center will have two pumped wells, about 250 meters deep, with a yield of 100 m^3/hour for water supply and irrigation. The centers will have corrals, tick baths, scales, a 200 m^2 open covered storage, offices, houses tractors, and machinery, land rovers and a truck.

The budget for each center includes:

Investment	CFAF
Water supply	84,000,000
Production buildings, corrals, etc.	7,700,000
Housing and offices	12,000,000
Fence, 80 km.	24,000,000
Tractors, machinery and vehicles	8,500,000
Cattle 1,000 head X CFAF 20,000	20,000,000
	156,200,000

Operating Expenditures	CFAF
Herders salaries, 20 X 120,000	2,400,000
Supplementary feed, 100f X 15,000f	1,500,000
Vehicle operation, 100f X 15,000 km 60f X 15,000 km	2,400,000
Operating water supply, 15f X 200,000 m3	3,000,000
Drugs	500,000
Maintenance of equipment	500,000
	10,300,000

Summary

Investment		156,200,000
Operations	3 years	30,900,000
Contingency		8,900,000
Total		196,000,000

APPENDIX 3

REBUILDING THE SHEEP HERD AND INTERVENTIONS FOR THE SECTOR - JULY 1974

The drought and lack of pasture caused about 1/3 loss of the national sheep herd but in some areas the losses were more severe, up to almost the complete herd.

In 1972 the herd was estimated at 2.85 million head, producing about 8,000 tons of carcass meat, with 2-3,000 of it being exported on the hoof or as meat. The sheep supply accounts for 10 percent of the domestic consumption of milk and 400 tons of skins.

Improved fecundity and potential for lambing at an early age will help programs to rebuild the herd and later to increase its productivity.

In the arrondissements of Tchintabaraden and Tahoua there are many sheep herders who have had losses which may exceed 70 percent. The impoverished herder families camp close to the centers of food distribution.

The sheep center will be attached to the FED-financed cattle multiplication center at Tahoua. The sheep husbandry center for which UNDP has proposed $400,000 funding, will, like the cattle multiplication center, seek to rebuild the herds by lending herds of 30 sheep as a center of extension, and subsequently for selection of improved breeding stock. The center will cover 2,000 ha, within the 50,000 ha of the cattle center.

In order to reduce losses and too early marketing, the sheep will only be provided for herders who have some sheep or who are qualified and experienced in herding them. Herds of 30 head or the number required to make up an existing herd to 30 will be provided. The center should buy 1,000 head the first year, 1,500 the second and 2,500 a year thereafter, making 10,000 head in 5 years.

Repayment for the sheep will be made in 5 years, with one years payment deferred. The herder will give to the cooperative a castrated male over 6 months old for each animal borrowed. The sheep will form the financial reserve of the cooperative, and can be sold and the funds used:

1) to build a stock of millet;

2) to buy ewes and ewe lambs; and

3) to buy supplementary feeds, drugs, or material for diffusion by the center.

The extension program will include vaccination, parasite treatment, mineral licks, and lactation rations. Practices can include suckling of orphan lambs, castration of males, etc: 44 percent of the funds are

expected to be spent on the extension program. There will be 2 Nigerien livestock assistants (one speaking Tamacheg and the other Peul) in charge of the center, with 20 shepherds. Some expatriate volunteers trained at the Rambouillet shepherd school could be included. The assistants will be responsible for buying the herds on the local markets, quarantining them in the center, marking and with the veterinary service, vaccinating them against anthrax.

The budget is as follows:	CFAF
Buildings	4,000,000
Land Rover	2,000,000
Purchase 10,000 sheep at 4,000f	40,000,000
25 camels for herders at 20,000f	500,000
	46,500,000
Operations	
Drugs 5 years including syringes	15,500,000
Feed supplements 5 years	19,000,000
Small equipment	3,500,000
	38,000,000
Vehicle 70f X 20,000 km X 5 years	7,000,000
2 livestock assistants	-
2 shepherds X 1st year	240,000
5 shepherds X 2nd year	600,000
10 shepherds X 3rd year	1,200,000
15 shepherds X 4th year	1,800,000
20 shepherds X 5th year	2,400,000
	13,240,000
Contingency 2%	2,000,000
Total	99,740,000

This includes a minimum of infrastructure, little or no administrative cost, no expatriates and a large budget item for supply services to the herders who have suffered losses.

APPENDIX 4

CONTROL OF TRYPANOSOMIASIS OF LIVESTOCK
FAO REPORT BY P. FINNELE DVM MARCH 1974
AGA: NER/74/002/A/01/12

The southwestern part of Niger, which offers good possibilities for forage production because of its higher rainfall, supports a herd of 470,000 head of cattle, but the Niger valley and those of its tributaries south of Say are infested with tsetse flies. The zone also serves as a zone of passage for cattle moving to dry season pastures in Upper Volta and Dahomey.

All of the cattle in Niger are Zebu and a high proportion of the cattle passing through this area contract trypanosomiasis. The area is also infested with Simulie, the vector of onchocerciasis, which is to be controlled by the WHO program starting in November 1976. It is hoped to clear the tsetse flies after this campaign starts and to develop the area for mixed farming.

The infestation of G. tachinoides and G. morsitans submorsitans extends through the Niger valley, and Tehoa, and Mekron valleys. The northern limit is the deforested barrier at Darebangou, about 50 km south of Say. The Goroubi and Dyamanfou valleys and the Niger Valley north of Darebanfou can be considered free from tsetse flies. Another infestation of G. tachinoides has been reported near Bengou, in the Dollol Maori. The area is covered with mango groves.

The morbidity of trypanosomiasis in cattle has been studied for several years (German aid) and is 5-11 percent in the infested regions. Human trypanosomiasis is rarely reported and seems to be no great problem in Niger.

The number of animals treated has typically been a function of the requests received from the herders and the supply of drugs, provided by the donors. Prophylaxis is obtained by using Trypamidium and cure by Berenil. A project for 300,000 doses has been submitted through CLISS. In the past, the number of doses used ranged from 32,000 to 98,000 a year.

Campaigns against tsetse fly have been used since 1942, when the health service cleared the brush from the Niger Valley above Say. From 1967, the Livestock Service, with German aid, has sprayed the valley between Say and the point where the Tapoa enters the Niger. A fence has been erected to limit movement of wild and domestic animals.

In 1969-70 a successful helicopter spraying campaign was carried out. Two applications, three weeks apart, on 1200 hectares cost about 28,000 CFAF ha sprayed. Since then a technique of helicopter spraying has been

developed in Nigeria, using a selective system, sparying about 10 percent of the vegetation, with 1.5 kg of active material (6 liters of liquid Endosulfan 25%) a hectare. This cost CFAF 3,000 ha for the helicopter, CFAF 2,800 for the insecticide, and CFAF 575 for preparation of the ground, etc.

Currently, the OMS (WHO) is making a study of new insecticides, and the results should be used as a basis of the project in Niger. The area to be cleared will first be surveyed to identify the vegetation types infested, the areas, the means of application of insecticide, and the tsetse sites. The Dallol Maori site will need a separate survey.

The necessary area will then be sprayed, the barriers created, and subsequently, the area will be surveyed for any reinfestation.

Budget	CFAF
The preliminary study will cost about	12,500,000
Spraying program, Niger river	
Fixed costs	22,250,000
Variable cost 4200 ha X 7350	31,375,000
	53,625,000
Spraying program, Dallol Maori	15,000,000
Tsetse barriers	12,500,000
Surveillance	10,000,000
Other costs	21,375,000
	125,000,000

APPENDIX 5

IMPROVEMENT OF LIVING CONDITIONS OF THE AGRICULTURAL AND PASTORAL POPULATIONS IN THE REGIONS OF AGADEZ AND ARLIT

From September 1972 to July 1974 a preliminary project was started in the Erhazer region near Agadez, addressed to the n mads of the region who are mainly Touareg. The major enterprise of the region was extensive livestock production; however, the build up of the livestock population and the pressure of population and in recent years the low yields of crops and fodder in the dry season pasture areas in the north of the Sudanian zone and the South of the Sahel have made production difficult. In addition, in recent years, due to scarcity, the price of millet has greatly increased in relation to that of milk. The herders have been obliged to sell their animals at a low price in order to subsist.

This population has also been subject to the pressure of desertification moving southwards, due to the series of dry years as well as to the pressure of population and animals on the fragile ecology of the rangeland. The nomads are also losing some of their source of income, such as running camel caravans, which are being replaced by modern means of transport. Lack of alternatives has accentuated the need for more livestock in order to subsist, and this has increased the pressure on the natural resources.

There are, however, some other resources in the region that are not fully exploited. Apart from the possibility of improving the utilization of the rangeland, irrigated agriculture can be developed around wells, water management can be improved by use of small dams, erosion can be controlled at least in part, crafts and tourism can be developed, reforestation may be feasible, and public health can be improved.

With five years of below average rainfall, with the loss of most of the cattle in the region, and with nutrition and health in a precarious situation, the GON started the project to improve the living conditions of the nomadic population at Erhazer. The long-term objective was to help the people in this type of ecology to find ways to improve their livestock production and their transhumance which is essential to prevent the degradation of the environment. Along with this were improvements in irrigated farming and health.

The first phase has provided information on soil conservation possibilities. Due to the temporary decline in grazing pressure, it is a suitable time to introduce changes while the rangeland is recovering. There are also many people who are prepared to do the work involved in exchange for food and a small payment.

There are several demonstration projects organized by voluntary agencies, missionaries, etc., making small structures to reduce run-off of water and wind erosion, planting trees and shrubs, improving vegetable

and fruit production and marketing. There has long been a tradition of vegetable production in the valleys and the production can be improved and expanded if recharging the underground reservoir is improved by infiltration pits, small dykes, etc.

The present situation and the possibilities have been laid out in a report by M.R. Ballacher, a soil conservation expert of the FAO.* The project activities include:

1) The improvement of livestock production by "improved management of the herd and rationalisation of the range management, followed by improvement in marketing." The reaction and participation of the nomads will be observed, and the impact on the pastoral zone ecology.

2) Improvement of irrigated farming around existing wells, new deep wells, artesian wells, and the Koris (valleys). Increased local food production and extension suitable for the whole region will help those who have sedentarised around the wells. Small ruminants for mixed farming, better marketing and starting cooperatives are included in this phase.

3) Study of tourism and the potential of crafts to bring greater benefits to the local population.

Four full-time resident experts will be provided:

1) team leader, development expert with experience in arid zone and pastoral problems;

2) Animal scientist and range management;

3) Agronomist, specialized in irrigated agriculture and extension; and

4) Associate - expert.

Additional technicians include a part-time expert in tourism and consultants in range ecology, agronomy and other disciplines.

The GON will contribute:

1) one ATE**

*Project UN/OTC Niger: Improvement of living conditions of Nomads at Erhazer (Agadez): Conservation of water and soils. 21 Feb.-9 April 1974.

**Agent Technique d'elevage

2) 5 agricultural moniteurs (extention workers;

3) 1 specialist in charge of the tree nursery;

4) 5 extension workers in the UNCC (Cooperative movement); and

5) extension workers in other fields.

GON will also solicit volunteers from foreign agencies to help with livestock, agriculture and other programs.

Budget

3 experts plus associate expert	$ 270,000
32 man months of consultants	80,000
Training local personnel	24,000
Vehicles and equipment	49,000
Interventions	
Livestock including $166,650 for rebuilding herds	251,000
Erosion control	54,000
Agriculture	135,100
Maintenance of vehicles and building	55,000
Local personnel	44,000
Secretariat and reports	16,500
Contingency	21,000
	999,600

NIGER
EDUCATION AND HUMAN RESOURCES SECTOR ASSESSMENT

In 1973 the Ministry of Education received 17.5% of the GON's operational budget. The system has retained its French heritage, with some components of curriculum content adapted to Niger, but with the output of the system bearing little relationship to the manpower needs of the country. Whereas France is quite urbanized and about one-half of school graduates can expect to play an active and productive role in the tertiary sector, in Niger the modern tertiary sector is very limited and urbanization is just beginning. Thus, the French classical education format fails to serve the needs of a population dependent upon agriculture and livestock. A recent Montreal University study even suggests that the present education system may be doing more harm than good.

The growth rate in school enrollment in Niger has been much below the level projected, and the wastage and repeater rates remain much too high. The increase in primary education has reached 11% instead of the 18% targeted. In absolute figures primary educational enrollment has increased from 13,887 in 1958 to 100,892 in 1973 which in view of population growth, has meant that enrollment increased from 2.5% to just over 11% from 1958 to 1973. However, even this level of achievement is plagued by profound disparaties in access to education. It has been estimated by Amyot, Beaugrand-Champagne and Jadotte of the University of Montreal, who performed a study for CIDA, that primary school enrollments extend from 4.2% and 5% at Tchintabaraden and Magaria respectively, to 60% for the city of Niamey. Furthermore, the breakdown between urban and rural enrollments is equally imbalanced: the enrollment rate for the whole Department of Niamey is 17.7% while for the city it is 60%. The cities of Zinder, Maradi and Tahoua have primary enrollment rates of 37.7%, 37.6% and 30% respectively, while their respective departments have rates of 9%, 10.1% and 10.6%.

At the secondary level, the enrollment rate is 1% with 8,103 students in the first cycle and 901 in the second. There is obviously profound wastage between primary school and the first cycle of secondary, as well as between the first and second cycles of secondary. Furthermore, the Department of Niamey alone has 45% of total secondary school enrollment.

Technical training is almost non-existent: the Lycee Technique de Maradi has 179 students enrolled while the Institut Pratique de Developpement Rural de Kolo (agricultural) has about 130 students enrolled. There were 250 students enrolled in normal schools in 1973.

The number of Nigerian students at the post-secondary level abroad went from 83 in 1965 to 365 in 1973. The Centre d'Enseignement Superieur was created in 1971 with 168 Nigerian students and in 1973 it had 78 enrolled

in the Superior School of Science and 90 in the University Institute of Pedagogy. These entities have since become part of the University of Niamey. It should also be noted that an analysis of the careers being chosen by university students overseas showed that only 22 out of 342 (6.4%) received training as agricultural engineers in 1970 and only 18 (or 5.3%) were preparing to become veterinarians--perhaps the two most critical professions required for Niger's economic development.

Thus, in spite of considerable efforts made since 1960 to generalize and democratize schooling in Niger, 88% of school aged population has not been touched, gross disparities have continued between regions and between rural and urban areas, and only a very small minority of the students who actually get into school can hope to remain there long enough to derive any social, economic or political advantages from it. Niger has not maintained the rate of growth achieved during the first years of independence: from 1967 to 1970 the rate of growth of school enrollments dropped compared to what was achieved prior to 1967 and it dropped even further between 1971 and 1973. Excluding the funds devoted to ITV (essentially provided by FAC), the educational budgets have remained stable since 1967.

I. EDUCATION REFORM

Concerned over the dysfunctionalism of the existing educational structure, reinforced by the failure to achieve results from limited attempts at primary school ruralization, the GON has had educational reform under serious consideration at least since 1972. Three different series of studies have been conducted to examine the existing educational situation and to make recommendations on reform:

1. The Report of the sub-committee "Education Emploi" prepared for Decennial Perspectives, 1973-82, was accomplished during 1972 by a high level group of government officials representing the ministries most concerned with the problem;

2. On May 19, 1972, a National Commission for the Reform of Education and of Educational Planning was formed. The Commission in turn established a permanent technical sub-committee, whose membership was largely derived from officials in the Ministry of National Education, to conduct a series of hearings which solicited input from teachers, parents of students and members of the National Assembly. The technical committee submitted a report in February, 1974 (Une note d'orientation de la reform de l'enseignement); and

3. The Presidency created on July 5, 1973, an interministerial committee "on television" which would examine the extension of educational television at the primary school level, to the post-school level, to the education of adults and eventually to recreational television programs. The major reporting which has resulted from this inquiry relates to specifics

for the establishment of a T.V. network linking Niamey and Zinder and providing T.V. coverage to approximately 80% of the total population. FAC, which has funded the establishment of the T.V. capability in Niger, was well represented in the committees and study groups which made recommendations on the future role of ITV in Niger.

In addition to these contributions from internal entities, analysis and recommendations have also been forthcoming from the CIDA-contracted study mentioned above, performed by the University of Montreal (Contribution a la Définition d'une Politique Integree d'Education des Masses au Niger, April, 1974), plus the IBRD report on Niger Education which has been completed and submitted to the Government of Niger but which will not become available until the GON accepts the report.

The National Reform Commission's report clearly points out that in spite of the accomplishments achieved in education during the past decade (increased enrollments, re-organization), the educational structure is failing to meet national needs. The Commission specifically noted the following weaknesses:

1. The growth in enrollment is much lower than planned;

2. Wastage and grade repeating rates are much too high;

3. The inequality of educational availability between villages and cities has been somewhat reduced, but even so, rural schools often have students too weak to succeed while the pressure for education continues to grow in the cities;

4. There continues to be a flagrant inequality in education for the minorities;

5. Post-school and non-school educational activities are of marginal value and students coming out of primary schools have difficulty in entering into productive activities;

6. Finally, in spite of some improvements, the effort to achieve a global reform of Nigerian education has not made any progress.

The Commission made recommendations related to the training of teachers, to school construction, to improvement in the output of the system and to reforming the examination system.

It is understood that the IBRD report will in part review the Commission's work and will endorse the recommendation that Niger undertake a fundamental reform of the entire educational system. However, it appears that the IBRD will express concern over the failure of the Commission to

establish major policy guidelines or principles which could then be used as criteria for measuring the extent to which recommended reform options will or can achieve national developmental goals.

Nevertheless, it is also felt that the broad long-term objective must remain the generalization of education, and that medium-term educational programs should not be strictly limited to projected employment opportunities. Massive scholarization could, through its own dynamism, modify the needs of the economy. Naturally, the new system ought to reflect the constraints under which the economy and the administration of Niger must operate.

The Commission believes that fundamental education must be directed toward the mass of students and oriented toward an economically productive life, but that it must also satisfy the need to prepare an elite who can continue on through the secondary and university levels and who will also be oriented toward meeting Niger's upper level manpower needs numerically.

As part of national orientation, according to the Commission, studies should be made on the introduction of national languages in primary school, improvements in the teaching of reading, writing and math, and the adoption of programs integrated into the national environment and accentuated by continuous practical applications.

It is understood that the IBRD report criticizes the recommendations of the Commission and briefly offers six different options which the GON might consider in making its decisions about the shape of the reform. As will be noted, about the time that this series of educational reform recommendations were being submitted to GON, the military coup occurred. While there is a strong feeling that an educational reform will in fact be launched, the new government has not yet indicated what the reform will be or when it might be initiated.

Until the contemplated educational reform is defined and announced, it appears that there is little A.I.D. could or should do regarding the formal education structure. Once the reform has been proclaimed, however, it should be studied carefully to determine if it contains programs whose implementation requires inputs which the U.S. would be especially well-qualified to furnish. Provided that the assistance would fit criteria established by both the GON and USG, sympathetic consideration should be given to U.S. participation in the reform effort.

There appears to be some possibility that Niger may establish a new, potentially very important, model which might subsequently be of interest to other developing countries. What could evolve would be a new basic education program which might be termed "functional education". There would not be concern for "formal education" or "non-formal education" systems

(such as are being created and expanded in Upper Volta), or for a "mass education/non-formal" approach which tends to be independent of the educational structure but is communal and practical in its focus. Instead, educational criteria may be developed identifying a basic core of skills and performance capabilities which citizens should possess. To achieve these, the facilities available will be mobilized with little concern as to whether the teaching/learning/practical experience occurs in a school, a non-formal institution, by radio, agricultural extension, or whatever. The objective will be to maximize the use of all facilities available and to integrate them in order to achieve the set objectives. If this approach is in fact adopted, then it is strongly recommended that A.I.D., if invited, should share in attempting to prove the model's viability and subquently its generalizability within and beyond Niger.

Recommendations in the Present Formal Education Sector:

There are certain institutions which appear to be worthy candidates for assistance in view of the contributions they are making to human resources development. Most observers believe that these institutions stand little chance of being adversely affected by the impending reform.

1. Ecole Nationale d'Administration: This school uniquely provides training for upper level (short of the license), intermediate and lower level personnel for the government and for its Nigerization program. It also accepts trainees from private business and offers special training courses in accounting and business management when there are enough students to form a class. The school is under the supervision of the Minister of Civil Service and Labor and its charter (Law No. 70-4 of January 22, 1970) states that its functions are to provide "training prior to employment and continued training after employment of personnel of government bodies and of the parapublic and private sectors of the national economy." In addition, "The National School of Administration may be commissioned to do research work in public administration and organization and methods."

The school undertakes training which ranges from long-term, academically oriented programs to short-term, special, practical courses. In terms of civil service employment it trains people from the upper grade (class A), through classes B,C, and even D at the low end of the job classification spectrum. At the upper level the training is in general administration, while at the middle level there are regular general administration sections (with specialization in financial services, in fiscal and public property, and in labor and social security), a judicial section, a customs and excise section, an accounting and enterprise management section and a secretarial section. The lower level options include a section for administration and judicial service agents, a section of commercial accounting and a typewriter section. There are lists of special courses given for government officials at all levels.

ENA has grown from 11 students in 1960 to 1,332 in 1973. By that year ENA had awarded 205 diplomas plus 409 brevets and certificates in addition to having had 2,105 participants who had received training in special courses. ENA is playing a major role in the implementation of the national Nigerization plan which, it is projected, will be completed by July of 1980.

The school receives substantial UNDP assistance which will continue until 1978 when the Nigerization program will be 90% completed. The school's major need, which was clearly demonstrated, is to have a new library and a new librarian. The present librarian is an American on leave from the Library of Congress as a UN volunteer. The Director would very much like to replace him with another trained American when his tour of duty ends pending the training of a Nigerien to take over the position. There are a large number of Belgians staffing the school and the possibility of securing Belgian assistance to build the new library (for which a location is already identified and reserved) should be seriously investigated. However, given the importance of this institution to both the government and to the fledgling private sector in Niger, A.I.D. might also consider either building the library alone or in conjunction with another donor. The latter approach should definitely be investigated first, providing the Belgians would not be willing to construct it themselves. A.I.D. has earlier made a contribution to this institution. It is extremely well run--a model of administrative efficiency in itself.

2. Institut Pratique de Developpment Rural (IPDR) at Kolo: IPDR, created in 1933, now operates the only program available in Niger for the preparation of agricultural extension agents. At present IPDR provides training for employees in the Rural Development Services (Agriculture, Water and Forest, Animation, and UNCC) who are usually at the Class D civil service rating level (primary school plus two years of training). Those holding these positions were formerly called Moniteurs, but this category has since been ended. If those who enter IPDR by being recruited by other agencies can complete the two year program and pass the examination, they receive the BER (Brevet d'Etudes Rurales) which qualifies them for promotion to the C1 employment level--that of Agents Techniques. Normally, however, IPDR recruits directly from students between ages 17 and 22 who have their BEPC (Basic Primary Education Certificate, which means they have completed nine years of schooling and passed an examination), after which they, too, take the two-year program at Kolo.

During the first year all students are required to take the following courses: general and special agriculture, machinery, zoology, botany, agricultural chemistry, natural sciences, rural development, economics (management and accounting), statistics, pedagogy and agricultural extension work, processing products, topography, and arboriculture.

Students are also required to take the necessary amount of language training in Zarma and Hausa to become proficient in both of these national languages.

Courses related to specializations are taught during the second year in the following: Rural Engineering Section: rural engineering, irrigation and drainage; Agricultural Section: more special agriculture; Waters and Forests Section: forest law, fishing, game and forestry; Animation Section: techniques for motivating and assisting farmers to improve agriculture; Cooperation Section: credit cooperation.

During the two years there is also practical work. Students work in the mornings in a garden (a collective garden with individual plots), they raise orchards, they work in the fields on crops watered by rainfall as well as on irrigated land, and they attend workshops where they work with machinery, with wood and with iron. They also learn how to dress beef and how to survey land.

The final element of the program is made up of training exercises away from Kolo. The first field experience is required of all students. It is held the first year from May 15 to August 15 (during the growing season) when students are assigned to their own native language area and learn the techniques of agricultural extension work. The second field experience, from October 15 to December 20 of the second year, is divided into three options determined by a student's specialization section: Self-help Commercialization of Peanuts (for those in Animation, Cooperation, and Agriculture); Waters and Forests and the Production and Commercialization of Arabic Gum (for those in the Waters and Forest section); and Management Training in Rice Cultivation (for the Rural Engineering section). The third and final field experience, from January 6 to February 28 of the second year, is in Animation Training in which all students participate in order to learn how to work with the farmers to teach them better agricultural techniques and to secure their cooperation in new agricultural efforts.

At the end of the second year, students take an examination which permits them to graduate with a Brevet d'Etudes Rurales degree. Very few students drop out during the program and very few fail to earn their degrees. Following graduation all students are employed by the government and assigned positions at the C1 level as Technical Agents (Agents Technique) generally responsible for a zone.

At present IPDR enrolls 125 candidates in the 2 year program; capacity is 150 students. In addition, they permit the other services of the Ministry of Rural Development (Agriculture, Waters and Forests, Rural Engineering and Animation) and UNCC to train their own aide-encadreurs (lowest level extension worker) at three to four month programs at Kolo. These other services use IPDR facilities but provide a substantial proportion of their own teaching staff.

A proposal is presently being worked out which would greatly expand IPDR's role and capacity. Beyond the Class D (Moniteurs) and C 1 (Agents Technique) level, which have already been discussed, the agricultural services heirarchy continues as follows: B 2 Conducteur d'Agriculture (Agents Techniques plus two years of training) and B 1 Conseiller Agricole (Conducteur d'Agriculture plus two years of training), both of whom work at

the Arrondissement level; then A 2 Ingenieurs des Techniques Agricoles (who will be graduates of the Ecole Superieure d'Agronomie just starting at the University of Niamey) and A 1 Ingenieurs d'Agriculture (who, at present, can only be trained abroad perhaps after having completed the Ingenieur Technique Agricole at Niamey), both of whom work at the departmental and national levels. It is felt that the promotion of Nigeriens to the B 2 and B 1 levels has been accompanied more on the basis of experience rather than on the basis of new and deeper knowledge, thus IPDR would establish two new two-year courses, one of which would be required (plus experience) for advancement to each level. It is estimated that this would require an expansion of IPDR from its present capacity of 150 to a total of 410. This would include 50 positions reserved for those previously trained as Moniteurs who would have a chance to up-grade themselves. Kolo will require classrooms, electricity, water and dormitories. The Kolo site has sufficient land to accommodate the expanded program.

The proposal to expand IPDR's mission for these programs has merit. It seeks to improve national agricultural graduates of the Institute who have returned to agricultural service. This training would address the critical middle-level manpower requirements, as well as the lower-level manpower needs, in the nation's most critical sector--agriculture. This would also fit A.I.D.'s priorities.

It is recommended that A.I.D. follow this expansion of IPDR and be prepared to assist if requested. There was an informal indication that UNDP was aware of the proposed IPDR expansion and that it was prepared to provide assistance. There is no need for A.I.D. to undertake a program at Kolo if another qualified donor is prepared to do so. However, if American agricultural expertise is required in this effort, then it is strongly recommended that A.I.D. seek to provide it. The Director of IPDR, Mr. A. A. Mayaki, is, incidentally, a charming and dynamic individual who spent some seven years in prison prior to the military take-over because of his opposition to the previous administration. He expressed his pleasure and appreciation at having well-qualified PCV's working at IPDR.

3. School of Agriculture, University of Niamey: The first graduates in agriculture (Ingenieur Agronome) will receive their degrees from the University of Niamey in June, 1975. This capability in agriculture grew out of the School of Sciences (Ecole Superieure des Sciences) provided to Niger by FAC as part of its commitment to the University of the Sahel. The School of Medicine of the University of Sahel was also to be placed in Niger, but the Letters, Law and Economic Sciences faculties were to be placed in Ouagadougou. While the University of the Sahel has apparently fallen victim to national jealousies, any effort which might make possible a sharing of costly faculties, such as Agriculture and Sciences, and sophisticated social science research institutes, would not only be desirable but almost obligatory for countries in such economic straits as Niger and Upper Volta. Judging from enrollment figures at Niamey, it may not be too late to have these facilities still serve both countries: of a total enrollment of 280 in

1973/74, 119 were Voltaiques and 131 were Nigeriens. The Voltaiques were almost totally in sciences and agriculture, and the enrollment of Nigeriens in languages and history was extremely limited. Almost all Voltaiques and Nigerien students attend the university on government scholarships and the Nigeriens are required to accept government assignments upon graduation for a minimum of 10 years or repay the government at 1,000,000 CFAF per year spent on university scholarship--otherwise the parents of the students are liable to pay. Although these regulations have not been enforced in the past, there is considerable feeling that they will be in the future.

The University of Niamey has plans to build the College of Agriculture on the Upper Volta side of the Niger River--in fact, the GON will eventually move the bulk of the university there. Since the institution is just starting, its needs are substantial, although FAC may be willing to continue its contributions for general university purposes. It appears assured that FAC will continue to support the Science faculty, which in turn satisfies substantial academic requirements within the College of Agriculture's program. Thus far, Upper Volta has not started a College of Agriculture--Voltaique students take the first two years in Ouagadougou, then go to Niamey to complete the Licence.

Within the College of Agriculture at Niamey there will also be a livestock specialization established as part of the program. The question of founding a College of Veterinary Sciences appears, however, to be open although a College of Medicine is being established also based on the College of Sciences' capabilities to provide required science courses.

The need for training agricultural leaders, teachers and researchers in this region of the Sahel is obvious--Niger, Upper Volta, perhaps Chad and Western Mali have no institution in their environment available at which to study and there is no research and development capability to initiate improvements or to respond to agricultural needs. Unless there is a massive strike of oil, gold, or other precious minerals, all of these countries must remain basically dependent upon agriculture for life. Even if oil, gas or minerals are discovered, the world's requirements for food still make it imperative that these countries, too, be as productive as possible.

It is recommended, therefore, that A.I.D. give careful study and consideration to supporting the College of Agriculture at the University of Niamey. It should not be necessary for students from the Sahel to study agriculture in France where conditions are somewhat different from those where they will subsequently be applying their knowledge. Furthermore, since Nigerien and Voltaique students have been expelled from both Senegal and the Ivory Coast, the former governments seem determined to have more control over an institutional capability so critical to their economies. A.I.D.'s participation at any level, staff, scholarships, etc., should, however, be closely related to contributions by other donors, and hopefully to some regional agreement--at least between Upper Volta and Niger--providing that they will cooperate in sharing these facilities. It would not be one-way from Upper Volta to Niger since there are presently 106 Nigeriens studying law and economic sciences in Dakar who apparently will not be

able to continue their studies there after this year. These students would, under the previous agreement, be continuing their studies in Ouagadougou. Furthermore, FAC is continuing to build these faculties in Ouagadougou under the previous University of the Sahel agreement. This offers some hope for meaningful regional exchange, sharing and cooperation, although the tide is definitely running against specifically regional activities.

4. Normal School Program at Zinder for Teacher/Community Development Workers: This program being undertaken under the auspices of the Ministry of National Education graduates Professors of School Animation. The program was started with a grant from UNESCO in 1968. After four years of secondary school, the best students are able to go to Zinder for a three-year program oriented toward teaching, community development work and practical experience in a rural environment. After completing the course at Zinder, the graduates go out to teach and to direct students in community development activities. During their first year, teachers and students do a complete monograph/profile of the community in which they are working which can both serve as a source of information for developmental activities, including important socio-cultural aspects, as well as it can establish a dialogue between school and community, expressing the school's interest in the community. The profile also identifies leadership within the local society, and shows concern for traditional institutions and their roles. Reports from officials interviewed in the Ministry of National Education indicated that they thought the program had been well received by the villagers, had provided important and significant learning experiences for the teachers and students, and had potential. The program is being expanded to normal schools at Tahoua and Tillaberry. The problems experienced appear to be largely related to a lack of the basic supplies and equipment the teachers need to serve as effective community development leaders. This in part is a result of poor coordination and/or poor support from extension personnel from other government agencies who in principle are supposed to be able to assist such efforts. Unfortunately, it was not possible to visit the normal school at Zinder, nor to check out the new programs being established at Tahoua and Tillaberry. The model, however, does appear interesting. What is lacking is cooperation in the field, an evaluation of the program with suggestions on its possible improvement, and a mechanism to ascertain that the work of the teachers and students in the school/community development work, including the village profiles, are actually fed into the development effort. It is recommended that A.I.D. attempt to evaluate this model. If the model is found to be serving the goals set, or if it shows evidence that it has the capability to do so, then the model, perhaps on its present limited basis, should be assisted to develop further as an important approach to rural development.

II. SIGNIFICANT PROGRAMS IN THE NON-FORMAL SECTOR

These activities, like those noted above related to the formal educational sector, may also be substantially modified as a result of the proposed educational reform. However, it is again felt that these activities will

be continued or that A.I.D.-sponsored inputs could help to identify what, if any, role they could play in a reformed educational system.

A. ITV: Tele-Niger is a French assistance activity. It is one of the most interesting educational television efforts in the world and has received considerable international recognition for the quality of programming it has achieved. Personnel at Tele-Niger felt assured of the support of the previous government but feel somewhat concerned about their position vis-a-vis the new government. In spite of this, the production facilities at Niamey are being expanded by FAC, and plans have been finished for the extension of the T.V. network in four steps so as to cover 80% of the total population of the country. However, there is a fundamental question regarding cost. Although the GON has not yet had to pay these costs, the IBRD report will probably indicate they would prove prohibitive should Niger ever have to meet them.

The ITV project in Niger began in 1962 and by 1966 it had established itself as an experimental project. It was then decided that ITV should concentrate its efforts on the education of pre-school and elementary level children. In 1967 Tele-Niger was producing programs directed at the first four years of primary school; and in 1970, the fifth year was added. The goal was to establish five years of quality tele-education which would cover the six years of material offered in the formal school and thus reduce the elementary program by one year. All broadcasts are in French and the dominant themes for the first four years are as follows: first year-language; second year-reading; third year-study of the environmental milieu; fourth year-introduction to techniques of observation (scientific approach). Considerable emphasis is placed upon promoting the value of manual work, introducing the elements of technology and encouraging experimentation. The basic theme is "learning to learn".

The experimental period launched in 1967 was to last five years and was to reach 500 centers with a total of 4,000 students. By June, 1971 about 20% of 800 students in 20 ITV classes were actually admitted to secondary schools where instruction was carried on in the traditional manner. The students apparently had no difficulty with the subject matter but had serious problems in learning within the confined formal school environment. It was proposed prior to the coup that by 1981 the system would be extended to reach 100,000 primary school students, at which point it would be cost-effective. While it had been further projected that ITV could reach 85% of the total school-age population from 5 to 14 years of age (some 700,000) by 1985, it now appears that ITV will not reach more than 20 to 25% of the students, or from 160,000 to 200,000.

Recently, ITV was also asked to begin to participate in adult education activities--an area of endeavour rejected in 1962. However, ITV is now willing to undertake this additional responsibility, since the primary school program is fairly well completed.

The major problem facing ITV is cost-effectiveness. There is substantial disagreement over what enrollment level would be required to make the system economically attractive. Any evaluation of this question should include its adult education potential as well as its primary school education function.

A.I.D. is presently involved in an evaluation of ITV in the Ivory Coast. It is suggested that careful consideration be given to the feasibility of adapting the evaluation procedures which will be developed and used in the Ivory Coast to Niger. If this can be done at a reasonable cost, A.I.D. might wish to consider assisting GON to reach a decision on the role of ITV in formal and non-formal education efforts in Niger based on a more solid cost-related foundation than now exists. In fact, the director of Tele-Niger would welcome such assistance.

Evaluations to date have indicated some very gratifying findings: the results in reading and math have been very positive and students were able to use French after only six months of instruction (instead of dragging out the learning of the language through the whole primary school program). There was almost a total reduction of repeaters, and student output during the first four years was 90% instead of the 50% found in the formal schools. Course material was integrated into the milieu, and there was a distinct feeling that the students were more critical and curious than those attending regular schools. Teachers (instituteurs) were employed for considerably lower salaries than those in normal schools. Maintenance costs of equipment were much lower than had been anticipated. Although the GON provided only $175,000 per year in operation expenses, this sum still amounted to $20.00 per pupil year.

What this level of technology costs and what it can produce in a country as poor as Niger provides an important developmental lesson. We shouldn't lose or waste the knowledge to be derived from what has already been expended for lack of evaluation. Nor should larger amounts of money be put into the effort if it has almost no chance of even achieving the level of cost-effectiveness it promised. A careful study of (1) the IBRD evaluation, (2) previous French evaluations, and (3) A.I.D.'s participation in the Ivory Coast evaluation, would help to determine and define the shape of an A.I.D. evaluation of Tele-Niger. If it can be determined in advance, however, that ITV will be selected for political reasons (e.g., to tie the country together, to mobilize support of the people for the new government, etc.) then advanced estimations of the cost-effectiveness of the system would be a waste.

B. Radio Clubs: Association des Radio Clubs du Niger (ARCN) is a para-statal organization which has done an impressive job with limited funds. The organization began in Niamey in 1961 to promote economic and social development among the people. By 1962 groups of listeners were asked to participate in preparing the radio programs and these discussions were taped and broadcast. The topics, related to national social and

economic development themes, became the first regular broadcasts through the national radio network. From that point on, groups of listeners began to be established at different locations around the country ("listening posts") and they not only listened to radio broadcasts together but began to be guided in their discussions by animateurs who in turn provided a feed-back loop to the radio programmers. In addition to Radio Clubs, the association has also established Listening Centers (Les Centres d'Ecoute) which are led by a young person from the village. While these centers were youth oriented, they are structured and function like the Radio Clubs.

The Association is under the direction of the Service de la Promotion Humaine of the Ministry of Development. The ARCN annual budget is 13,000,000 CFAF, and it is met by the GON. There are presently about 70 Radio Clubs in operation. If additional funds were available the Association would seek to establish two to three (depending upon population) Radio Clubs in each Arrondissement (there are 36) for a total of about 108 clubs throughout the nation. They would also like to have one inspector-coordinator in each Arrondissement to assist Radio Clubs to coordinate their activities with development-oriented services--Waters and Forests, UNCC, Health, Literacy, etc. Present budgetary restrictions, however, prevent any expansion.

The Radio Clubs broadcast on Radio Niger and therefore have little competition for their programs. They presently broadcast for 30 minutes twice a week, once in Zerma (or Zarma) and once in Hausa from December through June. During July and September they establish a broadcasting station in the Tamourzak area (N'Gall) where the Tuaregs are grazing their livestock and broadcast to them in Tammacheck. Special emphasis is given to providing information on livestock, range management, and health. Once the herds begin to leave this area the broadcasts are stopped. Tuaregs who have been trained as animateurs work with the Radio Clubs "on the move" throughout this period.

The animateur, or the group leader of the individual Radio Clubs, is selected for the position from among volunteers. Those chosen to become animateurs are sent to Niamey for a three-week training program. They learn about the general development efforts in Niger, the techniques of animation (organization and motivation), how to work with groups, how to fill out the necessary Radio Club forms, how to ask questions (both in discussion groups and in survey research contexts), and how to make reports to club headquarters. The animateur is also taught how to use the radio most effectively with whatever supplies are provided for each club. The animateur is then issued a radio to be used by the club. (It should be noted, however, that officials questioned confirmed that transistor radios were to be found throughout the country--it is one of the first items farmers and nomads purchase when cash becomes available.) Once a year there is a follow-up one week re-training program. Animateurs receive 5,000 CFAF per month during the broadcasting periods and there are many volunteers seeking these positions.

The problems which the Radio Clubs experience are partially related to the lack of structure and depth in program content. The Clubs seek to support GON developmental objectives but a large part of their programs are not "constructive" or "participation" oriented--they are more propagandistic in nature. Each of the major rural action service organizations attempts to get as much time as possible on the air to emphasize the importance of its individual activities. There is no contact with ITV programming efforts (even now that ITV is moving into adult education), and the Radio Clubs use no other supporting media materials except for a "Club" type of newspaper. The most action oriented programs in which ARCN has participated are those which were conducted in support of the literacy program (in some instances the animateurs for literacy and Radio Clubs are the same person) and campaigns in support of UNCC activities. Some of the special themes on health, livestock, social problems and commercialisation of agricultural products seem to have been well received but they lack sufficient consistency, structure and follow-up.

Without exception GON officials felt very positive about Radio Clubs and about the prospects for achieving much greater results from using radio for educational purposes. However, the Radio Club system should be carefully evaluated (the last, rather casual, evaluation appears to have been done in 1964); some idea needs to be obtained of its impact beyond the limited Radio Club audiences (ARCN has not attempted to obtain hard data on its impact on non-club listeners); and an assessment needs to be made regarding the increased impact which might be achieved through augmenting the radio broadcasts with other media--pamphlets, brochures, slides, a stimulating regularly published newspaper, etc.

It is strongly recommended that A.I.D. give favorable consideration to providing assistance to ARCN to evaluate and improve its educational and informational impact in Niger. Part of the assistance should relate to audience assessment, broadcast impact, introduction of new materials, and perhaps improved training to make the feed-back link more effective; but part of the assistance should also be directed toward improved programming accomplished through better coordination between rural action services. Radio can substantially support all of the rural services' activities provided these are goal oriented and provided that their plans and programs are developed in sufficient detail to permit ARCN to interface with them effectively. Assisting with the development of this type of coordination and cooperation capability would be a major part of any outside assistance. On an initial basis PCV's might be willing to work with an A.I.D. Radio Clubs project to help to assess as well as participate in radio stimulated action programs.

ARCN appears to have a good staff and to have made a good start in rural non-formal education activities. The staff, however, has levelled out in terms of growth and program development and innovation. It must have assistance to make the more significant contribution to rural development which Nigerien officials believe they are capable of. In an orally oriented culture where only about 6% of the population is literate, the role of

radio is potentially profound. Now literacy based education must preceed literacy education if it is to reach the people in the short-term.

NIGER
HEALTH SECTOR ASSESSMENT

1. Major Health Problems

The major health problems of Niger are by and large the same as those of the other countries of the Sahel: malaria, tuberculosis, leprosy, schistosomiasis, filariasis (including guinea worms and onchocerciasis) intestinal parasites, and malnutrition.

Malaria: The Government has a proposal to combat malaria through chemical prophylaxis (using nivaquin). It has been estimated that only 70 percent of the population of the departments of Diffa, Bosso, Maradi, and Niamey, 50 percent of Tahona and Zinder, and 10 percent of Agades could actually be reached. The total number of reachables would amount to 2,625,910 or about half of the total population and the proposal would cost $600,000 annually. However, unless some kind of close supervision and follow up is provided, there is no guarantee that the population reached would faithfully and regularly take the pills. Hence, it would seem logical to strengthen the health infrastructure before embarking upon such a project.

Tuberculosis: As elsewhere in Africa tuberculosis is rampant everywhere.

Leprosy: Twenty thousand cases of leprosy are known to exist, implying a significant potential for the support of continuous contagion. Case finding is carried out through a special service staffed with state nurses who dispense sulphone drugs which so far have been available.

Schistosomiasis, Onchocerciasis and Guinea Worm: These diseases are prevalent in the Niger River Basin where ecological conditions favor the breeding of the intermediate hosts - snails (schistosomiasis) and simulidae flies (onchocerciasis), as well as the utilization of step wells or ponds for water supply.

Malnutrition: Malnutrition is probably one of the most important factors limiting productivity and progress in Niger. Very little information is available on Niger diets. The basic staples are millet, sorghum, rice, corn and in certain areas, wheat, manioc and yams. Beans and peanuts as well as wild fruits, berries and legumes contribute to the regimen. The nomad diet is based on milk, surpluses of which are bartered for millet grown by sedentary farmers.

A recent exploratory survey of 31 villages thought to be representative of the 6,000-7,000 Haussa- and Djerma-speaking communities of the country with populations ranging from 108-7,000 each, showed that nearly all the villages were receiving some relief supplies of food. Thus, while the local millet and sorghum supply situation was very tight, there were no outward signs of acute malnutrition. The preliminary results of the survey indicated that a large percentage of children had abnormally low weight-to-height ratios, indicating malnutrition. However, the degree of malnutrition appeared to be moderate. Percentages by department were as follows:

TABLE 1
PERCENTAGE OF CHILDREN WITH BELOW NORMAL HEIGHT/WEIGHT RATIOS

Niger - 1974

Department	Percentage
Tahoua	14.0
Maradi	16.6
Zinder	10.3
Dosso	10.0
Niamey	8.8
Niger	11.5

In the nomadic group, a survey done in 1973 had shown a prevalence of 12 percent malnourished children. The age distribution appeared to confirm the existence of a very vulnerable group of infants between 1 and 3 years of age. Infants are usually weaned at 15-18 months of age. Weaning is abrupt; overnight the child is deprived of his mother's breat and put on an adult diet. Should the mother become pregnant when the infant is younger, weaning takes place immediately.

In the north Tuaregs are still in trouble because they have lost or sold all their cattle. Serious vitamin A deficiency resulting in vision problems is reported.

Primary schools in district capitals have canteens where it is claimed that 50 percent of the children receive a mid-day meal. Basic nutrition education for mothers is promulgated through maternal and child health centers (MCH). School gardens have been started. There is a School Nutrition Service within the Ministry of Health.

2. Health Infrastructure

Niger is divided into seven departments and 32 arrondissements as follows:

Niamey: Terra, Tillaberi, Ouellam, Fillinque, Niamey, Say

Dosso: Birni N'Goure, Dosso, Loga, Gayu, Dogendoutchi

Tahoua: Tahoua, Illela, Birni N'Konne, Madaoua, Bouza, Keita, Tchim Tbaradeu

Maradi: Dahoro, Maradi, Mirria, Tessaoua, Goure

Zinder: Matameye, Magaria, Myrria, Tanout

Diffa: Maine-Sorea, Nguimi, Diffa

Agades: Agades, Bilma

There is a hospital in each department as follows:

National Hospitals

Niamey - 530 beds (possibly 700, but "bed" difficult to define)

Zinder - 377 beds

Departmental Hospitals

Dosso - 41 beds

Tahoua - 77 beds

Maradi - 126 beds

Maine-Soroa - 106 beds

Agades - 54 beds

Thus there is a total of 1,311 beds for a population of about 4 million. Official figures for hospital beds per person include all "beds" available in maternities, dispensaries, etc., resulting in a somewhat optimistic figure of 1 bed per 1,650 inhabitants. Obviously, no figure is really meaningful without a careful geographical study of coverage.

In 1972 there were the following additional facilities in the Niger health infrastructure:

- 30 maternities (with a total of 430 beds)
- 34 hospital dispensaries or medical centers (one in the main town of each arrondissement plus two). A certain number of these are said to have physicians in charge (number not available), but most are run by state nurses.
- 114 rural dispensaries run by certified nurses (a step below state nurses)
- 12 mobile units (described in more detail hereunder)
- 3 anti-tuberculosis centers at Niamey, Tahoua and Zinder with a total of 128 beds
- 9 MCH (PMI) centers (2 in Niamey, 1 each in Agades, Filingue, Magaria, Maradi, Tchin-Tabaraden, Tahoua and Zinder)
- 4 medical-social centers of the Caisse Nationale de Securite Social

- 101 village pharmacies where village populations distant from the nearest rural dispensary can receive basic emergency medical care (first aid)

In addition to these Government-sponsored institutions there are 20 private agencies providing a total of 236 beds, including a clinic in Niamey with 20 beds, a hospital in Galmi with 130 beds, a leprosarium near Maradi, a maternity at Guescheme and several mission dispensaries.

The National Bureau for Pharmaceutical and Chemical Products (Office National des Produits Pharmaceutiques et Chimiques), which is a mixed governmental and private undertaking, has the monopoly to provide government health establishments, local communities and public establishments with pharmaceutical products and medical and surgical supplies. Distribution is made through:

- Popular pharmacies (In Niamey, Zinder, Tagoua, Maradi, Agades, Konni, Dosso, and Tera)

- Depots of Medical Supplies (at Matameye, Magaria, Dakaro, Tillaberi, Ayorou and Mehana)

- Village Pharmacies.

Each of the seven departments has a departmental director of health who is charged with the coordination of all health activities in the department under the direction of the Ministry of Health. In each department there are from 3 to 7 arrondissements each constituting a medical area normally in charge of a state nurse, but in a few cases directed by a physician. He is located at arrondissement headquarters where there is a dispensary hospital with a varying number of beds and generally a maternity service combined with MCH services. In the arrondissement there are generally 3 to 10 dispensaries run by certified nurses and supervised by monthly visits of the state nurse. At the lowest level is the voluntary village health team, consisting of a village health worker and a matrone, supervised by the certified nurse of the nearest rural dispensary. A village pharmacy or a number of drugs given to the village health team completes the services at this level.

The government is strongly aware of the fact that this type of infrastructure can only be effective if two activities are carried out concurrently: a) animation and permanent re-training of personnel; and b) regular control and supervision.

There is at least one mobile unit attached to each departmental headquarters. Each of these mobile units has a physician, one or two state nurses, two to three certified nurses and a couple of nursing aides. These units are charged with case-finding and vaccination. They are located as follows;

Niamey.....3 units (1 for leprosy)

Zinder.....2 units (1 for leprosy)

Dosso.....2 units (1 for leprosy)

Maradi.....1 unit

Diffa.....2 units (1 case-finding 1 vaccination)

Agades.....1 unit (no leprosy found in Agades Department)

Tahoua.....1 unit

Vehicles have been made available by UNICEP and FAC. The Niger Government was to furnish two vehicles annually, but so far none has been made available. The governmental budget allows CFA 15 million ($681,810) for all materials including gasoline. Medicine for leprosy is made available by WHO and vaccine against measles by AID. There is a serious problem of cold storage for the measles vaccine. There is now a total of 11 physicians attached to this service but only one is a Niger national.

The mobile units carry out a vaccination program against measles, smallpox, tuberculosis, yellow fever, cholera, diptheria, tetanus, and typhoid. They are in charge of fighting all the endemic parasitic diseases (schistosomiasis, onchocerciasis, guinea worm) and helminthic infections (taeniasis, anchylostmiasis, ascariasis, etc.) Of the bacterial diseases the mobile units deal with cerebrospinal meningitis which has not been a problem in 1974 but which is still a serious menance and cholera of which there has been no major outbreak in 1973 although sporadic cases occur. One of the difficulties is the lack of facilities for early diagnosis of cholera.

Niger has developed an infrastructure which is within the possibilities of the Government to support financially with some assistance for supplies, transport and fuel from abroad. The Government has clearly realized that such a system cannot function effectively without constant re-training of the personnel at all levels and without regular supervision, and has developed a project designed to insure both of these functions at the lowest possible cost. (see Government Health Plans).

To effectively carry out the above mentioned operations the Niger Government will need:

- Medical specialists and generalists to work for the stationary (fixed) health institutions.

- Physicians with special training (diplomes) in tropical pathology and in public health. These physicians must take a special interest in rural health, environmental sanitation and health education.

- Paramedical personnel, particularly in areas where the Government at the moment has insufficient personnel.

- Means of Transport
  Light vehicles for touring over difficult terrain (in principle the Government would like to possess one car per physician).

  Vehicles for urban use

  Fuel, oil, spare parts, and means (financial) for maintenance

- Technical Material (larger items) for the use of the specialized services of the hospitals and certain dispensaries (microscopes, examination tables, sterilization equipment, etc.)

- Technical Material (smaller items) such as scissors, forceps, scales, etc., to equip the smaller rural dispensaries

- Basic medical supplies and vaccines. A number of standard lists have or will be established by the Ministry (not available at this time) of supplies which will be needed for re-supplying the smaller dispensaries in the rural areas and for the village pharmacies.

- Funds for the yearly organization of seminars at national and departmental level (see Personnel Availability).

  This will enable the Government to carry out regular re-training programs and will permit discussion and understanding among the health personnel of the Government's national health policy.

- Fellowships
  Local fellowships for the training of nurses, midwives, social aids and, when the medical school gets started, physicians. Fellowships for overseas training of specialists.

- Audio-Visual equipment and equipment for the reproduction of documents, largely for health education.

- Buildings
  For the time being priority will be given to overhauling and rebuilding presently available health structures in order to enable them to function. The general policy is, however, to enlarge the health coverage of the country as much as possible with complete integration of all institutions.

3. Personnel Availability

The following health personnel were available in Niger in 1970-72.

Table 2

Medical and Social Personnel - Niger 1970-1972

Categories of Personnel	1970		1971		1972	
	Expat.	Nationals	Expat.	Nationals	Expat.	Nationals
Physicians	60	9	59	10	81	16
Pharmacists (state)	6	4	-	-	4	5
Dentists	3	1	3	2	3	3
Dental Technician	1	2	-	-	2	1
Midwives (state)	2	28	-	24	-	23
Nurses (state)	-	110	20	145	15	207
Health Assistants		45		45		45
Nurses (certified)		461		160		603
Sanitary Engineers	1	1	-	-		1
Hygiene Agents		29		29		30
Social Assistants (state)		6		7		5
Social aides		-		9		-

The figure for Niger nationals with a medical degree is still not above 16. There are about 37 medical students studying abroad at Dakar and Abindjan or in France, Belgium and Germany. The French and other European training, while technically highly satisfactory, is poorly related to the type of work the student will have to carry out in his homeland after graduation. The Niger Government has therefore decided to begin its own training programs for physicians in the near future. This is a highly controversial subject even in national planning circles, but nevertheless apparently it has been decided to go ahead with the training of medical students in Niamey. Thirty students have been inscribed and will begin their studies in 1974. The course will be given in two parts: a) two years in the Faculty of Science where teachers for basic sciences are already available, but professors of anatomy, physiology and biochemistry remain to be recruited; b) four years devoted to medical and surgical theory and clinical training followed by a rural internship, which is expected to take place in Tillabery Arrondissement.

The first 16 students should be ready to enter the clinical phase of studies by 1976, when the Government will be faced with two alternatives: either the university will be ready to provide the clinical training; or the students will have to be sent to Dakar, Yaounde or Abidjan for part two

of their medical studies. It is not the intention to utilize the National Hospital in Niamey for internships but to build a new 100-bed University Hospital and to utilize teaching staff from other medical schools in Africa. This project, which is extremely unrealistic, is estimated to cost as much as 1 billion CFA ($4,255,319).

It is difficult to understand why such a project should be seriously contemplated by the Government at a stage in the development of the health infrastructure when practical assistance is needed at every level, and when the Government is unable to meet more than a fraction of the needed costs for medical materials, transport and fuel. So far requests for assistance for this project have met with little response from FAC, FED and other possible donors.

A little less than half of the expatriate physicians working in Niger are French nationals; others come from Germany (five or six), Poland, Korea, Denmark, Taiwan and Egypt. It is the present government's policy to have Niger nationals in all leadership positions. Expatriate medical personnel have been withdrawn from positions in the rural areas outside the departmental headquarters. Nigerisation of all services is the goal, but it is obviously dependent upon the availability of increasing the number of Niger physicians.

The National School of Public Health trains nurses, auxiliary nurses and midwives, as well as social service auxiliaries. Candidates for state nurse must be 17 years of age and have had 6 years of primary education. The course is of 1 year's duration and 20-25 are graduated annually. There is an obvious need to train more nurses. The present program is supported by UNICEF with 35 fellowships for nurses. (UNICEF also provides 10 fellowships for social assistants (more-or-less health educators) and 5 fellowships for community development workers.)

State nurses are often substituted for physicians at health posts due to the shortage of MD's. It appears that for a long time to come the state nurses will be in charge of services below the level of departmental headquarters and the certified nurses will be running the rural dispensaries.

Candidates for midwife training must have completed secondary school. The course is of 3 years duration with the first year taken together with nursing students. Approximately 5 midwives are trained each year.

Reliable figures are not available for the number of traditional midwives. One 1973 report cited 263 matrones as being active, but a series of other reports makes it clear that this figure is much too low. The Government has initiated a training program for traditional matrones in order to improve their practices so as to lower infant and maternal mortality due to post-partum infections. In 1973 some 241 trained matrones were working in 80 villages in the Department of Matadi.

There was only one sanitary engineer in Niger in 1972. At present there are no training facilities in the country for this essential category of health personnel. Sanitary engineers are very important in the fight against the spread of the four scourges malaria, onchocerciasis, schistosomiasis and trypanosomiasis. They could be trained in Yaounde under the 20-country project "Strengthening the Delivery of Rural Health Services". Sanitary agents (agents d'hygiene), on the other hand, could and should be trained in Niger. This could be done through the mobile teams.

A special paragraph is needed on the secourist (a very bad word implying emergency services only) or village health worker (its proper appelation). The appointment of trained village workers equipped with a small amount of drugs was launched in Niger in the middle 1960's. The choice of the villages where training courses are to be organised is generally decided upon by the Council of the arrondissement on proposals of the medical chief of the arrondissement and the chief of the Animation Services. These proposals take into consideration the health and socio-economic situation of the villages together with their geographical location in relation to the closest dispensary. During one or two meetings in each of the villages the population is informed about the objectives of the proposed action and about the role of village health workers. The comments of the villagers are received with regard to their own health situation, their views and traditional practices with regard to handling sickness. The population is then invited to appoint two health workers and three members of a managerial team (chairman, secretary and treasurer). The village health workers should fulfill the following conditions:

- be volunteers and work without payment
- be present in the village most of the time
- give some emergency care
- advise on prevention and hygiene and practice health education
- treat simple diseases
- record the activities carried out and the cases treated
- manage the stock of medicines.

The training of the voluntary village health personnel is done at the nearest rural dispensary by the nurse in charge, supervised by the chief of the circonscription medicale (the state nurse in charge at arrondissement center) and the chief of the local Animation Service. The course normally lasts 10 days, 7 of which are devoted to training in health care and 3 to

management activities. The health care training comprises five components: general health concepts; emergencies and evacuation to hospital; epidemic diseases; health education; and elementary health care. Concepts of malnutrition and preparation of weaning food are gradually introduced during the retraining program. The box of pharmaceuticals given to the volunteers at the end of the training is usually composed of the following: a) drugs to be distributed free (mercurochrom, methylen blue, argyrol sol. 1%); b) drugs to be paid for (sulphaguanidin, flavoquine, charcoal, aspirin, tetracycline or other anti-biotic ointment for eyes, alcohol for disinfection, bandages).

When the village health workers have completed their training, they are established in their villages and generally a room or house is made available for their activities, which are supervised by the certified nurse of the nearest rural dispensary. Where he is available, the treasurer keeps the stocks of drugs to be paid for as well as the cash box of the village pharmacy. The treasurer also delivers drugs to the village health works in exchange for cash-payment on the basis of fixed prices. He maintains the stocks by buying from the Central Pharmacy for Village Health Workers in the headquarters of the arrondissement. Where there is no treasurer the village health worker carries out these additional duties.

This program is aimed at strengthening the base of the health delivery system pyramid and could well serve as a model for other countries.

4. Sectoral Constraints and Causes

As elsewhere in Africa the two major constraints are: a) money (which covers all subchapters); and b) properly education personnel. In consideration of the first constraint the GON seems to have decided to limit most of its health programs to what its own resources can pay for. Out of a total national budget of about $68 million health is assigned $4.169 million or about $1 per person per year. The policy of Nigerization compounds the second problem. By eliminating 105 expatriate professionals, 81 of which are physicians, paid by the French Technical Assistance Service, the GON deprives itself of quality help at low cost.

5. Government Plans and Policies

The Government's health policies can be summarized as follows:

- Regrouping of the physicians in the main centers of the seven departments at the following levels: national hospitals and departmental hospitals; departmental mobile units; departmental directorates of health; MCH centers.

- The takeover by national personnel of the leadership positions in all circonscriptions medicales at the arrondissement level.

- The organization of village health teams (secouristes and matrones)

- Frequent supervision and retraining of personnel at all levels.

- More emphasis placed on the rural level which constitutes 95% of the population.

- All personnel to be actively engaged in preventive and training activities.

The allocation of funds to the health sector to carry out these policies has diminished steadily since 1970, as shown by the following table.

Table 3

National Health Budget - Niger 1970-74
(in 1,000 CFA francs)

Year	Allocation	% of National Budget
1970	898,075	8.3
1971	898,840	8.2
1972	950,205	8.0
1973	1,017,000	
1974	1,117,225	7.8

As in most African countries, personnel costs have been rising at the expense of supplies and equipment.

Table 4
Distribution of the Health Budget - Niger 1970-1974

Year	Budget (CFA 1,000)	Personnel (CFA 1,000)	Percent	Material (CFA 1,000)	Percent
1970	898,075	432,960	48.2	465,115	51.8
1971	898,840	445,635	49.5	453,205	50.5
1972	950,205	483,200	50.8	467,005	49.2
1973	1,017,000*	519,820	51.1	497,045	48.9
1974	1,117,225*	577,505	51.7	538,475	48.3

*This amount also includes CFA 750,000 for "Minister's housing, water and electricity." This amount has been subtracted in calculating the percentages. No information was available for earlier years regarding this.

A further examination of the 1974 budget indicates that the amount allocated for drugs came to CFA 315,000,000 for transport to CFA 73,5000,000 and for feeding and dress (nurses uniforms?) to CFA 68,725,000.

It is the Government's intention to assemble in each main arrondissement center all the certified nurses responsible for the rural dispensaries, the local heads of the Animation Service and the persons in charge of the literacy program for a certain number of days each trimester for intensive re-training. The government has calculated the cost for per diem, transport, etc. for this at CFA 6,176,000 ($28,072) per year. At the departmental level it is planned to have all the state nurses and state midwives responsible for the hospital-dispensaries and the maternities in the main cities of the arroundissements (and services below that level) as well as the departmental personnel dealing with animation and the persons dealing at departmental level with literacy participate in an annual seminar at department headquarters. Cost of per diem and transport for this is calculated at CFA 5,766,670 ($26,212).

At the national level it is considered necessary to have two seminars annually of a total of 15 days duration. These seminars will be for the seven directors of departmental health services, the seven chiefs of mobile teams, the seven persons responsible for the Animation Service and the five directors of the central administration. Per diem and transport is calculated at a total of CFA 2,966,670 ($13,485). The cost of organizing all these seminars is estimated at CFA 2,626,000 ($11,981).

Recognizing that good supervision is the keystone of an efficient and well-maintained health infrastructure the GON has proposed a continuous supervisory program as follows:

Supervision of the village health team: It is estimated that the 162 certified nurses in charge of rural dispensaries will each have to travel six days per month by motorcyclette, camel, horse or pirogue. Per diem and travelling expenses are calculated at a total of CFA 18,662,400 ($86,829).

Supervision of rural dispensaries: It is calculated that the 38 chiefs of the arrondissement medical service will have to tour for 5 days a month. Per diem and cost is estimated at a total of CFA 6,680,000 ($30,363).

Supervision of the arrondissement medical service: Directors of departmental health services will be expected to travel 15 days per trimester. Per diem and transport is calculated at CFA 2,706,670 ($12,303).

Supervision of health institutions central level personnel: The directors of central services in the Ministry of Health will tour for 10 days per trimester. There are normally five such directors and the cost is calculated (per diem and transport) at a total of CFA 2 million ($9,090).

TABLE 5

SUMMARY OF COSTS FOR RETRAINING AND SUPERVISION

I. Animation and Retraining		
Arrondissements	CFA	6,176,000
Departments	CFA	5,766,670
National	CFA	2,966,670
Sub-total	CFA	14,909,340
II. Organization of Seminars	CFA	2,626,000
III. Supervision		
Village level	CFA	18,662,400
Arrondissement level	CFA	6,680,000
Department level	CFA	2,706,670
National level	CFA	2,000,000
Sub-total	CFA	30,049,070
GRAND TOTAL	CFA	47,584,410
Rounded to	CFA	48,000,000 ($216,335)

6. Evaluation of Government Plans

The policy of regrouping the available physicians in the main centers is acceptable if there are enough physicians to do so and if they have the administrative ability and training to organize the large system of preventive medicine that Government recognizes is needed. According to the figures available there are only 16 Niger physicians in existence. This means either that the policy on Nigerization will not be possible implement before some 15 years or that this heavy responsibility will fall on the shoulders of young and inexperienced nurses. The policy of Nigerization is running afoul of two classic obstacles: medical education in France is not designed to meet the health problems of Nigeria; and the creation of a medical school in Niger (which is what the Government wishes for prestige reasons) is unsound since a faculty will be almost impossible to find without a resulting dangerous drop in quality. The obvious solution would be for the GON to accept for at least 20 years to send their medical students to Dakar, Abidijan or Yaounde.

The policy of organizing village health workers is a sound one and the progress of Niger's program in this area should be closely followed since it could prove to be a model for other central west African countries.

The proposal for frequent supervision and re-training of personnel at all levels is an interesting and very well designed program, which seems to have been worked out by the Ministry of Health staff with some possible assistance from WHO and UNICEF representatives.

7. External Assistance

It is not possible to get the latest source of foreign assistance. In the Four-Year Plan 1971-1974 (now being worked into a new plan) the following list of anticipated external investments in the health sector was given.

Anticipated External Investment in Health - Niger 1971-74
(in CFA millions)

Project	Source	Total
Anti-tuberculosis campaign	UNDP	56.30
Environmental sanitation	WHO	37.00
	FNI	6.90
Reorganization and equipment of hospitals	FED	501.30
16 rural dispensaries	FED	51.20
Equipment for OMNES and Mobile Teams	FAC	194.00
Treponematosis	WHO	32.46
	FNI	4.00
Extension MCH (PMI) Niamey	FNI	8.00
MCH	WHO	36.49
	FNI	1.50
Smallpox, measles vaccination	WHO	14.16
	USAID	246.65
Curative medicine	FAC	54.00
Construction and equipment for 4 social centers and MCH, Niamey	FAC	100.00
Extension of MCH Niamey	3 FED	176.00
Additional hospital equipment	3 FED	80.00

Project	Source	Total
Reconstruction of 20 dispensaries	3 FED	252.00
Oullam hospital	FNI	10.00
Extension of the anti-tuberculosis center Niamey	FNI	3.40
Niamey hospital	FNI	7.00
Mobile team garage, Niamey	FNI	3.40
Total		1,943.76 ($8.84 million)

8. Possibilities for AID Interventions

As in the other countries, AID could probably not undertake to support singlehanded what would be needed to reach the goal of complete rural health services in Niger. But USAID could contribute to a joint program with other donors, as suggested for Senegal. As in Senegal, the problem is to fill the gaps of a health plan already accepted by the Government. Unlike Senegal, the GON has made the decision to limit itself to what it can achieve with an all Niger personnel.

The needs to accomplish Niger's health programs are listed in Section 6. The US response could tentatively be:

a. Physicians - grant a fellowship to x number of Niger medical students to be trained at Yaounde or Dakar every year for 5 years.

b. Paramedical personnel - contribute all or part of the $216,235 that the program of retraining would cost.

c. Continue in cooperation with WHO the measles/smallpox program for another 4 years at a cost to be determined after a study on the spot (number of subjects to be vaccinated every year, distances to be covered, other donor contribution in fuel and motor transportation, etc.).

d. Contribution of the time of a French-speaking health planner to the proper curriculum to be taught in the training and recycling programs.

It is suggested that the groundwork for these eventual contributions be laid down by the Dakar-based health technician mentioned above, keeping in mind that an additional person or persons might have to be added if and when a concrete well-defined USAID health program has been drafted during FY 1976.

NIGER
NUTRITION PROFILE

POPULATION

Total: 3.8 million
Growth rate: 2.9 percent
Rural population: 97 percent of total
Major tribes:
- Hausas (54%) - sedentary agriculturalists.
- Djerma (25%) - some sedentary agriculturalists, but mostly nomads.
- Tuaregs (12%) - nomadic herdsmen
- Peuls (8%) - nomadic herdsmen who customarily inhabit the southern fringes of the Sahara

AGRICULTURE

Major crops*:

Millet and sorghum	12,000 tons in 1971
Rice	40,000
Manioc	200,000
Sweet potatoes	10,000
Peanuts	240,000
Cowpeas	150,000

Corn is a hut culture among the sedentarists and wheat is a basic food for the nomadic groups, grown on desert oases.

Livestock:

Cattle	4.4 million head in 1971
Sheep	2.8 million
Goats	6.2 million
Camels	410,000
Poultry	7.0 million

Cattle are raised by Peuls, Fulanis and Boros who do not commercialize their animals. Sheep, goats, and camels are herded by Tuaregs who live off the milk, meat, and hides of their animals. Goats are also raised by sedentary farmers. There are no figures on poultry, but chickens are raised and eggs are consumed. There is a poultry station at Maradi and some experts believe that a poultry industry could be developed in Niger.

Fishing:

Fishing is important on the Niger River, Lake Chad, and the Koumandougou River and certain large ponds. Production is thought to range from 6,000 to 10,000 tons annually, in normal times. It is dried and smoked for local and export trade.

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*Figures from FAO Production Yearbook 1971.

Agricultural policies:

In 1968, the Government established two experimental ranches - one at Niamey, the other at Filingue - to develop breeds adapted to the environment. Development of water holes and establishment of slaughterhouses near transportation centers were also planned. River drainage and irrigation projects were initiated to increase arable lands for farming, especially in the Maggia Valley and Goulbi de Maradi. Improved marketing and transportation services have also received attention.

DIETS

Very little information is available on Niger diets. The basic staples are millet, sorghum, rice, corn, and in certain areas, wheat, manioc and yams. Beans and peanuts, as well as wild fruits, berries, and legumes contributed to the diet. The nomad diet is based on milk, surpluses of which are bartered for millet grown by sedentary farmers.

NUTRITION PROGRAMS

Primary schools in district capitals have canteens where 50 percent of the children receive a mid-day meal. Basic nutrition education for mothers is promulgated through the Maternal and Child Care Centers (PMI). School gardens have been started. There is a School Nutrition Service within the Ministry of Health.

NIGER
POPULATION AND FAMILY PLANNING

The Republic of Niger has no official population policy. In the past a series of ten year sectoral perspectives have formed the basis for development planning. None of these reveals any indication of a concern for demographic implications. Foreign advisors to the Ministry of Plan are presently engaged in developing sectoral inputs for a national plan although reportedly progress has been delayed due to the lack of political decision to coordinate these various segments. There appears to have been no substantive demographic input into the work that has been completed so far. Data that is available is mostly based on the 1960 demographic sample survey carried out by INSEE. Periodic administrative headcounts used up to the time of the 1960 survey to estimate total population were reinstituted in 1970. The results of these and numerous localized surveys are still considered to be incomplete and inexact. There appears to be no basic data which could be properly utilized to articulate discrete goals and targets.

Preparation has begun for a national census under the African Census Program. At the moment, the project is being held in abeyance while the government seeks financial assistance to carry out aerial photography in order to establish the census tracts. According to officials, the aerial mapping can only take place in the months of November to April, the dry season. A sponsor has not been established and it would appear that this portion of the preliminary work for the census will be delayed until late 1975. The actual enumeration has been set for 1976 and follow-up survey including the demographic portion are not likely to take place before the following year.

Although Niger is a large country (900,000 km^2), vast stretches of uncultivable land have concentrated 9/10 of its population in a quarter of its area. Still, the population is primarily rural. Urbanization has been negligible in recent years with the exception of Niamey, where rapid growth may soon pose difficulties. Over a number of years, the generation of new cultivable areas in the Sahel produced a sort of localized demographic explosion through rapid colonization. The extent to which the recent drought has permanently affected this distribution is yet unknown. For the most part out-migration is temporary, with the migrant remaining on the average only 4-5 months. There appears to be little effect on the structure of the population due to migration, although the potentials exist for a trend toward more permanent migration in the future.

Niger has no national vital registration system. Statistics, such as they exist, derived from the 1960 national sample survey and a number of localized surveys since, have produced estimates that appear to be generally consistent, portraying a situation of high fertility (Table 1-A). Disaggregated urban-rural statistics from one recent survey indicate an average completed family size of about 5 children. However, given the high rate of infant mortality, the actual number of pregnancies is much larger.

In fact the larger number of child losses (as adjusted for females experiencing no losses) is reported to be 2.8 and 3.1 for urban and rural areas respectively.

Although data on infant and child mortality are not complete, survey results indicate the possible violence of the current situation (Table I-B). In general, as would be expected, child mortality rises with age and parity of the mother and falls with the age of the child. Rural rates are usually much higher than those for urban areas. If traditional attitudes concerning the value of children are operative, population prospects in Niger are confronted with a paradox: fertility rates are not likely to fall until infant mortality is reduced, yet falling infant mortality will induce higher population increases until a fertility response is evoked.

All forms of overt family planning activities and the importation of contraceptives are prohibited in Niger. Even modest initiatives by foreign donors under the previous administration to include some form of family planning in the context of maternal and child health pilot projects have, under the present government, been frustrated and now face the threat of termination. On the other hand there is some indication of a demand for family planning services. Child spacing information is available in a few urban dispensaries and a limited supply of relatively expensive contraceptives is reportedly available in some urban pharmacies. Likewise, a recent survey reveals that the incidence of abortion (all types: but presumably including illicit) in urban areas is almost twice that of rural areas.

Meaningful data on family structure are even more lacking than other basic demographic statistics. The population of Niger is almost exclusively Moslem and the factors which determine fertility are those which one would expect to find in a conservative rural population. There is some difference between urban and rural attitudes and practices related to fertility; but for the most part these are more related to social status than to urbanization itself. A recent survey reports somewhat alarming data on age of marriage and first pregnancy (Table I-C). It appears that marriage and pregnancy occur earlier in urban areas; but peak more rapidly in rural and fall off more slowly. Obviously, continuance of this early marriage, early pregnancy phenomena has and will continue to have drastic effects on future population levels in Niger. With a slight difference between urban and rural attitudes, a 1971 study revealed a pervasive fatalistic attitude by women in regard to their family size. Traditional attitudes toward child spacing and lactation are considered to be declining, under the assumption that they were ever really practiced. Even in urban areas only 38% of spacing is for three years or more, and over 70% of weaning occurs due to a new pregnancy. Although there has been some publicity in urban areas given to the modernization of the woman's role in society, alternatives outside the traditional role are limited to a select few. Government MCH services in Niamey are considered greatly underutilized and in rural areas the scant services that do exist are utilized generally only under conditions of crisis.

Conclusions and Recommendations

At the moment, the Government of Niger has no established national planning procedure and according to foreign advisors to the government planning authority, the instability of the present political situation does not lend itself to the promise of an early resolve to develop a coordinated program. Baseline information currently in use is inadequate and insufficient. Estimated trends from various localized surveys are available but for the nation as a whole the data is decidely lacking on which any discrete targets or goals could be based. The government has for the most part neglected to consider demographic impact on present or future national potentials. The promise of better baseline data suffers from a lack of urgency which combined with an identification of additional expenses and rising costs extends the potential availability of any usable data to at least 1978. Although aerial photography for census purposes is desirable, if not in fact necessary, maps of adequate scale could probably be obtained through ERTS were this their only application. However, if the more extended value of this project is considered (i.e., for land use evaluation/planning) then perhaps the larger-scale photography requested by the GON could be justified, with its use for census purposes considered a bonus. There is no indication of any potential to introduce demographic impact analysis into either sectoral or overall planning concepts in the near future.

Contraception for either spacing or birth control is not likely to gain official support except in the context of an elaborated MCH service program. Even then, it would appear that the government would insist on its containment to urban situations and would not likely endorse any official document recognizing family planning services per-se. It is, therefore, necessary to regard the potential for the introduction of a government program as being dependent first on the creation of centralized MCH services which must be considered in light of their own merit, apart from the impact such a program might eventually have on reducing fertility. An alternative which would seem highly desirable in the case of Niger is the creation of a private association with family planning objectives. The potential appearance of such a group is unknown but there is a strong possibility that the government would welcome an indigenuous organization of this sort which, either in conjunction with or outside of the existing health structure, could accommodate the demand for services without official government endorsement.

TABLE I-A

NIGER--SUMMARY OF POPULATION DATA

Reference No.1/	(1)	(2)	(3)	(4)	(5)	(6)
Year	1966	1970	1972	1972	1972	1973
% Population						
0-4	19.4	16.8	16.7	19.7	16.7	18.7
5-9	15.6	14.4	14.4	15.0	14.4	14.2
10-14	11.7	13.3	13.4	12.2	13.3	11.7
15-19	8.2	10.1	10.2	10.0	10.1	9.9
20-24	8.0	9.2	6.7	8.3	--	8.6
25-29	7.9	8.5	6.4	7.0	--	7.5
30-34	6.7	6.8	6.5	6.0	--	6.4
35-39	5.3	5.4	6.1	4.9	--	5.3
40-44	4.2	5.0	4.8	3.9	--	4.5
45-49	3.4	3.0	4.3	3.4	--	3.7
50-54	2.7	2.3	3.3	3.0	--	2.9
55-59	2.0	1.5	2.5	2.7	--	2.3
60-64	1.6	1.2	1.8	2.1	--	1.7
65-69	1.4	1.0	1.3	1.5	--	1.2
Over 69	1.9	1.5	1.6	1.7	--	1.3
Population (000)						
-Total	3452	4016	4243	4088	4239	4304
-Male	1715	1942	2115	1983	--	2140
-Female	1737	2074	2127	2105	--	2164
Total Fert. Rate	--	--	--	7.4	--	7.1
Crude Birth Rate	--	51.8	--	53.1	52.0	51.1
Crude Death Rate	--	23.5	--	21.7	25-27	28.0
Infant Mortality	--	200	--	--	200	200
Life Expectancy						
-Male	--)	40.0	--	42.6	--	--
-Female	--)		--	45.5	--	--

1/ Complete source references are cited in attached Bibliography. Page references are:
(1) B-3, p.3
(2) A-1, p.7
(3) B-2, p.5
(4) B-4, p.I-1
(5) B-1, p.1
(6) A-4, p.7

TABLE I-B

NIGER--VITAL STATISTICS

		Average Number of Children	
		Urban	Rural
Total		5.0	4.6
Age of Mother			
	Less than 20	3.0	2.2
	20-35	4.7	4.5
	36+	6.9	6.6
		Infant and Child Mortality (Rate per thousand)	
	Less than 20	400.00	103.09
	20-35	230.82	430.24
	36+	442.22	513.12
Parity	1-4	213.09	201.32
	5-7	255.03	519.28
	8+	374.61	794.19
Age of Child			
	0-1	682.31	489.03
	1-5	207.58	361.29
	5+	110.11	149.67

Reference: Bibliography, C-1

TABLE I-C

NIGER--FAMILY STRUCTURE

		Age at First Marriage		Age at First Pregnancy	
		Urban	Rural	Urban	Rural
Ages	6-9	1.87	2.78	--	--
	10-13	38.25	29.11	4.67	2.17
	14-17	40-86	60.40	59.89	69.37
	18-21	41.48	6.73	17.54	26.09
	22-25	2.06	4.00	3.54	2.17
	26-28	--	--	0.70	--

Reference: Bibliography, C-1

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C. Surveys:

1. American ORT, "Analyse preliminaire de l'enguete femmes hauts risques" Realisee dans le cadre du project PMI," Niger, 1974.

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NIGER
WATER RESOURCE DEVELOPMENT

Strategy for USAID Participation in Water Resource Development in the Republic of Niger

In Niger the exploitation, development and maintenance of water resources are linked directly to the physical morphology and hydrogeology of the landscape. There are six (6) primary morphological categories whose water resource development is inter-related ethora-geographically;

(1) The Valley of the Niger River (present day flood plain and adjacent terraces);

(2) The Niger River's southwestern tributaries (including the Dargol, Serba, Gourbe and Diamongou Rivers of the Onchocerciasis Zone);

(3) The Dallols (ancient stream beds having primarily a north south axial trend);

(4) The Lake Chad Drainage Area (the Diffa Region and the Kamadougou River whose headwaters and primary drainage area are in Nigeria);

(5) The Plateaus and adjacent wide shallow valleys (situated both north and south of the Niger River); and

(6) The Stable and Mobile sands (located north of Felingué).

Presently the government's water policy has been progressively to meet the water needs of all utilizable territory (i.e., the region south of the 300 mm (11.8 inch) isohyet. This has been attempted through the establishment of wells maintained through the Office des Eaux des Sous-sol (OFEDES-Ground Water Office). It is apparent, however, that each of the previously described zones is characterized by its own water regime and should be managed through specialized water resource utilization.

The most obvious water sources are the surface waters (i.e., the Niger River and its tributaries). It is expected that river waters may be used most effectively in surface irrigation projects. It must be realized, however, that the Niger River is not the only source of water and even if its total irrigation capacity were harnassed it could not possibly feed the whole nation without the development of dry land agriculture. Of the various schemes of irrigation management (government, private and cooperative) it is expected that USAID's prime objective to serve the rural poor would be realized through the growth and Nigerienization of irrigation cooperatives at the village level (through UNCC possibly). A.I.D. should further support the Niger River Commission in its effort to maintain a data collection and river control network. This would result in long-term planning benefits to the member states. Irrigation along the Kamadougou may be only marginally beneficial since the Nigerian government is currently developing

the headwaters in a 400,000 hectare irrigation project. Well development in the Diffa region seems to be promising because of the presence of an economically exploitable aquifer.

The development of the Dallols, shallow, wide valleys and sand dune regions could be most effectively carried out by the careful location, management and maintenance of wells. A.I.D. should continue to foster pilot projects (such as the Bas-fond' development project in the Balayara-Tabla district) however, care should be taken to ensure that project design and data bases are adequate so that the experimental evidence could be estrapolated to other regions of similar hydrogeology. A.I.D. should also consider the development of additional test sites along the Dallols (in regions of differing rainfall, hence recharge, distribution). All projects should be developed with on-the-site Nigerien apprentices who would eventually assume the responsibility for management and design of similar projects. Adjunct training programs should be required at each site to enable local farmers to understand the function of the program. A.I.D. should consider funding a technical extension program through the university in the field of water resources, design and development. Such a program would foster indigenization in a critical sector of the country's development.

Niger - The Geography

The Republic of Niger is the largest of the franco-phone West African Nations with an area of 494,980 square miles (1,281,867 km^2). Niger has a population of 4.09 million people (1972 estimate) concentrated primarily south of the 12 inch (300 mm) isohyet in the southern third of the country bordering along Upper Volta, Dahomey and Nigeria. This isohyet is approximately coincident with the maximal northerly limit of cultivation. Virtually all of the country lies in the Sahel, with the exception of the northermost fifth in the Saharan zone and the most southerly portion lying in the Sudan. The population density varies from zero to 180 people per square mile. (70 people/mi^2). The most evacuated zones are the Onchocerciasis infested areas and the deserts; and the most densely populated areas are in Niamey and northwestward along the banks of the Niger towards Tilaberig. The Dallol Basso and southern portions of the Dallol Maouri are also densely populated. Population density where not affected by density is clearly related to the amount of water available.

Unlike Upper Volta the Nigerien landscape is dominated by highly permiable quaternary sands. Secondary and teritiary rocks outcrop in the southwestern and central regions. Pre-Cambrian rocks outcrop only around Zinder and the most notable form is the Air Massif. The most important features of the landscape are remnants of the period (from 2 to 10,000 years ago) when the region was wetter and greener. The easily differentiated Dallols are ancient stream beds, now outlined by vegetation and their characteristic low relief and gradient. Today these dry channels are populated because of their relatively rich sandy soils and shallow ground water table. The plateau surfaces, silhouetted on the panorama of any of these stream channels

represent older river terraces. Today, as a result of the water regime, they are covered by laterite and tiger bush and are sparsely populated. Now acolian processes are more important than in the past. Shifting sands, especially north of Felinque, cover and reshape the landscape. Desert encroachment and retreat is a rule, to which the people have had to adapt.

Like Upper Volta, the Niger is land-locked and dependent upon neighboring states for the transportation of imported goods and to a greater extent for the water of the Niger River. The flow of the Niger (greatly reduced in the last few years) is governed by the physio-hydraulic characteristics of its valley train from the Fouta-Djallon in Guinea, through Mali and finally into Niger. The intense evaporation from the inland delta of Mali regulates the waterflow at Niamey. The result is that the Niger's high flow corresponds to the local dry season and low flow to the wet season.

The climate at Niamey, Niger would be similar to Fada N'Gourma, Upper Volta were it not for the low humidity and high evaporation potential at Niamey. Storms do periodically occur in Niger but in many cases the rain is in the upper atmosphere and never reaches the ground due to intense heat and evaporation. The average yearly rainfall varies directly with latitude. At the southern border the highly variable rainfall is about 30 inches (760 mm), dropping to less than one inch (22 mm) in the north at Bilma. The first rains are most important since they determine the amount of time seeds have to germinate and take root. It is not always the years of greatest rainfall that determine the size of the harvest but for some crops, especially millet, it is the spacing of the rain that is most important.

Irrigation has been suggested as the solution to the food shortage. There are, however, few regularly flowing streams north of the Niger River proper. The actual drainage net, if one exists, for the Dallols is presently unknown. Rains falling on their catchments apparently do not have a special drainage point. Water, ponded in the southern extremities of the Dallols usually remain until the dry season. There are several permanent ponds in the Dallol Maouri but these have been in existence only about twenty years. There are several permanently flowing streams entering the Niger River from Upper Volta, the Sirba, Gourbi and the Diamongou. These streams flow through Niger's Onchocerciasis zones and have fertile valleys and terraces which are not presently farmed. With the eradication of the Similurm damnosae these areas could become more productive. The only other large drainage basin in Niger is Lake Chad. The main Nigerien stream is the Kamadougou whose primary drainage area is in Nigeria. Though it is currently being used for marginal irrigation, its future development is bleak because of Nigeria's development of its headwaters.

Exploitable ground water resources are: (1) the alluvial sands and gravels of the Dallols (easily exploited by shallow traditional wells); (2) the Continental Terminal Layer (accessible by manufactured wells); and the (3) the Tegama and Lake Chad Basin sandstones (accessible by ordinary

wells where the ground water is high but usually by deep wells, 1300 feet/ 400 m). Fossil water reserves may exist at greater depths but there is no certainty of quantity or location.

The development of Niger's critical water resources is linked to the physical morphological regions. Land utilization and farming practice is tied to the cultural imperatives of the farmers in each location. Any U.S. development in these regions must take into account the indigenous culture, functional application of technology and the hydrogeology of each region. The regions to be developed are:

(1) The Valley of the Niger River

(2) The Niger River's southwestern tributaries

(3) The Dallol

(4) The Lake Chad Drainage Sector

(5) The Plateaus and adjacent wide shallow valleys

(6) The Northern Stable and Mobile Sands

The first two regions are discussed in other sections of this document.

The Dallols

Niger is covered by an intricate set of shallow stream channels left over from a former wet period. The Dallol Bosso trends due north from Baumba (southeast of Niamey) to Agalambalam where it arcs to the northwest of Agadez. The Dallol Maouri, east of the Bassa follows a similar pattern but stops far short of Agadez near Tahoua. The other Dallols are less significant as water resources but have a greater potential than is presently realized. The Dallols are characterized by shallow wells (less than 30 feet, 10 meters), heavy, fertile soil and high population density. This surface water usually is a better resource for cattle than for agriculture since it is easier to water cattle than irrigate a garden perimeter. A.I.D. and CARE are currently working on a joint bas-fond development project at Balayara. The land was fenced in to protect it against animals. Wells were dug by OFEDES. The irrigated perimeter is designed to extend the traditional valley gardens perimeter by as much as a factor of three. Most of the work is done through the village farmers and Peace Corps. The project will expand to include Allcama, Tabla, Izagagaden, Agargaraden, Zidacmet, Timmbora, Aggou N'Gawa, and Oungara in addition to Balaryara. This type of project is highly desirable because it links the traditional farming methods to modern technology. There is one major problem with the project. As presently designed there has been no solid research done on the location

and depth of wells. The layout of individual wells seems inadequate and is not based on sound topographic or hydraulic study. If such programs are to be beneficial and applicable to Dallols in general, certain hydraulogic data should be kept. First, a detailed topographic study should be made of the region to be developed. A rain gauge should be set up to gather rainfall data. Once the perimeter is designed, wells should be located based on the topographic surface and the water needs of the various farm plots. When the wells are dug, well records should be collected and well output and level charted. With this data, the information on the projects viability would be analyzed for application at other latitudes, even as far north as Agadez and the Air Massif. Preliminary research should be done on well depth and yearly viability for the Dallols. There are several conflicting reports about the depth of water resources in the Dallols, some sources suggest that viable wells would have to be dug in excess of 1950 feet (600 meters). These conflicts should be clearly resolved, though it appears that the sandstone aquifers from the Lake Chad basin may extend to this zone. If this is the case, the development of these deep wells would become economically feasible in a few years.

Some feel that the potential for well development is not as promising as OFEDES would lead one to believe. Wells at Maradi do not produce as much water at constant flow as was initially expected. There is research being done with artesian water production. The following is the only well data presently available by OFEDES.

Districts	Existing Wells Counted By OFEDES	FUNDING ORGANIZATIONS						Total
		CANADA	SWISS	FED	UNICEF Emergency	UNICEF UNDP	Others	
AGADEZ	112	-	-	-	9	-	3	124
DIFFA	87	108	-	-	-	-	-	195
DOSSO	670	-	80	30	-	-	-	780
NARADI	685	-	-	200	-	-	-	885
Niamey	786	-	-	20	73	-	15	894
TAHOUA	743	-	120	50	18	-	-	931
ZINDER	693	-	-	90	-	-	-	783
Not Designated	-	-	-	-	-	400	-	400
	3,776	108	200	390	100	400	18	4,992

This gives us very little information about potential well production. USAID should consider conducting a study of these wells as compared to traditional construction and output.

The Lake Chad Drainage Area

There are three primary sources for water in the Nigerien portion of the Lake Chad drainage area: the Kamadougou River, the underground Tegama and Lake Chad water supplies the Tegouma and Dillia Dallols, and the lake proper. The government of Nigeria presently is developing the headwaters of the Kamodougou Rivers in an intensive 400,000 hectare irrigation project. The primary headwaters of the Kamodougou are in Nigeria. This development will have a great effect on the flow available from the Tegama and Lake Chad aquifers (these beds are currently being researched by BRGM and more information should be forth coming). Water usage along Lake Chad will continue on the lake shore margins with polders and irrigation dikes. Marginal livestock water resources are still available in the region through the use of the Lake Chad aquifer wells. Dallol production is presently only speculative awaiting further study. A.I.D. should anticipate possible range management problems connection with the Dallols, along with the high cost and maintenance of these wells. There is apparently a greater potential for food production in the southern part of the country where the grossly hostile environment is a little less hostile.

The development of any water resources in Niger will be possible only through adequate training of the Nigerien farmers. In a number of cases, e.g., the Balayara Project, the farmers have shown a high receptivity to change in farming habits. In many cases farmers are used to a modified form of irrigation. In other cases farmers are resistant to irrigated farming because of their preference for dryland farm goods, the intens labor and cost their desire for livestock. It is expected that the Dallols represent the greatest water resource potential for animals.

The Plateaus and Adjacent Valleys

The plateaus are formed by terminal continental sediments (tertiary), dissected by rivers and separated by sandy valleys made up by materials largely from the plateau surfaces. The groundwater level is usually more than 65 feet (20 meters) deep. The tops of the plateau are covered with a lateritic duricrust and the hearty tiger bush and are generally unfavorable to cultivation. There are sometimes ephemeral lakes atop the plateaus which last well into the dry season.

Most villages are in the valley where dry land agriculture is the rule since wells are too deep for hand watering and few large lakes or ponds are available. There is the possibility of pump irrigation, though the cost would be high and the returns relatively low. Submersion agriculture is possible along meander channels and has been practiced by traditional farmers.

A.I.D. should seriously consider the feasibility of reforestation projects on the plateau surfaces. The tiger bush is presently being used for firewood for the major cities. Perhaps a variation on the tiger bush could be grown and harvested as a forest resource.

The Stable and Mobile Sands

North of Felengue the plateaus fade into a region of stable dunes. Water is found about 50 feet (15 meters) below the surface; however, here we are near the limit of assured growth of dry land agriculture. Villages are separated by great distances with much free land in between. This is the habitat of the Nomads. Once again, the most logical development for these regions is water wells for humans and livestock. The efficient use of the resource would have to be developed with range management and hydro-geologic research. If the U.S. can increase its aid in this area and maintain a constructive hydrologic documentation, designed systems could be extended over a much larger area.

NIGER
ECONOMIC DEVELOPMENT OF ONCHOCERCIASIS - FREE ZONES

I. ONCHOCERCIASIS VECTOR CONTROL PROGRAM AREA

The vector control program will affect only a small sector (17,000 km^2) in the extreme southwest of Niger from the Upper Volta border to the Niger River and north to the Dargol River, a tributary of the Niger River. The area contains approximately 90,000 inhabitants. *Simulium* is found along several river valleys in the area - Mekrou, Sirba, Gorombi and Diamangou - all tributaries of the Niger. The Southern part of the region, especially along the Niger, is also affected by trypanosomiasis.

Most of the program area is within the Say administrative district of the Niamey Prefecture. This area, in the North Sudanian climatic zone, enjoys Niger's highest average rainfall, 600-700 mm., with a five-month rainy season. Despite the relatively abundant rainfall, population density averages only four inhabitants/km^2 with a maximum density of 42 inhabitants/km^2. The area is populated with sedentary Fulani and Djerma in the northeast and Gourmantche in the southwest near the border with Upper Volta. Limited seasonal and temporary migration flows to Niamey and to Ghana and the Ivory Coast.

Millet and sorghum take up 90% of the cultivated land area although beans, cassava, maize, cotton, and rice are also produced. Approximately 14% of the country's livestock (305,000 head of cattle) are located in the region.

The region exports millet, milk, skins and firewood to Niamey, livestock to the coast, and cereals to Mali and Upper Volta.

Soils in the area are varied with best soils in the Sirba and Gorombi valleys, and in an uninhabited region south of the Goroubi River near the Niger River.

A major all-weather (Niamey-Fada-N'Gourma) road passes through the region, but access from Say to other parts of the region is severely limited due to a very limited secondary transportation network.

II. ONCHOCERCIASIS-FREE ECONOMIC DEVELOPMENT ZONE

The Onchocerciasis-free development zone encompasses in theory the whole of the area described above. No specific zones have been delimited for priority action by the PAG Mission although at least two potential development zones are presently uninhabited due to *Simulium* or a combination of *Simulium* and *Glossina*.

PAST AND PRESENT DEVELOPMENT ACTIVITIES IN THE PROJECT ZONE

The area west of the Niger River has been almost completely neglected by major development efforts. Some wells have been drilled in the area and a

limited extension infrastructure exists. Recently a CIDR agent began to encourage the use of animal traction in the Torodi area and German volunteers operate a small community development program, specializing in rice production. Stimulated by the plans for onchocerciasis control and reportedly by the Niamey ADO, the government has recently prepared a "Schema Directeur" for development of the Say Arrondissement and has indicated that it would welcome A.I.D. participation in the program.

III. DEVELOPMENT STRATEGY

A. PAG Recommendations

The PAG report did not recommend a major resettlement project in the program area due to the sparse population in the area, its distance from major areas of population overconcentration, and what it considered to be relatively poor soils. It did indicate, however, that control of onchocerciasis should permit an increase in agricultural productivity and suggested that projects for modernizing agriculture in association with the onchocerciasis control program should be considered bearing in mind the potential market at Niamey for all forms of agriculture or livestock products.

B. Government Development Plans and Progress to Date

The Niger Government "Schema Directeur" indicates that soils in the Say area are much better than indicated by the PAG report. At least two zones which are presently uninhabited due to disease have important development potential. The government feels that these areas could be colonized with people (up to 50,000) who now inhabit parts of the Niamey Prefecture north of the old colonial "limit to cultivation" - north of the 300 mm isohyte. Over the past 20-30 years encouraged by increased rainfall and heavy population density in the Dallol Bosso (60 inhabitants/km^2), these people have gradually moved north into areas where they are particularly susceptible to variations in rainfall. Recently, largely because of several consecutive crop failures, small but increasing numbers of these people (Djerma) have migrated west of the Niger River. The government would like to reestablish the "limit to cultivation" (in the process setting aside more land for livestock grazing) and encourage major settlement in the high rainfall (in the Niger context) regions of the country (i.e., Say).

The major constraints to development of the uninhabited zones of Say are (1) presence of onchocerciasis and trypanosomiasis; (2) possibly the lack of water for human consumption. Reportedly UNDP/FAO or the German Government will carry out a tsetse control program along the Niger River and its southern tributaries, so with the onchocerciasis control program, the disease constraint will soon be eliminated. BGRM, a French water resource organization, will conduct a thorough study of water resources potential in the Say district.

The "Schema Directeur" indicates that increased millet, milk, skins and firewood exports from the region could be readily absorbed by the Niamey market. Sesame, rice, beans, sorghum, fruit and vegetables (onions, tomatoes, peppers) all have important unrealized potential in the Say region.

The UNDP has agreed to undertake basic mapping, hydrological, pedalogical and social/economic studies of the Niger onchocerciasis program area.

IV. RECOMMENDED AID ASSISTANCE OVER THE NEXT FIVE YEARS

Development of the limited onchocerciasis zones of Niger should be linked to broader development efforts within the Say Arrondissement. There is considerable development potential in areas of the Arrondissement which are presently inhabited where cereal production could be increased through the introduction of animal traction, improved farming practices and improved seed (to be developed via the Niger Cereals project). A number of additional development activities ("bas-fonds" development, introduction of new crops, rational exploitation and marketing of firewood from "tigerbush areas for provision to Niamey with concomitant reforestation, increased milk production and marketing, small ruminent production, etc.) could be initiated in selected regions of the Say area prior to initiation of the onchocerciasis control program. A.I.D. could support these activities through a combination of small Voluntary Agency projects and through strengthening the extension network of the Arrondissement.

Two substantial areas of the Say Arrondissement are uninhabited due to onchocerciasis or a combination of onchocerciasis and trypanosomiasis. At least one of these areas, along the Niger River south of the Goroubi River has excellent potential for sorghum and millet and possibly niebe production. The government proposes to encourage colonization of these areas with up to 150,000 families who now live in marginal zones (300 mm less) north of the old French "limit of cultivation", in the Niamey department. The colonization project as now envisaged would be based upon attracting settlers to the area through the development of basic infrastructure, provision of land, initial seed, food for work, credit and technical assistance. Spontaneous settlement would also be welcomed from regions such as Dosso. UNDP will carry out basic hydrological, pedological and social/economic studies of the onchocerciasis region and the whole Say Arrondissememt. A.I.D. could support this proposed activity through first, funding of additional detailed socio/economic studies which may be necessary to determine population pressure and attitudes toward migration in migrant-departure areas of the country and the social conditions under which colonization might most favorably occur. If these studies indicate that colonization of these zones is socially and economically feasible, A.I.D. should consider financial assistance in developing a secondary road network within the Say Arrondissement to encourage colonization and marketing of surplus crops, funds for construction of wells, medical and educational facilities, and possibly the provision of credit to newly installed farmers. Although technical assistance for the colonization project should be left largely to other

donors who can provide technicians with French language capability, A.I.D. should also consider the provision of one-two long-term advisors to assist in the planning and management of region-wide activities.