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UPPER VOLTA

NIENA DIONKELE RICE DEVELOPMENT PROJECT

STAFF APPRAISAL REPORT

April 10, 1980

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CURRENCY EQUIVALENTS

US\$1.00	=	CFAF 210
CFAF 1,000	=	US\$4.762

WEIGHTS AND MEASURES

1 metric tonne	=	0.98 long ton (2,205 lbs)
1 kilometer (km)	=	0.62 mile
1 hectare (ha)	=	2.47 acre

FISCAL YEARS

Government:	January 1	-	December 31
Project:	April 1	-	March 31
IDA:	July 1	-	June 30

ABBREVIATIONS

AVV	Volta Valleys Management Authority
BOAD	West African Development Bank
BCEAO	Central Bank of West African States
BND	National Development Bank
CERCI	Irrigated Crops Research Center
CFDT	French Fibre and Textile Company
CNCA	National Agricultural Credit Bank
DU	Demonstration Unit
FAC	French Aid and Cooperation
FSC	Farm Service Center
IRAT	Agriculture and Food Crops Research Institute
IRCT	Cotton and Textiles Research Institute
MRD	Ministry of Rural Development
OFNACER	National Cereals Agency
ONBI	National Dams and Irrigation Department
ORD	Regional Development Organization
ORSTOM	Overseas Technical and Scientific Research Organization
RIAM	Rice Industry Advisor to MRD
RISG	Rice Industry Support Group
SCET	French Consultant: Societe Centrale d'Equipment du Territoire
SERS	Secondary Road Maintenance Services Unit
SOFITEX	Textile Fibre Company
SOVOLCOM	Upper Volta Trading Company

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This report is based on the findings of an appraisal mission consisting of Messrs. Pease and Notley (Bank) which visited Upper Volta from May 22 - June 5, 1979. This followed a preappraisal mission in October 1978 consisting of Messrs. Pease, Guerreiro, Levi, and O'Sullivan (Bank), Boumendil and Hammond (Consultants) and Barry (AFDB).

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UPPER VOLTA

NIENA DIONKELE RICE DEVELOPMENT PROJECT

I. THE RURAL SECTOR

1.01 Upper Volta has a total area of about 274,000 km², and a resident population of 5.6 million (1978) whilst an additional 800,000 live abroad. Overall population is growing at 2.6 percent per year, less emigration of 1.6 percent, giving a net increase of 1.0 percent. The average urban increase is 4 percent against 0.7 percent for rural areas. While average population density is 20/km², there is a heavy concentration of people in the central north, where 60 percent of the population lives. The urban population represents some 8 percent; the main towns are the capital, Ouagadougou (225,000), and Bobo Dioulasso (135,000). Per capita GNP was US\$160 in 1978.

Agricultural Sector

1.02 Agriculture is the dominant economic sector, providing a livelihood for 80 percent of the economically active population and producing some 40 percent of GDP and 90 percent of recorded exports. Industry, much of which is based on agricultural products, represents about 15% of GDP. Remittances from migrant Voltaic labor to the Ivory Coast (the main destination) are also a substantial source of income and are responsible for 6 percent of the GNP. Gross value from agriculture is estimated at US\$215/family/year or US\$40 per capita (1977). Crop farming, under shifting cultivation, produces 25 percent of GDP, and provides 60 percent of official export earnings. Livestock employs another 6 percent of the population, produces 10-12 percent of GDP, and provides 30 percent of official export earnings. About 8 percent of the land, or approximately 2.2 million ha, is cultivated each year; the basic food crops, sorghum, millet and maize, account for some 85 percent of the cultivated area and, on average, 80 percent of total production value, but little is marketed. Rainfed cotton, groundnuts, sesame, irrigated and swampland rice, sugar and vegetables account for most of the remaining cultivated area and are marketed in greater quantities for local consumption or export.

1.03 Although the entire country is relatively flat, there are pronounced regional differences in climate, soils and population density. The climate changes gradually from Sahelian in the north, with a rainfall of 600 mm, to savannah toward the south, with a rainfall of 1,200 mm, creating agricultural differences: the low and erratic rainfall in the north results generally in unreliable harvests and greater reliance on livestock for survival and consequently low population densities. There is also a striking contrast between the Mossi plateau in the central north and the western and the south-western regions. On the Mossi plateau, crop farming remains at a subsistence level because of high population, over exploited soils and unreliable rainfall, whereas in the west and southwest, soil and rainfall conditions are more favorable, population densities are lower, and production is more market-oriented.

The Sahelian droughts in the early 1970s further exacerbated these differences: in the central region, they virtually eliminated cotton production and reduced grain production by as much as 35 percent; while in the western region, they affected production of these two crops very little. Moreover, most of the country's irrigation potential is in the western region.

1.04 Cotton is the country's most important cash crop, and a major export. Production began in the early 1950s, and had reached some 36,000 tonnes in 1969-70. During the 1971-75 drought period, production stagnated at about 30,000 tonnes annually, but then increased to about 50-55,000 tonnes in 1976 and 1977. Almost 90 percent of this cotton was produced in the western region.

1.05 The livestock subsector, while of vital importance to the economy, faces serious constraints, mainly recurrent droughts, overgrazing, insufficient watering facilities, and the growing competition of foodcrops. Forestry, another important subsector, especially the production of firewood and building poles, faces serious problems related to destruction of the land cover.

1.06 The foodcrop subsector also faces considerable problems. Since 1975, Upper Volta has become a substantial importer of grains amounting to 52,000 tonnes in 1977, some supplied as food aid. Commercial imports of rice have risen from 3,000 tonnes in 1974 to 20,000 tonnes in 1978. A return to self-sufficiency in overall grain production is a goal which is attainable in years of reasonable rainfall. However, given the almost total reliance on rainfed agriculture, the achievement of production sufficient to cover demand in poor seasons poses difficult technical problems. Further, rice is of special interest because imports are expanding to meet urban demand - the value of rice imports is now equal to 10 percent of the country's export earnings.

Rural Sector Strategy and Issues

1.07 Government Strategy. The Government's strategy for the rural sector can be summarized as giving priority to: (a) developing rainfed agriculture by promoting improved farm practices while integrating cropping and livestock activities; (b) stepping up migration from the densely populated and relatively infertile north central plateau to areas in the west and southwest which have low population densities and good agricultural potential; (c) gradually increasing the development of swampland and irrigated agriculture, thus helping to protect the nation against the catastrophes of major drought; and (d) assuring national self-sufficiency in foodcrops, particularly to replace rice imports.

1.08 These priorities are overlapping to a considerable degree, and being pursued by a variety of projects. In particular, in the central plateau, it is intended that a balanced effort of cropping development and adaptive research will be pursued under the Koudougou ORD project currently being appraised by IDA. Migration from northern areas will continue to call for development of exploitable lands in the south, including swamps, such as at Niéna Dionkele, and irrigable land. This development would also improve the security of food supplies and reduce imports of rice.

1.09 A major constraint on development is the limited quantity of sociological, technological, environmental, economic and marketing information on which national agricultural policy is based. This constraint requires that a pilot approach be followed in new fields such as medium-scale swampland development before funds are committed to larger projects. Nevertheless, available data indicates that the development of swampland such as Niena can be supported economically (para 7.05). With half of present rice demand being met by imports, Government is also keen to see the development of large irrigated schemes. Thus technical studies of the potential areas of the Black Volta and Sourou river systems are underway (para 1.26). In the future, policy decisions on such matters as cropping alternatives (e.g. cotton and/or rice), food self-sufficiency, and drought protection may involve careful analysis of price relationships and economic trade-offs. It is thus important that a maximum of factual information and sound analytical studies be made available to Government decision-makers.

1.10 Bank Group Lending. Bank Group lending policy toward Upper Volta is in keeping with an October 1977 presidential decree which established rural development as a priority sector. Three rural development projects have been successfully completed (para 1.11). There are also four ongoing IDA-assisted agricultural projects: Bougouriba I (Credit 496-UV) for US\$8.0 million, West Volta Agricultural Development (Credit 706-UV) for US\$3.6 million and the Livestock Development Project (Credit 557-UV) for US\$6.0 million, all of which are located in the southwestern part of the country, and the Second Rural Development Fund (Credit 640-UV) for US\$9.4 million, largely concentrated on the Mossi plateau. An agricultural development project covering the Koudougou ORD is currently being appraised. A forestry project credit for US\$14.5 million was approved by the Board on January 21, 1980.

1.11 The three completed rural development projects were essentially consecutive efforts. The Rural Development Fund Project (Cr. 317-UV) was started in 1972 and the Project Performance Audit Report (PPAR) confirmed that the project had been innovative and successful in implementing diversified and scattered subprojects including small area (10 ha) rice development projects, wells, feeder roads and soil conservation measures. The rate of return was estimated at 19 percent compared with 16 percent at appraisal. The Drought Relief Fund Project (Cr. 442-UV) using the RDF organization, successfully developed clean water supplies for 105 villages and 307 km of feeder roads. The PPAR noted that this project's components had already been introduced in the RDF Project and that a main contribution was to put the project organization to a successful test. No rate of return was computed for this project. The Completion Report on the Cotton Project (Cr. 225-UV) noted that substantial improvements in farming practices had occurred and that, as a lesson of experience, the ongoing follow-up project is based on an integrated rather than a single-crop focus; the rate of return, 37 percent, also exceeded the appraisal estimate of 31 percent partly due to an increase in cotton prices. As a general conclusion,

it has been noted that the problem remains of the Government having insufficient financial resources to maintain services established under the project after the project period has ended; so far this unresolved problem has been met through continued financing under the second phase project.

1.12 The RDF II and West Volta Agricultural Development projects have been making good progress and there are indications that Bougouriba II, after a slow start, is beginning to be effective. The Livestock Development Project aims to improve animal health and establish ranches for pastoralists. The former has gone well but because of organizational and other problems the number of ranches has been cut from 9 to 3 and the Credit reduced by US\$3 million.

Principal Agricultural Institutions

1.13 The Ministry of Rural Development (MRD) has as its executive head a Secretary General, located in Ouagadougou, who has under him appropriate planning, organizational, and national agricultural support services including research and irrigation. Several parastatals come under the responsibility of MRD. There are 11 Regional Development Organizations (ORDs), which cover the entire territory except for the lands adjacent to the three Volta rivers, which are largely depopulated because of river-blindness and are administered by the autonomous Volta Valleys Development Authority (AVV). ORDs are public agencies which are supervised by Boards of Directors representing the local administration and population. The directors of the ORDs report to the Secretary General, MRD. The ORDs have a large degree of autonomy and carry out a wide range of activities, such as extension services, the execution of small rural works, women's activities, cooperatives and community development, and economic analysis and planning. They rely on centralized public services for certain technical activities, such as construction of feeder roads, buildings, wells and irrigation works.

1.14 The ORD Hauts Bassins, where the project is situated, has its headquarters in Bobo Dioulasso. It covers five sectors: Bobo North, Bobo South, N'dorola, Hounde, and Orodora; and is responsible for the Kou Valley and Banzon irrigated rice schemes (paras 1.24-25). Its responsibilities include agricultural extension, training and visual aids, community development, finance and administration, agricultural credit, livestock health, rural engineering (including vegetable production), draft equipment manufacturing (Corema), and cold storage.

1.15 Agricultural Research. A number of research centers are responsible to MRD. The Centre d'Etudes et de Recherches sur les Cultures Irrigees (CERCI) conducts work on irrigated crops, particularly rice. This center is financed by and receives technical assistance under UNDP/FAO. It is located at Faraka Ba near Bobo Dioulasso and operates one substation on the Kou Valley irrigated rice scheme. For cotton, the main agency is the Institut de Recherches du Coton et des Textiles (IRCT); and for cereals the Institut de Recherches Agronomiques Tropicales (IRAT); these two agencies are French funded.

1.16 The Office National des Barrages et de l'Irrigation (ONBI) in MRD is a recently established organization (initially recommended by an IBRD/CP sector study of irrigation in 1975) which is the agency responsible for the design and construction of irrigation projects in Upper Volta. It is relatively inexperienced and, in due course, will have to be given more support.

1.17 Agricultural credit mechanisms are in a state of change. Short-term agricultural credit for annual inputs has in the past been provided by the National Development Bank (BND), through its Agricultural Credit Division, making use of the rediscount facilities of the Central Bank of West African States (BCEAO): BND lent to the ORDs who on lent to farmers at 5.5 percent. Funds for medium-term credit funded by the Conseil de l'Entente, USAID and by IDA under Credit 640-UV have also been used by ORDs for medium term loans to farmers at 5.5 percent. Government intends that agricultural activities will be coordinated and overseen in the future by the Caisse Nationale de Credit Agricole (CNCA) which is currently being established. Credit operations will continue to be administered by the ORDs, but the CNCA will have one agent at each ORD to supervise the segregated accounting and control of credit operations, and will provide central training facilities for ORD credit staff. IDA funds for agricultural credit will continue to be channelled separately to ORDs but in the short term the MRD Financial and Administrative Unit and in the medium term CNCA will oversee their administration (para 4.13).

1.18 Cereal marketing is undertaken by two parastatals, and by private traders. The National Cereals Agency (OFNACER) under MRD was established with funds from Government and has completed its first year of substantial local-purchasing operations. OFNACER purchases maize, white and red sorghum, millet, rice and cowpeas. It is endeavoring to ensure, by direct purchases and purchases through licensed traders, that farmers receive the official price for cereals (uniform throughout the country for each product) and through its wholesale and direct retail outlets, that official consumer prices are effective at retail level. The objective of substantially influencing prices has not yet been met. OFNACER is also charged with managing large reserve cereal stocks (provided by foreign aid). OFNACER has its headquarters in Ouagadougou, where accounts for the first year are still being collated. It is understood that at present the organization is running at a loss, and that Government intends to continue to meet shortfalls in operating costs. The Voltaic Marketing Company (SOVOLCOM) under the Ministry of Commerce and Industry is 97 percent government-owned. It is a major wholesaling and retailing organization, dealing in a wide variety of goods. It purchases locally, imports, and retails agricultural produce. It operates mainly in Ouagadougou and Bobo Dioulasso and functions profitably. There are also a considerable number of private traders who operate effectively nearer the main consumption areas. High transportation costs deter traders from providing an adequate market outlet in remote areas at prices that producers would find attractive. It is not clear whether the official wish to have OFNACER purchase at a uniform price throughout the country can be realized in practice, although OFNACER now has sufficient storage and transport capacity to operate on a large scale. Small-scale traditional local production from swamplands and production from improved swamplands is consumed near the point of production and also in the urban markets, with prices

being governed by market forces. Producer prices for rice are further discussed at para 1.28.

1.19 Cotton marketing and ginning are undertaken by a well-functioning joint arrangement, recently transformed from a partnership into the Textile Fibres Company (SOFITEX) under the Ministry of Rural Development, with participation by Government and the French CFDT. As cotton must go to a ginnery, Government is readily able to regulate producer prices, which are announced annually. About 90-95 percent of lint production is exported, the remainder being sold to the domestic textile industry. From its cotton operations, Government has in the past obtained sizeable cash surpluses, used to finance input subsidies and ORD activities. However, as falling export prices in the last two years have reduced these surpluses, the financing of input subsidies has become problematic. With regard to the proposed pilot project, input use would not be sufficiently large for this situation to be of concern. IBRD forecasts improved cotton prices through 1990, and cotton can be expected to continue to play a key role in the Upper Volta economy.

The Rice Subsector

1.20 Supply and Demand. In Upper Volta as a whole, per capita consumption of rice has increased steadily since the early 1970's, rising from 3.7 kg in 1971 to 7.2 kg in 1978. Most of the increase since 1974 has come from increased consumption in the cities, where there has been a dramatic replacement of millet and sorghum. Consumption in urban areas has reached 55 kg/person, and the preference for it over the traditional grains is likely to continue.

1.21 Domestic production of rice reached 45,000 tonnes paddy in 1976/77 (23,000 tonnes rice equivalent after deducting on-farm losses). Government would like to achieve self-sufficiency in rice production--an understandable goal for a landlocked country which suffers from recurrent droughts and food shortages, but a goal whose economic implications require careful analysis. The production implications of the goal are that an additional 109,000 tonnes of domestic production of paddy would be required by 1990 if the country were to become self-sufficient. This is based on expected trends in population growth and per capita consumption of rice (increasing at a rate of 1 kg every four years) which puts rice requirements in 1990 at about 75,000 tonnes (154,000 tonnes paddy equivalent) taking into account farm losses. Whilst higher rice prices relative to millet and sorghum may slow this growth, the experience in neighboring countries indicates that rice quickly replaces millet and sorghum in the urban diet, and in view of its greater convenience and lower cost of preparation, can bear an appropriate price differential. Given these circumstances it is important for Upper Volta to conceive and implement a well-founded rice policy - within the framework of an overall food policy - in order to ensure best use of resources. Whilst government wishes to be self-sufficient in rice, further analysis of the technical and economic aspects of rice production and their place in a total food policy, must be carried out. It appears likely that in the absence of direct controls, or major price interventions depressing demand, the country will continue to rely heavily on rice imports through to 1990.

1.22 Current domestic production comes from traditional sources (76 percent), swamplands (8 percent), and irrigated areas (16 percent). Traditional rice growing is generally carried out in swamps, that is low-lying areas with impeded drainage. Because of the absence of water control, production is unreliable and thus receives little cultural attention. Land preparation and weeding in particular are perfunctorily performed, seed is of the traditional Gambiaka variety and the crop is regarded basically as a bonus to production of other crops on upland parcels. Some conscientiously tended swampland rice is grown (5 percent) where an upland farming source is not available and where therefore the family is dependent upon the rice crop. In these cases, production is constrained by the absence of improved seed, fertilizer and water control measures. Nevertheless, yields of about 1 tonne paddy/ha can be expected.

1.23 Schemes to increase rice production have centered on water control of swamplands and on irrigation. To date 2,200 ha of irrigation have been developed. There are an estimated 30,000 ha of swamplands suitable for development, and the considerable river water resources provide the opportunity for at least 130,000 ha for irrigation. Although promising, there is as yet no completely successful large scale scheme. The first major scheme, involving improvement of swamp drainage and the retention of water levels through sluice gate control at the end of the rains (August/September), was initiated in 1958 in the Niena Dionkele flood plain. About 1,500 ha of rainfed rice was developed; but the scheme failed after three years due to poor flood control due to bad design and operations and inadequate support services and marketing services (para 2.06). Subsequently, some 3,040 ha of swamplands in small schemes of 5 to 20 ha have been developed in various areas of the country under the IDA-financed RDF I and II projects. These schemes have been generally successfully initiated, with yields ranging from about 1-3 tonnes/ha. The subsequent performance of these developments however has not yet been measured (para 1.11) and there is now a need to see whether larger swamps such as Niena Dionkele can be developed successfully.

1.24 The first major irrigation project including the use of permanent river flow was developed, between 1968 and 1973, by a Taiwanese mission at Kou (26 km northwest of Bobo Dioulasso) in Hauts Bassins ORD. This double-cropped rice project originally covered 1,000 ha but has been reduced to 870 ha. Some areas with unsuitable soils were deleted, and some land was lost because a lake expanded as a result of inadequate drainage facilities. The project produces 6,000-7,000 tonnes paddy per annum, contributing about 14 percent of national rice production. Farmers grow about 1 ha of rice each; some make informal arrangements with the local people whereby they also cultivate upland areas. Many use oxen for cultivation. Seed and fertilizer are provided by the scheme's cooperative and cultural practices are good. Yields are 3,500-4,000 kg/ha per crop and high returns to farmers continue to be obtained. There are also some problems: declining soil fertility; inadequate drainage; inadequate maintenance of irrigation structures; inexperience in cooperative society management and financial control; and poor crop marketing, as well as inefficient operation of the Kou Valley rice mill. Rehabilitation of this scheme is being financed by the West African Development Bank (BOAD) through a loan of US\$1.7 million, signed in July, 1979. It's relationship to the proposed project is discussed at paras 1.27 and 3.19.

1.25 In 1977, a similar scheme covering 500 ha was commenced at Banzon, about 100 km to the west of Bobo Dioulasso in the Hauts Bassins ORD, with assistance from the People's Republic of China. The project is still in the early stages of development.

1.26 The promising results of the RDF schemes and the evidence of the Kou scheme have resulted in the financing by FAC of the preparation of a master plan, which is being prepared for the Sourou and Upper Black Volta rivers. Studies which commenced in 1979, will include a number of feasibility studies that will examine in depth those areas having particular suitability for irrigated and rainfed development. The cost of water control, yields, prices and the place of rice within an individual farmer's overall cropping system, will determine whether rice can be produced economically. Thus these studies, and detailed analysis of current development schemes and of the proposed Niena Dionkele scheme will enable technical choices to be made, and provide evidence of farmer response to specific systems. This project will help government in this task.

1.27 Rice Milling. There are three large-scale rice mills in Upper Volta, a 3 tonnes/hour mill at Kou and two 1 tonne/hour mills within 10 km of Bobo Dioulasso. A smaller mill is located at Banfora, to the south. Elsewhere in the country, there are a number of 0.5 tonne/hour mills. The two mills at Bobo are both old and operate well below capacity. The larger mill at Kou, relatively new (1976), also operates below capacity on account of poor maintenance and spares availability. It is currently under ORD control. Management requires upgrading, and an excessively large labor force is employed. This mill would have adequate capacity for production from both the Kou Valley scheme and from the proposed Niena Dionkele scheme up to the end of the second phase (3,000 tonnes paddy/year). At that time (1987), an increase in the capacity of this mill, or construction of another mill, would be necessary. The shorter term needs are considered in the proposed project.

1.28 Marketing and Producer Prices. Very little rice grown by traditional methods finds its way into the organized marketing channels. What does is usually handled by small traders, although OFNACER may in the future play a greater part. The Kou Valley scheme is the major organized source of production, and these farmers have had increasing difficulty in selling their surplus production despite OFNACER purchasing some (1,860 tonnes) of the 1979 dry season crop (3,800 tonnes). Up to 1978/79 the ORD was involved in purchasing the crop on behalf of OFNACER. The ORD's financial difficulties have led to dissatisfaction by OFNACER with this arrangement, as obligations of the ORD have not been met on schedule, in turn leading to delays in the crop being purchased. Except for such purchases by OFNACER, farmers have usually received less than the official price. Part of the problem has been due to financial difficulties between OFNACER and the ORD as purchasing agency. The other is that it has been more profitable for SOVOLCOM, the Army, OFNACER and traders to import rice for sale to the urban areas than to go to the trouble and risk of purchasing rice from Kou - especially after the official producer price was increased in 1978 (to above world prices) at the same time as world

prices decreased. In addition, the lack of institutional capability in the Ministry prevented a proper analysis of the rapidly expanding rice market and failed to regulate imports. The project has taken this experience into consideration (para 6.02).

II. THE PROJECT AREA

Location

2.01 The project is in the Niena Dionkele zone located 108 km northwest of Bobo Dioulasso in the subsector of N'dorola in N'dorola sector of Hauts Bassins Region (see Map 14301). The swamplands to be developed in the Niena Dionkele area consist of 3,500 ha of the Dougo and Kuo Swamps and swamplands along the valley bottom of the river Dougo and its tributaries, the Kuo and Ouzou. The two valleys are flooded in the wet season and, along with their rivers, dry out in the dry season. Farmers at present grow dryland crops on the red lateritic soils of the surrounding uplands and from 150 to 200 ha of swamp rice on the edges of some of the flooded areas. The whole catchment area covers some 90,000 ha and includes the villages of N'dorola, Were, Karamassasso, Dingasso, Diguere, Niena, Kourouma and Dionkele.

Climate, Land Features and Topography

2.02 The area is close to the 1,050 mm isohyet and is characterized by a dry season from November to March and a wet season from April to October. Maximum temperatures occur in March and April, minimum temperatures in December and January. Temperatures average 25-30°C. Maximum cloud cover and rainfall center on August. During the dry season, the dry winds from the Sahara (northerly and northeasterly) result in very sunny weather and very low humidity. Rainfall data (collected over 22 years at N'dorola) show that evapotranspiration requirements are amply satisfied from the end of June to the end of September, and that climatic conditions are very favorable for annual dry season crops. The rainfall ranges from 1 in 50 year extremes of 400 mm over 6 months to 2260 mm over 12 months. One year in two, 1060 mm can be expected spread over 9 months. Working Paper C3 contains data on sunshine, temperatures, and humidity in Bobo Dioulasso, and some data recorded at Niena Dionkele.

2.03 The catchment area is bounded, except on the south, by high projections with outlying hardpan. The geologic formations are of sandstone origin (close to Niena) and doleritic (north of N'dorola). Peripheral elevations are in the 450-650 m range. The alluvial depressions are below the 336 m level. The basin is characterized by a flat relief with some slight longitudinal and transversal slopes. The valleys leading to the central depression have variable longitudinal slopes and gentle to sharp transversal slopes. In general, natural embankments border the low-lying areas.

Water Resources, Soils and Vegetation

2.04 The flow patterns of the Duogo, Kuo and Ouzou rivers follow closely the rainfall pattern, with a maximum runoff at end-August/mid-September. Generally, the rivers are dry by December. Hydrological surveys, carried out by the Overseas Technical and Scientific Research Organization (ORSTOM) in 1974, 1975, and 1976, show that the coefficient of runoff (i.e. the ratio of actual runoff to rainfall) is unexpectedly low (5.8 percent); this finding considerably limits the feasibility of storage reservoirs for permanent irrigation.

2.05 At their entrance inside the flood plain, the river beds of Dougo and Kuo disappear completely and, consequently, these rivers usually flood the neighboring areas of good lowland soils.

2.06 There is only one exit for the river floods, at Karamassasso, at the northern extremity of the flood plain. The grade of the river from here on is quite shallow, and further downstream the floods flow through a 48-km-long channel with some narrow stretches due to rocky outcrops that limit the drainage discharge of the flood plain. At Karamassasso, the discharge is limited to 20 m³/sec. This low discharge causes the water to back-up, so that the northern part of the plain is regularly flooded. In 1958, a gated structure was built at Karamassasso with the purpose of maintaining a pond of some 2,900 ha (at contour level 331) for the purpose of controlling water levels in the swamp. However, the level of control was insufficient for sustained high yields due to the highly variable hydrology of the area. It was concluded that better flood control would be needed. Development proposals involving this structure are discussed at para 3.06.

2.07 Soils. A number of soil surveys have been carried out in the project zone. The soil types are distributed as follows: lithosols, 40 percent; tropical ferruginous soils, 46 percent; vertisols, 7 percent; and in the swamplands, hydromorphic soils, 7 percent.

2.08 The upland loamy to clayey-sandy ferruginous soils have good water retention, and water penetration is not impeded by a resistant structure on the surface. These soils are of average to good quality for sorghum, cotton, maize, and legumes. The pH of the soils is slightly acid to neutral; organic content is average (3-9 percent); there is little assimilable phosphorus and a low absorbent complex.

2.09 Vegetation in the project zone is similar to that of the Sudano-Guinean region. There are five tree species, which help identify soil types. The karite and nere trees are found on deep soils, acacia and bauhinia on vertisols, and myrtragyne in flooded areas. In the range lands, the grass cover consists mainly of andropogon, eragrostis, loudetia and sporobolus.

Land Use and Tenure

2.10 A bush fallow system of farming is used and areas are cleared for crops by burning over the vegetation and leaving certain trees standing, generally the karite and nere species. Millet is cultivated on a two-to-three-year cycle, sorghum for six years followed by five years of fallow. Maize may be continuously cultivated for as many as 50 years in some locations, rice for one to 10 years, and cotton from two to five years. Where striga (a semi-parasitic weed) is a problem, the land is left 10-15 years to regenerate.

2.11 Average area cropped per family is currently 2.4 ha. In addition, families have access to varying quantities of fallow land and grazing areas, much of which could be cropped as population increases. About 5,000 head of cattle graze in the area during the dry season. Average farm size is estimated at 4.75 ha excluding grazing areas, thus indicating an area of some 2.35 ha of fallow land cropped from time to time.

2.12 Land tenure throughout the project area is organized on the basis of kinship. Traditionally, farmland is held collectively by a man and his sons and their children - the patrilocal extended family. Occasionally, the land is held by the fraternal joint family, consisting of two or more married brothers and their sons. In recent years, an increasing number of fields are held on the basis of the immediate family alone. The residual or final right to land, once held by the "earth chief", is now held by the national government (See Working Paper C 4).

Population and Farm Labor

2.13 The present population is estimated to be 1,500 families (8,000 people) distributed as follows:

Project Area Population

<u>Village</u>	<u>-----1976-----</u>		<u>1979</u>
	<u>Population</u>	<u>Families</u>	<u>Families 1/</u>
Ndorola	2,309	433	466
Teoule	694	140	152
Dingasso	590	102	111
Karamassasso	178	35	38
Diguera	111	19	20
Were	256	52	55
Niena	256	48	51
Kourouma	2,385	447	482
Dionkele	<u>620</u>	<u>116</u>	<u>125</u>
Total	<u>7,399</u>	<u>1,392</u>	<u>1,500</u>

1/ Assumes 2.6 percent growth rate since 1976.

The region is one of the least populated in the country, having an average density of only 10/km², as against a national average of 20/km² (and a density on the Mossi plateau of 40/km²). The principal ethnic groups are: Senoufo, 48 percent; Bolon, 42 percent; Bobo, 7 percent; Mossi and others, 3 percent.

2.14 Farm Labor. Women do not generally work in the fields, though some will assist at harvest time. A man generally works his land assisted only by his young sons. However, additional labor sources can come from voluntary work groups, reciprocal aid from friends, or the return of family members from outside work. As shown by the labor profile in Working Paper C2, there is adequate family labor available for the proposed cultivated area. The number of persons per family varies among villages, but is generally in the range of 4.9-5.7, with an average of 5.3 and an average of three economically active persons.

Roads and Communications (Map IBRD 14613)

2.15 IDA Credit 653-UV provides for the paving of the major road serving the southwest of the country, where Niéna Dionkele is located, from Bobo Dioulasso to the border with Mali. There is now a good asphalt road for the first 60 km; the remaining 48 km is laterite and mostly in good condition (the original construction of this road was financed under the Cotton Project - Cr. 225-UV). Within the project area, most roads become impassable at the height of the wet season. Some road construction in the area would be carried out under the IDA-financed Rural Roads Project (Cr. 579-UV). The major import/export linkage is the Ouagadougou-Abidjan railway, on which Bobo Dioulasso is located.

Power, Water Supply, Education and Health Services

2.16 There is no power supply in the project area and none is planned for the near future.

2.17 Rural water supplies are generally inadequate and often unhygienic. The high water table throughout the project area has resulted in the existence of many poorly constructed private or village wells. Most are about 5-10m deep. While they generally do not dry up even at the height of the dry season, they soon become adulterated and frequently collapse because of poor design and maintenance. As there is no scarcity of water, any improvement should be aimed at improving the supply of unadulterated water. To this end, Government has made proposals to USAID to finance a scheme to improve water supplies for each village.

2.18 Health services are based on curative care at fixed point facilities, although mobile teams are available to conduct vaccination against major diseases such as cholera and sleeping sickness. In the project area, there are dispensaries at N'dorola and Kaya; in 1978, there were 9,945 consultations at N'dorola. The project area has a number of health problems, with malaria being a major health hazard and leprosy cases significant. A tenth of the population have suffered from onchocerciasis, with many of these suffering permanent eye disabilities. The low population density

reflects these poor health conditions. However, the area continues to benefit from internationally-aided onchocerciasis control measures and the disease no longer represents a serious constraint to swampland development.

2.19 Education services in the project area are limited to one six-year primary school at N'dorola for 300 pupils, and two three-year primary schools of 150 pupils each at Kaya and Kurouma. Under the Second Education Project (Cr 956-UV) a Young Farmers Training Center (CFJA) will be built at Teoule for 30 students for 3 year courses, opening in 1982.

Prospects for Rice Development

2.20 Efforts to develop irrigated rice in Upper Volta have centered on the southwest region (paras 1.23-1.26) and thus the project area has been a focus of subsectoral attention. In view of the apparent suitability for rice development Government asked IDA in 1974 to look at the area again. A FAC-financed SCET study in 1974/75 concluded that there was inadequate water availability for a double crop irrigated scheme, but nevertheless that an agricultural project combining upland crops and rainfed swamp rice appeared feasible. Three alternatives were offered which involved 1,500-1,800 ha of flood plain development. The alternative initially selected was the least expensive and simplest, eliminating alternatives that included mechanized cropping in the uplands and/or expensive civil works for growing rice under full or supplemented irrigation. This development approach combined 1,500 ha swampland single-crop rice production together with a small 315 ha irrigated polder and extensive cropping in the uplands. The preappraisal mission in October 1978 examined the proposal and concluded that the area could be expanded to 3,500 ha of rainfed single crop swamp rice which should be developed through a three-phase development program. The parameters of the full scheme were estimated on the basis of assumptions that were considered reasonable, but which required testing out before committing funds to a scheme estimated at preappraisal to cost US\$33 million. The three phase program presented in this report, based on the above scheme but substantially changed in some aspects, is estimated to cost US\$22 million.

2.21 The first phase, taking three years, would involve the development of 400 ha of rainfed rice involving farmers in the area. The pilot project would test: cost and benefit assumptions, technical assumptions, labor availability, compatibility and effect of rice in the farming system, sociological aspects of the development, cooperative and input systems, and marketing aspects.

2.22 If this pilot phase proves successful, a second phase project would consist of the development of the adjacent areas of the Kuo perimeter (660 ha) and the South Duogo perimeter (400 ha), a total of 1,060 ha. This second phase would include improvement of the discharge capacity of the downstream flood plain outlet by blasting away of rocky outcrops (para 2.06), and feasibility studies for developing suitable areas around the Karamassasso lake. The third phase would probably involve the remaining reclaimable areas of the Niena Dionkele flood plain, some 2,040 ha. Flood protection would be required for the perimeters as well as the areas along the rivers.

2.23 Nearby the Niena Dionkele flood plain, there are two more large flood plains (Foulasso-Lelasso and Kadana) with similar hydrological and soil conditions. These swamps offer about 4,000-5,000 ha of swamplands suitable for rice cultivation which could be developed in subsequent phases. A successful experience with rice cultivation on the swamplands of Niena Dionkele could therefore provide the necessary information that could lead to the development of large areas in the general vicinity of the project area, as well as other extensive areas all over the country (estimated at 30,000 ha).

III. THE PROJECT

General

Identification, Preparation and Appraisal

3.01 The droughts of the early 1970s had a severe effect on Upper Volta's agriculture, particularly upland farming. As a result, Government's attention was drawn to the potential for improving the balance of crop production, particularly rice, through development of lowland swamp areas. Government also sees the development of such areas as providing the opportunity to resettle people from the Mossi plateau where population pressures have resulted in soil deterioration. At Government request, an IDA mission identified a possible irrigation project at Niena Dionkele in 1974. FAC then financed a full feasibility study in 1974-75 by SCET International, which produced its report in May 1976. Preparation was done by the FAO Co-operative Program, with field work in February/March of 1978; the preparation report was completed in June. The Bank's Resident Mission in West Africa monitored the feasibility/preparation effort. IDA pre-appraised the project in October 1978, and appraisal took place in May 1979.

General Project Objectives

3.02 The proposed project would be a three-year pilot phase of a possible three-phase program for converting a swampy area to more productive use. In the first phase, 400 ha of the North Dougo swamp would be developed for cultivation by 800 of the local Senoufo and Bolon families. It will assist farmers in the development of 2160 ha of existing upland crops, principally cotton, sorghum, millet and maize, and assist government to address the rice sub-sector issues through the provision of technical assistance. If this first-phase pilot project is successful, the project could be extended in second and third phases to about 3,500 ha for about 3,900 families, some of whom would come from outside the area.

3.03 The two primary objectives would be (i) to test key assumptions regarding the future development of swamp areas (para 2.21) and (ii) to address the rice subsector issues. The project would examine the feasibility and sociological aspects of including swamp rice within farming systems having varying ratios of upland crops. It would also promote institution building in the rice sector through strong evaluation, organizational and training components. The project would examine the prices, marketing and economic aspects of rice production with a view to defining a national rice

policy in the context of an overall food policy. The Government would be helped to create the necessary marketing structure to ensure farmer confidence in rice production, to determine the country's future rice development policy and strategy with the aid of economic planning and analysis, and to train future rice industry managers by a formal career advancement program. In conjunction with studies to be conducted on the upper Black Volta, financed by the Fonds d'Aide et de Cooperation (FAC) and monitored by IDA, the project would help open the way for the appraisal of a series of development schemes for irrigated or rainfed crops.

3.04 The project follows Government policy to increase the production of rice, thereby raising farm incomes and the standard of living of the farming population, decreasing the need for rice imports, and providing greater stability to food production in drought years. Through its institutional and fact-finding roles, the project would play a significant role in laying the foundation for a sound rice industry.

Summary Description

3.05 The pilot project would be implemented over three cropping years, 1981/82 - 1983/84, with an infrastructural build-up in 1980/81. It would comprise two distinct but interrelated components - production and rice industry support, involving:

A. Production Component

1. developing 400 ha of the North Dougo swamp for single crop rainfed rice production;
2. providing management staff, a trained extension service, and promoting better farming on swampland and uplands through improved husbandry, credit, farm inputs, oxen and equipment;
3. constructing and operating two farm service centers and promoting a Niena Dionkele Cooperative Society;
4. providing farm inputs and oxen and equipment for sale on cash or credit;
5. establishing a demonstration unit, with demonstration, seed production and training functions;
6. establishing and operating a research substation to undertake research into project-related matters;

B. Rice Industry Support

7. strengthening the Ministry of Rural Development with technical assistance, charged amongst other things with the preparation of a rice industry policy study;
8. establishing a monitoring and evaluation unit;

9. strengthening the management of the Kou Valley rice mill and providing for possible physical improvements;
10. funding studies of further developments in the project area and of the national rice industry.

Detailed Features

A. Production Component

Swamp Development

3.06 The first objective is to develop an area with soils and elevation as representative as possible of the whole cultivable soils of the Niena Dionkele flood plain. The North Dougo swamp has been selected for this reason. It has about 400 net ha of Class I and Class II 1/ (mostly Class I) soils, located at low and intermediate elevations, permitting observation of the varying influence of the capillary water supply from the water table created by the Karamassasso lake. The North Dougo swamp is the area within the Niena Dionkele flood plain least affected by the flooding which resulted in the failure of the scheme initiated in 1958 (see para 1.23). Under the project, the problems which occurred under the 1958 scheme would be resolved by the construction of interception drains, and a protection dike to protect the area against the highest levels of the Karamassasso lake, upstream of the weir, and by more efficient operation of the Karamassasso weir, which regulates water levels in the lake. The swamp development would consist of flood protection works consisting of retaining banks to prevent water overflowing from the Dougo and Kuo rivers and perimeter ditches to protect the rice fields from damaging downhill runoff. The 400 ha would be subdivided into 0.5 ha plots which would be marked out, levelled and bunded by hand labor to retain rain water. This swamp development would be relatively inexpensive in terms of the civil works (see para. 3.08). Moreover, only 14 km of new feeder roads are required, an additional road section through Teoule to Niena. Hence development costs for the pilot project would be kept to a minimum. Flood protection works take into consideration existing run-off. However, future phases will reassess the run-off effects of increased upland cultivation.

3.07 The Office National des Barrages et Irrigation (ONBI) would survey and peg out the area. Then, 7.4 km of interception drains and 4 km of 1 m-high dikes would be constructed along contour-level 331 m to protect the area against the highest levels of the Karamassasso lake. This work would be done under the control of the Project Manager, by private contractors or in the event of excessively high bids, by ONBI using land development machinery (1 x 140 hp tractor, heavy plow and ancillary equipment) procured under the project. Farmers would construct 120 km of internal bunding (40-45 cm high), using their own labor. ONBI would do the initial deep plowing. The

1/ SCET Classification (See Annex 5 B3).

bunds would permit the building up of a water layer of 10 cm, and also would provide storage for at least 10 cm from heavy rainfall. SERS would construct 14 km of roads using its own existing machinery and staff. Assurances were given at negotiations that ONBI will provide the supervisory services to implement the civil works program, either using machinery procured under the project or through contractors; and that SERS would construct about 14 km of roads using its own existing machinery and staff, and according to the project timetable (para 8.01).

3.08 Maintenance of the water control structures would be carried out under the control of the Project Manager. Farmers would be required to maintain the internal bunding as a condition of creditworthiness for future loans. Maintenance of interception drains and protecting dikes would be carried out by hand labor supplemented where necessary by machinery provided under the project and operated by ONBI. The costs of this work would be fully recovered by the annual charge mentioned below. ONBI has the staff for initial survey work, which would be carried out over a three-month period during the dry season 1980/81. At 1980 prices, base capital costs for water development for the pilot project are US\$1,943 per ha or US\$971 per family; and for the complete three-phase program would be US\$2,659 and US\$2,386 respectively. Total recurrent and operating costs for the three phases are US\$65 per ha per annum or US\$59 per family per annum. An annual land charge of US\$38, rising to US\$95 per ha per annum in the third cropping season, would be paid by farmers through sales of produce (para 6.06).

Management, Extension and Farming Methods

3.09 During the pilot project, the response of the local people to technological innovation and issues of land use and settlement would be tested. In this first phase, it is expected that participation would include 800 families, or 53 percent of the project area population. The selection of these farmers would be primarily the responsibility of a Management Committee (para 4.05), which would be composed of community leaders. Project staff would play an active role to ensure a high proportion of potentially responsive farmers. It is estimated that farmers will grow between 2.9 and 3.3 ha of crops, of which 0.5 ha will be swampland rice (the other main crops: maize, sorghum, millet and cotton, being grown in the surrounding uplands). Improved upland crop and rice husbandry would be promoted through the extension services (para 4.08) and demonstrations (para 3.14) and the provision, through cash and credit sales, of farm inputs such as seed, fertilizer, oxen and equipment (such as ox plows, planters, harrows, ox carts and hand operated threshers, sprayers etc). At full development of the three-phase program, about 444 tons of fertilizer and 6,000 litres of insecticide (mainly for cotton) will be sold by the project through Farm Service Centers; and about 76 tons of rice seed will be produced by the CERC research station, the Demonstration Unit, and master farmers (paras 5.06-07). There are about 150-200 pairs of oxen already in the project area and the project would provide another 170 pairs of oxen, which would meet the immediate needs of project farmers for both swampland and upland farms. Oxen would be purchased at the end of the cropping year, when farmers possess liquid cash resources to make down payments; the oxen would be trained in time for the next plowing season.

Supplementary feed (cotton-seed) would be provided by cash sale for 90 days annually and adequate arrangements would be made for veterinary services and technical advice. About half the farmers are likely to use seasonal credit, and oxen and equipment will be purchased with medium-term credit. Total credit requirements for the pilot project are estimated at US\$440,000 and would be administered through a revolving fund controlled by the Project Manager (para 4.13).

3.10 The project would establish a project management unit with appropriate management staff and a trained extension service including equipment, vehicles, buildings and operating costs for organizing and carrying out the development activities. Project headquarters would be located in or near N'dorola. For the pilot project, buildings would consist of two senior staff houses, one intermediate house and materials for construction by villagers (a traditional practice) of 13 junior houses. Additional buildings would consist of stores and a generator house.

Farm Service Centers (FSC) and Niena Dionkele Cooperative Society

3.11 There is an existing input supply center at N'dorola operated by the ORD. Under the pilot project, the N'dorola center would be managed by the project and would be improved. A second center would be constructed at Teoule. These centers, which would serve both project and non-project farmers, will provide all project farmers with an FSC within 8 km of their rice holdings. An FSC will consist of a store, office, house for the supplies assistant, and a well, and would supply a variety of input supplies on cash as well as on credit.

3.12 A Cooperative Society would be progressively developed based on the existing village groups which would continue to function and to which all rice growers would belong. It would approve agricultural credit taken by members and would ultimately handle the supply requirements of farmers, together with marketing of agricultural products (para 4.15). Initially, farmers would meet in project offices and use project stores. A cooperatives specialist would be provided under the project and would help establish and supervise the Cooperative Society.

Farm Inputs

3.13 Farm inputs financed under the project (para 3.09) would be managed under two separate accounting systems, one recording purchases and sales whether on cash or credit; the other recording the credit transactions. The cooperatives specialist would work closely with the farm service centers and the credit operation, in order to draw up a program for close involvement of the farmers in these activities, and a schedule aiming at their phased takeover by the Cooperative.

Demonstration Unit

3.14 A 5 ha Demonstration Unit would be established to carry out practical, project and farmer-oriented undertakings. It would supplement seed production by master farmers; conduct field trials on varieties of rice and other crops released by research; and conduct field trials on the Unit and

on farmers' holdings, devoted to a variety of project-related practices. Activities would fall in three categories: (a) fertilizer trials; planting date trials; fodder crop trials for feeding draft oxen; minimum tillage trials; feed and management trials on work oxen; and trials aimed at maintenance of soil fertility through manure collection and application and use of green or cover crops; (b) demonstrations to farmers of farming techniques through periodic field days; and (c) encouragement of a greater involvement in the farming cycle by women whose traditional involvement has been limited to a modest input at harvest time. Investments would include provision of buildings, equipment and operating costs.

Research Substation

3.15 The project would fund the establishment and operation of a 2 ha research substation to be operated by the Centre d'Etudes et de Recherches sur les Cultures Irriguees (CERCI). The substation would be located in the project area alongside the project-managed Demonstration Unit and CERCI would conduct crop research on agricultural aspects such as variety selection and cultural priorities.

B. Rice Industry Support

Rice Industry Support Group

3.16 The project would provide support to the Ministry of Rural Development in its function of developing a national rice industry through the provision of 4 technicians: Rice Industry Advisor to MRD (RIAM), Senior Evaluation Officer, Manager of the Kou Valley Rice Mill and a Cooperatives Specialist. A Voltaic social-anthropologist would assist the Monitoring and Evaluation Unit (MEU) for the first 18 months. Funds would also be provided for vehicles, equipment and operating costs to carry out monitoring and evaluation, a rice industry policy study, and a career advancement program for rice industry specialists. This rice industry support group would live in Bobo Dioulasso in rented accommodation with rented offices. The average base cost of the four specialists assuming international recruitment, (totalling 12 man-years) including relocation costs and benefits, is US\$99,000/ man-year, of which US\$71,000/year represents salary and direct benefits.

Rice Industry Advisor to the Ministry of Rural Development

3.17 The Rice Industry Advisor to MRD would lead all activities of the rice industry support group, but in particular would be responsible for (i) preparing a rice industry policy study; (ii) assisting the Ministry to coordinate ongoing activities, such as marketing policies, which have a bearing on the success of the pilot project; and (iii) implementing the career advancement program for rice industry specialists.

Monitoring & Evaluation

3.18 A monitoring and evaluation unit will be established which will in its monitoring role assist the production component in implementing its development program, and in its evaluation role provide those essential data required for the preparation of future projects.

Kou Valley Rice Mill

3.19 Production from the pilot phase will be milled at the Kou Valley rice mill. The mill is badly in need of attention (para 1.27). The project would therefore provide for the rehabilitation and improved management of the mill through: firstly, an expatriate mill manager for three years who would supervise the mechanical rehabilitation of the mill and its continued maintenance and improved operations, and would also ensure that the mill operated along sound commercial lines with efficient accounting controls and management; secondly, the supply of spare parts and repair costs to bring the mill back into a state of effective operation; and thirdly, a senior house would be built for the mill manager at Kou. The Kou Valley rice mill is located 82 km from Niéna Dionkele on the Bobo Dioulasso road. Improved management and operation of the mill will not only benefit the project, but will also give support to the national rice industry.

Studies

3.20 Twenty-three man-months of consultant services would be provided under the project to undertake or assist with three studies: (i) A review of alternative lines of action for the improved management and operation of the Kou Valley rice mill. Funds for this review are provided under the PPF. Alternatively, the study may be conducted by the Rice Mill Manager when appointed. (ii) A rice industry policy study directed by the Rice Industry Advisor to the MRD, with assistance from specialists provided under the project (para 4.22), would examine the present rice industry and make recommendations on policies to be followed to promote its development (see Working Paper C 6). (iii) Preparation of a Phase II project, which would reflect the lessons of experience during the first three years of the pilot phase as well as findings from the rice industry policy study (see Working Paper C 6). In addition, consultants would be engaged to provide a periodic overview of training activities at all levels (para 4.21 and Working Paper C 6). If necessary consultants would be used to determine the need for and eventually prepare terms of reference for a study of the incidence and control of schistosomiasis in swampland (see Working Paper C 6). The average base cost of consultant services is estimated at US\$9,300/ man-months, including subsistence and travel. At negotiations, Government gave assurance that prior to engaging any consultant, the detailed terms of reference would be reviewed by and agreed with IDA, consultants appointed would have qualifications, experience and terms and conditions of appointment satisfactory to IDA, and consultant reports would be promptly reviewed with IDA for examining possible implementation implications (para 8.01).

Cost Estimates

3.21 Project costs, net of identifiable taxes and duties (from which the project will be exempt), are estimated at CFAF 1,495 million (US\$7.1 million), of which CFAF 894 million (US\$4.3 million) or 60 percent represents foreign exchange requirements.

Project Costs

	--CFAF million--			--US\$ thousands--			% For Exch.	% Base Costs
	Local	For.	Total	Local	For.	Total		
<u>A. PRODUCTION COMPONENT</u>								
1. Swamp Development	92	138	230	438	657	1,095	60	21
2. Management, Extension and Farming Methods	101	135	236	480	645	1,125	57	21
3. Farm Service Centers	22	16	38	106	75	181	41	3.5
4. Farm Inputs	44	29	73	210	139	349	40	7
5. Demonstration Unit	13	3	16	60	14	74	19	1
6. CERC I Research Sub-station	8	3	11	41	12	53	22	1
Subtotal	280	324	604	1,335	1,542	2,877	54	54.5
<u>B. RICE INDUSTRY SUPPORT</u>								
7. Rice Industry Support Group	77	145	222	368	688	1,056	65	14
8. Monitoring & Evaluation	66	85	151	311	407	718	57	13.5
9. Kou Valley Rice Mill	25	79	104	116	378	494	76	9
10. Studies	19	80	99	95	380	475	80	9
Subtotal	187	389	576	890	1,853	2,743	68	45.5
<u>C. TOTAL BASE COSTS</u>								
	467	713	1,180	2,225	3,395	5,620	60	100
Physical Contingencies	36	42	78	173	197	370	53	
Price Contingencies	98	139	237	468	663	1,131	59	
<u>D. TOTAL PROJECT COSTS</u>								
	601	894	1,495	2,866	4,255	7,121	60	

Cost estimates are based on prices and quotations obtained during appraisal in May 1979, revised to allow for anticipated price increases to March 1980. Estimates for land clearing and deep plowing are based on force account operations, but implementation will be by contractors if this is feasible at lower cost; other land development costs are on the basis of implementation by contractors. Physical contingencies added to base estimates are 15 percent for civil works, 10 percent for vehicles, equipment and furniture and 7.5 percent for local salaries and operating costs. Price contingencies on costs, including physical contingencies, have been calculated for 1980, 1981,

and 1982-83 at 9 percent, 8 percent and 7 percent respectively compounded for all items. The base cost for the pilot phase is US\$5.6 million and for all three phases is estimated at US\$22 million.

Proposed Financing

3.22 The proposed IDA credit of US\$6.5 million would finance 90 percent of net project costs rounded to US\$7.2 million, to cover 100 percent of foreign exchange costs (US\$4.3 million) and 76 percent of local costs (US\$2.9 million). The Government of Upper Volta would contribute 10 percent of project costs, US\$700,000, which would include salaries and post allowances of civil servants employed by the project estimated at US\$150,000, together with input subsidies of \$40,000. Beneficiaries would contribute US\$30,000 of project costs as down payment for oxen. At present, the subsidy on fertilizer used on cereals is provided by the Caisse de Stabilisation which is funded largely by a distribution of cotton profits, which are currently depressed because of world market conditions. At negotiations assurance was given that the project would obtain its fertilizer requirements through SOFITEX. In regards to fertilizer subsidy this would be reviewed as part of the Rice Industry Policy Study to be conducted by the RISG. Assurance was given by Government that it would take all necessary steps to ensure the availability of the project's fertilizer requirements.

3.23 Project Preparation Facility. Included in the above costs are amounts totalling US\$120,000 for project start-up expenditures for which IDA made available a PPF advance on April 19, 1978, to finance operating expenses of the project manager designate, building construction including the research outstation, and a study of the Kou Valley rice mill.

3.24 Project Special Account. Because Upper Volta has difficulty in prefinancing expenditures, an amount of US\$400,000, financed as an advance from the credit, would be deposited in a special bank account under the joint control of the Project Manager and the Director of FAU, which would be operated under terms and conditions acceptable to IDA. Unless agreed otherwise by IDA, all disbursements in local currency would be effected from the special account and reimbursement made by IDA to that account. Disbursement applications would be accompanied by (i) a statement of movements on the account since the application, with the balance certified by the Bank holding the account; (ii) a reconciliation showing that the balance represents the original amount of the account, less payments awaiting reimbursement, or small working advances. IDA would replenish the account on receipt of these statements together with evidence of disbursements for allowable expenditures. Should any disbursements be made from the revolving fund which are not acceptable to IDA, the Government would deposit the corresponding amount in the special account. Assurances to this effect have been obtained at negotiations (para 8.01). The opening of the account would be a condition of credit effectiveness (para 8.02).

Procurement and Disbursement

3.25 Procurement of civil works for drainage, land clearing, and deep plowing, houses, and offices (totalling US\$1.9 million) would be by competitive bidding in accordance with local procedures, which are acceptable to IDA, or with the agreement of IDA by force account (para 3.07). Experience in Upper Volta has shown that works of this size in remote areas do not attract international firms. Vehicles and equipment (totalling US\$0.5 million) including equipment required for civil works undertaken by force account, but excluding farm draft equipment, would be procured through international competitive bidding in accordance with IDA guidelines in the case of contracts over US\$100,000, through competitive bidding in accordance with local procedures, which are acceptable to IDA, in the case of contracts between US\$30,000 and US\$100,000 and by competitive shopping for contracts less than US\$30,000. Farm draft equipment for sale on credit or cash (totalling US\$200,000) would be procured by competitive bidding in accordance with local procedures. Farm inputs including fertilizer and urea (totalling US\$100,000) would be procured from SOFITEX or by competitive bidding in accordance with local procedures in the case of contracts between US\$30,000 and US\$100,000 or by competitive shopping for contracts less than US\$30,000. Domestically manufactured goods would be allowed a preference of 15 percent or the level of applicable import duty if lower. Internationally recruited staff (estimated cost US\$1.5 million) and consultants (estimated cost US\$0.5 million) would be obtained following procedures acceptable to IDA. The average base costs of the five internationally recruited specialists, for which project funds are available (totalling 15 man-years), including relocation costs and benefits, is US\$96,000/man-year, of which US\$69,000/man-year represents salary and direct benefits. The average base cost of consultant services, totalling 23 man-months, is estimated at US\$9,300/man-month including subsistence and travel. Remaining project costs (US\$2.4 million) would involve (a) wages, salaries and related allowances; (b) operating costs of vehicles, equipment and offices; and (c) scholarships, audits and training, and (d) credit for oxen purchases by farmers.

3.26 Applications for withdrawals from the credit account would be fully documented except for civil works done by force account, credit for oxen, local salaries, and operating costs, which would be submitted with certified statements of expenditures, whose supporting documentation would be retained for inspection and certification by the independent auditors, and for inspection in the course of project supervision.

Disbursements

3.27 The IDA credit of US\$6.5 million would be disbursed over four years under the following categories:

	<u>US\$</u> <u>thousands</u>	<u>% of Expenditures</u>
A. <u>PRODUCTION</u>		
1(a). Civil works	)	88% of expenditures
)	
1(b). Vehicles and equipment	) 1,530	100% of foreign expenditures or 88% of local expenditures
)	
1(c). Local staff salaries and operating costs	)	88% of local expenditures
)	
2. Salaries and allowances of internationally recruited staff	300	100% of expenditures
3(a). Credit for oxen	)	100% of credit granted
)	
3(b). Draft equipment	) 400	100% of foreign expenditures or 88% of local expenditures
)	
3(c). Incremental farm supplies ^{1/} and inputs	)	The lesser of (i) 100% of foreign expenditures or 88% of local expenditures; or (ii) 100% of the price charged or to be charged to farmers
)	
B. <u>RICE INDUSTRY SUPPORT</u>		
4(a). Civil works	)	88% of expenditures
)	
4(b). Vehicles and equipment	) 1,400	100% of foreign expenditures or 88% of local expenditures
)	
4(c). Local staff salaries and operating costs	)	88% of expenditures
)	
5. Consultants' studies, audits and salaries and allowances of internationally recruited staff	1,700	100% of expenditures
C. <u>GENERAL</u>		
6. Reimbursement of Project Preparation Facility	120	100% of amount advanced
7. Initial Deposit in Special Account	) 400	
)	
8. Unallocated	650	
TOTAL	6,500	

The Table of disbursements is at Annex 2, Table 2.

^{1/} The basis for calculating the disbursement claims for incremental supplies (Category 4 (c)) would be Years 1 and 2: gross quantities purchased, valued on basis in the third column; Year 3: gross quantities purchased in Year 3 valued on basis in the third column, less amount claimed in Year 1; Year 4: gross quantities purchased in Year 4 valued on basis in the third column less amount claimed in Year 2, less the amount of the Year 3 calculation if this were negative.

Accounts, Audits and Reports

3.28 Four distinct sets of accounts would be kept and maintained in accordance with sound and recognized accounting practices, for (A1) the project unit, (A2) farm inputs, (A3) agricultural credit, and (B) the Rice Industry Support Group. Each would have its own bank account. The four accounting systems would be prepared and installed by the Financial and Administrative Unit (FAU) (financed under Credit 706-UV) during the project's formation year. Systems (A1), (A2) and (A3) would be maintained by the project accountant at N'dorola, system (B) by the accountant attached to the Rice Industry Support Group. The accounting would be supervised by the Financial and Administrative Unit. In due course, responsibility for supervision of the agricultural credit accounts would pass to the Caisse Nationale de Credit Agricole, which is being established. Assurances have been obtained during negotiations on all the above matters (para. 8.01).

3.29 Annual budgets would be prepared by the Project Manager and by the Rice Industry Advisor to MRD (RIAM), with the support of FAU, and in consultation as necessary with regional officials concerned with the project. They would be submitted for the review and approval of the Project Executive Committee and would be based on appraisal estimates amended, where necessary, to reflect changes in cost and policy. Both the Project Manager and RIAM would submit quarterly statements of expenditure against budget, and a reconciliation of their bank accounts, to FAU, which would monitor them on behalf of MRD. At negotiations, an assurance was obtained from Government that all project accounts would be maintained in accordance with sound and recognized accounting practices; that accounts would be audited annually by independent auditors acceptable to IDA; and certified copies of audited accounts and the auditors' report would be submitted to IDA within six months of the financial year ending March 31. The audit report would comment upon the soundness of the accounting system and internal controls and would include a statement as to whether or not IDA funds had been used for their intended purpose and confirmation that summary statements of expenditure correctly reflect detailed records, and supporting documentation (para. 8.01).

Land Title

3.30 As a condition of effectiveness:

- land title will have been obtained to land required by the project for building construction, the research substation and for the Demonstration Unit (para 8.02).

IV. PROJECT IMPLEMENTATION AND MANAGEMENT

Project Management

4.01 The project would be the overall responsibility of the Ministry of Rural Development with the production component being implemented by a semi-autonomous self-accounting Project Management Unit. This Unit would be established under the ORD Hauts Bassins, with a Project Manager being responsible to the ORD Director. Project headquarters would be located near N'dorola. There would be a Project Executive Committee (PEC) at national level composed principally of MRD Department heads which would have a budgetary review and approval function. At Regional level the Director ORD Hauts Bassins would coordinate departments and organisations directly concerned with the project. At local level a management committee would control land use and credit approval and an ad hoc group would advise the project manager on matters related to the farming community (See Chart I and Working Paper C5). Senior Project Staff would be appointed by the Ministry of Rural Development.

4.02 In the Project Management Unit (PMU), under the Project Manager, the management of technical activities would be delegated to a Deputy Project Manager. Operational units would be an extension service, consisting of rice specialists; the Farm Service Centers; the Demonstration Unit; and a livestock assistance section. Accounting and credit administration would be under the PM. A Rice Industry Support Group (RISG), established in the Ministry of Rural Development, would be charged with the cooperative's program, monitoring and evaluation, and administration of a special junior manager advancement program (see Chart 2).

4.03 The Project Executive Committee would be formed to review and approve project budgets and to review project performance from progress reports submitted to it by the Project Manager and by the Rice Industry Advisor to MRD (para. 8.01). The Committee would be composed of: Prefect Hauts Bassins Region (Chairman) Secretary General MRD, Director of Land and Water Development (HER), Director of Agricultural Services (DSA), Director of ORD Hauts Bassins, Director General OFNACER, Director of ONBI, Representatives from the Ministries of Trade, Finance and Planning, Director of CNCA and Director of CERCI. In addition the Project Manager, Niene Dionkele would be Secretary and the Rice Industry Advisor to MRD would attend in a non voting capacity. During negotiations assurance was given that the committee would be formed with composition and function as detailed above.

4.04 The Director ORD Hauts Bassins would provide a coordinating role normally through routine ORD meetings (para 8.01). In addition the Project Manager would from time to time request meetings of senior officials having related responsibilities to the project. This coordination would ensure that those officials of Hauts Bassins Region having a contributory role to play in project implementation were aware of project progress and of their own commitments to the project. This coordination function would operate as necessary and would include, as appropriate, representatives from SERS, CERCI, Training and Visual Aids, Pest Control, National Seed Service, Animal Health, Kou Valley Rice Mill and where necessary from OFNACER, SOVOLUM and the Banking system. At negotiations assurance was given that coordination would function as detailed above.

4.05 A Management Committee would be formed which would have as its principal functions the control of land use, the selection of project farmers and the approval of credit to farmers. It would be composed of: the Sous Prefect N'dorola who would be Chairman, the District Chief, representatives from ORD, ONBI and DSA, two traditional chiefs and three farmer representatives. The Project Manager would be Secretary and other project staff would attend as necessary. A sub-committee of the Management Committee would meet in an ad hoc capacity and would advise the Project Manager on all matters relating to the social customs, traditions and sensitivities of the local people; and as a sounding board so that project management would be able to anticipate reactions to development proposals; encourage an involvement by the people in project planning and implementation. Consideration would be given to the viewpoint of all sections of the community and the various ethnic groups. At negotiations assurance was given that the committee would be formed with composition and function as detailed above.

4.06 The project infrastructure is relatively simple and aligned to existing practices of the ORD Hauts Bassins. In the event that no further phases were conducted, project components would revert to the ORD with a minimum of organizational or administrative disturbance. If, on the other hand, the results of the pilot project lead to extended phases, the project organization and infrastructure would be continued and moderately expanded to cope with the increased development program.

Farmer Involvement

4.07 Identification of the 800 project farmers would be carried out initially by extension workers in conjunction with village leaders. Final selection would be made by the Management Committee with the Project Manager having overriding control. Criteria would be: enthusiasm to grow rice; location relative to North Dougo swamp; current farming performance; current loan repayment record; manpower availability relative to existing lands farmed; enthusiasm to adopt new technology (e.g., oxen); and need for assistance as a poor farmer. Project farmers would represent some 53 percent of the local community. With this high percentage of the community participating in the project, a proportion of low response farmers is, therefore, unavoidable. For this reason, 25 percent of farmers (200) are assumed to adopt project recommendations at such a low level that they can be considered to remain "traditional". Nevertheless, they will obtain higher-than-existing yields by virtue of benefiting from the scheme's water control measures.

Agricultural Extension and Research

4.08 The project would provide an intensified agricultural extension service under the direction of the Deputy Project Manager. The five existing ORD extension workers, who are responsible for overall agricultural coverage, would continue to be responsible to the Officer-in-Charge of the N'dorola agricultural subsector. They would provide extension services to project farmers on their upland crops and to non-project upland farmers. The DPM and the Officer-in-Charge, N'dorola subsector, would ensure effective coordination of services to upland farmers through formal weekly reviews and day-to-day close cooperation. The effectiveness of this arrangement will be kept

under regular review and will be adjusted if necessary. The project would provide and supervise four rice specialists (one specialist per 200 families). By Phase III, there would be 13 rice specialists responsible for extension to 3,900 farmers on 3,500 ha - a ratio of 1:325 families. In addition, one animal production assistant would be employed to assist the 170 farmers owning oxen. Periodic refresher training of extension staff would be conducted at existing institutions (para. 4.16). The compactness of the project area will permit a relative concentration of extension activities and assist the supervisory and training functions. For mobility, project extension personnel will be provided with mopeds, which they will buy on credit, and for which operating allowances will be paid.

4.09 Research. The project's 2 ha research substation (para 3.15), which will be located contiguous to the project's demonstration unit would be operated by the Centre d'Etudes et de Recherches sur les Cultures Irriguees (CERCI), whose main station is at Faraka-Ba near Bobo-Dioulasso. The research program would be formulated in consultation with the Project Manager and approved by the PEC. Half-yearly reports will be presented and research results analyzed within six months of trial completion. CERCI is expected to continue to receive technical assistance and finance from UNDP/FAC. CERCI's recommendations on rice varieties would be followed by the project.

4.10 Demonstration Unit. The 5 ha Demonstration Unit (para 3.14) would come under the Deputy Project Manager since its functions would be closely related to the extension and training functions of the project. This unit would play important observational, demonstrational and training roles for both farmers and extension workers. The trial program would be developed in consultation with CERCI staff and would be presented to the PEC at the same time as the research program. Quarterly reports would be made.

Farm Service Centers (FSC) and Credit

4.11 The two supply centers at N'dorola and Teoule (para 3.11) would come under the project accountant and a supplies assistant would be in charge of each. The centers would provide: (i) medium-term credit items (ox equipment, donkey carts, sprayers); (ii) short-term credit items which would also be sold for cash (fertilizer, seed, insecticide/ pesticide and sacks); (iii) cash items for dryland farmers, draft oxen owners, and swampland farmers (hand tools, mineral bricks, and cotton seed for oxen feed); and (iv) lesser used equipment such as ox-drawn seeders and pedal threshers, which would be available on hire to farmers. Furthermore, the FSCs would become important contact points for farmers and the extension service. Farm inputs would be passed on to farmers with an adequate mark-up to cover handling charges, losses, etc., and to help ensure that when the cooperative took over the operation it was financially attractive. Non-project farmers would purchase items for cash or credit under the West Volta Project (Credit 706-UV).

4.12 The incremental funding requirements will be financed by the project to create a short-term and medium-term fund that will roll over. The accounting and bank account for these operations would be separate from other projects and credit accounts.

4.13 Credit. Presently, medium-term agricultural credit is provided at an interest rate of 5.5 percent under two IDA-financed projects (Credits 430 and 640-UV). Under the proposed project, credit would be made available to members of farmers groups within the cooperative at an interest rate, for both short and medium-term loans, of 8.5 percent, the maximum permitted under the regulations of the six country central bank (BCEAO). This compares with a past rate of inflation averaging 12 percent for the period 1976-78 but expected to decline to 9 percent during the next three year period in keeping with international inflation. A group whose members as a whole were less than 90 percent repaid for the second previous year would not be eligible for a further loan until the arrears had been cleared. A farmer group would consist of a minimum of 5 and a maximum of 30 farmers who, from family relationship or other reasons, naturally operate together in their farming operations. They would obtain the benefits of pooled resources and would accept the responsibilities of loan repayment as a group. The credit would be administered by the Project Management Unit through a special revolving credit fund. At negotiations, assurances were obtained from Government that rates of interest charged to farmers would be not less than 8.5 percent on both short and medium-term lending (para 8.01).

4.14 Lending terms would be: (i) seasonal inputs - no down payment, with repayment of interest and capital in full at the end of the season; (ii) a minimum down payment of 25 percent of the total cost of a pair of oxen, with three equal annual repayments of capital and interest; and (iii) ox equipment and donkey carts - no down payment, with an interest-only payment after one year, followed by four equal annual payments of interest and capital, giving five years credit in all. In addition, farmers would be required to contribute 10 percent of the cost of oxen each year to an insurance scheme which will provide for the replacement of oxen which die. The cooperative and livestock production assistants would have to agree that a claim was valid and the veterinary assistant would have to certify the cause of death. Claims would be limited to the amount available in the insurance fund.

Cooperative Society

4.15 The project would progressively promote the formation and operation of a Cooperative Society which would be based on the existing village groups which would continue to function. This Society would be represented on the Management Committee (para 4.05). The Cooperatives Specialist in the Rice Industry Support Group (RISG) would assist in the establishment of the Society and the training of office bearers in their duties and members in their responsibilities. Operations would commence with the collection and sale of rice and possibly other crops on behalf of farmers. Deductions for handling and Society operating costs would be made from bulk revenues before passing the proceeds on to farmers. At the same time, the Society would be responsible for the repayment of loans and the collection of land assessment charges. Since in the early years, loans would be issued from the Farm Service Centers, with accounting control directly under the project, a close liaison would be maintained between the Society and the project accountant and

credit staff. At a later stage, depending on capability, the Cooperative would incorporate input purchase and supply and ultimately would take over the Farm Service Centers and support activities. Within the Society, existing sociological groupings would be expected to advise on individual farmer creditworthiness and to take responsibility as a group for loan repayment. The formation, training, and expansion of business activities of the Cooperative would be phased over a timetable to be devised by the Cooperatives Specialist.

Training

4.16 Field Staff and Farmers. The project's training program, under the Deputy Project Manager, would be closely integrated with the training facility provided under the West Volta Agricultural Development Project (Credit 706-UV). A training center at Bobo Dioulasso, with a capacity for 60 trainees at one time, specializes in short (either two weeks or 1-3 days) courses. This center has concentrated on the production of training aids related to the cotton farmer, but could readily expand its effort to include the rice farmer.

4.17 The proposed project would also place much emphasis on farmer training through the Demonstration Unit (DU). This Unit's major assignment would be training-by-demonstration mostly on farmers holdings. Project extension workers would maintain a very close liaison with DU workers, and regular demonstrations, field days and training exercises would be held on the DU and conducted by DU staff for the benefit of both farmers and extension workers. Because of the small scale of its initial operations, the DU would be controlled by the Deputy Project Manager. At a later date, if a unit chief becomes necessary, an otherwise qualified person may need to receive instruction in training methodology and be attached for a short period to a professional training organization to gain experience in training techniques. This approach to farmer training through a DU will be examined as part of preparing the future project phases, to determine its potential for continuation and replication.

4.18 Cooperative Training. The Cooperatives Specialist will be responsible for initiating whatever training may be required for farmer members or Society office bearers and will, if appropriate, use audio-visual equipment for this purpose. The objective will be to ensure that: members have a basic understanding of the benefits available from cooperative membership and their obligations through farmer groups to the Society; and office bearers are capable of managing society affairs by the completion of the Cooperatives Specialist's assignment (3 years). In this work, the Cooperatives Specialist will receive advice from the Social Anthropologist in the Monitoring and Evaluation Unit who will assist in identifying social constraints and sensitivities in the establishment of the group and cooperative system.

4.19 Career-Advancement Program (Details in Working Paper C 5). Three Voltaic staff, who will preferably have been in employment for a year or two since completing their tertiary education, will be assigned to the project under a career advancement program. They will be responsible to the Secretary General, MRD, but will be administered by the Rice Industry Advisor (RIAM). The objective will be to produce senior level managers for the rice industry over a three-year period. While it would be advanta-

geous to have more than three junior managers, such manpower is limited in Upper Volta and it would be prudent to begin an untested training approach on a relatively small scale. As a condition of credit effectiveness, at least two of these junior managers will have been selected (para 8.02).

4.20 Each junior manager would complete the 36-month program in a different cycle to the other two managers. Training components and periods (in months) of attachment to each are: overseas business management training (9); practical commercial agricultural experience, (3); cooperatives (3); monitoring and evaluation (3); irrigation (3); financial and personnel management (2); marketing (2); planning (2); mill operations (3); project management and operation (4). This schedule leaves two months spare and for leave. In each training component, the junior manager would be given responsibility and would physically work on the component; and each would be required to submit an in-depth paper on a given subject, which would be commented on and discussed with the component manager. These reports would in turn be used by the RIAM in reviewing the experience of the program.

4.21 Consultant Overview of Training. The project would provide US\$30,000 (12 man-weeks) to cover the services of consultants who would provide about six weeks/year overview of all three components of the project's training program during the three-year project life.

Rice Industry Support Group

4.22 The project would provide support to the Secretary General of the Ministry of Rural Development, and to the Director of the ORD Hauts Bassins, through the provision of a small Rice Industry Support Group (RISG) based on Bobo Dioulasso consisting of a suitably qualified head, a cooperatives specialist, a senior evaluation officer assisted by a social anthropologist, and a mill manager. Apart from its supporting functions to the project in monitoring and evaluating, cooperatives support (para 3.16), and mill management, the group would carry out a Rice Industry Policy Study; for this exercise, the RIAM would draw upon expertise existing in Upper Volta, both from staff financed by the Niema Dionkele project and elsewhere. The group would be responsible for other consultancies and studies and for the career advancement program for junior managers. The head would be a person having extensive commercial, economic, or project management experience. He would be responsible to the Secretary General and would advise on all aspects of rice production, marketing and processing in Upper Volta, but especially in regard to the operations of the various project components and rice activities. In addition, the project provides six man-months consultancy support, which would be used as necessary by the RIAM. He would be assisted by a cooperatives specialist and a senior evaluation officer, both provided for under international recruitment. A social anthropologist would carry out an 18-month assignment at the beginning of the project and would be responsible to the senior evaluation officer (see Working Paper C 7). This support group would operate with financial autonomy (though cheques would be countersigned by the Project Manager) and with budgetary control exercised by the Secretary General, MRD. Annual and quarterly reports would be submitted separately, but in conjunction with the Project Management Unit.

4.23 Rice Mill Manager. A Rice Mill Manager (probably to be internationally recruited), who would be based at the Kou Valley rice scheme, would be responsible for the technical, managerial and financial reorganization of the mill. He would be responsible to the Secretary General, Ministry of Rural Development, and would also have an advisory relationship with the Rice Industry Support Group. He would also liaise closely with the Project Manager, Niena Dionkele.

Staffing

4.24 As local recruitment is not likely to fill all posts, funds are provided for international recruitment. It is assumed that the pilot project would employ five internationally recruited staff for 15 man-years; (Rice Industry Advisor to the Ministry of Rural Development, Senior Evaluation Officer, Kou Valley Rice Mill Manager, Cooperatives Specialist and Deputy Project Manager). The pilot project would also employ four senior Voltaic staff for 11 man-years and 50 intermediate and junior staff for a total of 158 man-years. In addition, Government would, under the project, finance the following ONBI staff for water control works: two senior staff for three man-years, three intermediate staff for six man-years, and five junior staff for 10 man-years. Three junior managers would undergo a management training program covering nine man-years. At negotiations Government gave assurance that suitably qualified and experienced Voltaic staff would be recruited where available (para. 8.01).

4.25 The key personnel for the project unit would be:

- (a) Project Manager, who would be an agriculturalist and would have overall responsibility for the project. He would delegate all extension, field trials, training and research activities to the Deputy Project Manager. A Project Manager was appointed in July 1979 and he was a member of the negotiating team.
- (b) Deputy Project Manager (probably internationally recruited), who would be experienced in rice agronomy, project management, and training. He would be responsible for project extension services, training and for the operation and management of the Demonstration Unit (paras 4.10 and 4.16).
- (c) Project Accountant, who would maintain project accounts, including farmers' loan accounts, assisted by the MRD's Financial and Administrative Unit (FAU) in Bobo-Dioulasso. He would be responsible to the Project Manager and would function closely with the Farm Service Centers and the Cooperative and would maintain records of farmer loans.

4.26 Disengagement of Internationally Recruited Staff. As five internationally recruited staff probably would be employed under the project (para 4.24), the following arrangements would be instituted to ensure a phased plan of disengagement: (i) the training program would be closely monitored, firstly by the RIAM, secondly by periodic visits of

consultants, and thirdly by IDA supervision missions; (ii) coincident with project quarterly and annual reporting (see Working Paper C 8), all internationally recruited staff, together with those Voltaic staff who are expected to benefit directly from their counsel, will submit separate progress reports to the RIAM for transmission to the Secretary General; (iii) the Deputy Project Manager, Niena Dionkele, and the Rice Mill Manager would relocate to Bobo Dioulasso about six months before the end of their contracts. Their involvement with the project would continue on a visiting agent basis, and they would also be committed to help prepare the project completion report and the Rice Industry Policy study; (iv) the post of Rice Industry Advisor (RIAM) will be discontinued after three years, as it is only temporary in nature; (v) similarly, the Cooperatives Specialist would not be replaced, his primary function being the establishment of the cooperative societies (para 4.15) and the training of society office bearers. Secondly, he will provide support to the RIAM in preparing the Rice Industry Policy Study. During the period of the project, the Director ORD Hauts Bassins will designate a cooperatives officer for the Region to take over from the project's Cooperatives Officer, he having provided whatever training to his successor as may be necessary. At negotiations assurance was given by Government that where international recruitment was undertaken, persons with qualifications and experience and on terms and conditions of employment satisfactory to IDA would be appointed. This is likely to apply to the posts of Deputy Project Manager, Rice Industry Advisor to MRD, and the Kou Valley Rice Mill Manager, and possibly to the Senior Evaluation Officer and Cooperatives Specialist (para 8.01). Terms of Reference for key project staff are in Working Paper C 5.

Monitoring and Evaluation (Details in Working Paper C 7)

4.27 As the project is designed to test a number of technical and sociological assumptions, a Monitoring and Evaluation Unit (MEU) would be an integral part of the pilot exercise. A small Evaluation Unit will be established under an appropriately qualified Senior Evaluation Officer, who will be a member of the Rice Industry Support Group. He will be assisted during the first 18 months by a Voltaic social anthropologist and thereafter by a Voltaic economist. Six enumerators of agricultural assistant level would collect data in the field. Four clerks/processors would provide processing support. In view of the small size of the unit, only data essential for monitoring of the project and the satisfactory preparation of a Phase II project would be collected. Other less essential but valuable information would be identified and conclusions reached whenever possible by subjective judgments. The MEU would provide information for the Project Manager and project supervisory bodies. It would evaluate the technical and social impact of the project in its wider implications, principally for use by Government and financing agencies. A sociological survey would examine agricultural practices as they relate to the specific ethnic groupings - Senoufou, Bolon and Peul - and to women as a distinct social group. In due course, MEU would become part of a national monitoring and evaluation program.

4.28 Completion Report. At negotiations assurance was obtained that Government would prepare and furnish to IDA, promptly after project completion, a project completion report in accordance with a format and content acceptable to the Association (para 8.01).

V. TECHNOLOGICAL AND PRODUCTION SPECIFICATIONS

Agricultural Production

5.01 Present Cropping Pattern. The Niena Dionkele catchment covers some 90,000 ha - roughly equivalent to the N'dorola sector. Of this area some 3,600 ha is cropped by 1,500 families (2.4 ha per family). The remainder is either fallow land, which from time to time is cropped, land reserved for grazing, or waste land. The present distribution of crops is: cotton, 450 ha (12.5 percent); sorghum/millet, 2,050 ha (57.0 percent); maize, 600 ha (16.5 percent); minor cash crops, 300 ha (8.5 percent); and swampland rice, 200 ha (5.5 percent). While cotton is the principal cash crop, groundnuts, sesame, rice and vegetables are also sold. The majority of the sorghum, millet and maize crops are eaten in the farmers' household.

5.02 Future Cropping Patterns. The project will affect the cropping pattern principally through the increase in swampland area (0.5 ha per family) and through the expansion of the use of oxen plowing, harrowing, weeding and transport). For project farmers who continue to use hand cultivation methods it is expected that they will continue to grow their 2.4 ha of upland crop as well as 0.5 ha of rice; farmers using improved husbandry are expected to shift their cropping pattern by growing more cotton and maize at the expense of sorghum and millet. Farmers using oxen will in addition to growing rice expand their upland crops by a further 0.4 ha making a total of 3.3 ha; they are also likely to change their upland cropping pattern. Because oxen will allow more timely cultivation including improved weed control this will lead to further improved yields. Because oxen owners are likely to use their oxen on upland crops before hiring them to neighbors, the project has included the purchase of more pairs than just the development of rice would require (para 5.09-11). These expansions are within family labor availability to cultivate, as shown in Working Paper C 2. As will be explained further in para 5.13 project farmers are likely to be categorized into (a) traditional farmers continuing to use the same husbandry methods and cropping pattern (b) intermediate hand cultivators using improved husbandry and changing their patterns and (c) ox cultivators. The average family cropping programs for the project farmers in the first phase is shown below:

	-----Project Farmers-----			
	Without Project	Traditional	Intermediate Manual	Farmers Using Oxen
	----- (ha) -----			
Cotton	0.3	0.3	0.6	1.2
Sorghum/millet	1.5	1.5	1.1	0.8
Maize	0.4	0.4	0.5	0.6
Minor Cash Crops ^{1/}	0.2	0.2	0.2	0.2
Rice	-	0.5	0.5	0.5
Total	2.4	2.9	2.9	3.3

^{1/} Includes groundnuts, cowpeas, sesame and vegetables.

In later phases it is expected that many farmers will come from outside the Niema Dionkele area. It is not known how many will be able to get rights for upland cultivation and it is anticipated that some will not and will therefore have to subsist on the rice plots alone. At this stage it is thought that such people will require between 1 and 1.5 ha of rice. Because of these unknown social and technical constraints the project has based its future settlement assumptions on the basis of 1 ha of rice per settler. The exact amount will be determined for each settler in later phases by future land rights, labor availability and other factors. During the pilot project the land use and soil studies conducted by SCET will be reviewed by the RIAM in relation to future settlement involving swampland or upland cultivation.

5.03 The labor requirement for the expected cropping program (Working Paper C 2) would be:

	<u>Man-days</u> ^{1/}	
	<u>Without</u>	<u>With</u>
	<u>Project</u>	<u>Project</u>
Traditional - manual	176	232
Intermediate - manual	235	302
Oxen users --	235	360

^{1/} One pair of oxen is assumed to replace 7 man days hand labor.

Peak labor requirements occur in June/July for planting and in November for harvesting. However, in no month would labor requirements exceed the availability of three active people in the average family unit.

5.04 Rice Cultural Practices. Land preparation will commence annually as soon as soil conditions permit, generally in April. Traditional and intermediate manual level farmers will cultivate with the hoe (daba). Ox cultivation farmers fall into three groups - intermediate level hiring from other farmers, intermediate level owning oxen and equipment and advanced level farmers with their own oxen and equipment. Traditionally, farmers broadcast seed. Under the project, farmers will use direct seeding methods; advanced farmers will be encouraged to line-plant at 30 cm intervals. Seed drills will be obtainable on hire through the farm service centers. Seed rice will be treated with Thiram, the cost of which is included in the price of seed rice. The optimum planting date is June 15-20. Weeding, which receives inadequate attention under traditional practices, is likely to be the most financially rewarding aspect of the improved technological package. Intermediate level farmers would weed their fields at least twice by hand; those advanced level farmers who had line-planted would use oxen cultivation supported by hand weeding. Trials would be conducted using herbicide (such as Propanil at 7.5 litres/ha and 2-4-D at 1.25 litres/ha) in the second and third leaf stages. Insect pests are a problem but CERC I does not at present recommend treatment. The project would conduct trials on pest control. If a suitable economic treatment is found, farmers would also be encouraged to spray their crops using the controlled-droplet applicator sprayers they possess for cotton spraying. Treatment would

likely be with either Furaden at 13 kg/ha or Sevin 85 at 6g/liter of water. At harvest, traditional farmers will collect the panicles by hand whereas intermediate and advanced farmers will be encouraged to harvest with a sickle sufficiently early to avoid ear shatter. Pedal threshers would be available on hire from farm service centers. Where applicable, grain would be treated in the store with Nexion 2 percent.

5.05 West Africa Rice Development Association (WARDA) varietal recommendations and yields for Upper Volta are:

<u>Classification</u>	<u>Variety</u>	<u>Duration (days)</u>	<u>Typical Farm Yields (t/ha)</u>	<u>Research Yields (t/ha)</u>
Rainfed	IRAT 10(90-100)		1.7-2.5	3.0-3.5
Swampland	IR 20 (115-125)		2.5-3.5	5.0
Swampland	VIJAYA (120-130)		2.5-3.5	4.0-5.0
Fully Irrigated	IR1529/680/3(140)		3.5-5.5	6.0

Currently, the most widely used variety of rice is the local Gambiaka, which under traditional practices yields about 1 tonne/ha. IRAT-10 will be recommended initially as the principal variety. It is responsive to fertilizer applications, yields well, and is tolerant to disease. A drawback is that palatability is only mediocre. The Demonstration Unit will conduct trials on IR 1529, a variety that is of longer duration (130-140 days), shallow rooting, and requires not less than 10 cm of water at the end of September. Thus farmers would not be encouraged to try IR 1529 until water availability in the swamplands has been better determined. IR 20 will also be tested by the Demonstration Unit.

5.06 Provision of Seed. CERCI produces foundation rice seed and can meet the first year's requirements for varieties IRAT 10 or IR 1529. Seed is certified by the National Seed Service, which operates a seed dressing unit at Kou - 82 km from the project area. Certified seed is bought from master farmers at CFAF 78/kg - a premium of 20 percent on the base price of paddy. Dressed seed is sold to farmers at CFAF 95/kg. The National Seed Service will clean and dress seed on behalf of farmers for CFAF 4/kg.

5.07 Farmers in the project area are cautious in their acceptance of improved seeds until they have witnessed better performance in the field. Improved seed will therefore be promoted through the interaction of: the CERCI research substation at N'dorola, conducting research on project area problems; the adjacent Demonstration Unit, managed by the project; and promotion of master farmer seed producers, supervised through field inspection by a representative of the National Seed Service, and encouraged by the incentive of attractive prices for certified seed.

5.08 Fertilizer. Hitherto, the only fertilizer available to farmers for application on swampland rice has been the compound fertilizer used on cotton (13-35-0), imported by CFDT. This is not ideal for use on rice. A new compound (14-23-14-6-1), first used on the 1978 cotton crop, has been found to be more acceptable for rice. In view of the rather small quantities of fertilizer required (68 tonnes compound and urea for Cropping

Year 3), there is inadequate justification to import special rice fertilizer at this stage. Farmers would therefore apply 14-23-14 to the seed bed, and urea as a top dressing at the following rates.

	<u>14-23-14</u>	<u>Urea</u>
Traditional Farmers	-	-
Intermediate Farmers	50 kg/ha	50 kg/ha
Advanced Farmers	100 kg/ha	100 kg/ha
Intermediate and Advanced Cotton Farmers	100 kg/ha	-

5.09 Oxen. Within the area farmers already own some 150-200 pairs of oxen and their benefits have been appreciated by other farmers who have created a large demand for oxen and ox implements. The use of oxen permits more timely and better land preparation, better weeding, and reduced labor requirements at peak periods - especially during harvesting and transporting. Eventually oxen cultivation would cover 90 percent of rice land under the project.

5.10 Oxen would be purchased at the end of the cropping year, when farmers possess liquid cash resources to make down payments, and would be trained in time for the next plowing season. Over the working season, supplementary feed (cottonseed) would be provided. When bought, at about four years of age, oxen are expected to weigh an average of 230 kg. They would be sold at the end of the cropping season, on average at seven years of age, weighing 340 kg. A veterinary assistant resident at N'dorola would provide a vaccination service for the principal disease hazards: rinderpest, contagious bovine pleuropneumonia, hemorrhagic septicemia, anthrax, blackquarter and trypanosomiasis. An animal production assistant would operate through the Demonstration Unit and would provide technical advice to farmers on improved nutrition and animal husbandry.

5.11 One hundred pairs of oxen with appropriate equipment are sufficient for the cultivation of the 400 ha of swampland rice. However, the project provides for 170 pairs of oxen, for needs to cropping year 3 which will circumvent oxen being used on upland work at the expense of the swamplands. Oxen would be owned by an estimated 80 advanced farmers and 90 intermediate farmers. An estimated 170 intermediate farmers would hire oxen.

Upland Crops

5.12 The project will assist swampland rice farmers in their upland farming through the provision of work oxen and implements and fertilizer, pesticide and seed for cotton. Whilst the project FSCs will provide farm inputs for upland crops grown by project farmers, the extension back-up to the inputs will be provided by the existing polyvalent extension workers who

are also responsible for non-project farmers. Cotton is the principal upland cash crop and average yields for the N'dorola Sector in 1978/79 were 1,100 kg/ha. The project farmers at intermediate and advanced level will therefore receive fertilizer (100 kg/ha), spray chemicals, and seed (25 kg/ha). Yield levels of 1,500 kg/ha for advanced farmers can be confidently predicted in view of the provision by the project of oxen and ox equipment resulting in more timely and more efficient cultural operations. Sorghum and millet are grown in pure or more frequently mixed stands and are the staple cereals in the diet. Intermediate and advanced farmers are expected to respond to the improved seed (for sorghum) and fertilizer (50 kg/ha) recommendations available. 1978/79 yield levels for sorghum in N'dorola were 1,100 kg/ha and, with the more timely cultural practices due to oxen use under the project, yields of 1,400 kg/ha for advanced farmers are projected. Maize is prized by farmers and, with the availability of improved fertilizer-responsive varieties like Jaune Flint and Jaune de Fo available, this crop is expected to become of increasing importance. Intermediate and advanced farmers would apply fertilizer at 100 kg/ha and yields of 1,600 kg/ha are projected as against an average yield for N'dorola of 1,200 kg/ha. For minor cash crops - groundnuts, sesame, cowpeas and vegetables - farmers would benefit from improved ox cultural practices.

Average Yields, Net Return per Manday and Total Production

5.13 At present, there are disparities in the level of husbandry applied by upland farmers. For estimating future project inputs and production, it is recognized that these disparities in ability will continue, and that project farmers both before and after the project fall into three main categories: (a) Traditional farmers, who will continue their present husbandry practices despite the selective methods used. Nevertheless, improvements on base traditional rice yields can be expected from these farmers on account of overall water control measures and contact with agricultural extension workers. Traditional farmers, however, are assumed to be unresponsive to improved seed, fertilizer, and improved cultural techniques on their upland crops. (b) Intermediate manual farmers, who will still use hand tools but will apply improved husbandry to both rice and upland crops. They would apply some fertilizer and inputs to rice and cotton with improved husbandry increasing other crop yields. The Bolon people, who in particular are less used to working with oxen, are likely to constitute the major group in this category. (c) Ox cultivation families, who will cultivate 13% more land than the hand cultivators and fall into three groups. Some hire oxen because they are unable to afford the downpayment or find hiring more convenient. Such farmers will use inputs on rice and cotton but are unlikely to get the highest yields as the oxen probably would not be available at the most opportune time. They could nevertheless expect improved yields through better land preparation and more timely cultivation. Similarly, some oxen owners do not make full advantage of their oxen and will get the same yields as hiring oxen. These two groups are classed as intermediate-level oxen users. In addition, there are the advanced oxen users who use row cropping with superior weeding. Inputs will be applied to rice and cotton and upland cereal crops. Yields would

reflect these improved cultural practices. The percentages of these three groups of farmers are given below:

	<u>Without Project</u>	<u>Cropping Year 3 1983/84</u>	<u>At Full Development-Yr 5</u>
Traditional	77	39	20
Intermediate manual	8	18	6
Oxen users - intermediate - hired	8	21	37
- intermediate - own	5	11	17
- advanced - own	<u>2</u>	<u>11</u>	<u>20</u>
	100	100	100

5.14 Although Niéna Dionkele is in the IDA West Volta Project (Cr. 706-UV) area, yields are presently lower than the average for that project 1/ because it has not received the attention (due to its low population density and distance from Bobo) that other areas have. By Year 5 project farmers would show the following improved performance:

	<u>Cotton</u>	<u>Sorghum/ Millet</u>	<u>Maize</u> kg/ha	<u>Minor Cash Crops</u>	<u>Rice 2/</u>	<u>Average net return per man/day per farm CFAF</u>
Before Development				<u>3/</u>		
Traditional	500	600	800	500	-	468
Intermediate	700	750	850	600	-	438
Advanced	1,100	1,000	950	650	-	518
Average	700	640	820	520	-	
Project Year 5						
Traditional	500	600	800	500	1,250	450
Intermediate - manual	900	950	1,150	800	2,000	513
Intermediate - Oxen Users	950	1,000	1,150	800	2,200	589
Advanced	1,500	1,400	1,600	1,000	3,000	726
Average	1,050	840	1,060	770	1,972	

1/ Average yield in kg/ha for the N'dorola sector for cropping season 1978/79 are reported by the ORD as: sorghum 1,100; maize 1,200; millet 1,000; cotton 1,100; groundnuts 460.

2/ Rice is not grown by project farmers before development, but local averages are 1,000 kg/ha.

3/ Yields for salable or consumable produce and are net of on-farm harvesting, storing, and handling losses.

VI. MARKETS, PRICES, FINANCIAL ANALYSIS AND COST RECOVERY

Markets and Prices

6.01 The pilot project would produce by Year 5: 870 tonnes paddy, 1270 tonnes maize, sorghum and millet; 850 tonnes cotton; 130 tonnes minor cash crops, such as groundnuts, sesame and cowpeas; and 8 tonnes meat equivalent. No marketing difficulties are expected for the modest non-rice production of this pilot project which involves commodities enjoying well established markets in Upper Volta. At any rate the grain output other than rice would be largely consumed on farm with only small quantities marketed through existing channels. Cotton, Upper Volta's major export crop, would be sold through the present well-functioning mechanism of SOFITEX. The market for cattle is good and is governed by the export trade to the Ivory Coast. Overall, the prevailing producer prices of these commodities are satisfactory. On the other hand, the rice market and related marketing procedures are yet to be developed in Upper Volta in a manner conducive to the full utilization of rice potential (para 1.28), but no unmanageable difficulties are envisaged in disposing of the rice from this pilot project. The incremental volume is small (2% and 3%, respectively of domestic production and imports); the quality is expected to be superior to that of traditionally-grown rice; and adequate transitory marketing arrangements have been agreed upon (para 6.04). The present paddy price of CFAF 63/kg is sufficiently remunerative to induce the expected participation in the project. However, looking beyond this pilot project, the development of a sound rice subsector in Upper Volta - to which this project is intended to contribute - depends upon the design of a well-tuned rice policy comprising not only the level of and the spread between paddy and rice price but also rice import policies as well as marketing arrangements and procedures. These issues are addressed in the following paragraphs.

6.02 While the project should have no unmanageable problem in disposing of the rice produced it is important that for subsequent phases and further rice development Government develops a sound rice policy which ensures that rice is grown and marketed within an economically dependable food and agricultural program. A major task of the Rice Industry Support Group will be to assist Government in this. Amongst its various tasks it will examine: costs of production, choice of production and milling technologies; competitive relationship of rice with other crops in relation to farmer incomes and national needs; importance of rice to food security and value over alternative food crops; level of rice and paddy prices, duties, taxes and subsidies and rates of land use charges and their overall effects on supply and demand and on the fiscal balance sheet of the rice subsector. How much demand will actually expand and how much self-sufficiency can be obtained, will depend upon a variety of factors, including price policies. If rice prices are too low, the consumer, particularly the urban consumer would be more likely to make the seemingly one-way switch to rice from coarse grains, which can be readily produced in Upper Volta albeit under drought-prone conditions. In turn, low rice prices may encourage the growth of imports rather than domestic production. If paddy prices are too high, then land (subject to suitability constraints) and labor resources may be switched from other crops, which may yield higher foreign exchange benefits (cotton) or greater food output for the costs involved, to rice. Incorrect rice or

paddy prices will cause economic distortions and could result in subsidies either to producers or consumers which Upper Volta is ill-equipped to finance, or the foregoing by Government of a reasonable source of revenue in the form of an import tariff. Periodic reviews will be necessary as import prices and local production costs are unlikely to move in concurrence. Moreover there is a natural wish to adjust the producer price for increases in production costs, without regard to imported prices. Whilst the producer price can usefully be protected from fluctuations in world prices, it is important that the relationship with world prices over a suitable period be taken into account. A contribution to the development of a good price policy is both an important and difficult aspect of the project objective (para 6.04).

6.03 As far as milling and marketing longer term policy are concerned, several options need studying. The economics of large and small mills must be explored, and whether policy should encourage private, cooperative, or government ownership and control. In marketing too, the role of cooperatives needs examination, as well as the methods for government intervention aimed at ensuring that demand is met within the framework of a national food policy, that farmers have an incentive to produce, that rice development takes place without a charge on the national treasury, and that imports are managed by an appropriate mechanism. These objectives may conflict with each other, but policy must aim at achieving a suitable balance.

6.04 Government views the proposed project as a vehicle to address the issues related to marketing and producer rice prices (para 1.28). The RISG in the MRD will have as one of its functions the formulation of recommendations aimed at ensuring that the marketing process works smoothly. Under a recent Government decree (August 1979), a Cereals Marketing Technical Commission has been formed which will amongst other things submit to Government each year its recommendations as to rice imports taking into account local production. Government has provided the following written assurances to IDA:

- (i) Purchasing Agency(ies). OFNACER and SOVOLCOM will purchase locally produced paddy at official prices. Government has stated it will guarantee these agencies borrowing from BND. At negotiations Government gave assurance that OFNACER will act as buyer of last resort (para 8.01).
- (ii) Import Management. A system of import management will be instituted in order to avoid disruptions in the marketing of locally produced paddy.
- (iii) Pricing. Price levels will be recommended annually by the Cereals Marketing Technical Commission. Government will set producer prices at levels which are not only attractive to both producers and the distribution agencies, but also competitive with the price of imported supplies.

Financial Implications for Farmers and Cost Recovery

6.05 Indicative budgets have been prepared (Summaries in Annex I, Table 1) for the main categories of farmers. At the extreme some farmers during the course of the project could move from the traditional level to the advanced oxen user level; and in this case, the net family cash income would increase from the current traditional level of CFAF 13,000 (US\$62) before development to CFAF 150,000 (US\$714). However, in most cases the increase will be much less, as farmers will advance from the traditional to an intermediate level or from the intermediate to the advanced. The average increase in net cash farm income is expected to rise from CFAF 13,900 (US\$66) to CFAF 80,500 (US\$384).

Farm Incomes (with Project) 1/

	Trad.	-----Intermediate-----		Advanced	
		Manual	Hired Oxen		Own Oxen
	-----CFAF '000-----				
Total Value of Production	117	174	199	209	281
Less Costs (net after oxen hire)	2	9	26	3	4
Less Land use charge	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>
	104	154	162	195	266
Less value of subsistence	<u>72</u>	<u>91</u>	<u>84</u>	<u>90</u>	<u>116</u>
Net cash income CFAF	32 <u>2/</u>	63	78	105	150
Net cash income man/day CFAF	138	209	271	304	410

1/ Averaged over 7-year period.

2/ Before development CFAF 13,000.

6.06 Cost Recovery. Farm budgets indicate that project farmers can bear land use charges which will cover all the recurrent costs associated with the land development and a considerable proportion of land development costs. However, a progressively increasing scale will be applied since in earlier years farmers could be discouraged by too high charges. Charges will therefore be fixed for the first year at CFAF 8,000/ha and will be increased progressively so as to reach CFAF 20,000/ha by the third cropping year. By the sixth year this should be increased to CFAF 30,000/ha but such a decision would be influenced by the progress of this pilot project and by the findings of the Rice Industry Support Group. The level of charges would fully recover recurrent costs and would liquidate 74% of the development cost in 50 years at the opportunity cost of capital of 8 percent. In respect of farmers benefitting from water control improvements outside the Project Area, Government agreed that charges would be maintained at levels sufficient to recover all recurrent costs plus such proportion of investment costs that farm budgets indicate can reasonably be borne by farmers (para. 8.01). Government assurances were given at negotiations to the principle of cost recovery and to the specific details for the pilot period noted above. In addition Government agreed that all land use charges would be reviewed annually and would seek to maintain their level in real terms.

Financial Implications for Government

6.07 At full development of the pilot project Government cash outflow, including IDA Credit repayments, will be fully covered by the land use charges and cotton revenue. Whilst the extension service is still required, which in this projection has been taken as 19 years, there will be a net Government cash outflow. Land use charges following successful three phase development should generate an income for Government of CFAF 105 million (US\$500,000) per annum by program maturity. Government receives substantial revenue from cotton marketing, and so will benefit from the small increase in cotton production by project farmers. Government will, for the pilot project, receive land-use charges rising from CFAF 2.4 million in the first cropping year to CFAF 6 million by the third cropping year. By Year 6 the figure could be increased to CFAF 12 million/year. Government should also benefit from spending on consumer goods subject to indirect taxation, by both beneficiaries, and expatriate employees. Although no data exists to support the extent of this benefit, an estimate has been included in the Government cash flow projections at Annex 2, Table 3.

VII. BENEFITS AND JUSTIFICATION

Project Benefits

7.01 At full development, the project would increase the incomes and living standards of 800 farm families (4,200 individuals). The net cash incomes of participating farm families in the project (at the traditional level) would increase from their current level of about US\$65 per year (1980 prices) to about US\$166 per year at a direct cost per benefiting family of about US\$766 (excluding costs due to price increases). Net benefits per family member rise from CFAF 15,500 (US\$80) for a traditional farmer to CFAF 33,300 (US\$172) for an average of intermediate farmers. This compares with an absolute poverty level for the rural areas of US\$89^{1/} per capita. By providing an ample supply of water, modern farm inputs, improved extension services, better access to credit, and better market access, the proposed project would support directly by year 10 increased production from 400 ha of paddy and 1,100 ha of upland crops. The incremental annual production at that time is estimated to be about 2,450 tonnes of paddy, valued at about US\$0.9 million, 163 tonnes of coarse cereals valued at US\$70,000, and 668 tonnes of cotton valued at US\$375,000.

7.02 At full development, the project's contribution to employment would stem not only from the regular work generated at the farm level but also from jobs created during the investment period. In Year 10 and each year thereafter, the project would require annually a total of 1,300 man-years of farm family labor. Total incremental on-farm employment generated by the project would be about 480 man-years.

7.03 In summary, the physical results of the project are modest but will allow confirmation to be provided to a number of technical and

^{1/} 1975 figure inflated by low-income consumer price index up to 1978 and projected at 10% to 1980.

socio-economic hypotheses. Should these hypotheses be confirmed the pilot project is likely to lead to a much larger program of development of swampland suitable for rainfed crop production. In the immediate future, this is likely to be focussed on Phases II and III at Niéna Dionkele involving 3,500 ha of the Niéna Dionkele flood plains, for which a detailed analysis has been made. At full development, the three-phase program would increase the incomes and living standards of 3,900 farm families (19,000 individuals). Phases II and III of the program would support directly by year 16 increased production from an additional 3,100 ha of paddy yielding 5,900 tons of paddy valued at US\$2.2 million. Later on, other similar developments may merit consideration.

7.04 On the institutional side, through the technical assistance and training programs, the project would improve the capability of Voltaic staff for implementing and planning ongoing and future projects, not only in the Niéna Dionkele area but countrywide. The benefits of training would extend to staff of the Ministry of Rural Development, to the cooperatives and to the farmers themselves. The technical and socioeconomic data generated by the project would be valuable for future development of rice and development of the rural sector as a whole.

Economic Rate of Return Calculation

7.05 The design aim of the production component of the pilot project is to test certain assumptions; the rate of return on the pilot phase is not a valid criteria for judging the project's acceptability because the pilot project bears high overhead costs relative to size, for example a project management unit. Nevertheless, the ERR for the pilot project is 9 percent. At the opportunity cost of capital in Upper Volta (8 percent) the net present value of the pilot project production investment is US\$385,000. The swamplands represent a valuable potential asset in Upper Volta given the pressure on agricultural land in the north and there are no alternative more profitable uses, known at this time, to which this or similar land can be put. In contrast, the rate of return of the three-phase program, which is the present best estimate of the possible larger scale investment that might follow a successful pilot phase, is a valid indicator to be used to confirm that conceptually at this stage one can foresee the scope for viable follow-up projects. Because of the uncertainties surrounding certain key assumptions the present best estimates on most-likely yields are 2.2 tonnes/ha at full development, and on this basis the ERR of the three phase program is 9 percent. However, should full development yields be 2.8 tonnes/ ha the ERR would be 13 percent. These higher yields could well occur, in the light of results at RDF swampland development schemes (para 1.23) WARDA varietal recommendations (para 5.05) and the irrigated Kou Valley project (para 1.24). An analysis of the rice component on its own is somewhat artificial, but a calculation charging all overhead costs of input distribution, administration and extension against rice benefits over the three phases results in an ERR of 8 percent. If large-scale, rainfed, single-crop rice schemes are contemplated in the future, it will be important to establish to what extent such overhead costs are imputable

to rice production and the scope for profitably utilizing excess overhead capacity to encourage farmers to produce simultaneously other upland crops.

7.06 In the economic calculation, the program life has been assumed to be 30 years after an 11-year development phase. Costs and benefits have been based on 1980 constant prices. The cost stream includes all economic costs (investment and operations) which are yield related. Included are the investment and operating costs of swampland development, project management unit and Demonstration Unit, farm equipment and inputs such as fertilizer and seed, family and hired labor, and 25 percent of the cost of monitoring and evaluation. Excluded are costs relating to the CERC Research Substation, the costs of the RIAM, management support to the Kou Valley Rice Mill and studies and consultancies, as benefits would accrue to later projects. Local wages and salaries paid by the project are valued at their financial cost, and additional family labor has been valued at the market rate for unskilled labor in the project area. The cost of the project unit technical assistance has been reduced by 25%, reflecting the estimated net cost of such assistance to the economy. Physical contingencies varying from 7 percent to 15 percent have been included (para 3.21). Tax and subsidies have been excluded. In calculating benefits, import parity prices were used for rice (at Bobo Dioulasso), maize and sorghum (at Niena), while local prices were used for oxen sales and minor crops. No allowances were made for possible major price increases in years of drought. Export prices were used for cotton. IBRD commodity price forecasts have been used. Local currency has been shadow priced using a standard conversion factor of 0.85.

7.07 The rate of return shown above argues for a close evaluation of the results of the first phase, and review of the rice industry policy study before embarking on further investments. The present arguments in favor of rice development, which will be explored in depth in the study, fully support initiating a carefully planned pilot production policy and study effort. They include (i) the substantial, presently unquantified, benefits to the national economy from improved food security, in the form of reduced costs of food shortages due to major drought (common every 7 to 10 years). If such benefits could be properly quantified, the rate of return for the rice component would be higher; (ii) the reduction of population pressure and associated soil degradation in the north by opening up new settlement possibilities; and (iii) the need to satisfy the growing urban demand for rice. It is prudent for a land-locked nation such as Upper Volta to protect itself from major fluctuations in food supplies produced locally under drought-prone conditions, and from food shortages that may occur in particular years on the world market. As necessity for more food security is clear, there is a related need to fully explore all reasonable possibilities, one of which is rice production.

7.08 From the farmer's viewpoint, rice, although competing somewhat with cotton at planting time, fits his family's labor profile and so improves labor output. Financial returns per manday are currently better than for other crops, except sorghum, so that rice increases rural incomes. As an additional cash crop to cotton, rice is also attractive because it decreases the likelihood of lower cash income through crop failure.

Environmental Effects

7.09 The development of the swampland may, by its nature, increase health hazards in the area (para 2.18), such as from schistosomiasis. Therefore, the project will provide three man-months consultancy, to carry out detailed surveys of disease incidence and if necessary a small control program (see Working Paper C6). Future actions could be funded either under the Phase II project or under a separate program. The project would have a number of beneficial effects environmentally through the utilization of an undeveloped swampland previously affected by onchocerciasis, improving soil fertility with use of manure from oxen, through studies and intensive management identifying and controlling future disease incidence directly related to the swamp, and through improved nutrition of the local populace. Possible water pollution from inorganic fertilizer applications is not likely to be a serious problem. No problems of erosion or other soil denudation are envisaged as a result of the project.

Risks and Sensitivity

7.10 The decision to carry out a pilot project as the first phase of a longer term program arose because of three main areas of risk:

- (i) a slow adoption rate of recommended practices due to labor being unavailable at the critical times when needed;
- (ii) the unknown responsiveness of the people to technological innovation, changes in farming system (i.e. introducing swampland rice in addition to existing upland farming) and sociological factors (introduction of ethnological outsiders in later phases); and
- (iii) the poor crop marketing arrangements that have prevailed hitherto and the unknown effectiveness of marketing arrangements which have been proposed.

7.11 Sensitivity analysis was applied to determine to what degree the three phase program's most important variables are likely to affect its return. These variables include the three risk areas mentioned above, together with the yield and price of rice, all of which affect the benefit stream for rice, the yield and price of cotton, the cost of civil works, and costs in general. Switching values were used as a measure of sensitivity. The switching value of a variable is that value at which, other variables remaining unchanged, the net present value of the project equals zero. At this point the rate of return of the project equals the opportunity cost of capital (OCC). In Upper Volta the OCC is estimated at 8 percent. Below this value the program becomes economically unacceptable. The table below shows the result of this analysis.

% Change Switching Value

Three Phase Program

Paddy production or prices	-9
Cotton production or prices	-46
Costs of major civil works	+23
Value of family labor	+37
Input costs	+35
All other costs	+28

7.12 The pilot project design incorporates safeguards against the project risks through:

- (i) adopting modest yield levels;
- (ii) delaying introduction of farmers from outside until Phase II or III;
- (iii) operating an intensive extension service (1:200); providing adequate staff training and farmer training through, for example, the Demonstration Unit; and linking research to the practical needs of the project;
- (iv) operating a Monitoring and Evaluation Unit to identify problems for action by management; and
- (v) assuring conditions of rice marketing for project farmers.

VIII. AGREEMENTS REACHED

8.01 The following assurances were given by the borrower during negotiations:

- (a) ONBI will provide the supervisory services to implement the civil works program either using machinery procured under the project or through contractors (para 3.07; Credit Agreement 3.03 (a));
- (b) SERS will carry out the road construction program using its own existing machinery and staff according to the project timetable (para 3.07; Credit Agreement 3.03 (b));
- (c) prior to engaging any consultancy, the detailed terms of reference would be reviewed by and agreed with IDA, consultants appointed would have qualifications, experience and terms and conditions of

appointment satisfactory to IDA and consultants reports would be promptly reviewed with IDA for examining possible implementation implications (para 3.20; Credit Agreement 3.02(d));

- (d) SOFITEX would be the source of supply for project fertilizer requirements. All necessary steps will be taken to ensure the availability of the project's fertilizer requirement (para 3.22; supplemental letter to Credit Agreement);
- (e) the project special account would be operated on terms and conditions satisfactory to IDA. Should any disbursements be made from the revolving fund which are not acceptable to IDA, the Government would deposit the corresponding amount in the account. Details of the other terms and conditions are at para 3.24; (Credit Agreement 2.02 (b) and (c));
- (f) Four sets of accounts would be designed and installed by FAU, which would provide accounting support to the project. Details are at para 3.28; (Credit Agreement 4.01 (b));
- (g) Government will implement satisfactory accounting and auditing procedures (para 3.29; Credit Agreement 4.01 (a) and 4.02);
- (h) a Project Executive Committee will be formed with composition and functions as noted in para 4.03 by June 30, 1980, (Credit Agreement Schedule 4);
- (i) the Director ORD Hauts Bassins will execute a coordinating function and the Project Manager can from time to time request meetings for coordination purposes (para 4.04; Minutes of Negotiations);
- (j) a Management Committee will be formed with composition and functions as noted in para 4.05 by June 30, 1980 (Credit Agreement Schedule 4);
- (k) rates of interest to be charged to farmers would be not less than 8.5 percent on both short and medium-term lending (para 4.13; Credit Agreement Schedule 5 para 6);
- (l) suitably qualified and experienced Voltaic staff would be recruited for posts to be filled locally - notably Project Manager, Project Accountant, and three junior managers (para 4.24; Credit Agreement 3.01(c));
- (m) where international recruitment was undertaken persons with qualifications and experience and on terms and conditions of employment satisfactory to IDA would be appointed. This is likely to be applicable to: Deputy Project Manager, Rice Industry Advisor to MRD, Kou Valley Rice Mill Manager, Senior Evaluation Officer and Cooperatives Specialist (para 4.26; Credit Agreement 3.02(d))

- (n) Government will prepare and furnish to IDA, promptly after project completion, a project completion report in accordance with a format and content acceptable to the Association (para 4.27; Credit Agreement 3.05 (c));
- (o) OFNACER would act as buyer of last resort for project produced paddy (para 6.04; Minutes of Negotiations); and
- (p) cost recovery would be progressively introduced for project farmers who in cropping year 3 would pay CFAF 20,000/ha. Non project farmers benefitting from water control measures would be charged a rate to recover all recurrent costs plus a reasonable proportion of investment costs. The level of land charges would be maintained in real terms and would be reviewed annually (para 6.06; Credit Agreement 4.04 (a), (b) and (c)).

8.02 The following would be conditions of Credit effectiveness:

- (a) the project special bank account had been opened (para 3.24; Credit Agreement 5.01 (b));
- (b) land title will have been obtained to land required by the project for building construction, the research substation and for the Demonstration Unit (para 3.30; Credit Agreement 5.01 (a)); and
- (c) at least two of the junior managers will have been selected (para 4.18; Credit Agreement 5.01 (c)).

MIENA BONGOLE RICE DEVELOPMENT PROJECT/PROJET DE DEVELOPEMENT RIZICOLES DE MIENA BONGOLE

Farm Budgets - 7 Year Average/Budgets d'Exploitant - Moyenne de 7 Ans

	Model/Modèle 1		Model/Modèle 2		Model/Modèle 3		Model/Modèle 4 ^{1/}		Model/Modèle 5 ^{2/}				
	Traditional Farmer Cultivateur traditionnel		Intermediate Farmer Cultivateur intermédiaire Manual/Travail à main		Intermediate Farmer Cultivateur intermédiaire Hired Oxen/Bœufs loués		Intermediate Farmer Cultivateur intermédiaire Own Oxen/Bœufs particuliers		Advanced Farmer Cultivateur expérimenté				
	Without Project/ Sans projet	With Project/ Avec projet	Without Project/ Sans projet	With Project/ Avec projet	Without Project/ Sans projet	With Project/ Avec projet	Without Project/ Sans projet	With Project/ Avec projet	Without Project/ Sans projet	With Project/ Avec projet			
Areas Planted (ha) and Yields (kg/ha)											Surfaces (ha) et rendements		
Cotton	(0.3) 500	(0.3) 500	(0.3) 700	(0.6) 860	(0.3) 700	(1.1) 910	(0.3) 700	(1.1) 960	(0.6) 1,100	(1.1) 1,415	Coton		
Sorghum/Millet	(1.2) 600	(1.2) 600	(1.2) 750	(1.1) 910	(1.1) 750	(0.8) 960	(1.5) 800	(0.8) 1,050	(1.0) 1,000	(0.8) 1,150	Sorgho/mil		
Maize ^{3/}	(0.4) 800	(0.4) 800	(0.4) 850	(0.2) 1,060	(0.4) 850	(0.5) 1,090	(0.4) 900	(0.6) 1,160	(0.6) 950	(0.6) 1,430	Maïs		
Minor Cash Crops	(0.2) 500	(0.2) 500	(0.2) 600	(0.2) 760	(0.2) 600	(0.2) 810	(0.2) 870	(0.2) 850	(0.2) 650	(0.2) 914	Petites cultures de rente		
Rice	(2.4) 500	(2.4) 1,190	(2.4) 600	(2.4) 1,830	(2.4) 600	(2.4) 2,010	(2.4) 870	(2.4) 2,000	(2.4) 650	(2.4) 2,730	Riz		
Production - Kg											Production - Kg		
Cotton	150	150	210	516	210	1,051	210	1,096	660	1,557	Coton		
Sorghum/Millet	900	900	1,125	1,005	1,125	768	1,200	848	1,000	1,040	Sorgho/mil		
Maize	320	320	340	230	340	654	360	696	370	658	Maïs		
Minor Cash Crops	100	100	120	152	120	162	120	172	130	183	Petites cultures de rente		
Rice		595		913		1,025		1,000		1,365	Riz		
Sales (CFAP) % Sold/Vendu Price/Price/kg											Ventes (FCFA)		
Cotton	100	53	7,950	7,950	11,130	27,345	11,130	25,968	34,380	82,921	Coton		
Minor Cash Crops	95	53	5,053	3,035	6,042	7,653	6,042	6,345	6,345	9,214	Petites cultures de rente		
Rice	90	60	30,120	36,115	36,410	40,410	34,270	41,000	34,270	75,710	Riz		
			12,965	43,115	17,172	84,411	17,172	13,460	17,172	113,668			
Inputs (CFAP) Rice Production Unit Price/Price unitaire											Inputs (CFAP) Production rizicole		
Bags/100 Kg		(5)	1,500		(9)	2,700		(10)	3,000		(14)	4,200	
Small Tools						1,000			1,000			1,000	
Seed Rice - kg					(11)	792		(11)	792		(11)	792	
Fertilizer - kg					(25)	925		(25)	925		(25)	925	
Urea - kg					(25)	925		(25)	925		(25)	925	
Hand Thresher hire/day					(4)	320		(4)	320		(6)	480	
Sceder hire/day											(2)	320	
Subtotal			1,500			6,562			6,562			12,492	
Non-Rice Production											Autres récoltes		
Fertilizer - kg	35/37			(25)	875	(25)	925	(25)	875	(40)	1,400	(40)	1,400
Urea - kg	35/37			(25)	875	(25)	925	(25)	875	(40)	1,400	(40)	1,400
Other													
Total			0	1,500	1,750	8,512	1,750	9,322	9,322	10,000	10,000	13,000	
Sales Less Inputs (CFAP)	12,965	13,615	15,422	75,899	15,422	105,250	14,372	138,736	32,220	140,953			
Animal Traction ^{2/} (1 = costs) ^{5/}											Traction animale ^{2/} (1 = coûts) ^{5/}		
Purchases and Sale Oxen & Equipment									(18,971)		(18,971)		
Recurrent Costs Oxen & Equipment									(10,470)		(10,470)		
Hire Costs or Revenue - day	1,500						(11)	(16,300)	26,214		40,000		
Total									6,771		15,557		
Land Use Change ^{7/}											Modifications ^{7/}		
		(11,430)		(11,430)		(11,430)		(11,430)		(11,430)			
Net Cash Receipts ^{6/}	12,965	32,185	15,422	64,469	15,422	77,698	14,372	124,047	32,220	149,680			
Project Incremental		19,220		49,047		62,268		99,617		117,103			
Home Consumption (CFAP) % CFAP/kg											Consommation familiale (FCFA) %		
Sorghum/Millet	58	60	32,920	32,920	66,150	58,599	66,150	49,852	55,800	55,800	Sorgho/mil		
Maize	98	98	16,327	16,327	17,325	27,009	17,326	33,328	22,047	43,680	Maïs		
Minor Cash Crops	3	3	159	159	191	242	191	258	207	291	Petites cultures de rente		
Rice	8	60	2,886	2,886	4,302	4,302	4,204	4,204	4,204	4,204	Riz		
Total			69,392	72,392	83,667	90,252	83,667	89,657	80,474	83,664	Total		
Residual Value Oxen & Equipment ^{8/}											Valeur restante de bœufs et équipement ^{8/}		
Net Benefit	89,371	104,427	99,085	156,871	99,089	161,196	103,469	213,339	150,570	265,780	Bénéfice net		
Project Incremental		22,056		37,802		62,107		109,870		149,141	Modifications à cause du projet		
Labor Requirements - mandays	176	232	233	302	235	286	219	245	233	366	Hommes/jours de travail		
Benefit/manday - CFAP	468	450	422	513	422	560	472	618	518	726	Bénéfice/homme-jour - FCFA		
Project Incremental Mandays		393		67		53		126		133	Hommes/jours supplémentaires à cause du projet		
Benefit/manday				834		1,172		1,691		1,872	Bénéfice/homme-jour		
Benefits per Family Member ^{8/}	15,542	19,703	18,696	29,240	18,696	30,414	19,722	40,253	22,751	34,073	Bénéfice/membre de famille		

1/ See Working Paper C3 for detailed 7-year model. Averages do not agree exactly due to rounding of areas and yields.
 2/ See Working Paper C3 for detailed 7-year model. Averages do not agree exactly due to rounding of areas and yields.
 3/ Vegetables, groundnuts, cowpeas and sesame.
 4/ Production is either sold or home-consumed, with difference from 100% representing seed retention.
 5/ See Working Paper C3 for details for Models 4 and 5.
 6/ The cost of credit transactions is assumed to be zero in real terms; the rate of interest 8-12% is below expected inflation.
 7/ CFAP 10,000/year for years 1 to 5, then CFAP 15,000/year.
 8/ 5.3 members per farm family; the GNP/head of Upper Volta is CFAP 24,200.

1/ Voir données de base C3 pour le modèle de 7 ans en détail. L'écart entre les moyennes est le résultat de l'arrondissement des chiffres de surfaces et de rendements.
 2/ Voir données de base C3 pour le modèle de 7 ans en détail. L'écart entre les moyennes est le résultat de l'arrondissement des chiffres de surfaces et de rendements.
 3/ Légumes, arachides, niébé et sésame.
 4/ La production étant soit vendue soit consommée à domicile, l'écart du niveau de 100% représente la conservation de semences.
 5/ Voir données de base C3 pour les modèles 4 et 5 en détail.
 6/ Le coût des transactions de crédit est censé être zéro en termes constants; le taux d'intérêt de 8-12% est inférieur au taux d'inflation prévu.
 7/ FCFA 10,000/an pour les années 1 à 5, puis FCFA 15,000/an.
 8/ 5,3 individus par famille; le niveau du PNB/personne en Haute-Volta s'élève à FCFA 24,200.

UTZER VOLTA/HAUT-VOLTA

MIENA DIORONKE RICE DEVELOPMENT PROJECT/PROJET DE DEVELOPPEMENT RIZICOLES DE MIENA DIORONKE

Summary of Project Costs by Project Activities/Résumé des coûts du projet classés par activité

	FY/AF 1980/81	CY/AP 1 1981/81	CY/AP 2 1982/82	CY/AP 3 1983/83	Total	Per.Esch./Devises US\$/\$U	%	US\$/\$U	
-----CFAP'000-----									
A. PRODUCTION COMPONENT									
1. Grass Development									
Civil Works									
Recurrent Operating Costs	205,962	19,411	1,230	1,230	227,833	1,084,910	60	650,651	
Total Base Costs	205,962	19,461	1,800	2,280	229,503	1,084,776	60	657,350	
2. Management and Extension									
Civil Works	55,800				55,800	266,143	60	159,686	
Vehicles, Equipment & Furniture	20,800	1,100	130	4,300	26,550	123,992	80	99,162	
Staff Salaries	29,994	31,225	32,340	24,540	118,099	528,090	0/80	291,429	
Other Operating Costs	8,775	11,945	11,945	11,970	43,455	206,833	65	131,441	
Total Base Costs	108,259	44,770	44,515	39,510	236,954	1,123,022	57	544,718	
3. Farm Service Centers									
Civil Works	14,380				14,380	68,476	60	41,086	
Vehicles, Equipment & Furniture		3,700			3,700	17,310	80	14,248	
Staff Salaries		4,540	4,540	4,540	13,620	64,969	0	0	
Other Operating Costs		1,530	2,530	2,530	6,590	29,866	65	19,036	
Total Base Costs	14,380	9,770	7,070	7,070	37,590	180,561	61	74,370	
4. Farm Inputs (Incremental)									
Oxen	3,735	4,365	5,810	5,810	19,320	94,057	0	0	
Draft Equipment	6,435	7,865	10,020	10,020	34,300	163,429	80	65,372	
Annual Inputs on Credit	2,634	4,920	3,625	3,625	14,770	67,392	90	61,127	
Cost Sales Taxes						3,565	16,906	40	6,750
Equipment for Hire	1,350				1,350	6,429	90	5,756	
Total Base Costs	15,189	16,610	20,065	19,565	73,405	349,643	40	133,105	
5. Demonstration Unit									
Civil Works	2,370				2,370	11,286	60	6,772	
Vehicles, Equipment & Furniture						940	80	3,215	
Oxen and Ox Equipment						392	1,676	0/40	0
Staff Salaries		3,430	3,430	3,430	10,690	50,739	0	0	
Other Operating Costs		360	360	360	1,080	5,452	65	3,544	
Total Base Costs	4,080	3,790	3,790	3,790	15,340	73,590	19	14,346	
6. CERDC Research Substation									
Civil Works	2,000				2,000	9,284	60	5,744	
Vehicles, Equipment & Furniture						430	80	1,638	
Oxen and Equipment						352	1,676	0/40	0
Study						275	1,210	80	1,048
Staff Salaries		2,400	2,400	2,400	7,200	34,826	0	0	
Other Operating Costs		300	300	300	900	4,288	65	2,706	
Total Base Costs	3,027	2,700	2,700	2,700	11,127	53,130	29	11,690	
A. SUMMARY - PRODUCTION COMPONENT									
Civil Works	280,562	16,411	1,230	1,230	300,473	1,440,343	60	964,009	
Vehicles, Equipment & Furniture	22,270	1,840	130	1,000	25,140	118,286	80	118,566	
Study	275				275	1,210	80	1,048	
Farm Equipment & Supplies	15,095	18,610	20,065	19,565	73,335	322,999	40	184,129	
Staff Salaries	29,994	40,000	40,000	35,910	145,904	570,325	36	291,429	
Other Operating Costs	6,640	14,105	15,705	15,250	51,700	225,714	65	166,214	
Total Base Costs	330,891	59,266	58,065	53,975	604,697	2,376,652	54	1,241,599	
5. RICE INDUSTRY SUPPORT									
7. Rice Industry Support Group									
Civil Works									
Vehicles, Equipment & Furniture									
Staff Salaries	9,112				9,112	43,381	80	24,100	
Course Costs	27,975	54,350	54,350	31,000	167,675	798,032	0/50	506,827	
Other Operating Costs		3,180	3,180	3,180	9,540	45,829	90	46,896	
Total Base Costs	4,080	68,730	68,780	44,380	229,775	1,066,972	65	608,175	
8. Management Support to Kou Valley Rice Mill									
Civil Works	12,000				12,000	57,153	60	34,286	
Vehicles, Equipment & Furniture	4,560	25,000			29,560	140,762	80	115,610	
Staff Salaries	3,000	18,300	18,300	9,000	48,300	227,143	80	205,714	
Other Operating Costs	1,375	2,750	2,750	1,375	8,250	39,286	65	25,236	
Total Base Costs	26,935	45,750	20,750	10,375	103,310	464,334	76	376,146	
9. Monitoring & Evaluation									
Civil Works		3,300			3,300	15,714	60	9,428	
Vehicles, Equipment & Furniture		5,990	130	2,400	10,300	51,610	80	41,448	
Staff Salaries		34,450	33,655	34,200	102,375	489,882	0/80	251,429	
Other Operating Costs		1,750	20,250	13,550	25,550	124,302	65	104,129	
Total Base Costs		41,490	44,335	47,150	150,975	725,337	57	406,328	
10. Studies & Consultants									
	2,900	33,120	33,260	29,100	99,580	474,657	80	379,734	
B. SUMMARY - RICE INDUSTRY SUPPORT									
Civil Works	12,000	3,300			15,300	72,867	60	43,714	
Vehicles, Equipment & Furniture	16,070	10,990	130	2,400	29,560	140,762	80	188,762	
Studies & Consultants	2,900	33,260	33,260	29,100	99,580	474,657	80	379,734	
Staff Salaries	36,950	107,000	107,000	66,675	317,625	1,274,476	65	260,650	
Course Costs		3,180	3,180	3,180	9,540	46,429	90	40,836	
Other Operating Costs		24,750	24,350	13,250	77,500	369,043	65	239,821	
Total Base Costs	76,870	202,300	206,120	120,505	576,120	2,713,469	68	1,826,977	
3. TOTALS									
Civil Works	286,562	22,911	1,230	1,230	311,773	1,513,203	60	907,923	
Vehicles, Equipment & Furniture	38,240	33,790	260	4,600	76,890	344,238	80	317,390	
Farm Inputs	15,995	18,610	20,065	19,565	74,235	322,999	40	184,129	
Studies & Consultants	2,475	33,260	33,260	29,100	99,095	472,476	80	380,781	
Staff Salaries	60,201	145,000	145,115	103,490	453,911	2,223,421	40	1,211,429	
Course Costs		3,180	3,180	3,180	9,540	46,429	90	40,836	
Other Operating Costs	17,790	39,895	40,295	34,590	132,570	624,762	65	403,992	
Total Base Costs	407,161	301,466	289,186	194,106	1,180,519	7,460,686	60	3,334,653	
Physical Contingencies									
Civil Works	15	43,084	3,406	180	47,665	226,921	60	136,139	
Vehicles, Equipment & Furniture	16	3,321	3,979	26	8,332	39,464	70	35,739	
Local Staff Salaries	7.5	1,213	3,240	3,534	12,070	57,476	0	0	
Other Operating Costs	7.5	1,333	2,914	3,024	9,607	46,867	65	30,437	
Total Physical Contingencies		50,956	13,459	6,786	71,641	369,738	55	197,365	
Price Contingencies									
Civil Works	304,000	1,663	374	500	306,477	1,203,371	60	1,042,225	
Vehicles, Equipment & Furniture	3,785	7,582	74	2,490	13,929	65,422	80	25,929	
Farm Inputs	15,995	18,610	20,065	19,565	74,235	322,999	40	35,329	
Studies & Consultants	2,223	3,662	9,160	10,127	25,172	120,027	80	96,220	
Local Staff Salaries	1,613	8,262	13,169	14,606	37,650	183,027	0	0	
Expatriate Staff Salaries	3,660	19,094	26,220	21,267	69,750	330,143	80	265,714	
Course Costs		3,180	3,180	3,180	9,540	46,429	90	40,836	
Other Operating Costs		463	387	1,107	2,957	11,821	80	12,702	
Total Price Contingencies	40,958	56,322	67,169	71,137	235,447	1,130,400	59	663,416	
3. GRAND TOTALS									
Civil Works	366,794	20,700	1,819	1,939	401,226	1,910,557	60	1,146,310	
Vehicles, Equipment & Furniture	45,850	46,321	360	4,990	97,521	428,614	80	391,301	
Farm Inputs	17,223	21,904	25,900	27,124	94,150	440,257	39	172,190	
Studies & Consultants	2,698	39,302	44,408	39,277	125,685	596,833	80	477,167	
Staff Salaries	67,134	199,775	199,330	146,113	622,352	2,725,797	46	1,477,143	
Course Costs		3,713	4,007	4,027	12,757	57,520	90	51,230	
Other Operating Costs	20,844	49,162	44,254	44,393	178,653	836,736	65	539,360	
Total	580,575	371,277	232,107	272,313	1,465,309	7,120,364	50	1,295,434	

FY = Formation Year ending March 31, 1981
CY = Cropping Year ending March 31
Base costs in prices as at March 31, 1980

AF = Année de formation se terminant le 31 mars 1981
AP = Année de production se terminant le 31 mars
Coûts de base exprimés en prix courants au 31 mars 1980

ANNEXE 2

UPPER VOLTA/HAUTE-VOLTA

NIENA DIONKELE RICE DEVELOPMENT PROJECT/PROJET DE DEVELOPPEMENT RIZICOLE DE NIENA DIONKELE

ANNEX/ANNEXE 2
Table/Tableau 3

Government Cash Flow (Pilot Project)/Flux monétaire de l'Etat (projet pilote)

Current CFAP '000	FY/AF 1980/81	CY/AP 1 1981/82	CY/AP 2 1982/83	CY/AP 3 1983/84	CY/AP 4 1984/85	CY/AP 5 1985/86	CY/AP 6 1986/87	CY/AP 7 1987/88	CY/AP 8 1988/89	CY/AP 9 1989/90	CY/AP 10-19 1990/99	CY/AP 20-49 2000/29	FCFA '000 courants
<u>Cash Inflow</u>													
1. IDA Credit	468,518	334,131	208,896	245,262									1. Crédit IDA
2. Land Use Charges ^{3/}		2,400	4,200	6,000	8,000	8,000	12,000	12,000	12,000	12,000	12,000	12,000	2. Redevances ^{3/}
3. Indirect Taxes on Project-Generated Spending ^{1/}		2,317	3,848	5,767	6,296	6,912	7,088	7,192	7,335	7,652	7,795	7,795	3. Impôts indirects sur dépenses résultant du projet ^{1/}
4. Cotton Revenue		5,000	16,000	27,000	32,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	4. Revenu sur le coton
Total Inflow	468,518	343,848	232,944	284,029	46,296	48,912	53,088	53,192	53,335	53,652	53,795	53,795	Flux d'entrée global
<u>Cash Outflow</u>													
1. Project & Post-Project Costs ^{3/}	520,755	371,257	233,107	272,513	60,000	60,000	60,000	60,000	60,000	60,000	60,000	10,000 ^{4/}	1. Coûts du projet et de l'après-projet ^{3/}
2. IDA Debt Service - Service Charge - Principal	3,370	5,630	7,580	9,360	9,360	9,360	9,360	9,360	9,360	9,360	8,895 12,484	4,450 37,000	2. Service de la dette IDA -Commission de service -Principal
3. Input Subsidies ^{2/}		900	1,600	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	3. Subventions des intrants ^{2/}
Total Outflow	524,125	377,787	241,287	284,873	73,360	73,360	73,360	73,360	73,360	73,360	85,379	55,950 ^{5/}	Flux de sortie global
Net Outflow	55,607	33,939	8,343	844	27,064	24,448	20,272	20,168	20,025	19,705	31,584	+ 12,155	

FY = Formation Year ending March 31, 1981
CY = Cropping Year ending March 31

AF = Année de formation se terminant le 31 mars 1981
AP = Année de production se terminant le 31 mars

Assumption is:

- ^{1/} 50% of incremental cash income spent on dutiable goods with average tax of 25%
^{2/} Based on analysis at West Volta Agricultural Development; assumes a reversal of present depressed world cotton prices
^{3/} In current terms to Year 5, constant thereafter

- ^{4/} Extension Service no longer continued
^{5/} Net Inflow

Hypothèse:

- ^{1/} 50% du revenu additionnel en espèces utilisé pour l'achat de biens susceptibles à l'impôt, avec une charge moyenne de 25%
^{2/} Basé sur une analyse du Projet de développement agricole Ouest-Volta; suppose un revirement des prix actuellement faibles du coton
^{3/} En termes courants jusqu'à l'année 5, en termes constants par la suite
^{4/} Fin de service de vulgarisation
^{5/} Flux d'entrée

UPPER VOLTA - NIENA DIONKELE RICE DEVELOPMENT PROJECT
ECONOMIC ANALYSIS OF 3 PHASE PROGRAM - SUMMARY OF COSTS AND BENEFITS
CFAF '000 IN 1980 TERMS

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988
PRODUCTION (TONNES)									
PADDY	0	338	544	697	832	1415	2270	3073	3281
COTTON	0	46	161	384	446	689	689	689	689
SORGHUM	0	-39	-52	-32	-30	-45	-45	-45	-45
MAIZE	0	38	70	153	243	275	275	275	275
MINOR CASH CROPS	0	3	10	28	41	45	45	45	45
PAIRS OF OXEN	0	0	0	43	52	67	109	166	209
ECONOMIC FARMGATE PRICES									
PADDY	0	58	59	61	62	63	65	65	65
COTTON	0	66	72	82	89	97	105	107	108
SORGHUM	0	68	69	70	70	71	71	71	71
MAIZE	0	72	72	74	74	75	75	76	76
MINOR CASH CROPS	0	50	51	50	48	47	47	47	48
PAIR OF OXEN	0	104	101	96	99	102	106	106	106
ECONOMIC BENEFITS									
PADDY	0	19604	32096	42517	51584	89145	147550	199745	213265
COTTON	0	3036	11592	31488	39694	66833	72345	73223	74412
SORGHUM	0	-2652	-3588	-2240	-2100	-3150	-3195	-3195	-3195
MAIZE	0	2736	5040	11322	17982	20625	20625	20900	20900
MINOR CASH CROPS	0	150	510	1400	1968	2115	2115	2115	2160
OXEN	0	0	0	4128	5148	6834	11554	17596	22154
TOTAL BENEFITS	0	22874	45650	88615	114276	182402	250994	310884	329696
ECONOMIC COSTS									
CIVIL WORKS	301125	20983	1351	1351	84622	329965	217089	78256	155553
VEHICLES AND EQUIPMENT	23197	5164	139	4268	15258	4268	3628	13231	4268
LOCAL STAFF SALARIES	13113	19920	20573	20573	33873	33873	33873	33873	43042
EXPATRIATE SALARIES	13096	26190	26190	13095	13095	13095	13095	13095	13095
OTHER OPERATING COSTS	8800	14061	15691	15228	18905	20432	24812	20738	38486
MONITORING & EVALTN	1194	13807	11200	11913	8221	7572	8199	8022	8016
FARM INPUTS	10663	15486	22847	29706	44297	58535	52115	46735	83792
INCREMENTAL LABOR	0	11834	16012	22917	27500	41113	54046	61282	60298
TOTAL COSTS	371188	127445	114003	119051	245771	508853	406857	275232	406550
NET BENEFITS	-371188	-104571	-68353	-30436	-131495	-326451	-155863	35652	-76854
YEAR									
	1989	1990	1991	1992	1993	1994	1995	1996-2020	
PRODUCTION (TONNES)									
PADDY	4060	5316	7611	8053	8076	8163	8253	8324	
COTTON	689	689	689	689	689	689	689	689	
SORGHUM	-45	-45	-45	-45	-45	-45	-45	-45	
MAIZE	275	275	275	275	275	275	275	275	
MINOR CASH CROPS	45	45	45	45	45	45	45	45	
PAIRS OF OXEN	181	176	356	318	404	356	318	318	
ECONOMIC FARMGATE PRICES									
PADDY	66	66	66	66	66	66	66	66	
COTTON	110	111	112	112	112	112	112	112	
SORGHUM	71	71	71	71	71	71	71	71	
MAIZE	76	76	76	76	76	76	76	76	
MINOR CASH CROPS	49	50	51	51	51	51	51	51	
PAIR OF OXEN	106	106	106	106	106	106	106	106	
ECONOMIC BENEFITS									
PADDY	267960	350856	502326	531498	533016	538758	544698	549384	
COTTON	75790	74479	77168	77168	77168	77168	77168	77168	
SORGHUM	-3195	-3195	-3195	-3195	-3195	-3195	-3195	-3195	
MAIZE	20900	20900	20900	20900	20900	20900	20900	20900	
MINOR CASH CROPS	2205	2250	2295	2295	2295	2295	2295	2295	
OXEN	19186	18656	37736	33708	42824	37736	33708	33708	
TOTAL BENEFITS	382846	465946	637230	662374	673008	673662	675574	680260	
ECONOMIC COSTS									
CIVIL WORKS	610076	412233	194664	0	0	0	0	0	
VEHICLES AND EQUIPMENT	3628	5400	5400	5400	5400	5400	5400	5400	
LOCAL STAFF SALARIES	43042	43042	43042	43042	43042	43042	43042	43042	
EXPATRIATE SALARIES	13095	13095	13095	0	0	0	0	0	
OTHER OPERATING COSTS	41033	55130	42703	45000	45000	45000	45000	45000	
MONITORING & EVALTN	8439	8262	7832	8000	8000	8000	8000	8000	
FARM INPUTS	87577	126093	101744	102048	110714	113300	114502	113841	
INCREMENTAL LABOR	76003	92783	120873	118900	118703	118165	117518	116900	
TOTAL COSTS	882893	756038	529353	322390	330859	332907	333462	332183	
NET BENEFITS	-500047	-290092	107877	339984	342149	340755	342112	348077	

UPPER VOLTA - NIEMA DIONKELE RICE DEVELOPMENT PROJECT
ECONOMIC ANALYSIS OF PILOT PROJECT - SUMMARY OF COSTS AND BENEFITS
CFAF '000 IN 1980 TERMS

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988
PRODUCTION (TONNES)									
PADDY	0	338	544	697	832	868	881	887	897
COTTON	0	46	161	384	446	689	689	689	689
SORGHUM	0	-39	-52	-32	-30	-45	-45	-45	-45
MAIZE	0	38	70	153	243	275	275	275	275
MINOR CASH CROPS	0	3	10	28	41	45	45	45	45
PAIRS OF OXEN	0	0	0	43	52	67	109	166	209
ECONOMIC FARMGATE PRICES									
PADDY	0	58	59	61	62	63	65	65	65
COTTON	0	64	72	82	89	97	105	107	108
SORGHUM	0	68	69	70	70	70	71	71	71
MAIZE	0	72	72	74	74	75	75	76	76
MINOR CASH CROPS	0	50	51	50	48	47	47	47	48
PAIR OF OXEN	0	104	101	96	99	102	106	106	106
ECONOMIC BENEFITS									
PADDY	0	19604	32096	42517	51584	54684	57265	57655	58305
COTTON	0	3036	11592	31488	39694	66833	72345	73723	74412
SORGHUM	0	-2652	-3588	-2240	-2100	-3150	-3195	-3195	-3195
MAIZE	0	2736	5040	11322	17982	20625	20625	20900	20900
MINOR CASH CROPS	0	150	510	1400	1968	2115	2115	2115	2160
OXEN	0	0	0	4128	5148	6834	11554	17594	22154
TOTAL BENEFITS	0	22874	45650	88615	114274	147941	160709	168794	174736
ECONOMIC COSTS									
CIVIL WORKS	301125	20983	1351	1351	0	0	0	0	0
VEHICLES AND EQUIPMENT	23197	5164	139	4268	6000	6000	6000	6000	6000
LOCAL STAFF SALARIES	13113	19920	20573	20573	20573	20573	20573	20573	20573
EXPATRIATE SALARIES	13096	26190	26190	13095	13095	13095	13095	13095	0
OTHER OPERATING COSTS	8000	14061	15691	15228	8000	8000	8000	8000	8000
MONITORING & EVALTN	1194	13807	11200	11913	8221	7572	8199	8022	8016
FARM INPUTS	10463	15486	22847	29704	30516	21865	25720	25897	25463
INCREMENTAL LABOR	0	11834	16012	22917	27500	29401	29398	29356	29341
TOTAL COSTS	371188	127445	114003	119051	113905	106506	110985	110943	97393
NET BENEFITS	-371188	-104571	-68353	-30436	371	41435	49724	57851	77343

YEAR	1989	1990	1991	1992	1993	1994	1995	1996-2012
PRODUCTION (TONNES)								
PADDY	920	929	929	929	929	929	929	929
COTTON	689	689	689	689	689	689	689	689
SORGHUM	-45	-45	-45	-45	-45	-45	-45	-45
MAIZE	275	275	275	275	275	275	275	275
MINOR CASH CROPS	45	45	45	45	45	45	45	45
PAIRS OF OXEN	181	176	356	318	404	356	318	318
ECONOMIC FARMGATE PRICES								
PADDY	66	66	66	66	66	66	66	66
COTTON	110	111	112	112	112	112	112	112
SORGHUM	71	71	71	71	71	71	71	71
MAIZE	76	76	76	76	76	76	76	76
MINOR CASH CROPS	49	50	51	51	51	51	51	51
PAIR OF OXEN	106	106	106	106	106	106	106	106
ECONOMIC BENEFITS								
PADDY	60720	61314	61314	61314	61314	61314	61314	61314
COTTON	75790	76479	77168	77168	77168	77168	77168	77168
SORGHUM	-3195	-3195	-3195	-3195	-3195	-3195	-3195	-3195
MAIZE	20900	20900	20900	20900	20900	20900	20900	20900
MINOR CASH CROPS	2205	2250	2295	2295	2295	2295	2295	2295
OXEN	19186	18656	37736	33708	42824	37736	33708	33708
TOTAL BENEFITS	175604	176404	196218	192190	201306	196218	192190	192190
ECONOMIC COSTS								
CIVIL WORKS	0	0	0	0	0	0	0	0
VEHICLES AND EQUIPMENT	6000	6000	6000	6000	6000	6000	6000	6000
LOCAL STAFF SALARIES	20573	20573	20573	20573	20573	20573	20573	20573
EXPATRIATE SALARIES	0	0	0	0	0	0	0	0
OTHER OPERATING COSTS	8000	8000	8000	8000	8000	8000	8000	8000
MONITORING & EVALTN	8439	8262	7832	8000	8000	8000	8000	8000
FARM INPUTS	27375	31205	30430	35285	34455	31080	27485	29620
INCREMENTAL LABOR	29323	29308	29308	29308	29308	29308	29308	29308
TOTAL COSTS	99710	103348	102143	107166	106336	102961	99366	101501
NET BENEFITS	75894	73056	94075	85024	94970	93257	92824	90689

UPPER VOLTA/HAUTE-VOLTA

NIENA DIONKELE RICE DEVELOPMENT PROJECT/PROJET DE DEVELOPPEMENT RIZICOLE DE NIENA DIONKELE

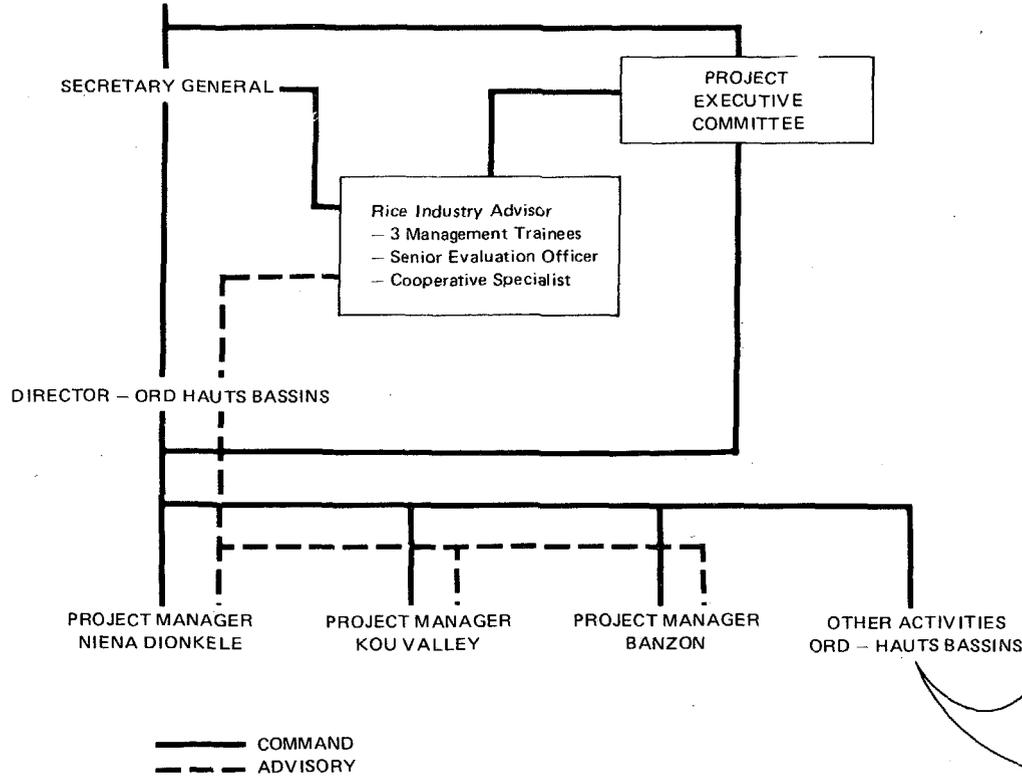
Economic Farmgate Prices/Prix économiques au producteur

(Constant 1980 Terms/tonne/Terms constants de 1980/tonne)

	1980	1981	1982	1985	1990 on et après	
Financial/ Financiers	% For. Exch./ Devises	Economic Economiqes (SCF = .85)				
PADDY						
Thai 5% Broken FOB Bangkok - US\$		429.6	441.3	457.6	487.6	503.8
Adjustment for Quality Difference - 15%		(64.4)	(66.2)	(68.6)	(73.1)	(75.6)
Ocean Freight (Sacked) and Insurance		43.4	43.4	43.4	43.4	43.4
CIF Abidjan - US\$		408.6	418.5	432.4	457.9	471.6
CIF Abidjan - CFAF at 210	85,806	85,806	87,885	90,804	96,159	99,036
Handling and Port Charges	6,360	6,360	6,360	6,360	6,360	6,360
Importers' Margin c. 5%	11,400	11,400	11,400	11,400	11,400	11,400
Rail Transport to Bobo Dioulasso	108,166	107,996	110,075	112,994	118,349	121,226
Price to Wholesale Store - Bobo	(1,100)	(1,067)	(1,067)	(1,067)	(1,067)	(1,067)
Road Transport & Handling (Mill-Bobo 26 km)	107,066	106,929	109,008	111,927	117,282	120,159
Price ex-Kou Valley Mill						
Paddy Equivalent - 64%	68,522	68,435	69,765	71,633	75,060	76,902
Mill Charge Including Rice Sacks	(7,700)	(7,180)				
Bran - 90 kg at CFAF 763/kg	687	687	687	687	687	687
Road Transport Farmgate-Mill - 120 km	(3,300)	(3,200)	(3,200)	(3,200)	(3,200)	(3,200)
Dessiccation and Loading	(950)	(908)				
Paddy Bags - In-farm Inputs						
Purchasing Agent - Farmers Coop						
Economic Farmgate Price of Paddy ex Niena	57,259	57,831	59,161	61,029	64,556	66,298
Finding Market at Bobo						
SEED COTTON						
Mexican SW 1-1/16" CIF North Europe - US\$		1,780	1,866	2,010	2,369	2,440
Adjustment for Quality Difference - 17%		1,477	1,549	1,669	1,966	2,025
Selling Price of Lint - CFAF at 210	310,170	310,170	325,290	350,490	412,860	425,250
Less CFDT Commission - 2%	6,201	6,203	6,506	7,010	8,257	8,505
Less Selling Costs	56,550	56,337	56,337	56,337	56,337	56,337
Price ex-Ginneries	247,319	247,530	262,447	287,143	348,266	360,408
Less Ginny Costs	28,400	26,483	26,483	26,483	26,483	26,483
Price into Ginny/tons lint	218,919	221,047	235,964	260,660	321,783	333,925
x 0.365 = Price/ton Seed Cotton	77,905	80,719	86,127	95,141	117,451	121,883
Less Collection and Transport to Ginny	28,350	18,976	18,976	18,976	18,976	18,976
Price at Farmgate (a)	57,555	61,743	67,151	76,165	98,475	102,907
Price of Cotton Seed FOB Abidjan - US\$/ton		161	167	176	195	229
- CFAF/ton at 210	33,810	35,070	35,960	36,960	40,950	48,090
Less Bagging, Transport and Port Charges	21,340	21,000	21,000	21,000	21,000	21,000
Price ex-Ginneries/ton Cotton Seed	12,470	14,070	15,960	15,960	19,950	27,090
x 0.34 = Price/ton Seed Cotton (b)	4,240	4,788	5,426	5,426	6,783	9,211
Economic Farmgate Price of Seed Cotton (a + b)	61,795	66,098	71,939	81,591	105,258	112,118
SORGHUM						
Grain Sorghum US No. 2 Yellow FOB Gulf Ports - IBRD May 1979	140.5	140.5	145.8	148.6	153.8	156.5
Plus Ocean Freight (Sacked) and Insurance	43.4	43.4	43.4	43.4	43.4	43.4
CIF Abidjan - US\$	183.9	183.9	189.2	192.0	197.2	199.3
CIF Abidjan - CFAF at 210	38,619	38,619	39,732	40,320	41,412	41,853
Handling and Port Charges	6,360	6,360	6,360	6,360	6,360	6,360
Importers' Margin - 5% of CIF	2,500	2,500	2,500	2,500	2,500	2,500
Rail Transport to Bobo Dioulasso - 800 km	11,400	11,230	11,230	11,230	11,230	11,230
Road Transport to N'dorola - 110 km	3,300	3,200	3,200	3,200	3,200	3,200
Wholesalers' Margin	7,000	5,950	5,950	5,950	5,950	5,950
Economic Farmgate Price of Sorghum	67,179	67,859	68,972	69,560	70,652	71,093
MAIZE						
US No. 2 Yellow FOB Gulf Ports - IBRD May 1979 - US\$	159.0	159.0	161.6	169.6	174.9	178.9
Plus Ocean Freight (Sacked) and Insurance	43.4	43.4	43.4	43.4	43.4	43.4
CIF Abidjan - US\$/ton	202.4	202.4	205.0	213.0	218.3	222.3
CIF Abidjan - CFAF at 210	42,504	42,504	43,050	44,730	45,843	46,683
Plus Same Costs as for Sorghum	30,560	29,240	29,240	29,240	29,240	29,240
Economic Farmgate Price of Maize	73,064	71,744	72,290	73,970	75,083	75,923
MINOR CASH CROPS						
Groundnuts - any origin, CIF Rotterdam Constant 1977 US\$/ton - IBRD May 1979	441	441	447	439	411	450
Index	100	100	101.4	99.5	93.2	102
Assumed Local Market Value of a tonne	58,900	50,000	50,700	49,750	46,600	51,000
Minor Cash Crops at N'dorola - CFAF						
OXEN						
Frozen Argentine Manufacturing Beef Exported to EC9 - US\$/ton at 1977 Constant Prices - IBRD May 1979	1,013	1,013	998	940	1,037	1,042
Index	100	100	97.8	92.3	101.9	102.4
Assumed Local Market Value of a Pair of Oxen at N'dorola - 320 kg	122,000	104,000	101,712	95,992	105,976	106,496
PADDY						
Thai 5% brisures FOB Bangkok - \$EU						
Déduction pour différence de qualité - 15%						
Fret et assurance maritimes (en sacs)						
CIF Abidjan - \$EU						
CIF Abidjan - CFAF à 210						
Frais portuaires et manutention						
Marge aux Importateurs c. 5%						
Transport ferroviaire à Bobo Dioulasso						
Prix au magasin de gros - Bobo						
Transport routier et manutention (Rizerie-Bobo 26 km)						
Prix ex-rizerie Vallée du Kou						
Equivalent en paddy - 64%						
Frais de rizerie, sacs compris						
Son - 90 kg à CFAF 763/kg						
Transport routier Producteur-rizerie - 120 km						
Dessèchement et chargement						
Sacs pour paddy - intrants agricoles						
Agent d'achat - Coopérative						
Prix économique au producteur du paddy trouvant un marché à Bobo						
COTON-GRAINE						
Mexicain SW 1-1/16" CAF Europe du Nord - \$EU						
Déduction pour différence de qualité - 17%						
Prix de vente de la fibre - CFAF à 210						
Moins rémunération CFDT - 2%						
Moins frais de vente						
Prix ex-usine						
Moins frais d'usage						
Prix avant usinage/tonnes fibre						
x 0.365 = Prix/tonne coton-graine						
Moins frais d'achat et transport aux usines						
Prix au producteur (a)						
Prix du coton-graine FOB Abidjan - \$EU/tonne						
- CFAF/tonne à 210						
Moins ensachage, transport et frais portuaires						
Prix ex-usine/tonne coton-graine						
x 0.34 = Prix/tonne coton-graine (b)						
Prix économique au producteur de coton-graine (a + b)						
SORGHU						
Sorgho, EU N° 2 jaune FOB ports du Golfe du Mexique - IBRD mai 1979						
Plus fret et assurance maritimes (en sacs)						
CIF Abidjan - \$EU						
CIF Abidjan - CFAF à 210						
Frais portuaires et manutention						
Marge aux importateurs - 5% du CAF						
Transport ferroviaire à Bobo Dioulasso - 800 km						
Transport routier à N'dorola - 110 km						
Marge aux vendeurs en gros						
Prix économique au producteur du sorgho						
MAIS						
EU N° 2 jaune FOB Ports du Golfe du Mexique - IBRD mai 1979 - \$EU						
Plus fret et assurance maritimes (en sacs)						
CIF Abidjan - \$EU/tonne						
CIF Abidjan - CFAF à 210						
Plus mêmes coûts que ceux du sorgho						
Prix économique au producteur du maïs						
PETITES CULTURES DE RETTE						
Arachides - origine non-spécifiée, CAF Rotterdam						
\$EU de 1977 constants/tonne - IBRD mai 1979						
Index						
Valeur supposée d'une tonne de petites cultures de rette au marché de N'dorola - CFAF						
BOEUF						
Boeuf d'origine argentine à usage industriel, exporté à la CE des Neuf - \$EU/tonne aux prix constants de 1977 - IBRD mai 1979						
Index						
Valeur supposée d'une paire de boeufs au marché de N'dorola - 320 kg						

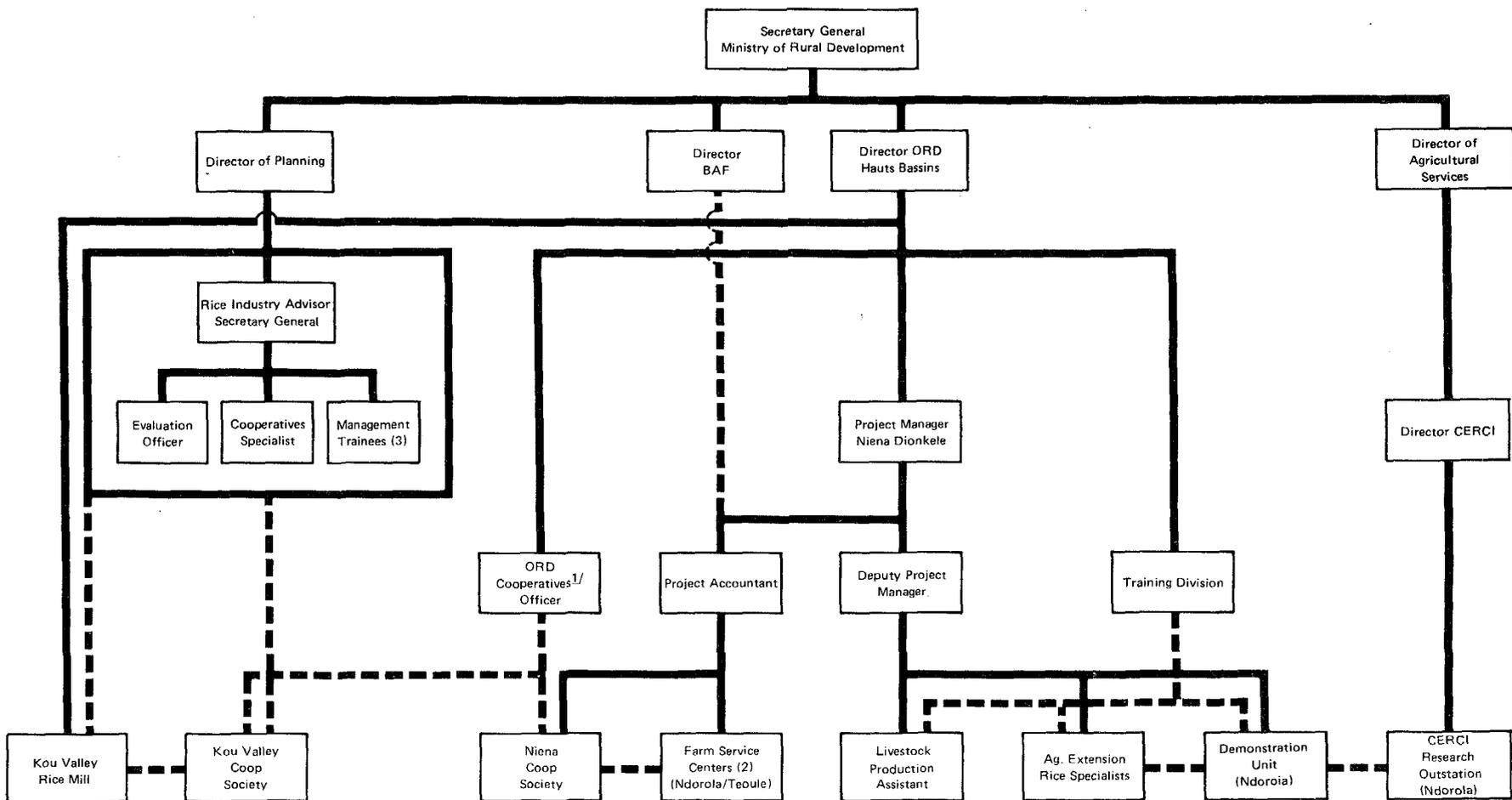
UPPER VOLTA
NIENA DIONKELE RICE DEVELOPMENT PROJECT
ORGANIZATION CHART
Relationships with Ord and Ministry of Rural Development

MINISTER OF RURAL DEVELOPMENT



OTHER ORD ACTIVITIES	
Secretariat	
Community Development	- Village Shops - Rural Radio - Functional Literacy
Training and Extension	- Audio Visual Aids
Finance and Administration	- Procurement - Stock Accounting - General Accounting - Crop Purchase
Agricultural Credit	- Agricultural Equipment (draft)
Livestock Production	- Veterinary Clinic - Vaccination Program - Marketing
Rural Engineering	- Topographic Survey - Rural Construction Programs
Production	- Vegetable - Smallscale Rice - Rice Schemes - Rice Mills - Arcoma) - Corema) draft equipment - Cold Storage

**UPPER VOLTA
NIENA DIONKELE RICE DEVELOPMENT PROJECT
ORGANIZATION CHART
Relationships at Project Level**



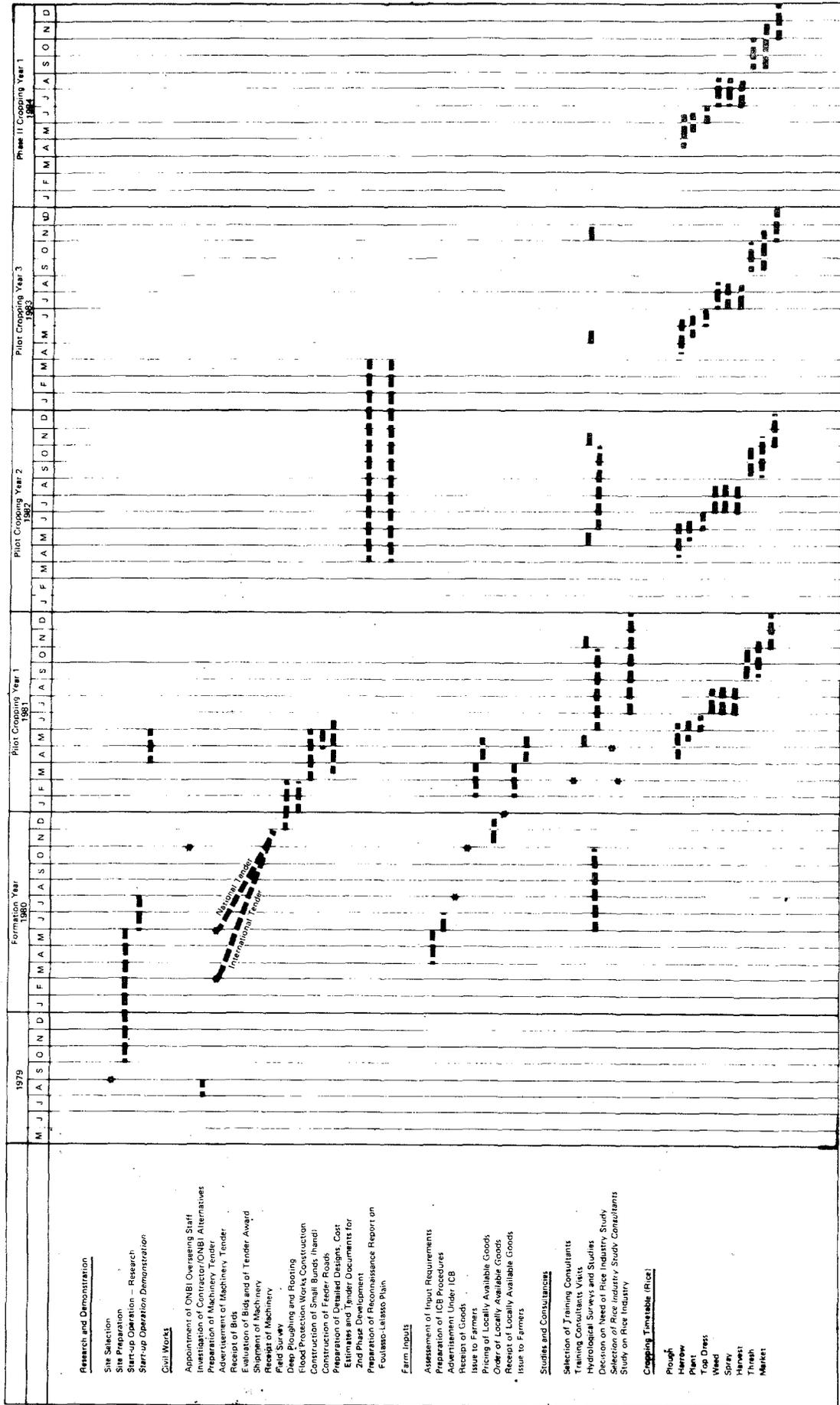
————— Command
 - - - - - Advisory

CERIC à Centre d'Etudes et de Recherche sur les Cultures Irrigués
 1/ Position not yet formally established

OCTOBER 15, 1979

World Bank — 20987

UPPER VOLTA
Niema Dionkele Rice Development Project
Management and Development Time-Table



UPPER VOLTA

NIENA DIONKELE RICE DEVELOPMENT PROJECT

Selected Documents and Data Available in Project File

A. General Reports and Studies on Sector

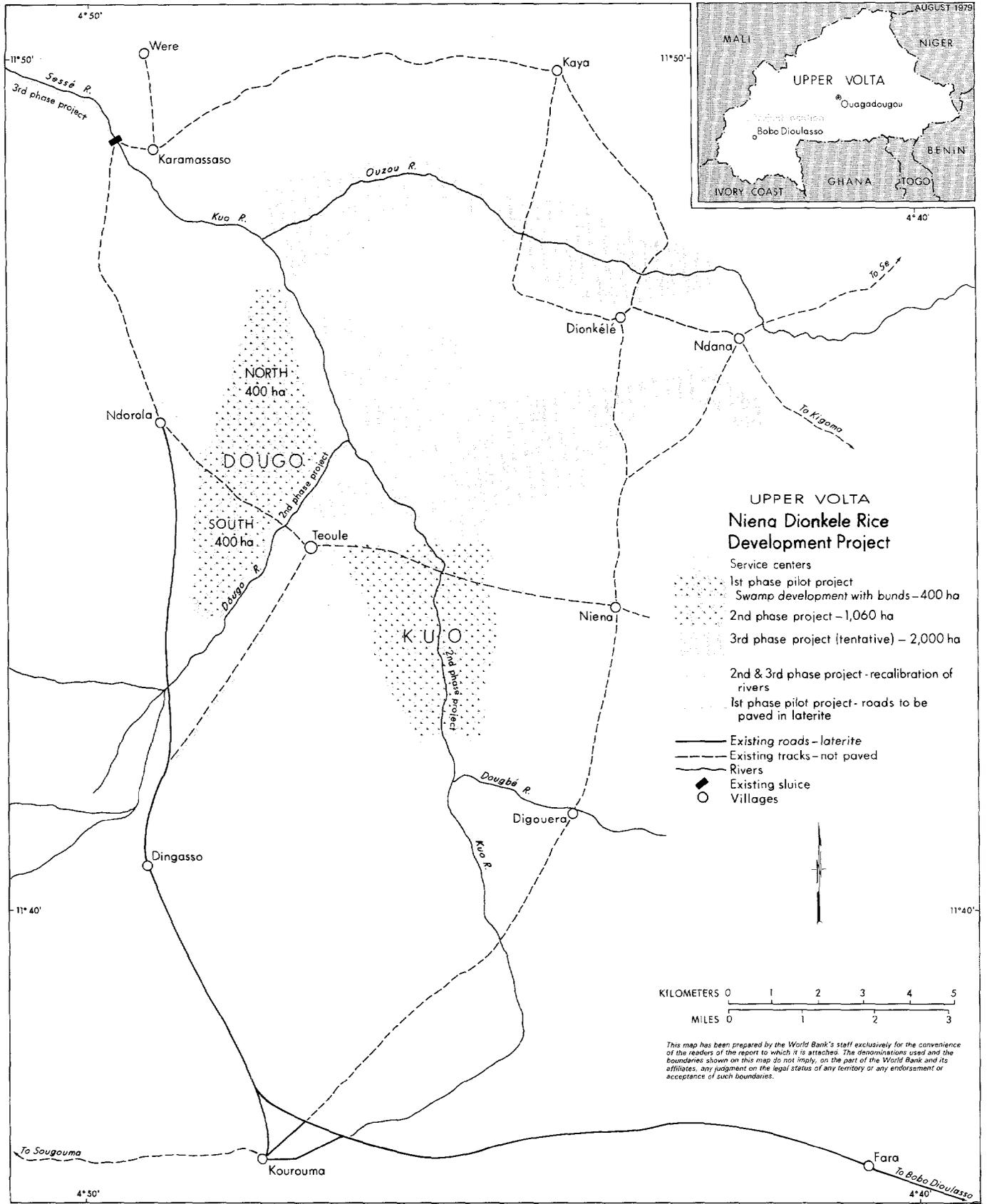
- A1. Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT) - Rapport de Synthèse 1977
- A2 ORD de Bobo-Dioulasso - Rapport Technique 1977/78
- A3 Hydraulique Villageoise - Inventaire - Aout 1976
- A4 Prix de Cession du Matériel Agricole Campagne 1978/79 - ARCOMA
- A5 Activités du Secteur No. 7 de Santé Rurale au Cours de l'Année 1978
- A6 Données Actuelles sur l'Association de l'Agriculture et de l'Elevage en Haute Volta - IRAT - Mai 1969
- A7 Autorité des Aménagement des Vallées de Volta (AVV) - l'Experimentation Agronomique d'Aménagement Résultats 1977
- A8 Association en Participation République de Haute-Volta (CFDT) Le Campagne Cotonnière 1977/78 - Rapport Annuel Juillet 1978
- A9 Centre d'Experimentation du Riz et des Cultures Irriguées - CERCI Riz et Cultures Irrigués Synthèse 1976
- A10 Institut de Recherches Agronomique Tropicale et des Cultures Vivrières (IRAT) - Zones Homogène Proposition des Systèmes de Cultures Vulgarisables - Avril 1978
- A11 Strategy Paper - WAIC - June 1979
- A12 Evaluation du Projet d'Embouche Bovine dans le Vallée du Kou Banque Ouest Africaine de Développement - Février 1978
- A13 Rehabilitation of the Kou Valley Irrigation Perimeter - Permanent Interstate Committee for Drought Control in the Sahel (CILSS) - September 1978
- A14 French translation of above
- A15 Association Pour le Développement de la Riziculture en Afrique de l'Ouest - Rapport de Mission en Haute Volta - Avril 1977
- A16 Proposition de Pret pour le Financement du Projet de Developpement de la Vallée du Kou - Juillet 1979

B. Reports and Studies Relating to Project

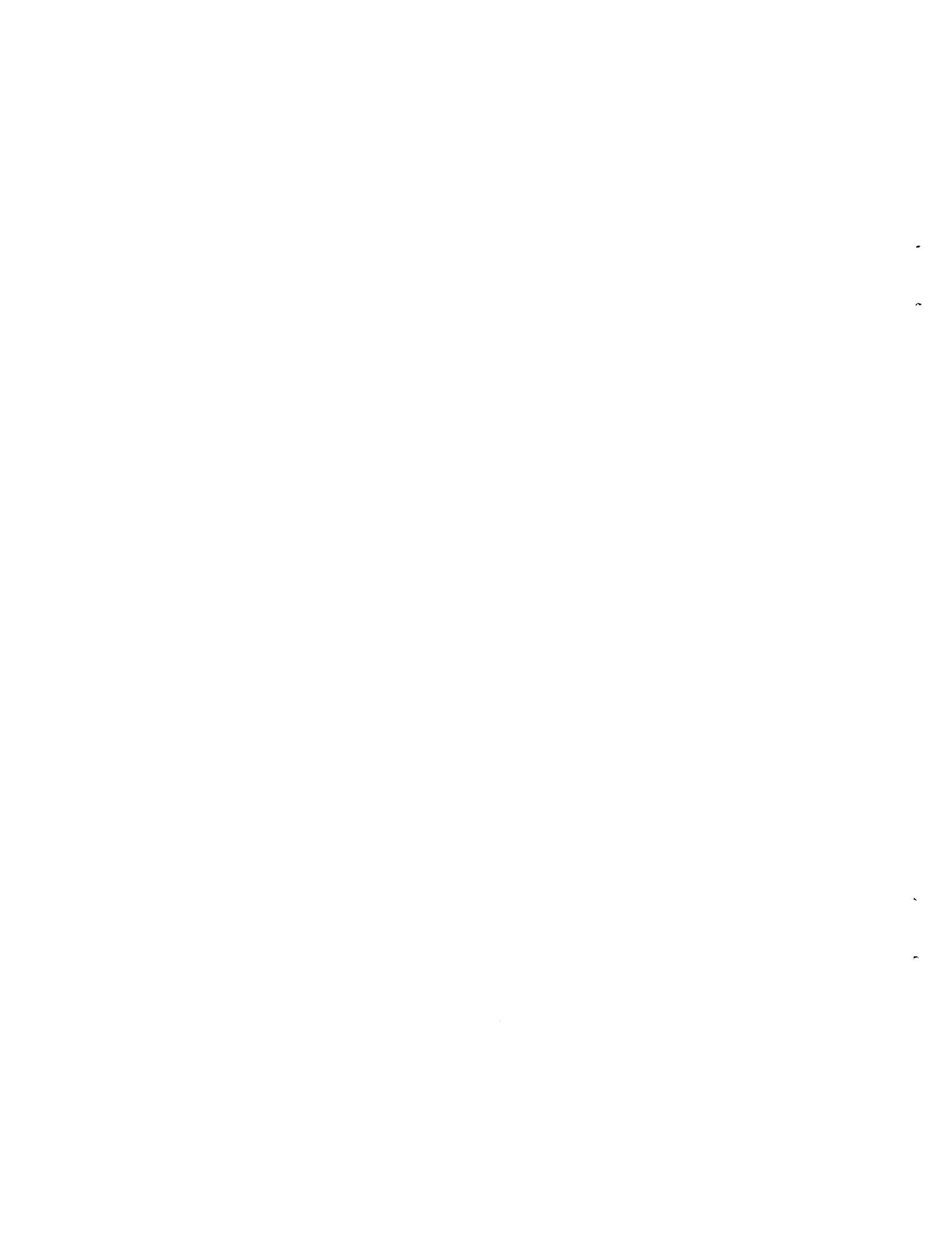
- B1 Reports of the Preparation Mission for the Niema Agricultural Development Project in Upper Volta - FAO/World Bank Cooperation Program - Investment center - June 7, 1978.
- B2 French translation of above
- B3 Etude de Factibilite de la Première Tranche d'Estimation Projet de Mise en Valeur Agricole de la Plaine de Niema Dionkele - Société Centrale d'Equipement du Territoire (SCET). Etude d'Elevage; Etude de Mise en Valeur Agricole; Rapport Général

C. Selected Working Papers

- C1 Civil Works and Land Development
- C2 Agricultural Potential
- C3 Climatology, Hydrology, Water Supply and Demand
- C4 The Human Factor
- C5 Organization and Management
 - i) Project Advisory Committee, Executive Committee and ORD Administrative Council
 - ii) Terms of Reference of key Personnel
 - iii) Aide-memoire to Project Manager Designate
- C6 Terms of Reference - Consultancies
 - i) Preparation of Phase II Project
 - ii) Kou Valley Rice Mill Study
 - iii) Rice Industry Policy Statement
 - iv) Training Overview
 - v) Schistosomiasis Study
- C7 Monitoring and Evaluation
- C8 Reporting
- C9 Marketing

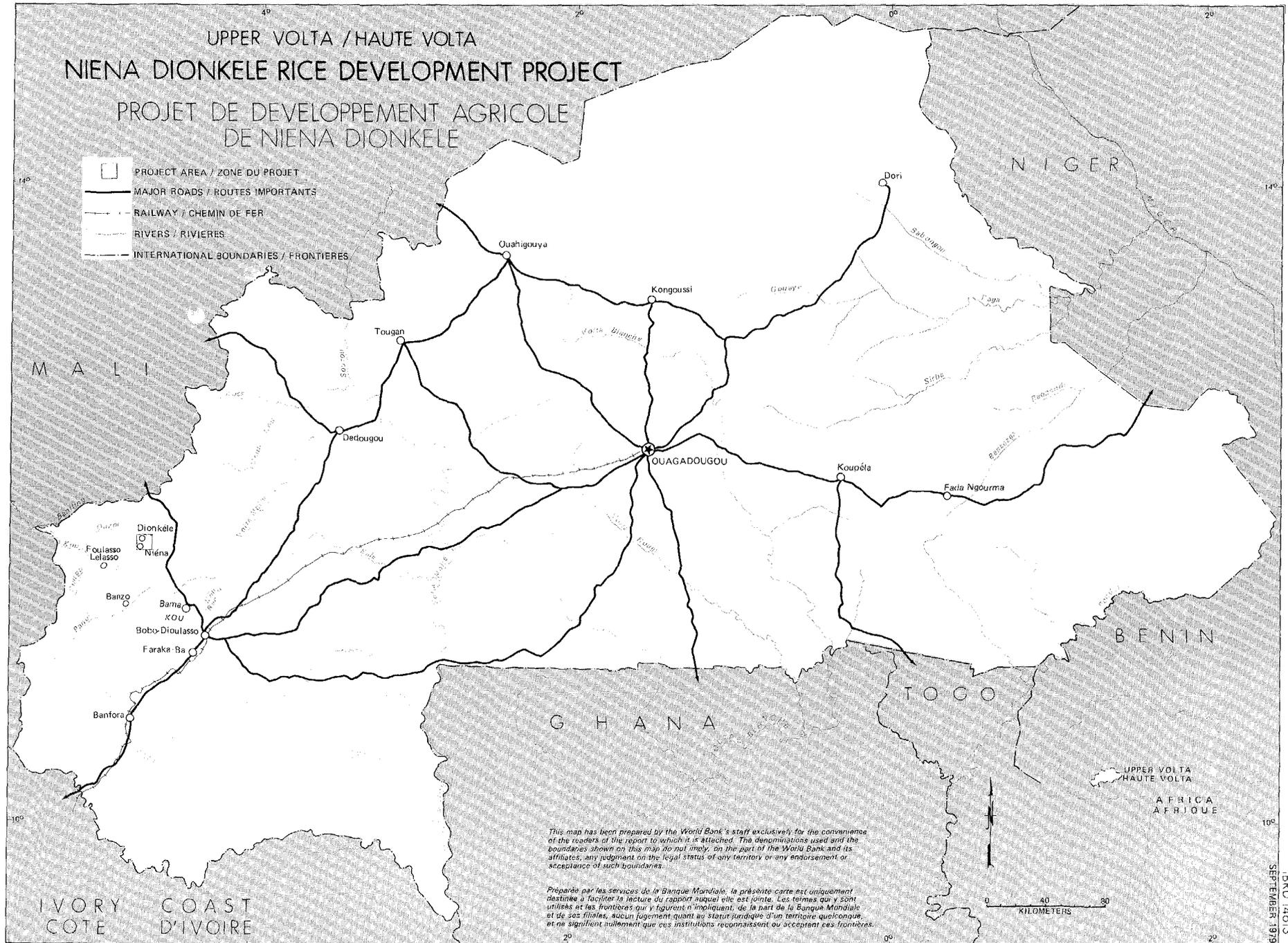


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UPPER VOLTA / HAUTE VOLTA
 NIENA DIONKELE RICE DEVELOPMENT PROJECT
 PROJET DE DEVELOPPEMENT AGRICOLE
 DE NIENA DIONKELE

-  PROJECT AREA / ZONE DU PROJET
-  MAJOR ROADS / ROUTES IMPORTANTS
-  RAILWAY / CHEMIN DE FER
-  RIVERS / RIVIERES
-  INTERNATIONAL BOUNDARIES / FRONTIERES



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