DRAFT ENVIRONMENTAL REPORT ON

UPPER VOLTA

prepared by the

Arid Lands Information Center
Office of Arid Lands Studies
University of Arizona
Tucson, Arizona
85721

National Park Service Contract No. CX-0001-0-0003
with U.S. Man and the Biosphere Secretariat
Department of State
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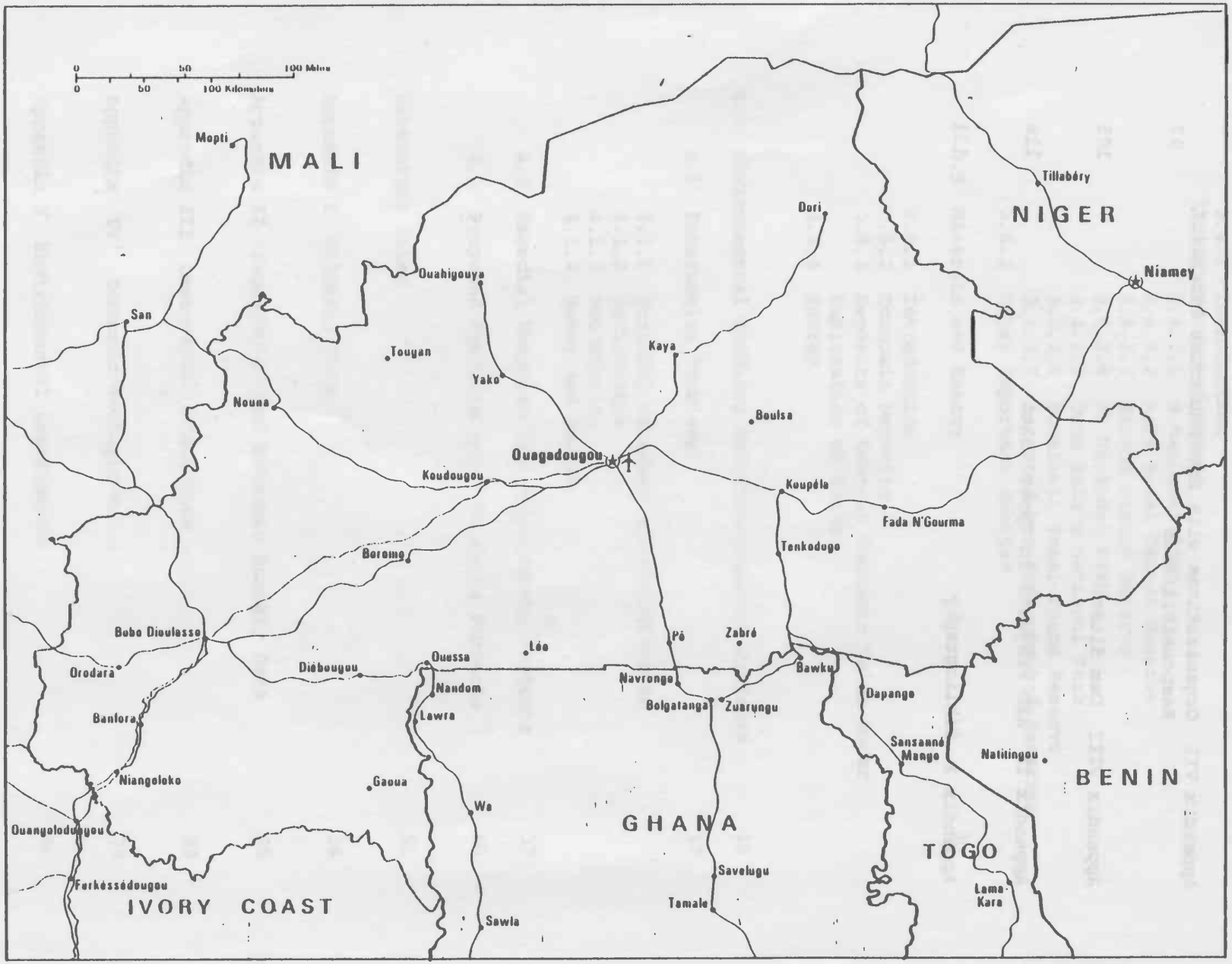
Upper Volta



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Lambert Conformal Projection
Standard parallels 8° and 32°
Scale 1 4 000 000
Boundary representation is not necessarily authoritative

SUMMARY

The environmental problems of Upper Volta center around intensive land use practices in the semi-arid savanna and a lack of native water resources. Expanding patterns of aridity are decreasing the carrying capacity of the land for both livestock and human populations. The effects of intensive resource utilization were exacerbated by the recent drought, which caused severe hardship to the majority of the population. Desertification has resulted from intensive land use patterns coupled with adverse climatic factors.

The major environmental problems faced by Upper Volta at present are:

1. Soil damage and loss resulting from overgrazing, agricultural practices and forest degradation. Continued pressure on the soil resource is increasing the rate of soil loss and is reducing fertility. Rangelands and agricultural lands are both seriously endangered.

2. Deforestation and desertification resulting from the whole system of degrading land use practices and harsh climate, including the overharvesting of trees for fuel.

3. Inadequate and hazardous water supplies resulting from climatic and geologic conditions coupled with water use practices which promote the spread of communicable disease.

Upper Volta has outlined a strategy to address these problems. Attempts are being made to upgrade the standard of living for the population and many development programs will have direct environmental benefits.

Sandra J. Turner
Compiler

1.0 Preface

This report represents a desk study compiled from many and varied sources. The major task was to integrate and synthesize the material available in the U.S. on the environment and natural resources of Upper Volta. This literature review and synthesis of available information is intended as a baseline study to provoke further work on the topics discussed, preferably in the field. A revision will be made within the year, incorporating comments from readers and users of this draft. The information contained herein is undoubtedly. incomplete and can best be enlarged upon by an awareness of those unpublished research activities taking place within Upper Volta which are not disseminated through the traditional international literature channels. Notification of any such information would be greatly appreciated by the compiler.

2.0 Introduction

2.1 Geography

2.1.1 Boundaries and Divisions [1/]

Upper Volta lies between 9° and 15° N and between 2° E and 5° W in West Africa. It shares a common border with Mali to the west and north and Niger to the east. Benin, Togo, Ghana and Ivory Coast share its southern border. The drought which plagued West Africa during the 1970's put a stress on the international borders due to unusually high north-south movement of nomadic people. In 1973 the borders were declared open to that migration. Upper Volta compares in size to Colorado, with 3,307 km. of border and 274,500 sq. km. (106,000 sq. mi.) in area.

While Upper Volta is largely enclosed within the loop of the Niger river, that major river does not flow through the country. In fact, Upper Volta has no navigable rivers and is entirely land locked.

Administratively Upper Volta is divided into 11 departments composed of 44 cercles (subdivisions) which are headed by a civilian prefect and function similarly to U.S. counties. The 11 departments coincide geographically with 11 Organizations for Rural Development (ORD's). These are responsible for planning and implementing agricultural operations and they report to the Ministry of Rural Development.

2.1.2 Physical Geography [2/]

Upper Volta is a vast wedge-shaped plateau, slightly sloping from north to south, with an average altitude ranging from 200 to 400 meters (600-1,000 ft). Isolated peaks and volcanic domes occasionally break the interior of the plateau and the broad shallow valleys of the Red, Black and White Volta Rivers cut through it flowing southward into Ghana. The rivers alternate between dry and flood stages. The plateau is the largest topographic feature in the center of the country. A low line of hills separates the basin of the Volta from that of the Niger.

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[1] Sources: Glore. 1961.
Godiksen. 1974.
U.S. Agency for International Development. 1979.
U.S. Central Intelligence Agency. 1980.
U.S. Department of State. 1979.

[2] Sources: Church. 1974.
Glore. 1961.
Peron. 1975.
U.S. Agency for International Development. 1979
U.S. Agency for International Development. 1976.

The western rivers flow toward the Gulf of Guinea while the rivers to the east of this chain of hills drain into the Niger River watershed. Elevations are slightly lower in this area. In the northeastern corner of Upper Volta, north of a line running from Dori to Djibo, there is an area of Sahelian sand dunes.

In the southwestern portion of the country the impressive Banfora escarpment rises in a steep sandstone cliff facing southeast. To the west of it, near the border with Mali, is the highest peak in Upper Volta, rising to 749 m (2,457 ft.).

2.1.3 Biogeography and Climate [3/]

Upper Volta comprises an ecotone of vegetational types grading from the hotter and dryer northeast Sahelian steppe/desert, through the savannah of the plateau region, to light forest in the more mesic southwest. In the scientific literature Upper Volta has been referred to variously as Subsaharan Desert, Sahel Desert, Sahel-Sudano Desert, Sahel or Sudan Steppe or Savanna. Upper Volta also encompasses some elements of the wetter tropics to the south.

For the purposes of this report Upper Volta is considered a savanna and is divided into bioclimatic regions according to the work of the Interafrican Committee for Hydraulic Studies (1979). Savanna has been defined as an area of plains covered with drought-resistant grasses and bushes with some trees or shrubs. This is a particularly useful description of Upper Volta because it is accurate not only for the xeric northeast where there are very few perennial shrubs and trees, but also for the more humid southwest where vegetation tends to be more lush.

The notable feature of the climate of Upper Volta, as with all the West African savanna region, is the distribution of climatic elements on a north-south gradient. The isolines of all climatic elements run nearly parallel. Upper Volta has three distinct seasons within the year: a relatively cool winter, a hot and dry spring and a hot and rainy summer/fall. Rainfall is highest (40") in the southwest where it also has the longest season (6 mo.). In the northeast the rainy season produces less precipitation (10") and is shorter (4 mo.). This tropical ecosystem is characterized by distinct dry periods during the year which extend from 6 to 8 months. Rainfall is highly variable seasonally and annually in any area of the country, so that the annual averages for rainfall do not convey an accurate estimate of the water available for utilization in the area within a specific season. Rain storms are usually of short duration,

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[3] Sources: Interafrican Committee for Hydraulic Studies. 1979.
Peron. 1975.
U.S. Agency for International Development. 1979.
Ackels. 1970.

such as 1 to 2 hours, and are intense; heavy storms may produce 5 cm or more. Intensities of 20 cm/hr over a short period are not uncommon. The effect of such storms on the soil and vegetation is considerable. Rain splash, soil compaction, surface crusting and sheet or gully erosion are results which constitute significant resource management problems.

The temperature regime in Upper Volta is nearly even throughout the country, though it is slightly cooler in the south where the incoming radiation levels are lower but the length of the growing season is longer. In the northern savanna there is high light intensity coupled with higher temperatures but a shorter growing period. During the growing period photosynthesis production is high, and the length of this season provides a measure of potential productivity.

Average minimum temperatures for the country as a whole may range from 6.8° to 12.8°C (44° to 55°F) in January, with coolest temperatures in the north and warmest minima in the south. Maximum temperatures range from 40.2° to 48.2°C (104° to 119°F). Again the extremes of temperature occur in the northern Sahel zone. Humidity ranges from a winter low of 12 to 45% to a rainy season high of 68 to 96%, following the same north-south gradient.

The Sahel bioclimate is a transitional zone from the desert to the savanna. In Upper Volta this region lies in the extreme northern part of the country and is divided into northern and southern subregions. In the northern Sahel the growing season is too low for crop production. Nomadic pastoral agriculture is the dominant form of land use and vegetation cover is very sparse. Plant growth is seasonal. In the southern Sahel the growing period and rainfall regimes allow for a more wooded savanna type where land use includes both sedentary agriculture and pastoral activities.

The Sudan bioclimatic region comprises the largest land area in Upper Volta and shows the effects of greater rainfall reliability. Even though soil fertility is low, most of the area is under intense cultivation. Natural vegetation is an open grassland with scattered deciduous trees of both broadleafed and fineleafed species. In drier areas baobab and tamarind are dominant while the shea butter tree is more characteristic of wetter areas.

The northern Guinea bioclimatic region covers most of the highly productive southwest area of the country. Rainfall is reliable and the probability of drought is low. Soils in this area are usually leached due to a surplus of water. Since this is an area of tsetse fly infestation cattle are excluded.

The extreme southwestern edge of Upper Volta falls into the southern Guinea bioclimatic regime. This is again a transition zone where rain tends towards a bimodal distribution of two wet

seasons per year. In Upper Volta the second dry and wet seasons are not fully expressed. The rainy season tends to be longer than elsewhere; however, water-related parasites and diseases are prevalent.

2.2 Population and Economics [4/]

The majority of Upper Volta's population are members of two major West African cultural groups, the Voltaic and the Mande. The Voltaic group is far more numerous and includes the Mossi people, who make up 50% of the total population of the country. These people are traditionally sedentary farmers and it is their culture which exerts a dominant influence upon life in Upper Volta. The official language of Upper Volta is French. The percentage of French-speaking inhabitants is not available, but 55% of the population speak Mossi and another 20% speak Dyula. All indigenous languages belong to the Voltaic sub-branch of the Niger-Congo family. Upper Volta is a conglomerate of ethnographically different groups who are either sedentary farmers, semi-nomadic herders, or nomadic pastoralists. All of these groups seem to interact beneficially in the sharing of space and resources. This is less true under conditions of environmental stress such as drought.

The majority of the population hold to traditional animist beliefs. Only 20% of the population are Muslim and 5% are Christian; of these most are Roman Catholic.

Education is free for Upper Volta but the number of schools is still low. The rate of literacy is increasing, however, from an estimated 5-10% in 1975 to 11-13% in 1979.

With a population whose livelihood depends predominately on subsistance farming, it is not suprising that Upper Volta is listed among the least developed countries of the world. The individual's share of the Gross National Product (GNP) in 1975 was $100, rising to $120 in 1978, which is a 6% growth rate in funds available to individuals. The national inflation rate for the last 5 years has been 12%. Poverty, defined as that income level below which a minimal nutritionally adequate diet plus essential non-food requirements is not affordable, is found in both the rural and urban populations. Rural people in Upper Volta require $53 per year to meet this stan-

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[5] Sources: Cohen. 1979.
Europa Publication. 1980
Godiksen, et al. 1974.
Interafrican Committee for Hydraulic Studies. 1979.
Legum. 1980.
Peron. 1975.
U.S. Agency for International Development. 1980a and 1980b.
U.S. Agency for International Development. 1979.
U.S. Department of State. 1979.
World Bank. 1979.

dard, and 39% of the rural population is impoverished. The urban dweller requires $108 per year, and 35% of the urban population is impoverished. Statistics are not available for the distribution of the GNP throughout the population.

Upper Volta has one of the smallest geographic areas of the six Sahelian countries (Chad, Mali, Mauritania, Niger and Senegal). However, the population is the largest at 6.7 million. The country's annual population growth rate of 2.3% to 2.7% is among the highest. There is an average population density of 54 people per square mile. However, this average density figure has little meaning if you consider the range of densities from 12 to 190 persons per square mile. The greatest concentration of population occurrs centrally around Ouagadougou and extends northward in Yateuga to the Mali border. This is one of the driest areas of the country and least able to support such a large population. Currently an effort is being made to redistribute some of the population via resettlement of volunteers in areas which are being made habitable by control of endemic diseases. The work of disease control and resettlement is being undertaken by the Volta Valley Association.

Population pressure will continue to increase as modern technology and access to medical care improve and people's perceptions of survival and reproduction change. The infant mortality rate, currently at 260/1,000, is dropping and the life expectancy of 38 years is increasing. The median age of the population was 18.3 years in 1975 with 43% of the population under 15 years of age. With the increasing population pressure, the land available to support that population may be stressed beyond its capacity to recover. Such indicators as declining soil resources, out-migration, and unemployment are components of the Upper Voltaic geographic setting and become extreme during times of drought.

The labor force is composed of 53.6% males and 46.4% females but the total employment figure is only a 54.6% total participation rate. In 1970 agriculture and pastoralisim occupied 99% of those people employed. Currently that figure has dropped to 96-86%. Ninety percent of the labor force is farm labor, which produces 31% of the Gross Domestic Product (GDP) and approximately 45% of the country's export earnings. Pastoral activities produce only 10-12% of the GDP but 33-50% of export earnings, while occupying only 6% of those people employed. This statistic is also interesting in light of the fact that nomadic pastoralists consider their herds as a preferred means of storing wealth and will only reluctantly sell more cattle than they must to meet immediate needs. Industrial processing of agricultural products produces another 34% of the GDP.

Migration is a major force demographically, economically, and environmentally in Upper Volta. There are several patterns of migration which are relevant to environmental issues. The nomadic herders' seasonal round of migration, called transhumance, has provided meat supplies for coastal Africa for centuries. In theory transhumance should make use of but not stress a fragile environment. Herd size has been noted to have increased continually since the

time of colonial conquest. The pressure of a cash economy may influence the nomad to increase herd size so that there is money to meet taxes if something happens to the herd.

Another form of migration which is increasing at an alarming rate is emigration. Young men 20 to 30 years of age are leaving Upper Volta to take jobs in Ivory Coast or Ghana. They find jobs in the commercial agriculture, mines, or coastal urban centers. Ten percent of the total population is estimated to emigrate. Only 9% of those who leave are absent for 5 years or more. This temporary emigration gives an economic advantage to Ivory Coast, which receives the productive efforts of a significant portion of Upper Volta's population at the age of their peak laboring abilities. Upper Volta, on the other hand, looses its prime work force only to receive them back at a time when they are chronologically closer to being part of the dependent population.

Rural-to-rural migration has been increasing since the time of the drought in the 1960s. The major direction of migration is from the densely-populated Mossi plateau toward the southwest. This spontaneous migration reached a peak in 1975 of 20,000 persons. It has slowed since to 14,000 persons per year.

Rural-to-urban migration carries the most alarming significance for environmental changes. In 1960, 95% of the population was rural and only 5% lived in the cities. By 1970 11% of the total population was urban and only 89% rural. In 1975 urban areas of Upper Volta gained a total of 25,000 persons; 55.5% of that number, 14,000 people, were migrants and only 44.5% of that increase (11,000 persons) was natural. A long-standing pattern of migration is for farm workers to travel to the cities during the off-season, swelling the size of the city tremendously. Recently the population has not reduced significantly when the planting season returns. The growth of cities is fueled by government expenditures, to meet the needs of the increased urban population, thereby fueling a cycle. Cities serve the important function of providing services to a rural-based economy. As yet, however, the cities of Upper Volta do not have the industrial base to either provide the services required by the rural area or to provide employment for all the immigrants. Under these circumstances cities tend to become a drain upon rural resources.

For Upper Volta these trends in migration increase the pressure on an environment which, despite irregular rainfall and low soil fertility, supports a dense population.

Further statistics for population and the economy can be found in Appendix II.

3.0 Natural Resources

3.1 Soils [5/]

3.1.1 Introduction

The soil resource in Upper Volta is seriously depleted. Derived from rock types which characteristically yield soils of low productivity, the scanty resource has been subjected to land use practices which have stripped the soil of fertility. Erosion rates are high and infiltration of water is low throughout most of the country. Slash and burn agriculture methods applied in the savannas tend to increase the propensity to erode. Drought and overgrazing combine to reduce the native vegetation cover, thereby decreasing nutrient replacement in the soil and increasing the tendency to erosion. Soil must be considered the most valuable natural resource in Upper Volta because it gives direct sustenance to 95% of the population. Further, the soil resource affects the recharge of groundwater systems and the quality of the surface waters. Degradation of soils can change the dominance patterns in vegetative systems and these in turn will affect the faunal components of the environment. Soils in this semi-arid environment constitute an extremely fragile component of the ecosystem. The soils of Upper Volta tend to be a thin stratumoverlying decomposed and infertile laterite rock.

There appears to be no legislation in Upper Volta which considers soil even as a portion of land use legislation. However, the government of Upper Volta has show interest in the furtherance of soil resources. A center for soil resources has been established in Bobo-Dioulasso with the assistance of the FAO..

3.1.2 Classification

The Interafrican Committee for Hydraulic Studies has developed a classification for the soils of the Savanna region of west and central Africa. This system classifies soils according to their productive capacity. Upper Volta lies entirely within the range of that study. There are 5 classes of soils, defined below. It should be noted the definitions refer to the capability of the soil at present, under traditional methods of cultivation, i.e. to the capability of the soil without major improvements, using traditional hand cultivation methods and with little or no use of imported fertilizer. The capability definitions refer to yields which range from poor (for class 4 soils) to good, but in the west African context the yields produced by traditional methods are generally somewhat low compared with yields that are obtained on agricultural stations using improved methods.

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[5] Sources: Ackels. 1970.
Cocheme and Fraquin. 1967.
Interafrican Committee for Hydraulic Studies. 1979.
Van Raay. 1980.

Class 1: Generally good soils. These soils do not have any serious limitations, and are able to produce good yields of suitable, climatically-adapted crops.

Class 2: Generally moderate to good soils which have slight to moderate limitations which may restrict their use. Yields of climatically-adapted crops are moderately good.

Class 3: Generally poor to moderate soils. These soils have limitations of moderate intensity, are usually of fairly low natural fertility, and generally give low to moderate yields of climatically-adapted crops under traditional systems of management.

Class 4: Generally poor soils. These soils have moderately severe to severe limitations and, under traditional systems of management, give generally poor yields.

Class 5: Soils generally unsuited to cultivation, though sometimes locally suitable for rough grazing or other extensive uses. They suffer from limitations which are generally severe enough to exclude cultivation, such as shallow depth, steep slope or very unfavorable soil reaction (extreme acidity of salinity/alkalinity), virtually preventing crop growth unless improved.

Class 1 soils occur only in a mosaic association with other soil classes in Upper Volta. These soils are often of a mineral nature. In terms of the FAO mapping system they are gleysols (humic, eutric and undifferentiated), fluvisols (eutric and undifferentiated), gleyic luvisols and gleyic cambisols. These soils occur along the major rivers of southwest Upper Volta in association with soils of classes 3, 4, and 2 (by order of prominance). Other patches of Class 1 soils occur in the east and northeast of the country in association with Classes 4, 3, 2 and 5. Classes 1, 2 and 5 are the least prominant components of that area. Class 1 soils show greatest development along major waterways.

Class 2 soils have only slight distribution in Upper Volta and, like Class 1, only occur in association with other classifications. Class 2 soils are found in the southwest and northeast areas of the country. They are acid humic and vertic Hydromorphic Soils which are gleyed throughout. There are some immature soils over sandy alluvium, some Hydromorphic Ferruginous Soils over sands, and some Brown Subarid Soils in this classification as well. All Class 2 soils in Upper Volta occur in minor patches.

Class 3 soils are second only to Class 4 in prominance throughout Upper Volta. In the south central portion along the border with Ghana, Class 3 soils cover a large area unbroken by other classes. In central Upper Volta, Class 3 occurs in association with Class 5 and it also forms a mosaic with other classes of soils in the eastern and southwestern parts of the country. Class 3 soils are desaturated Tropical Ferruginuous soils (equivalent to plinthic and Ferric luvisols in FAO terminology). Slightly desaturated and desaturated Ferallitic Soils (ferric and Orthic Acrisols, with some Nitosols) are also part of this classification. Minor types in this class are Brown Subarid Soils (vertic Cambisols), Vertisols and Immature Soils. The Tropical Ferruginous Soils are modal soils of the moderately dry savannas, while the slightly desaturated Ferrallitic soils are found in wetter savannas.

Class 4 soils cover the greatest area. Perhaps 25% of Upper Volta is covered by Class 4 soil without other association. The west central area along the border with Mali, reaching towards Ouagadougou, is all Class 4. Class 4 also occurs as the major component of the eastern and northeastern mosaic of soil types and in the southwest mosaic. There are two broad groups of Class 4 soils divided by contrasting texture. The more prominant first group are are very light textured sand soils with little profile development. They are Immature Soils, Reddish Brown Subarid Soils, and Tropical Ferruginous Soils over eolian sands. These correspond to Rugosols and to luvic, cambic and ferralic Arenosols in the FAO system. The second broad group consists of soils with very heavy texture, the Vertisols; these are less extensive, occurring only in the southeast areas of Upper Volta.

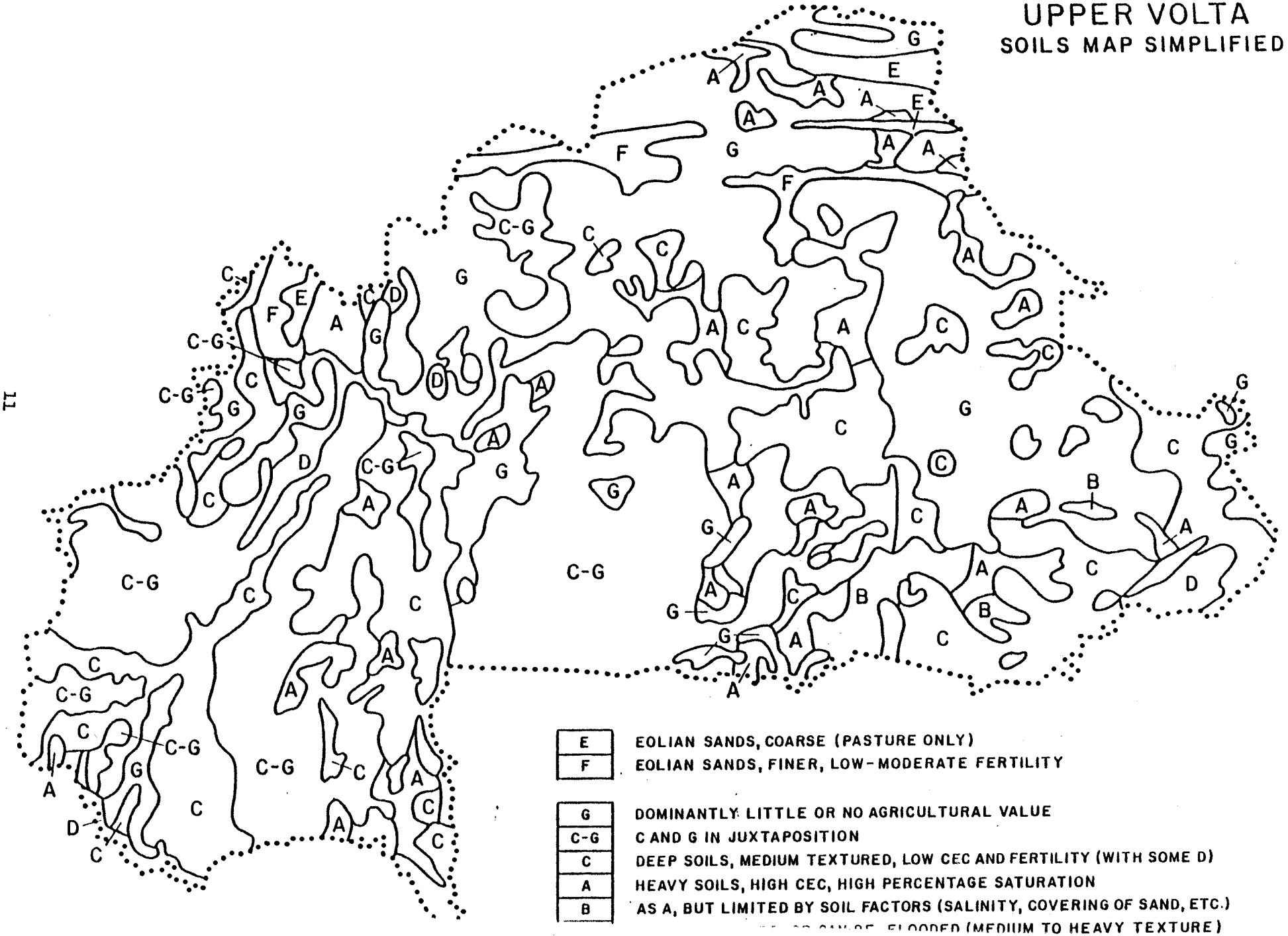
Class 5 soils are loose shifting dune sands and saline soils. The loose sands occur only in northern Upper Volta. Saline soils occur in northern Upper Volta and in small patches, both unassociated and associated with other classes, in central and eastern Upper Volta.

The accompanying map is an attempt to reduce these complex soil associations into a simple form. Due to simplification and reduction from the original map, the Hydromorphic and Vertisols are lost because of their small map size.

3.1.3 Soil Use - Agriculture

Much of Upper Volta is devoted to agriculture, pastoralism, or a combination of the two activities. Virtually all of the Class 3 and 4 land is being utilized in an extensive agricultural system. Large areas are temporarily exploited at a low technical level and then soil fertility is restored by fallows. Cultivation and animal husbandry are essentially separate. The fallow system leaves the soil without vegetative protection during the rainy season when the intensity of the rains tend to erode and leach the soils. Tribal traditions maintain a

UPPER VOLTA
SOILS MAP SIMPLIFIED



large population on the land. The richest land with the greatest potential is nearly unpopulated. That land is currently being cleared of disease by the government and settlement is beginning to take place.

3.2 Water Resources [6/]

3.2.1 Introduction

The water situation in Upper Volta at the present time is critical. The country has just come through an extreme drought from which it has not yet fully recovered. Rain, particularly in the northern regions of the country, is irregular and of high intensity, which causes loss through runoff. The river systems are either at flood or nearly dry. There are too few wells to meet people's needs and often the water is of poor quality. Groundwater resources seem inadequate. In areas where the water supply is secure disease is prevalent. However, water resources in Upper Volta may respond readily to conservation and development measures.

Data and general information on the water situation is now readily available. The Interafrican Committee for Hydraulic Studies has completed a massive study on Savanna Regional Water Resources and Land Use. This study is complete and current, and constitutes the major source for water information in Upper Volta.

Water legislation is practically non-existant in Upper Volta. Legislation treats only the public health aspect of water pollution (see Appendix V). Water use and proprietorship are not legislated. Furthermore much of the small amount of surface water available for use flows out of the country. This water should be subject to international agreement, but no such agreement exists. However, the various international organizations which bind the West African States to cooperative agreements provide a vehicle for the formation of such legislation.

3.2.2 Precipitation

Precipitation has been considered in the introduction to this report (see section 2.1.2). Due to the erratic nature of rainfall in Upper Volta and its high susceptibility to runoff, the water available from rain will not be treated separately from surface water.

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[6] Sources: Europa Publications. 1980.
Ganley. 1976.
Interafrican Committee on Hydraulic Studies. 1979.
U. S. Agency for International Development. 1979.

3.2.3 Surface Water

3.2.3.1 The River Basins

Volta River Basin

The headwaters of the Volta basin are in Upper Volta, but 85% of the basin is shared by Upper Volta and Ghana. The countries sharing the remainder of the basin are Ivory Coast, Benin, Togo and Mali. The mouth of the Volta River is in the Gulf of Guinea. The basin consists of several independent sub-basins. The Black Volta, the White Volta, and the Red Volta are the sub-basins of importance within the boundries of Upper Volta.

Black Volta (Volta Noire)

The Black Volta rises in western Upper Volta and flows to Lake Volta in Ghana. It first flows north and then turns southward at its confluence with the Sourou. The Sourou is not only a tributary but a flood retention basin for the Black Volta. It is estimated that 250 million m^3 of water overflow into the Sourou from the Black Volta in flood season. Since the Sourou is large and shallow, about half of the floodwater is evaporated.

Approximately 3.6×10^9 m^3 of water leaves Upper Volta in annual runoff from the Black Volta, which is about 6% of the total volume of precipitation occurring in the Black Volta Basin. September is the month of peak flow while March is the month of lowest flow. The Black Volta has a year-round flow but with a high-low variance of approximately 900%.

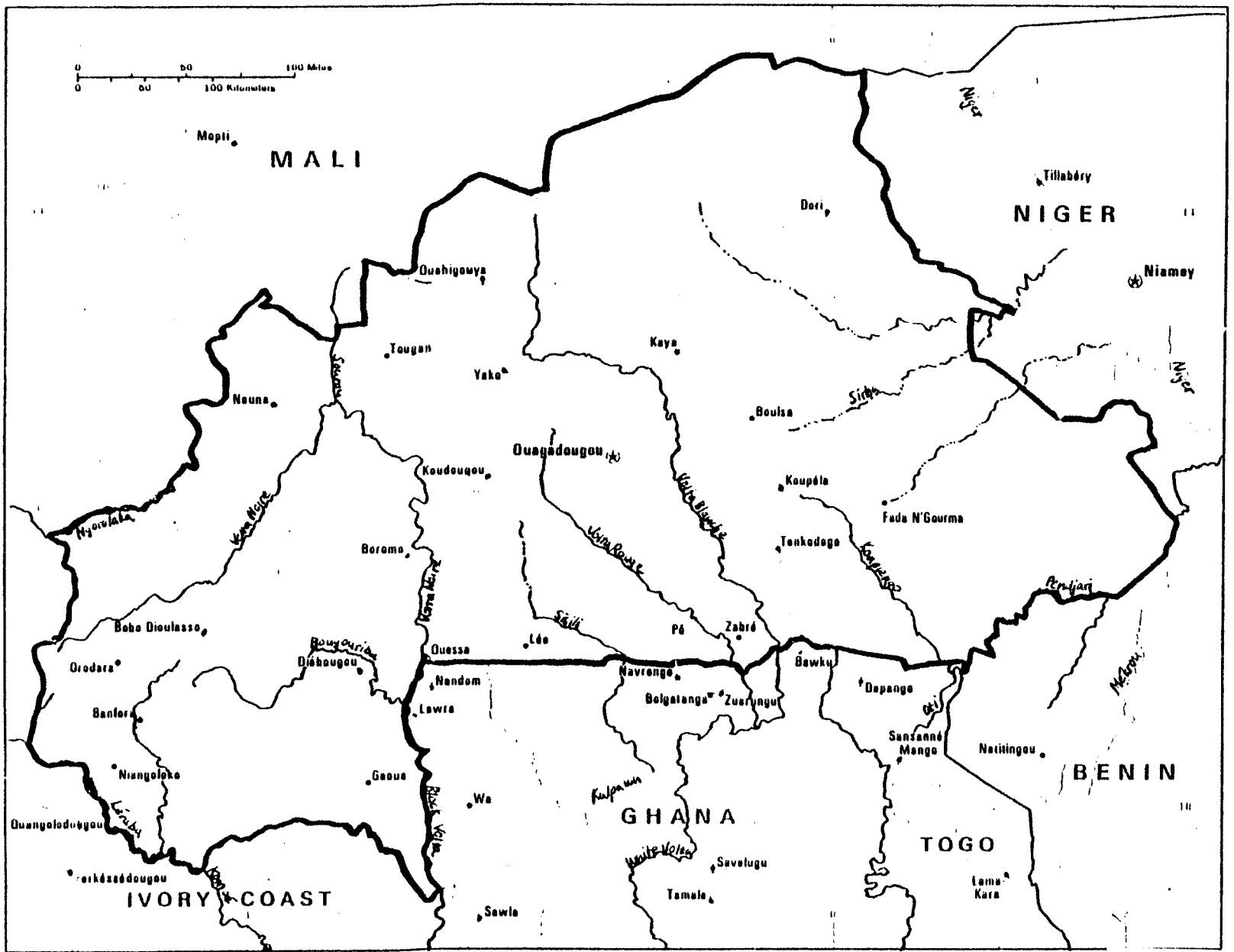
White Volta

The White Volta rises in the north Sahelian zone and flows only after periods of heavy rainfall. The gentle slope of the riverbed promotes the formation of shallow pools which are empty during the dry season. Within the boundries of Upper Volta the White Volta has no tributaries.

Red Volta

The Red Volta is a tributary of the White Volta but does not join it until the two rivers reach Ghana. The Red Volta, like the White, is completely dry except after heavy rainfall. Rising in the center of the country and flowing southward into Ghana, the Red together with the White and another tributary, the Sissili, only contribute approximately 7.8×10^9 m^3 of water annually. This is about 10% of the annual rainfall for the entire Volta Basin.

Rivers in Upper Volta



Source: U.S. Agency for International Development. 1979.

Niger Basin

The Niger basin encompasses the eastern region of Upper Volta. A low stand of hills separates the Niger Basin from the Volta Basin to the west. That portion of the basin in Upper Volta is the Sahelian section. Several tributaries which rise in Upper Volta flow to the Niger River; the most important of these is the Sirba River.

Small Watershed Runoff

There is no data for the amount of runoff from small watersheds. In the savanna zone these watersheds are particularly important because of their use in small water projects. These areas have an unreliable cycle because of the irregularity of rainfall.

Flood Flows

High intensity rainfalls are brief and limited in area. These cause overbank flooding but usually do not result in a significant increase of flow at gauging stations.

Low Flows and Drought

Flows usually decrease from January to April. The Sahelian zone rivers show a characteristically irregular runoff pattern from year to year. Streamflow data show lowest values during the three drought periods of this century, which were 1913-14, 1940-45, and 1969-74 .

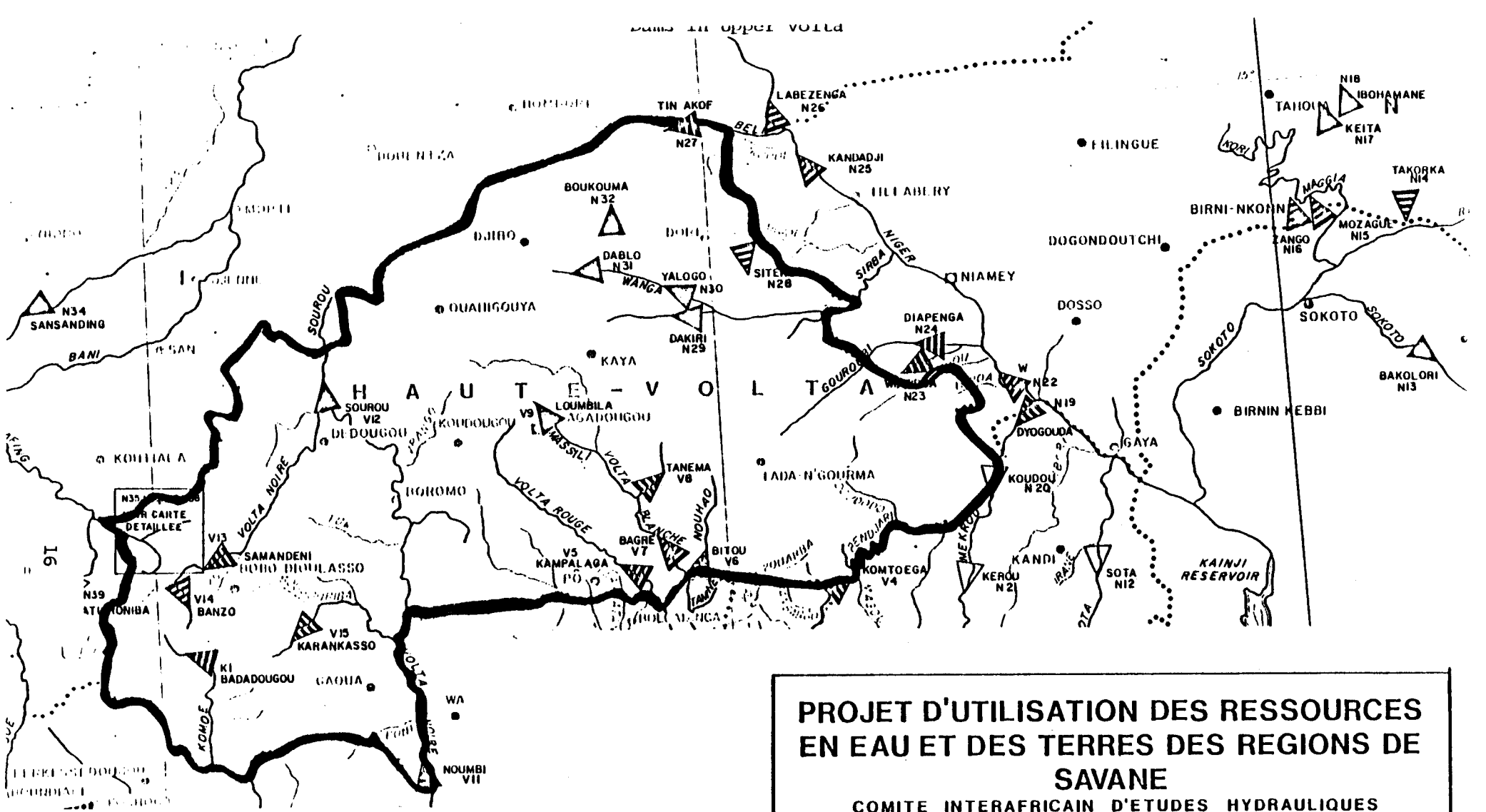
Water Quality and Quanity

No information is available on the quality of river water for human consumption. Sedimentation rates have not been calculated, but observation indicates that sedimentation is highest at times of peak water flow.

Data indicates that the amount of water available for development in Upper Volta is lower than for most other West African countries. This is due to the irregular pattern of riverflow throughout the country.

3.2.3.2 Use of Surface Water

The volume of surface water actually used has not been determined, but these resources appear to be considerably underutilized. Data indicates that in West Africa as a whole only approximately 3% of annually available surface water is being used.



LEGEND

BARRAGE EXISTANT OU EN CONSTRUCTION
EXISTING DAM/BARRAGE OR UNDER CONSTRUCTION

BARRAGE EN COURS D'ETUDE
DAM/BARRAGE AT DESIGN/INVESTIGATION STAGE

Source: Interafricain Committee for Hydraulic Studies. 1979.

PROJET D'UTILISATION DES RESSOURCES EN EAU ET DES TERRES DES REGIONS DE SAVANE

COMITE INTERAFRICAIN D'ETUDES HYDRAULIQUES

SAVANNA REGIONAL WATER RESOURCES AND LAND USE PROJECT

INTERAFRICAN COMMITTEE FOR HYDRAULIC STUDIES

BARRAGES EXISTANTS ET PROPOSES

EXISTING AND PROPOSED DAMS

TIPPETTS ABBETT McCARTHY STRATTON ENGINEERS AND ARCHITECTS

Storage

In Upper Volta there are 6 dams completed or under construction. Four of these are on the Sirba River of the Niger Basin and two are in the Volta Basin. The dam at the confluence of the Black Volta and the Sourou rivers is a multiple use dam for flood control, irrigation and fishing. The dam on the White Volta provides water to the people of Ouagadougou. Two of the dams on the Sirba also provide water for human consumption while the other two provide irrigation water.

Twelve other dam sites have been identified and preconstruction studies are being conducted. The majority of these dams will provide water for irrigation solely or in combination with other functions. Four dams will provide electrical power, one will provide water for industrial use, and one will provide water exclusively for human consumption. A complete list of dam projects is given in Appendix VIII.

Fishing

The total catch of fish in 1973 was 3,500 metric tons. The total fishing industry contributed less than 1% to the GDP. Fish are a valuable source of animal protein. Industrial fishing will probably increase when the construction of dams is completed. There is no information available on the amount of subsistance fishing.

Irrigation

The total area of land under irrigation in Upper Volta is 7,900 hectares, including 4,300 hectares on which there is full water control. There are two main irrigation schemes. The one at Banfora is devoted to 2,600 hectares of sugar cane. This area is being expanded to 4,000 hectares. On the Kou, 1,200 hectares are under rice cultivation. The remaining areas comprise small schemes in valley bottoms for flood recession irrigation.

More than 300 small dams are used to draw off rain water to complete the growing cycle of crops started in the rainy season or to provide water for people and stock in the dry season. Most of these dams are between 3 and 10 meters high and are subject to high evaporation and seepage. Seventy percent of total volume may be lost. Drawoff facilities on many of these dams are reported to be inefficient.

3.2.3.3 Surface Water and Health

The upper reaches of the Volta River have perhaps the highest infection rate of onchocerciasis in the world. This parasitic infection known as "river blindness" is a microfilarial disease transmitted by the small black fly Simulium damnosum. The larvae of the black fly is dependent upon rapidly flowing, highly oxygenated, and highly nutritious water. These conditions are completely met by the Volta rivers during flood season. Approximately 75% of the population of Upper Volta harbor these parasites and 10% of the population are blind. In the area of the occurrence of onchocerciasis settlement has been scarce, although these are usually highly fertile agricultural areas. In 1970 a seven nation control project was proposed to combat the disease, and in 1975 massive spraying with insecticides was begun in an attempt to kill the Simulium larvae. The project, which covers even small stream during the rainy season, is expected to last 20 years. Spraying of onchocercal worm breeding sites may be continued for as long as 40 years.

Schistosomiasis concentrations can be found around man-made lakes, pools and dams. This is a health problem which is likely to increase with the activities of man because man created habitats are conducive to the spread of the snail host. Control of the parasite is most efficient through destruction of habitat. However, as of yet, no single control method is recommended by world health authorities.

3.2.4 Groundwater

In any groundwater system topography and climate are the primary factors which affect infiltration for recharge of the groundwater resource. Subsurface geology determines the location, boundaries, storage, transmittal and quality of the water resource.

The Basement Complex known as the Libro-Ivorian-Voltaic Shield is comprised of metamorphosed Pre-Cambrian granites, schists, quartzite and various eruptive rocks. The lithologic nature of these basement rocks, which are the most prominent component of Upper Volta's geologic setting, is not conducive to good groundwater prospects. This basement rock is highly susceptible to fracturing and weathering, however, which does increase the groundwater potential.

Sedimentary basins make up only a small portion of Upper Volta's geologic structure. Of these the Paleozoic sedimentary cover found in the southeast and west are not favorable for groundwater except where fracturing has occurred. The Mesozoic sediments which occur in a small area near the Mali border offer good groundwater prospects. Most of Upper Volta is underlain by a geologic structure which is a poor aquifer. Fourteen percent

of the total country is underlain by fair to good aquifers. This figure refers to the native rock type and structure. Fracturing and weathering processes, which are extensive influences throughout the country, tend to increase the storage and yield capacities of the basement rock.

3.2.4.1 Groundwater Occurrence

Groundwater occurrences in basement formations tend to be extremely variable and discontinuous. This is caused by the highly localized nature of the fracturing and weathering processes. Fracturing and weathering generally occur together since fracturing promotes weathering. Thus a surface area of extreme weathered condition is likely to overlie a fractured area and favor groundwater bodies. Well yields off these basement rocks are usually low, averaging from 0.5 to 8 m^3/h. Well depths average 15-40 m.

The Paleozoic sedimentary basin is only a slightly better aquifer than the basement complex. There are, however, local occurrences of exceptionally good aquifers such as the Kou springs in Bobo-Dioulasso, which discharges 2-4 m^3/s. Well depths average 25-40 m with yields which vary greatly with rock type.

The Mesozoic sediments are considered to be Continental Terminal Sand and Sandstone Clay. This is a fair to good aquifer which might be expected to produce 10-150 m^3/h. Well depths can be expected to be deeper in this area.

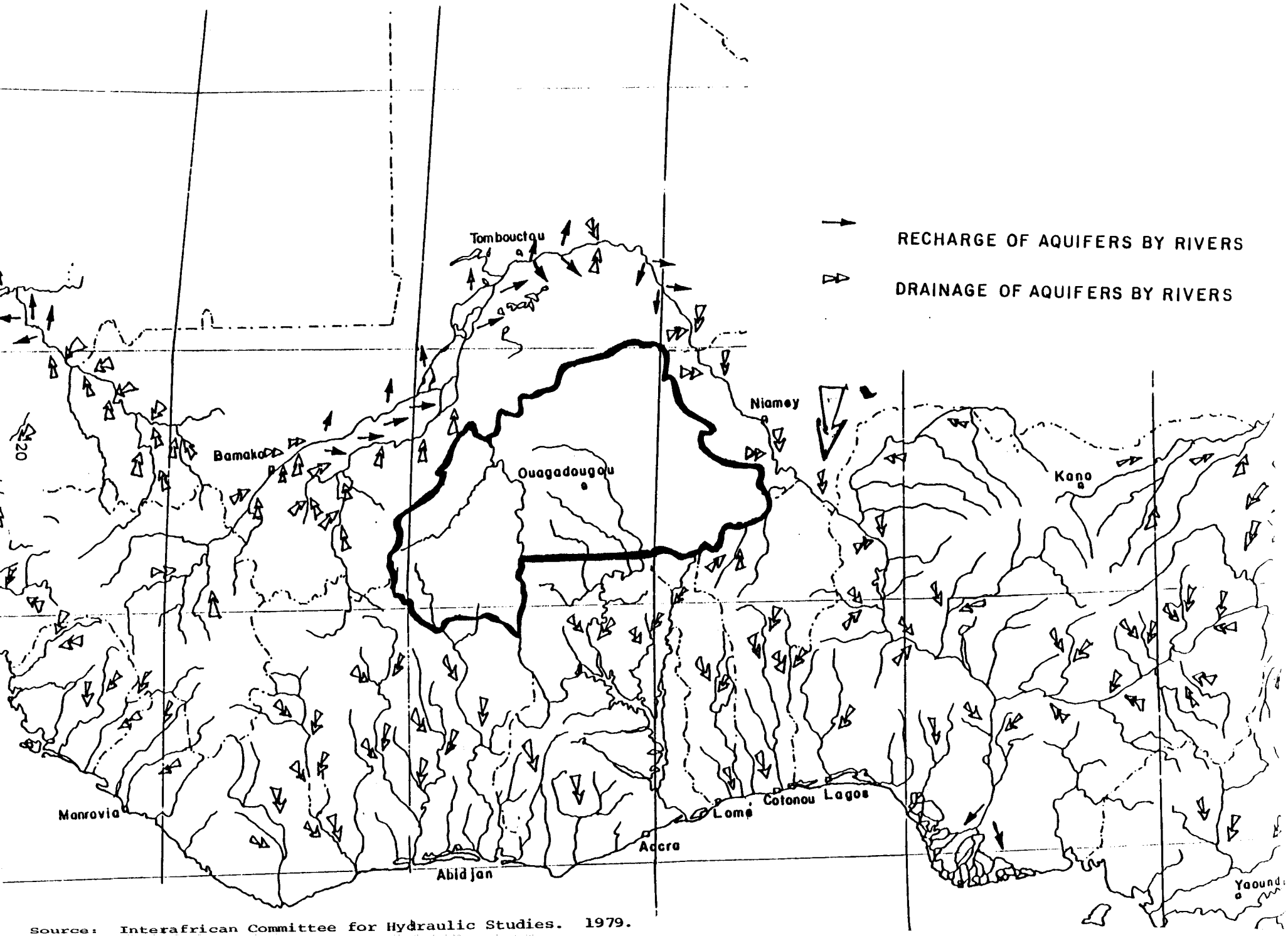
The basement complex is considered to be a poor but usable aquifer which is particularly appropriate for rural water supply. The sedimentary basins are good aquifers but do not cover a significant portion of Upper Volta.

3.2.4.2 Groundwater Movement

Groundwater recharge is mainly from rainfall. Therefore recharge is dependent on the irregular rainfall patterns noted in Section 2.1.3. Important seasonal fluctuations in the water table occur. The water table does not significantly recharge the river systems in Upper Volta, nor do the rivers recharge the aquifers. Once rainwater has reached the river it is virtually unavailable for recharge.

Yield from Groundwater Storage

The safe yield, or natural recharge, which might be expected is a difficult figure to determine for these highly complex groundwater conditions. The Interafrican Committee for Hydraulic Studies estimates that Upper Volta has a total of 22,500 million m^3 of water mineable from the basement complex and another 5,230 million m^3 from sedimentary sources. They caution that these figures are conserva-



Source: Interafrican Committee for Hydraulic Studies. 1979.

tive. Generally speaking, groundwater from basement sources might be expected to yield sufficient water for rural needs but will not support a population of urban densities. The sedimentary basins might be able to meet urban demands but they occur in low quantity in areas not close to urban populations.

Groundwater Quality

Groundwater quality is thought to be good throughout with less dissolved salts from basement groundwater than from sedimentary.

3.2.4.3 Use of Groundwater

Upper Volta has several thousand low-yield wells in the Basement Complex. These wells serve for village water supply. The development program has a goal of 5,000 new wells in 5 years starting in 1978. Livestock are also watered from groundwater resources. Irrigation is not a common use of groundwater, and urban use of groundwater is probably limited; no references to such use were found in the literature.

Wells may be hand-dug or drilled. Those which are dug by hand are generally operated by traditional waterlifting methods which may result in groundwater contamination and health hazards. Hand pumps are also used, especially on drilled wells. Motorized pumps are less frequent; there are an estimated 500 in Upper Volta.

3.3 Flora

3.3.1 Introduction

In a country where 95% of the population earn their living by farming or pastoralism, where the population is reasonably dense with a long history of habitation, and where the climate is severe, it is highly probable that areas of totally natural vegetation will be limited. The vegetation of Upper Volta shows the influence of overgrazing, intensive harvest for fuelwood, drought, and complete destruction in order to bring land under cultivation.

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[7] Sources: Interafrican Committee for Hydraulic Studies. 1979.
International Union for the Conservation of Nature and Natural Resources (IUCN). 1979.
Ouedraogo. 1975.
Rattray. 1960.

Fourteen percent of the land area of Upper Volta is considered forested and under the administration of the government. Seventy-two percent of these forests are national parks and reserves. The legal structure exists to protect completely some species and restrict the use of other species, but funding and manpower to enforce the regulations present problems. The budget for forestry services is one of the most limited in the Ministry of Planning and Rural Development. Legislative emphasis has concentrated on forest regulations and does not consider the vegetation zone type as a whole. Vegetation is threatened by indigenous land use patterns which may or may not consider the species which are protected by legislative restrictions. Wood is the most common fuel throughout Upper Volta. Reforestation is being undertaken with varying success and efficiency. Plant protection services are being strengthened. Appendix V presents the pertinent legislation.

3.3.2 Natural Vegetation

Upper Volta is a vast stretch of semi-arid savanna which can be divided along a north-south gradient into three distinct vegetation zones. These zones correspond to the relative density, growth-form and height of the woody perennial species. The northern portion of the country is far more open, with fewer tree and shrub species than the area to the south where vegetation can be classified as woodland. Along the banks of major rivers fringe forests add pockets which are more densely wooded. The majority of all perennial vegetation is deciduous. The vegetation zone categories used in this report are derived from a classification of African vegetation types created in 1956 by the Commission for Technical Cooperation in Africa, South of the Sahara/Scientific Council. The international literature, while quite consistent in the area covered by each of these divisions, is not consistent in names used in classification. The most commonly applied vegetation names are noted below.

3.3.2.1 Shrub Savanna (Sahel desert, South-Sahelian Zone)

This area is the northernmost vegetation zone in Upper Volta. Its northern limit is an area of sand dunes with few trees or shrubs. To the south the area is still very open but the grass cover is more complete and the shrubs become more frequent. The dominant species are Acacia and other deciduous thorn shrubs. The soils of this area are likely to be sandy which gives a habitat advantage to the Cenchrus genus of grasses. On sandy clay soils or clay soil Andropogon grass is more common. A more complete list of woody species can be found on the accompanying table. Grass species include:

ASSOCIATIONS DE VEGETATION PAR ZONE [1]
VEGETATION ASSOCIATIONS BY ZONE

PHYTOSOCIOLOGIE [2] *PHYTOSOCIOLOGY*		BUISSONS ET ARBRES *BUSHES AND TREES*	HERBES *GRASSES*
Savane arbustive *Shrub Savanna*		*Combretum macranthum* G. Don. *Combretum nigricans* Lepr.ex *Combretum glutinosum* Perr. *C. glutinosum* var. *passargei* Aubr. *Guiera senegalensis* Pers. *Cassia sieberiana* D.C. *Annona senegalensis* Pers. *Bauhinia rufescens* Lam. *Ziziphys sieberiana* *Ziziphus mauritiaca* Lam. *Sclerocarya birrea* (A.Rich.) Hochst. *Prosopis africana* Taub. *Acacia scorpioides* (L.) var. *nilotica* (L.) A.Chev. *Acacia ataxacantha* D.C. *Acacia caffra* Willd. var. *campylacantha* Aubr. *Anogeissus leiocarpus* Guill. & Perr. *Bauhinia reticulata* D.C. *Hyphaene thebaica* (L.) Mart. *Mitragyna inermis* O.Kuntze [5]	*Cenchrus ciliaris* L. *Andropogon gayanus* Kunth [4] *Brachiaria* spp. Griseb. *Loudetia hordeiformis* (Stapf) C.E.Hubbard
Savane arborée *Wooded Savanna*		*Acacia caffra* Willd. var. *campylacantha* Aubr. *Acacia macrostachya* Reichenb. *Acacia scorpioides* (L.) var. *nilotica* (L.) A.Chev. *Adansonia digitata* L. *Anogeissus leiocarpus* Guill. & Perr. *Bombax costatum* Pellegr. & Vuillet. *Borassus aethiopum* Mart. [7] *Butyrospermum parkii* Kotschy *Detarium senegalense* Gmel. *Ficus* spp. L. *Isoberlinia dalzielii* Craib & Stapf *Isoberlinia doka* Craib & Stapf *Terminalia avicennioides* Guill. & Perr. *Lannea acida* A.Rich. *Parkia biglobosa* Benth. *Pterocarpus erinaceus* Poir. *Tamarindus indica* L.	*Andropogon* spp., e.g., *gayanus* Kunth. *chevalieri* Reznik. *tectorum* Schumach. *Loudetia togoensis* (Pilger) C.E.Hubbard *Pennisetum pedicellatum* Trin. *Hyparrhenia* spp. Anderss. ex Fourn. [6] *Schizachyrium* spp. Nees
Savane boisée *Woodland*		*Daniellia oliveri* (Rolfe) Hutch. & Dalz. *Detarium senegalense* Gmel. *Khaya senegalensis* Juss. *Parinari macrophylla* Sabine *Pterocarpus erinaceus* Poir. *Sterculia setigera* Del. *Ceiba pentandra* (L.) Gaertn.	*Hyparrhenia* spp. Anderss. ex Fourn., e.g., *chrysargyrea* (Stapf), *subplumosa* Stapf *Chasmopodium caudatum* (Hack.) Stapf *Andropogon pseudapricus* Stapf *Echinochloa pyramidalis* (Lam.) Hitchcock & Chase *Pennisetum purpureum* Schumach. [8]

[1] Les catégories de végétation naturelle se conforment à celles établies à la conférence de Yangambi tenue en juillet-août 1956.
The natural vegetation categories conform to those established at the Yangambi Conference held in July-August, 1956.

[2] Les croquis phytosociologiques représentés se rapportent à l'habitat de la végétation, tel qu'observé sur le terrain.
The phytosociological sketches shown relate to the vegetation habitat as seen in the field.

[3] Dans des cours d'eau non permanents. *In dry washes.*

[4] Cette espèce avait été abondante dans le passé mais elle a disparu par suite des pressions exercées par l'élevage.
This was formerly abundant but has disappeared due to grazing pressures.

[5] Sols plus lourds et lieux plus humides.
Heavier soils and more moist locales.

[6] Aux endroits favorables. *At favorable locations.*

[7] Dans les plaines d'inondation. *In floodplains.*

[8] Dans les lieux humides. *In wet locations.*

ANNEXE A LA CARTE ATTACHMENT TO MAP VOLUME 6 CARTE No. MAP No. 1	UTILISATION ET COUVERTURES DES TERRES LAND USE / LAND COVER
TIPPETTS · ABBETT · McCARTHY · STRATTON	ENGINEERS AND ARCHITECTS

Source: Interafrican Committee for Hydraulic Studies. 1979.

Sandy Soil

Cenchrus biflorus
Ctenium elegans
Eragrostis pilosa
Aristida mutabilis
Aristida stipoides
Latipes senegalensis
Brachiaria hagerupii
Trichoneura mollis
Dactyloctenium aegyptium
Chloris prieurii
Eragrostis tremula
Aristida adscensionis
Aristida longiflora
Perotis patens
Tragus racemosus
Brachiaria deflexa
Pennisetum pedicellatum

Sandy Clay or Clay Soil

Andropogon amplectens
Sporobolus festivus
Schoenefeldia gracilis
Tetrapogon spathaceus

Many of the grass species are perennial. This is an important pasture area for wildlife and domestic herds. The area was particularly devastated by the drought. Even the trees suffered great damage in part because herdsmen pruned any green shoots to feed their stock. Under these conditions it is difficult for the trees to regenerate. The overall effect has been a reduction in the number of trees and in these species which depend on the shaded habitat at the base of the trees.

3.3.2.2 Wooded Savanna (Sahelian-Sudan Savanna, Sudanian Isoberlinia woodland, Sudan)

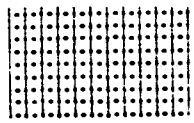
Wooded savanna covers the center of Upper Volta in a broad band from east to west. Here the open grassland is scattered with deciduous trees which are a mixture of broadleafed and fineleafed species. Trees and shrubs are more numerous in both absolute numbers and in the number of species. Dominant grass species are Andropogon spp. on sandy and sandy clay soils, Ctenium spp. on lateritic soils. Grass species include:

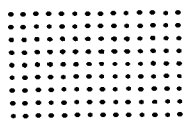
Sandy and Sandy Clay Soil

Andropogon gayanus (and several varieties)
Andropogon pseudapricus
Cymbopogon giganteus
Panicum praealtum
Pennisetum hordeoides
Rottboellia exaltata
Schizachyrium semiberbe
Setaria sphacelata
Andropogon chevalieri
Andropogon pinguipes
Andropogon tectorum
Digitaria perrottetii
Panicum tambacoundense
Pennisetum subangustum
Schizachyrium exile
Schizachyrium brevifolium
Setaria pallide-fusca

LEGEND FOR VEGETATION MAP OF UPPER VOLTA

11  Sudanian Woodland with abundant Isoberlinia

12  Undifferentiated Sudanian Woodland

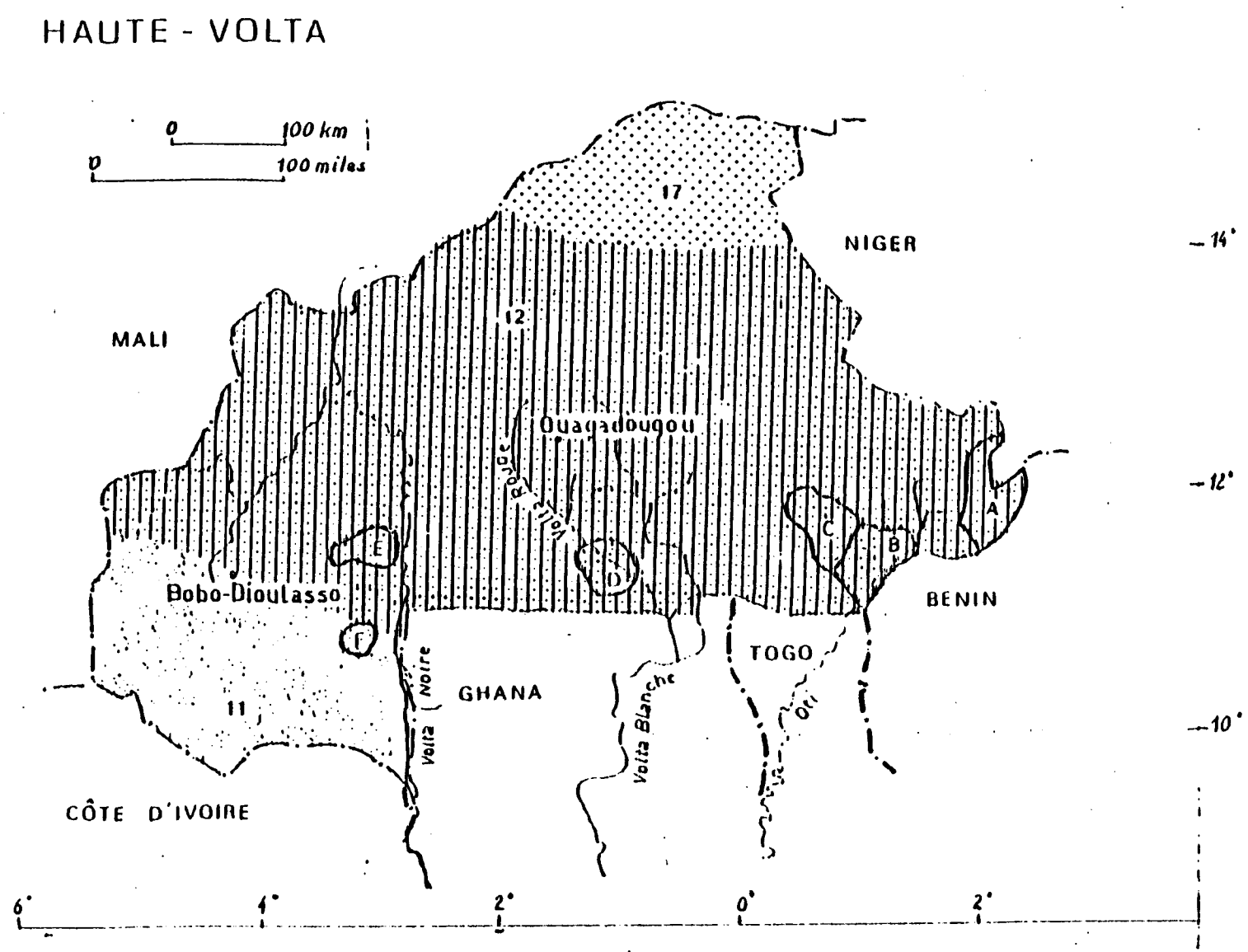
17  Sahelian Acacia Deciduous Bushland and Wooded Grass-land

HAUTE-VOLTA

A. Parc national du W	350.000 ha
B. Réserve totale d'Arly	206.000 ha
C. Réserve totale du Singou	192.000 ha
D. Parc national de Pô	155.000 ha
E. Parc national des Deux Bâlés	115.000 ha
F. Réserve totale de Bontioli	12.700 ha
TOTAL	1.030.700 ha

Source: International Union for the Conservation of Nature and Natural Resources (IUCN). 1979.

Vegetation Zones of Upper Volta



Lateritic Soil

Ctenium newtonii
Elyonurus elegans
Schizachyrium nodulosum
Diectomis fastigiata
Loudetia togoensis

The wooded savanna is the area of Upper Volta which has been subjected to the greatest agricultural pressure. Cultivation, grazing, wood gathering and hunting provide major impacts. Often the land is burned prior to cultivation to encourage grass species which are preferred for grazing. Burning is a direct selective pressure.

3.3.2.3 Woodland (Sudanian savanna, Sudanian woodland, Guinea woodland)

The woodland vegetation zone is the southernmost vegetation zone in Upper Volta. It occurrs only in the southwest area of the country. This area is considerably more mesic than other parts of the country and that is reflected in the vegetation. The region is far less prone to drought and areas of perennial water are more frequent. Tree species are larger and in absolute number they are far more numerous. In some areas the canopy may be nearly closed. Species are more often broadleafed; some are evergreen. Grass species are dominated by Hyparrhenia, which is a fire tolerant species. This southwest area in Upper Volta has felt less human influence than other regions because of the presence of tsetse fly and onchocerciasis. These less settled areas are presently the focus of national development efforts.

3.4 Wildlife and Protected Areas [8]

3.4.1 Introduction

It is possible that Upper Volta has the greatest wealth of faunal species in West Africa. Even in areas not designated as protected, populations of the once numerous native species still survive. The drought and increasing population pressure have reduced the habitats of these wild animals. There is no limitation on hunting and hunting license fees are low. Upper Volta's fauna is generally overhunted. Traditional methods of utilizing wild animals as a source of food are exerting

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[8] Sources: International Union for the Conservation of Nature and Natural Resources (IUCN). 1979.
IUCN. 1973.
IUCN. 1971 -
Republique de Haute Volta. 1974.
Van Raay. 1980.

severe and increasing pressure on the remaining wildlife populations. There are a significant number of professional hunters who make their living through the sale of game meat. The growth of urban areas has encouraged this activity.

There are laws which regulate hunting and protect animal species; however, due to a lack of resources, these laws are difficult to enforce, even in protected areas. Two laws of 1968 give special protection to animal species. Ordinance 68-50, which ratifies the African Convention for the Conservation of Nature and Natural Resources, protects a total of 106 mammals, 19 birds, 13 reptiles, and 7 fish. Ordinance 68-59 protects species, sets hunting rules and designates protected areas. This ordinance protects or partially protects 44 mammals, 25 birds and 7 reptiles. Another 32 mammals, 14 birds, and 2 reptiles are designated as small game. All species native to Upper Volta which are listed on the available threatened or endangered species lists can be found in these documents. With proper enforcement these two ordinances would probably constitute powerful animal conservation instruments.

Wildlife concentrations are greater in protected areas and in areas where human populations have been low. Buffalo, monkey, antelope, lion , elephant and crocodile can be found in the south portion of the country. In the north, close to the border of Mali and Niger where there is no protected area, giraffe can be found. In the south there are some wetland areas which provide important habitat for birds.

3.4.2 Protected Areas

Upper Volta has 6 protected areas which enclose a total area of 1,030,700 hectares. Two of these areas, W National Park and Arly Faunal Reserve, meet the United Nations standards of protection, size and maintenance which provide them with full status given to national parks.

3.4.2.1 W National Park (350,000 hectares)

The vegetation of this park is partially open Sahel savanna in the north and open woodland in the south. The vegetation is degraded throughout. The Atacora chain of hills crosses the park from northeast to southwest, of which the highest peak is 375m. The fauna includes elephant, buffalo, roan antelope, hartebeest, topi, Buffon's kob, Defassa waterbuck, Bohor reedbuck, bushbuck, red-flanked duiker, oribi, Grimm's duiker, lion, cheetah, and yellow baboons. In well-watered areas there are hippopotami, crocodiles and tortoises.

This is an international park shared with Niger and Benin. However, management throughout is not equal. In Upper Volta poaching is reported to be heavy.

3.4.2.2 Arly Total Faunal Reserve (206,000 hectares)

Arly Reserve is a huge flood-prone lowland area which has a similar savanna woodland vegetation to W National Park. Arly is bordered by the Pendjari River. There are permanent ponds in the dry season. Fauna includes elephant, buffalo, kob, hartebeest, hippopotamus, various antelopes, lion, leopard and various primates.

3.4.2.3 Singou Strict Reserve (192,000 hectares)

This park lies to the northwest of Arly but is drier, with a fairly dense savanna vegetation. The fauna is similar to that of Arly.

3.4.2.4 Po National Park (155,000 hectares)

Po National Park is a wooded savanna. The fauna includes elephant, buffalo, roan antelope, hartebeest, oribi, Grimm's duiker, Bohor reedbuck, warthog, vervet, and patas.

All of the permanent ponds in this park are occupied continuously by fishermen which restricts wildlife access to water. The entire park is threatened by poaching, cattle grazing and woodcutting by local population, especially in the dry season.

3.4.2.5 Deux Bale's National Park (115,000 hectares)

This area is savanna, with forest along the White Volta River. In this park the fauna has been completely exterminated.

3.4.2.6 Bontioli Total Fauna Reserve (12,700 hectares)

In the southwest part of Upper Volta, Bontioli Reserve lies in a Isoberlinia woodland. There are many elephants and some yellow-backed duiker but no topi. A more complete faunal report is not available.

3.4.2.7 Reported but Undocumented Reserves

There is a reserve at the confluence of the Comoe River and Leraba River in an Isoberlinia woodland. Fauna includes elephant, some wild hog, Buffon's kob, reedbuck, hartebeest, Defassa waterbuck, bushbuck, roan antelope and chimpanzee.

3.4.3 Other Important Habitat

Riverine communities have not been given official protected status by any existing legislation in Upper Volta. Riverine habitat is, however, a minor component of some of the protected areas. The fauna of the river environment is particularly rich, with species which are restricted to this habitat.

Wetland communities are even less frequent in Upper Volta than riverine communities. The wetlands are particularly important for migratory avifauna. Wetlands are particularly susceptible to habitat destruction by draining for cultivation, overgrazing, and fishing.

3.5 Minerals and Energy

3.5.1 Introduction

It is speculated that Upper Volta has significant deposits of minerals but few have been exploited at the present time. Because there has been little development of economic mineral deposits, the legislation concerned with mining and mineral processing is either nearly non-existant or not reported in the international literature (see Appendix V). Geologic mapping of Upper Volta has been conducted and mineral exploration is currently underway.

3.5.2 Economic Deposits

Manganese

Tambao - The Tambao manganese deposit near the border with Mali and Niger is being developed. The estimated ore reserve is 13.5 million tons (oxidized) of which 54% is manganese and 0.14% is phosphorus. The annual production estimate is 500,000 tons.

Other Deposits - A manganese deposit has been described from the area west of Boromo. No information is available.

Gold

Poura - The gold deposit at Poura was exploited until 1966. Further development of the deposit is under study. Annual production was 2170-3720 kg of ore.

Limestone

Tin-Hrassan - The Tin-Hrassan deposit has enhanced economic value because it is located near the Tambao deposit. The estimated reserve is 56 million tons, of which 46% is CaO and 3% is MgO.

3.5.3 Deposits of Unknown Economic Value Under Exploration or Study

Phosphate for fertilizer

Copper-Gold near Kaya

Iron, Titanium, Vanadium near Dori

Lead at Gan

Antimony

Diamond

Bauxite at Kaya and Kongoussi

Zinc at Tiebete

Nickel near Dori

Marble near Tiara

Granite for building stone, near Ouagadougou

The lack of transportation facilities has been a major block to the development of mineral deposits in Upper Volta. The railway system is being extended. The development of the Tambao manganese deposit depends upon construction of a 350 km extension to the railway from Ouagadougou through Kaya and Dori to Tambao. Water and energy availability are likewise inhibitors of mineral development.

3.54 Energy

In Upper Volta energy is generally in the form of wood fuel which constitutes 94% of current energy consumption.

All petroleum requirements are met by imports. Explorations for oil deposits have not been reported.

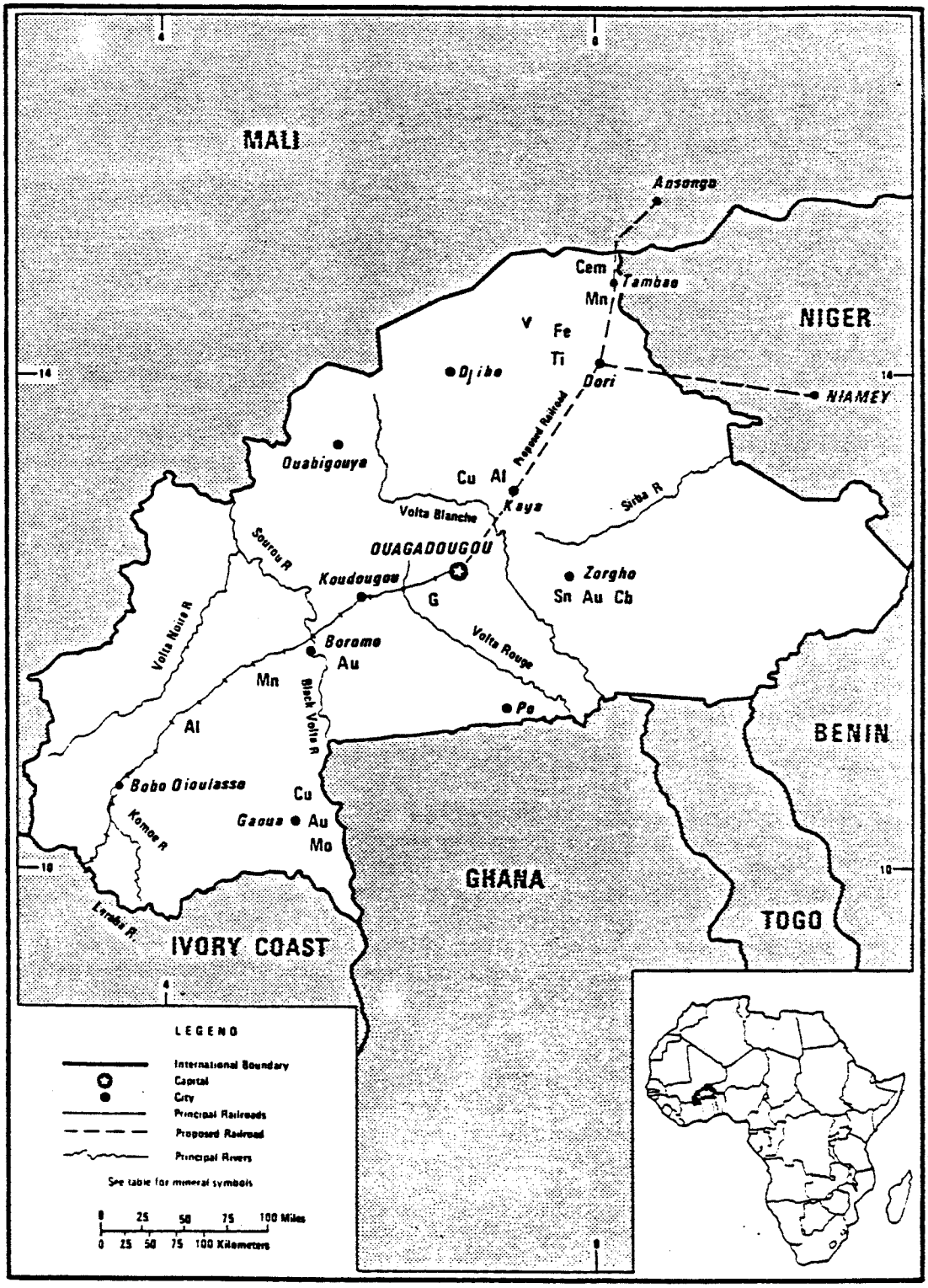
Installed electricity capacity was 16.7 megawatts in 1973. Electric power development is a prime target in Upper Volta. Projects were under construction or in the planning stage in Bobo-Dioulasso, Kou River, Gaoua, Kaya, Tenkodogo ,and Fada N' Gourma in 1974. A dam on the Black Volta is planned for the Gaoua area for 60,000 kilowatt-hours.

It is not known if wind energy development has been studied in Upper Volta but studies elsewhere in West Africa seem to encourage this form of energy, particularly for use at the village level.

Solar energy has been investigated. Pilot projects for solar electric power generating plants are showing encouraging results for meeting village power needs.

UPPER VOLTA

AREA 274,000 Sq.Kms. POPULATION 5.8 Million



Source: U.S. Bureau of Mines. 1975.

4.0 Environmental Problems and Environmental Projects

4.1 Interactive Problems [9]

The problems considered for this report are the major environmental problems facing Upper Volta. It is always true that environmental problems are human problems but this is perhaps more evident in a country so closely tied to its natural resources. An attempt has been made to divide the environmental problems into interactive sub-units but in reality there is no division within each problem. Each system is an integral part of every other.

The major climatic influences which affect Upper Volta probably became similar to present conditions about 5,000 years ago. Minor changes over the last few hundred years have left little evidence on the landscape, probably because the most overwhelming condition is that of variability of precipitation and the occurrence of individual extremely heavy rainstorms. The natural vegetation is adapted to an irregular climate. The species which occur survive because erratic conditions are compatable with their physiology. Years of high and low rainfall tend to be bunched together in clusters. There have been three periods of significant drought in this century, and there have been periods of significantly increased precipitation. The most recent drought period of 1969-1974 was preceded by a significant wet period of 1950-1963. This indicates a natural cycle of short-term weather fluctuations. Some researchers suggest that lengthening recurrent droughts indicate a subtle though pervasive change toward a drier climate. In either case it is quite true that drought is a parameter that must be considered a major and recurrent environmental factor.

Despite the adaptability of the natural vegetation to drought conditions and general climatic irregularity it is evident and well reported that the desert lands are encroaching upon the savanna. This is apparent not so much from climatic changes as from changes in vegetation and soil. Notable changes in vegetation are occurring which leave progressively larger areas of the savanna resembling the more xeric desert. The absolute number of plants in response to grazing, cultivation, cutting, burning, and drought have decreased. This has created a more open aspect of the land. The lack of vegetative cover has left the soils exposed. The impact of exposure is an increase in all types of erosion because winds tend to make vast quantities of soil airborne and rains tend to be sudden and intense.

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[9] Sources: Campbell and Renwick. 1975.
Charney. 1975.
Dalby, Church and Bezzaz. 1977.
DuBois. 1973.
Eckholm. 1977.
International Union for Conservation of Nature and Natural Resources (IUCN). 1971.
Johnson. 1973.
Nicholson. 1978.
Seifert and Kamrany. 1974.
U. S. Agency for International Development. 1980.

Without vegetation the water-holding capacity of the soil is decreased and splatter and washing of soil by rain is increased. This causes surface compaction of the soil which then is less able to absorb water. With less infiltration there is even more erosion. As the land becomes progressively degraded the soil will be crusted at the surfaces, with areas of erosion where large quantities of soil have been transported from the area. Sediment loads in streams during flood season will be high, degrading that water resource at a time when it should be most useful. Lowered infiltration rates affect groundwater recharge as well.

It is quite possible that this shift towards a more desert-like environment may in fact feed back into the overall climatic system. Some investigators, among them Charney (1975) and Campbell and Renwick (1975) feel that the increased openness will increase the surface albedo (the reflectivity of the surface of the land), which leads to a decrease in net incomming radiation, and an increase in radiative cooling of the air. As a consequence, the air would sink to maintain thermal equilibrium by adiabatic compression. The result is cumulus convection and associated rainfall would be decreased. The decreased rainfall would enhance the original decrease in plant cover. This development of desert-like conditions where none had existed before is termed desertification.

4.1.1 Pastoral Nomadism and Semi-Nomadism

Pastoral nomadism must be seen as a livelihood system that is a rational response to a moisture deficient, fragile environment. Nomads make use of resources that are beyond the reach of settled agricultural populations. It is a system where human population, herd size, grazing and water resources were, in the past, held in rough balance. Over a period of centuries hardy strains of animals become adapted to the harsh climate and sparse rangelands. The yearly cycle of movement permitted a nearly symbiotic relationship between pastoralist and agriculturalist as the herds were moved on to agricultural land at the end of the growing season. In exchange for forage which the animals consumed, the animals deposited manure to fertilize the fields. This state of equilibrium began to be altered as a result of the encroachment of a highly developed society upon a less developed one.

The animals are the primary basis of the subsistence economy. Pastoralism is not a capital-oriented undertaking aimed at producing a marketable surplus. Some animals are used for consumption, some die, and the rest are saved as an investment in the future. In this situation where land and water are not owned, decreasing the herd size does not save the land but only puts the herdsman at an economic disadvantage. It takes no account of the fact that many raw materials may be depleted. Increasing herd size is a response to changing social environments. The need for cash in order to pay taxes and buy services means the sale of cattle, therefore the herd size must be increased to meet current or future demands for funds. The increased availability of veterinary services and new man-made

water supplies encourage herd size increase and a more sedentary life style. All of these factors mean more wealth for the pastoralists' economic security in bad times, and a greater grazing pressure on the land. In some areas of the Sahel the cattle population doubled between 1960 and 1970. Cattle are an important export commodity in Upper Volta.

Overgrazing by livestock appears to be a major factor in desertification. The overgrazing situation increases not only with the increase in animal population but with the change toward a more sedentary lifestyle in response to water resource improvement and political and administrative arrangements. Further, as poorer lands are lost to the desert, livestock are concentrated on ever-shrinking pasture lands. Agricultural land too is encroaching upon traditional pasture. Trampling and compaction from grazing all take a heavy toal on the grasslands where large numbers of animals concentrate. Not only are the plant resources directly affected but the soil resources are deteriorated.

4.1.2 Agriculture

Farming at subsistance level is a study in making do with little. Therefore, with the lack of equipment to clear new land, slash and burn techniques are a commonly practiced method of land preparation. The ash from the burn adds a sudden burst of nutrients available to the first years crop. Initial yields may be high but successive yields are drastically reduced. After a short period of time the land is allowed to remain fallow for a number of years. Some natural vegetation and fertility is restored by this process. Burning the land is the cheapest and least laborious method of land clearing. However, there are a number of problems inherent in the cycle of slash and burn agriculture followed by a fallow period.

In the more wooded areas of the savanna the burning itself may be a problem. It may get out of control and threaten either neighboring crop land or land the farmer is unable to use himself.

Lands that have been burned but not used and lands that are fallow are highly susceptible to erosion. Topsoil may be seriously depleted. Water and wind erosional processes will both have noticeable impacts.

The fallow system depends upon a course of fallow years to restore fertility. The need for new arable land has increased but little new land is available; as a result the fallow years have been reduced and the soil fertility has declined. In some areas of West Africa fallow time has decreased more than 50% while the use of fertilizers has changed only slightly.

4.1.3 Woodcutting

Woodcutting is a serious problem. The rate of wood consumption in Upper Volta was estimated to be equal to the rate of net reproduction of trees in 1974. There are three reasons for woodcutting: a) cutting for building material; b) cutting of foliage to feed livestock, which is particularly prevalent during times of drought; and c) the cutting of wood for fuel. Ninety-four percent of the total energy consumption is from wood resources. In 1974 this fuel consumed 20 to 30% of yearly income. People in the countryside around urban areas find the sale of firewood to townspeople a useful supplement to cash income. Virtually all the stands of trees within 70 kilometers of Ouagadougou have been exhausted. This depletion of forest resources is countrywide, though more noticable around urban areas. That the availability of firewood has a major impact on the quality of life is evident if only from an economic point of view. There are other equally important consequences of the loss of the forest resource. Other sylvan produce such as honey, fruits, nuts, beans, and medicaments are lost with the wood supply. Furthermore trees, through their root-to-leaf systems, bring up nutrients from below that are released to the base-poor sandy soils through the decaying of leaves. Trees break the speed of wind, and reduce the rate of evaporation at the end of the rains. They bind the soil, provide shade, store water, and encourage water percolation into the soil, thereby reducing runoff erosional flooding. These factors alone are major losses which favor desert encroachment.

As the supply of fuelwood is reduced the population turns to its only other available source of fuel, dried dung. This constitutes a serious loss of agricultural nutrients. Manure which would be added to the field is dried for fuel. Perhaps more important than the loss of nutrients is the concommitant damage done to soil structure and quality through failure to return manures to the fields. Organic materials play an important role in the preservation of soil structure and fertility. The loss of structure and fertility results in low productivity and erosion. Low productivity necessitates the need for more arable land and causes the shortening of fallow periods. The cycle is complete and again favors desertification.

4.1.4 Water and Health

Only 25% of the population has access to a safe water supply; therefore 75% of the population is in danger of becoming ill from their daily water supply. Groundwater, which geologically should be pure and sweet, is often contaminated because of the water delivery system. Often hand dug wells are an open system whereby any contaminant on a hand may be added to the groundwater. Many communicable diseases are transmitted in this way. Small and large irrigation systems encourage the population of the snail that harbors schistosomiasis, causing an increase in this endemic intestinal parasite. Onchocerciasis

is extremely prevalent and is dependent upon fast running streams for the spread of its fly host. Malaria, also common though not as prevalent as might be expected, is spread by a mosquito whose larvae depends upon still water such as might be found behind a small collecting dam. Health problems related to water are prevalent and affect the majority of the population.

4.2 Remedial Measures and Governmental Projects [10/]

The government of Upper Volta has shown a firm commitment to development within the structure of the environment by adoption of a strategy which emphasizes the small farmer in the existing rural situation. Stated goals include achievement of food self-sufficiency and a better quality of life for the rural population. The decentralized rural development administration provides a structure for village-based development. The integrated rural development strategy should begin to ameliorate pressures upon the environment. Twenty percent of the core component of Upper Volta's 5 year (1977-81) development plan is allocated to crop production, livestock, environment, rural hydraulics, and the Volta Valley Authority. Most of these activities are to be undertaken by the regional development organizations (ORDs).

Some of these projects, such as the "Fonds du Developpement Rural" project, which is to take place in 5 ORDs in the Mossi Plateau area, aim at increases in agricultural production and improvements in village water supplies. Such projects will incorporate entire ecological systems. Similar projects have been identified for each ORD.

Livestock has also been given priority in development, receiving over one quarter of the rural sector investment. Development in this sector needs to be carefully assessed. The interface of indigenous methods of livestock husbandry and a livestock-based economy with modern livestock techniques could lead to further overstocking of the rangeland and degradation of the environment.

Water development plans concentrate on assuring the rural water supply together with making water available to livestock. Projects include dams, wells and the general improvement of arable land.

The dam projects were outlined previously in this report. These projects, both large and small, should be assessed for their impacts upon the environment and possible mitigation of these impacts. The structure of a dam changes the water course from a live stream with

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[10] Sources: Berry, Hay and Scott. 1978.
Duke. Undated.
Horenstein. 1979.
International Union for Conservation of Nature and Natural Resources (IUCN). 1971.
Murphy. 1979.
Van Raay. 1980.

highly oxygenated water to a motionless body of water. All water parameters will change and cause changes in the living conditions for the inhabitants of the water. It is quite possible to completely wipe out some species of fish, for instance. On the other hand, fishing could become an important food item to be exploited in the reservoir behind a large dam. The construction of a dam upsets the distribution pattern of environment-related jobs. Fewer jobs in agriculture could mean more jobs in fishing. The patterns of pastoralism may also be upset. Water-borne disease parameters could also be changed.

Irrigation from small dam projects will probably have a significant effect upon agricultural production in the future. It is also possible for irrigation to increase salinization. This consequence must be monitored as it tends to be a rapid process in arid environments.

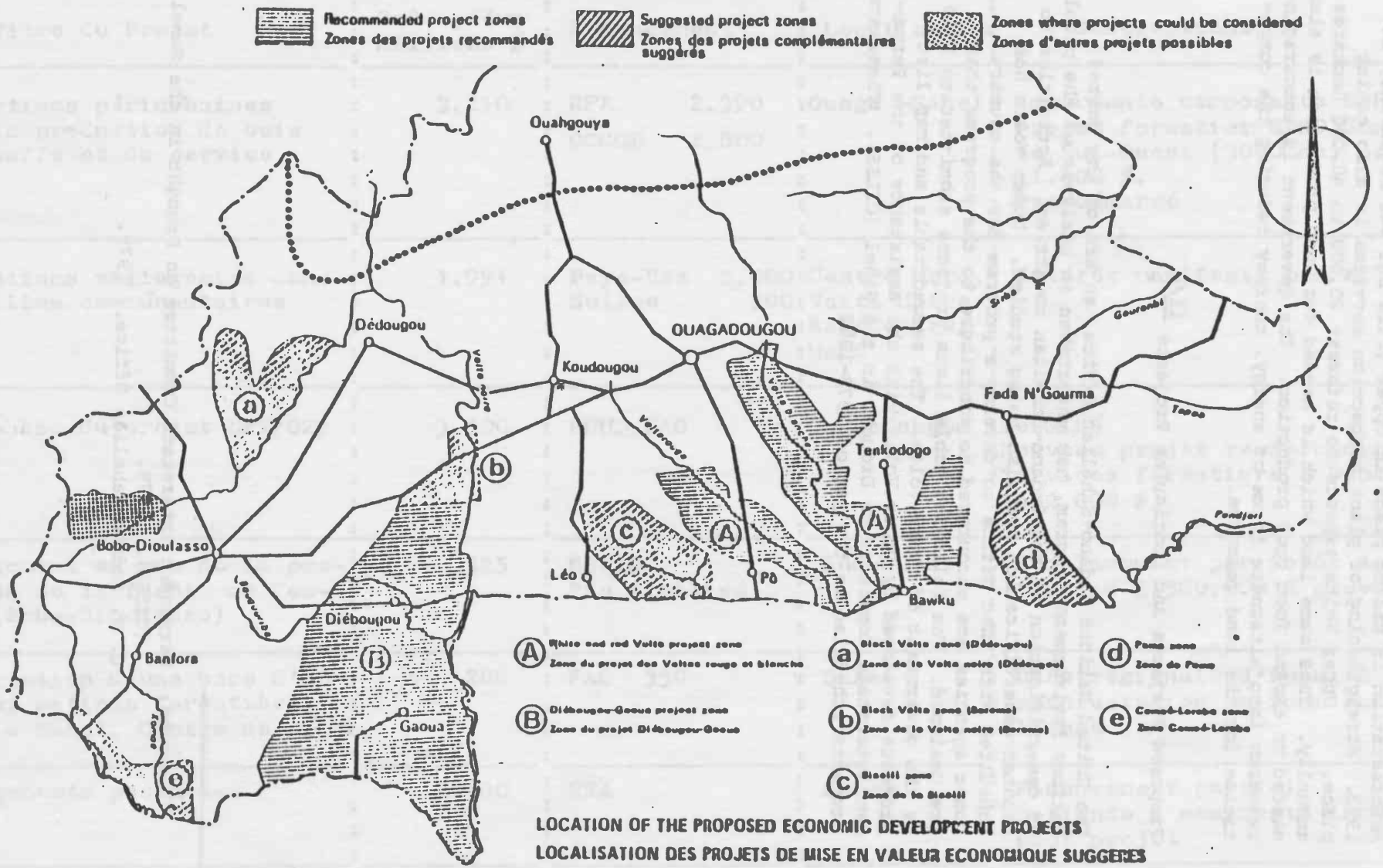
Well development has been described previously. The establishment of new wells and the upgrading of those already in existence should be a positive factor in the control of communicable disease.

The Volta Valley Authority (AVV) was created in 1974 to administer the Volta River valleys. The Volta River is one of the areas most affected by onchocerciasis. In 1973 the World Health Organization started a program of chemical eradication which is controling the Simulium fly host. This control has opened the Volta River Valley to development. The AVV has a highly-controlled program of colonization and development. This program strives for maximum agricultural development while minimizing ecological damage. Non-arable land is to be preserved for wildlife, grazing and wood production. A reforestation program has been implemented. Animal traction and crop rotation are agricultural practices which are infrequent in other parts of the country. Fertilizer is required but sometimes it is not used on the fields. Analysis data is just becoming available for this project, which receives a great deal of government funding plus large financial and technical aid from several donor countries. The primary justification of this project is as a testing ground for agricultural techniques and extension methods which can be used in the rest of the country.

Movement into the Volta Valley has been planned by AVV and also is spontaneous by colonizers in search of new land. The areas from which the people are moving are environmentally different from the valleys. Soil and vegetation types, animal populations, and water management and flooding characteristics are new. Crops and markets are changed also.

The onchocerciasis clearing project raises its own questions with the long-term use of even low levels of insecticide. Impact on other forms of life, especially fish, may be extreme. Also, the activities of man tend to increase the range of the Simulim fly by creating new habitat which extends beyond the area of spraying. It is possible too that during the term of spraying the fly may develop a resistance to the insecticide. However, this project has been a significant advance in improving the health conditions in the Volta Valley.

Volta Valley Authority (AVV)



LOCATION OF THE PROPOSED ECONOMIC DEVELOPMENT PROJECTS
LOCALISATION DES PROJETS DE MISE EN VALEUR ECONOMIQUE SUGGERES

Source: Berry, Hay and Scott. 1978.

Reforestation is taking place in Upper Volta but was begun only in 1973. Strengthening of plant protection services is also taking place. Upper Volta expects to reforest 20,000 to 40,000 hectares annually. This same land which is needed for wood production is also needed to expand food crop production. The government is encouraging research into alternate forms of energy, thereby reducing the competition for the land resource.

4.3 Proposed Projects and Continuing Projects [11]

The United Nations Sudano-Sahelian Office, an arm of the United Nations Environment Program, has undertaken an analysis of the problem of desertification in the Sudano-Sahelian countries. Activities to counter desertification are also being studied. Upper Volta has consulted with that office to develop a program for the country. Donor agencies are encouraged to contribute to the programs that are designed. The following table lists projects submitted to UNSO by the government of Upper Volta. The second table and map list projects developed by Upper Volta with the assistance of the Permanent Interstate Committee on Drought in the Sahel (CILSS). These are projects scheduled in the period 1973-1982.

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[11] Sources: Permanent Interstate Committee on Drought in the Sahel (CILSS). 1979.
U. N. Sudano-Sahelian Office. 1979.

Projects Concerned with Forests

Titre du Projet	Coût prévu millions $	Financement	Localisation	Observations
Plantations périurbaines pour la production de bois de chauffe et de service	3.210	RFA 2.390 OCCGE 2.800	Ouaga -Sahel	Importante composante Sahel. Projet forestier BIRD dans le Sud-Ouest (3000 ha) pour 11.400 $. Pas démarré
Plantations villageoise dans les villes communautaires	1.991	Pays-Bas 2.000 Suisse 700	Centre Nord, Volta Noire Est/Centre/ Nord	Intérêt manifesté par ACDI
2ème phase du projet UPV/029	3.500	PNUD/FAO	Ouagadougou	Terminé Nouveau projet renforcement Services forestiers - Démarré (682.000 $).
Aménagement en vue de la production de la forêt de Koulima (Bobo-Dioulasso)	525	USAID Pas finalisé	Sud-Ouest	Remplacement par forêt de Dinderesso 5.500.000 $ prévus
Constitution d'une base d'appui aux actions forestières dans le Sahel, Centre de Djibo	288	FAC 350	Sahel	Base régionale d'appui à la reforestation en zone sahélienne
Aménagements pastoraux	2.500	RFA	Sahel	Financement partiel Hollande a manifesté intérêt pour projet
Aménagements des parcs nationaux de Pô et d'Arly	4.818	PNUD/FAO 160	Sud-Est	Canada a manifesté intérêt (Protection de la faune sauvage)

Source: U. N. Sudano-Sahelian Office. 1979.

Projects Concerned with Forests (Continued)

Titre du projet	Coût prévu millions $	Financement		Localisation	Observations
Centre de formation forestière de Dinderesso	2.047	USAID	40	Sud-Ouest	Lié au projet fôret Dinderesso - formation de cadres moyens (S.C.)
Renforcement de la section forestière de l'ISPC	300	USAID	2.500	Ouagadougou	Renforcement de l'ensemble d l'ISPC - formation de cadres supérieurs : ingénieurs.
Foyers améliorés		RFA			Action menée dans le cadre d l'économie d'énergie

Projects Concerned with Livestock

Titre du projet - localisation	Coût prévu (millions F.CFA)	Financement	Observations
Développement de l'élevage dans l'ORD du Sahel	2.500	FED	Tranche 470 millions accordée couvre la partie Nord de l'ORD
Développement de l'élevage dans l'Ouest (ORD Bobo, Dédougou)	2.500	BIRD (9 millions $) + BND + Gouvernement	Projet intégré en cours - installer 9 fermes d'élevage + 1 centre de développement - assistance vétérinaire - parc et marché à bestiaux, abattoirs Bobo - remise en état 700 km de piste à bétail - assistance technique, formation
Ranch de Diefoula	700	FED	
Développement de l'élevage dans les ORD de Kaya, Fada, Koupèla	448	USAID	1ère phase : études en cours Projet intégré : contrôle pâturage, formation, encadrement élevage villageois
Développement de l'élevage dans l'ORD de Banfora	212	FED	
Feed - lot de Banfora	270	RFA	
Développement de l'élevage dans la région de Diébougou, Gaoua, Léo	34	BIRD	Volet Elevage d'un projet agricole (coton)

Source: U. N. Sudano-Sahelian Office. 1979.

Projects Concerned with Livestock (Continued)

Titre du projet - Localisation	coût prévu (millions F.CFA)	Financement	Observations
Zone d'attente et parc de restauration de Loumbila	98	FED	
Développement des cultures fourragères dans la zone soudano-sahélienne	50	FAO/PNUD (Suisse)	Expérimentation des cultures fourragères (espèces locales) Vulgarisation.
Développement du petit élevage (ovins, aviculture dans l'ORD du Yatenga)	162	FED	Volet élevage d'un projet intégré d'appui à l'ORD (creusage de puits, lutte contre l'érosi
Ranch de faune sauvage	115	ONG (Canada, USA)	

Projects Submitted by the Government of Upper Volta to UNSO

Titre et localisation	Description - Objectif	Montant - Durée (Millions F.CFA)	Observatio
Plantation et aménagement de la fôret classée de TWESSE, Centre-Ouest (KOUDOUGOU)	:- Plantation de 500 ha (100 ha/an) :- constitution d'un réservoir de bois de feu et de service :- stabiliser les prix :- réduire la pression sur les peuplements naturels.	151 sur 5 ans	
Reboisement et aménagement de la fôret classée de TIOGO (KOUDOUGOU)	:- Plantation 1000 ha (200 ha/an)	225 sur 5 ans	
Reboisements villageois et familiaux (KOUDOUGOU)	- Plantation 1000 ha (200 ha/an) - satisfaction des besoins des populations - encadrement et éducation des populations	villages 115,2 Budget national 36,3 Extérieur 48,4+20 200,0	
Plantations villageoises intégrées dans l'CRD du Sahel		162	
Renforcement de l'Education, de l'information et de la formation des populations rurales en matière de lutte contre la désertification (ORD Sahel)	- Accélérer prise de conscience des masses rurales - Amener les paysans à réaliser les travaux - Lutte contre l'érosion - Reconstitution du couvert végétal et fertilité des sols	sur 2 ans	

Source: U.N. Sudano-Sahelian Office. 1979.

Projects Submitted by the Government of Upper Volta to UNSO (Continued)

Titre et localisation	Description - Objectif	Coût Millions Francs CFA	Observations
Equipement hydraulique de la réserve pastorale de Tin Akachen : "Forage Christine" ORD Sahel	- Exploiter un forage existant (débit 150 m3/H, situé dans une réserve pastorale de 35.000 ha (à utiliser en fin de saison sèche)	286	Maître-d'Oeuvre CNERA
Ranch de Léo : études hydro-géologiques complémentaires	- Créer une station d'embouche (40.000 ha) en zone soudanienne	100	Maître d'oeuvre CNERA Etudes préliminaires disponibles
Aménagement des pistes à bétail du Centre de la Haute-Volta	- Création de points d'eau - balisage de pistes - quai d'embarquement	181	Maître-d'Oeuvre CNERA Dossier disponible
Centre de démonstration de l'embouche paysanne dans la région de POUYTENGA (ORD Koupèla)	- Améliorer l'insertion des activités des paysans dans une zone qui connaît un afflux de cheptel, en aménageant une zone pastorale, et en menant des actions de vulgarisation appropriées.	Pas estimé	Etude de la zone, et élaboration d'un document de projet.

Projects Submitted by the Government of Upper Volta to UNSO (Continued)

Titre et localisation	Description - Objectif	Montant - Durée (Millions F.CFA)	Observations
nservation des écosystèmes natu- els et étude des possibilités de égénération de la végétation natu- lle - Saponé-Bissiga (ORD Contre)	:- Expérimentation (50 ha) :- Etude sol, végétation :- Etude érosion, effet du feu :- Mettre au point mesures de protection	30 durée non-définie	
boisement de 600 ha à Gaoua et aponé (ORD Contre)		210	Fiche à fourni
nstruction de 40 barrages en ne sahélienne	Construction de barrages de retenue d'eau pour fourniture notamment d'eau d'irrigation	2.918	Intervention plusieurs sources de financement
énagements hydro-agricoles de la aine de Kamadéna	En vue de la production agricole	1.500	-

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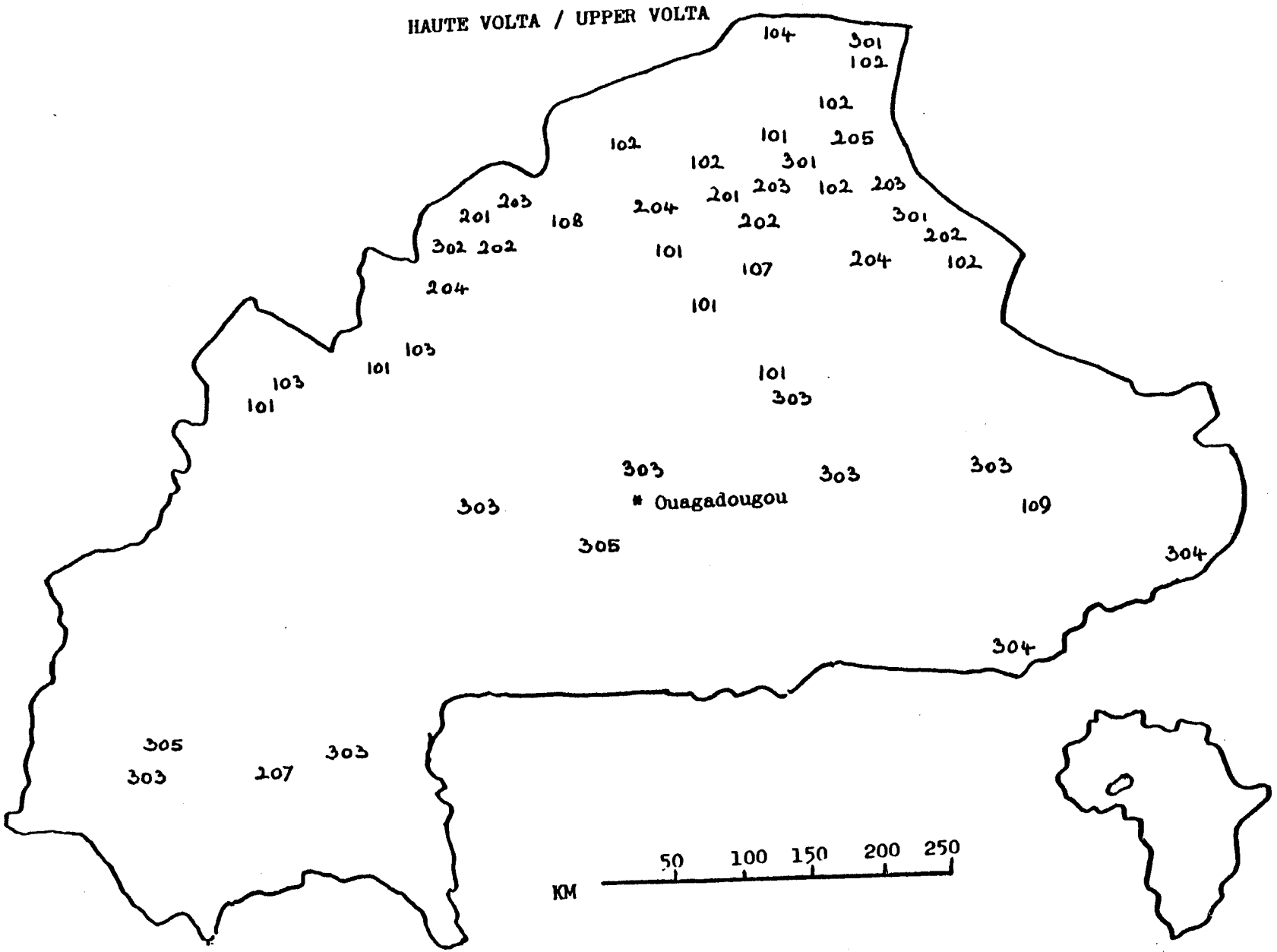

Source: CILSS. 1974.

HAUTE VOLTA / UPPER VOLTA

Plan indicatif du décaissement par projet - en millions CFAF 1/
Indicative disbursement plan by project - in million CFAF 1/

19.12.1973

CILSS CPV	PROJETS / PROJECTS	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	TOTAL
101	Opération puits Well construction	180	180	180									540
102	Equipement des centres secondaires Village water supply		20	20									40
103	Recherche de nappes profondes Ground water research		65	50	35								150
104	Hydraulique pastorale Pasture water management		200										200
105	Aménagement hydro-agricole Agriculture irrigation projects		250	400	400	300	100	50	50	50			1600
106	Construction de petits barrages Construction of small dams		200	350	350	200	100						1200
107	Modernisation ORD Kaya Modernization ORD Kaya		150	200	200								580
108	Modernisation ORD Yatenga Modernization ORD Yatenga		57	159	103	103	89						511
109	Modernisation ORD Fada N'Gourma Modernization ORD Fada N'Gourma		274	110	118	78							580
110	Multiplication de semence Seed multiplication		80	120	100	50	50						400
	Sous-total Sub-total	180	1476	1589	1306	731	339	50	50	50			5771
201	Aliments de bétail Animal feed		100										100
202	Control des maladies Animal disease control	113	79	40									232
203	Reconstitution des troupeaux Herd reconstitution		125	125	125								375
204	Cartes agrostologiques Pasture maps		33										33
205	Modernisation de l'ORD Sahel Modernization of ORD Sahel		200	250	250	50	50						800
206	Développement du petit élevage Livestock development (Poultry)		40	40	40	40	40						200
207	Usine d'aliments pour bétail Animal feed plant		40	25									65
	Sous-total Sub-total	113	617	480	415	90	90						1805
301	Protection des sols Soil protection in the Sahel		276	60	64	73	81						555
302	Plantation d'arbres Tree plantation around urban centers		60	100	100	80	80	80	70	70	64		704
303	Parcs nationaux National parks improvements		40	40	24								104
304	Plan test de dév. des pêches Fisheries pilot scheme		20	20									40
	Sous-total Sub-total		396	220	188	153	162	80	70	70	64		1403
401	Route Dori/Gorom-Gorom Road Dori/Gorom-Gorom		125	100	25	25	25						300
402	Route Fada N'Gourma-Bogande Road Fada N'Gourma-Bogande		200	180	40	40	40						500
403	Route Dori-Djibo Road Dori-Djibo		300	250	50	50	50						700
404	Route Dori-Seba Road Dori-Seba		90	50	20	20	20						200
	Sous-total Sub-total		715	580	135	135	135						1700
501	Action en matière de la santé de la population Health measures for the population		250	250									500
	TOTAL	293	3454	3119	2044	1109	726	130	120	120	64		11179

1/ 1 unité de compte = 278 CFAF
1 unit of account = 278 CFAF

Source: CILSS. 1974.

MALI

Plan indicatif du décaissement par projet - en millions FM 1/
Indicative disbursement plan by project - in million FM 1/

19.12.1973

CILSS MLI	PROJETS / PROJECTS	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	TOTAL
101	Opérations puits Well construction		950	950	600	600	252						3352
102	Equipement Génie Rural Equipment for hydraulic service		850	691	525								2066
103	Eau pour la population Village water supply		950	850	850	600	510						3760
104	Opération mil Kaarta Agric. extension operation Kaarta		249	215	201	238	266						1169
105	Multiplication semences Seed multiplication		220	200									420
	Sous-total Sub-total		3219	2906	2176	1438	1028						10767
201	Protection sanitaire du troupeau Animal disease control		145										145
202	Aliments de survie Animal feed		400	200									600
203	Reconstitution du troupeau Herd reconstitution		800	710	530	530	530						3100
	Sous-total Sub-total		1345	910	530	530	530						3845
301	Reboisement de roniers Replanting of palm trees		70	122	60								252
302	Reboisement, trois centres Reforestation, three towns		600	250	250	231	200	200					1731
	Sous-total Sub-total		670	372	310	231	200	200					1983
401	Amélioration de pistes Road improvement		1600	800	200	200	200						3000
	Sous-total Sub-total		1600	800	200	200	200						3000
	TOTAL		6834	4988	3216	2399	1958	200					19595

1/ 1 unité de compte = 556 FM
1 unit of account = 556 FM

Source: CILSS. 1974.

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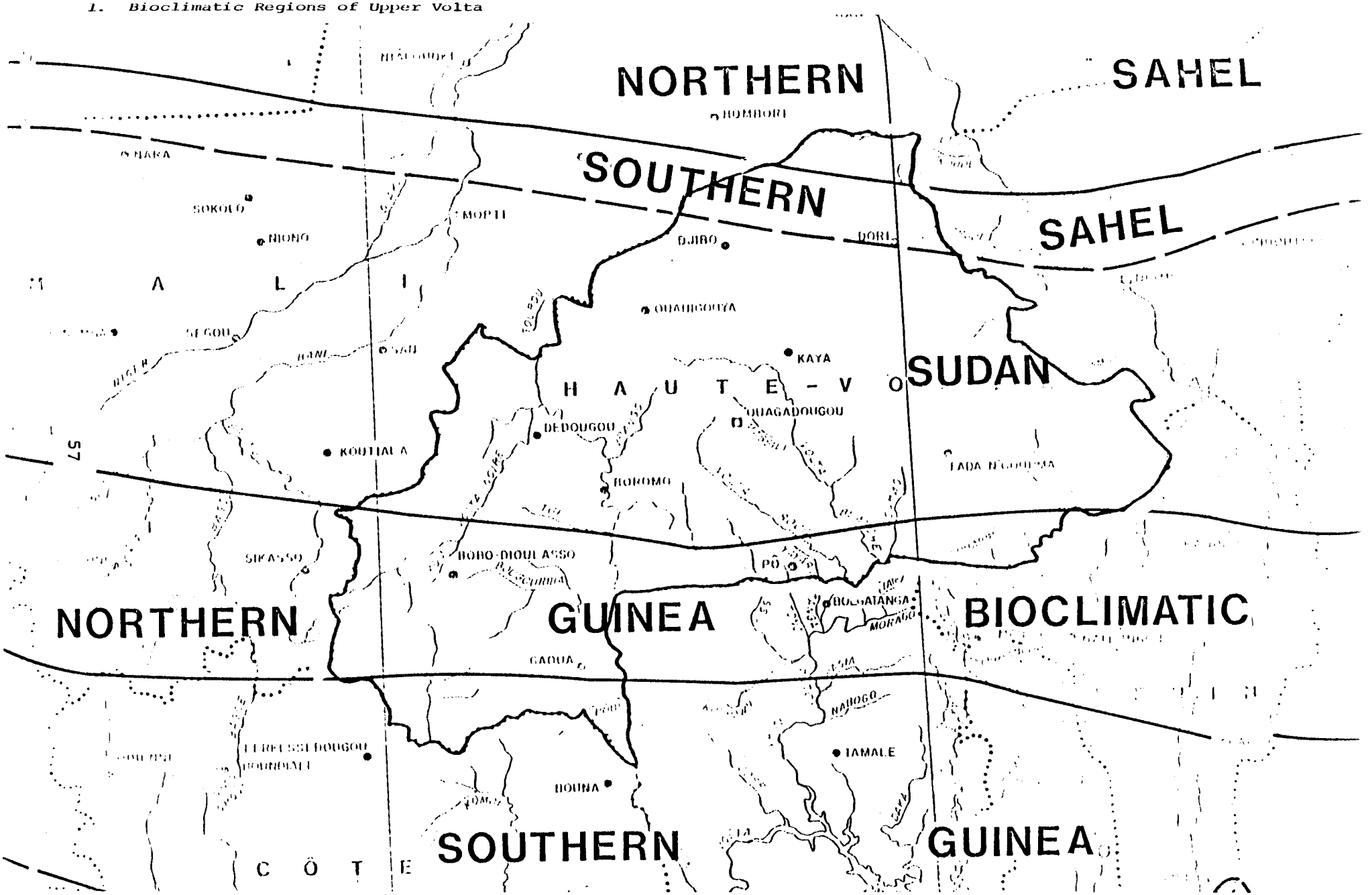
Appendix I

Climatic Data

1. Bioclimatic Regions of Upper Volta
2. Climatic Characteristics of the Bioclimatic Regions
3. Climatic Regions
4. Air Mass Circulation
5. Climatic Isolines: Temperature, Onset of Rainy Season, Evapotranspiration, End of Rainy Season
6. Maximum and Minimum Temperatures
7. Precipitation Average for January, August, and Annually Over 25 Years
8. Precipitation Records since 1970

1. Bioclimatic Regions of Upper Volta



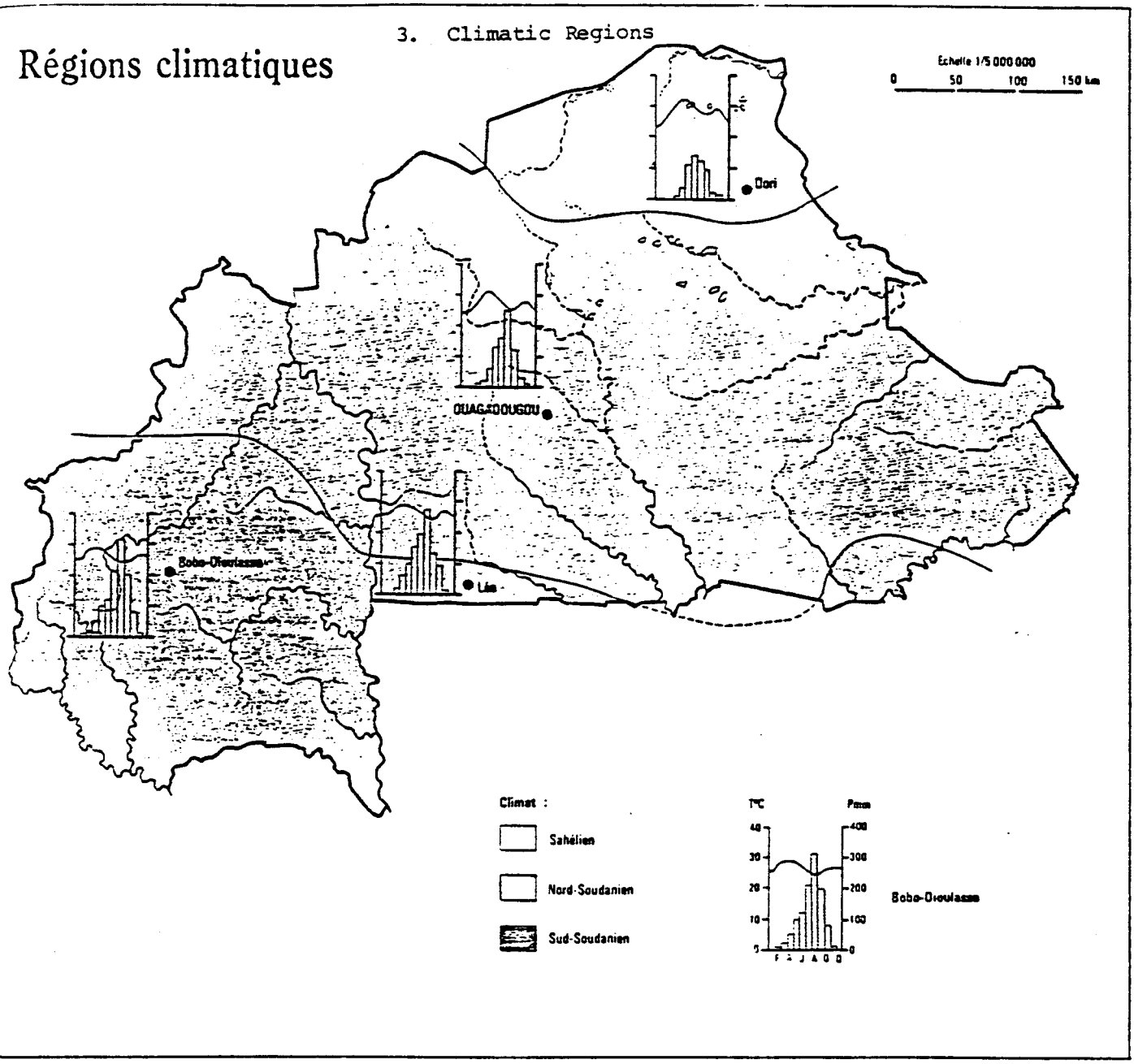
Source: Interafrican Committee for Hydraulic Studies. 1978?.

2. CLIMATIC CHARACTERISTICS OF THE BIOCLIMATIC REGIONS

Bioclimatic Region	(days)	Annual Rainfall (mm)	Radiation (cal $cm^{-2} day^{-1}$	SEASONAL MEAN TEMPERATURE (°C)					Potential Dry Matter Production	VEGETATION CHARACTERISTICS	
				Day Time	Average	Night Time	Maximum Range	Minimum Range		Grassland	Woody
Northern Sahel	0 - 75	0 - 450	470 - 500	31.0 - 32.2	28.4 - 29.3	25.9 - 27.0	33.6 - 34.9	23.2 - 24.2	To be Calculated	Aristidia Cenchrus	Acacia & Shrubs Acacia dominant
Southern Sahel	75 - 90	450 - 550	467 - 470	30.8 - 31.0	28.2 - 28.4	25.7 - 25.9	33.3 - 33.6	23.0 - 23.2			
Sudan	90 - 165	550 - 1000	445 - 467	29.6 - 30.8	27.1 - 28.8	24.7 - 25.7	32.1 - 33.4	22.0 - 23.0	To be Calculated	Andropogon	Baobab and shea butter most characteristic
Northern Guinea	165 - 210	1000 - 1250	431 - 44	29.0 - 29.6	26.4 - 27.9	24.0 - 24.7	31.4 - 32.1	19.8 - 21.5	To be Calculated	Andropogon spp. [illegible]ate	Isoberlinia spp. most characteristic
Southern Guinea	210 - 270	1250 - 1400/1[illegible]00	414 - 431	28.0 - 29.0	25.6 - 26.4	23.2 - 24.0	30.4 - 31.4	20.7 - 21.5	To be Calculated	Hyparrhenia spp. & Imperata cylindrica	Isoberlinia Brachystegia Woodland

Source: Interafrican Committee Hydraulic Studies. 1978?.

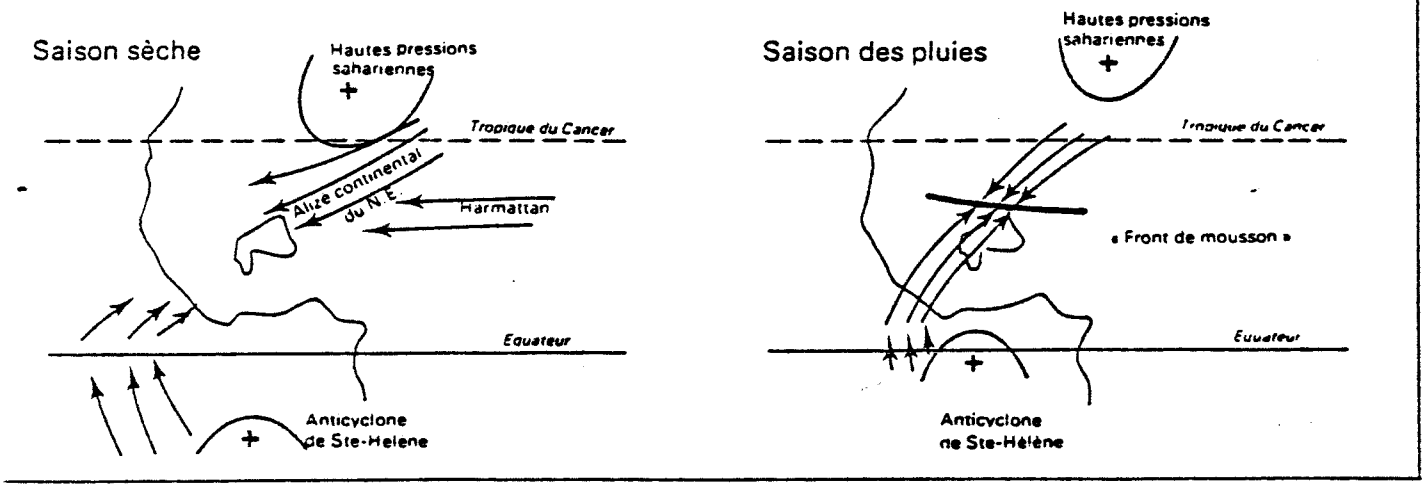
3. Climatic Regions



Source: Peron. 1975.

4. Air Mass Circulation

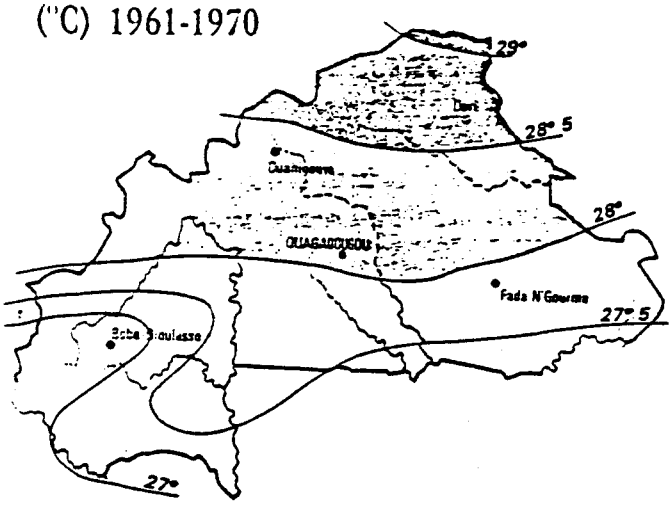
Circulation des masses d'air au-dessus de la Haute-Volta



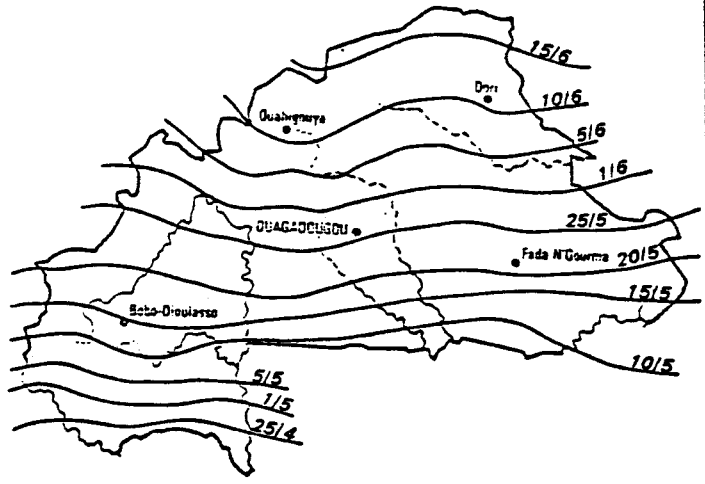
Source: Peron. 1975.

5. Climatic Isolines: Temperature, Onset of Rainy Season, Evapotranspiration, End of Rainy Season

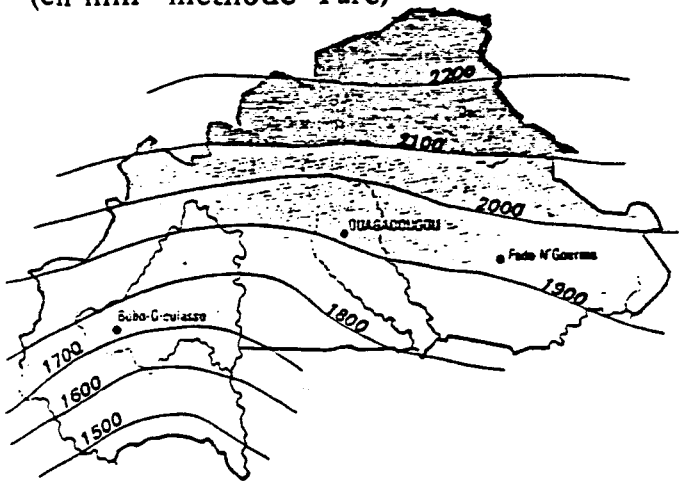
Températures moyennes annuelles de l'air ("C) 1961-1970



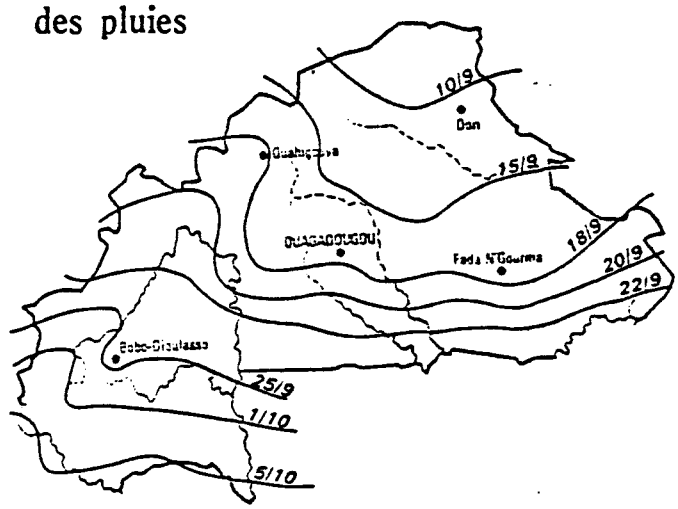
Dates approximatives du début de la saison des pluies



Evapotranspiration moyenne annuelle (en mm - méthode Turc)



Dates approximatives de la fin de la saison des pluies



Source: Peron. 1975.

6. Maximum and Minimum Temperatures

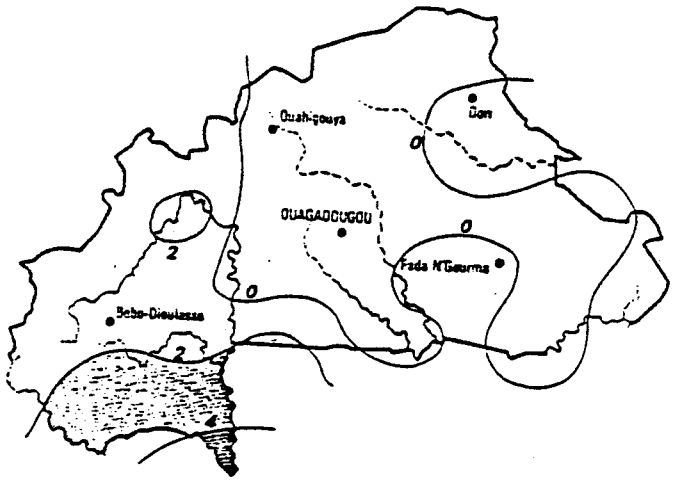
Températures maximales (A) et minimales (B)
Période de référence (C)

	Bananka-ledaga (à 17 km de Bobo-Dioulasso)	Bobo-Dioulasso	Boromo	Dédougou	Dori	Fada N'Gourma	Gaoua	Ouaga-dougou aérodrome	Ouahi-gouya
A	41° 9 5-4-1958	41° 6 10-4-1940	43° 2 21-4-1949	43° 6 10-4-1959	45° 4 31-3-1958	46° 7 5-3-1940	42° 0 29-2-1948	42° 6 11-4-1959	44° 6 14-5-1951
B	2° 9 29-1-1961	10° 0 31-12-1961	9° 4 10-1-1957	10° 0 29-1-1961	6° 8 4-1-1946	8° 4 31-12-1959	12° 8 29-1-1961	9° 5 8-1-1957	9° 1 11-1-1963
C	1955-1964	1940-1964	1945-1964	1957-1964	1940-1954	1940-1964	1940-1964	1952-1954	1951-1964

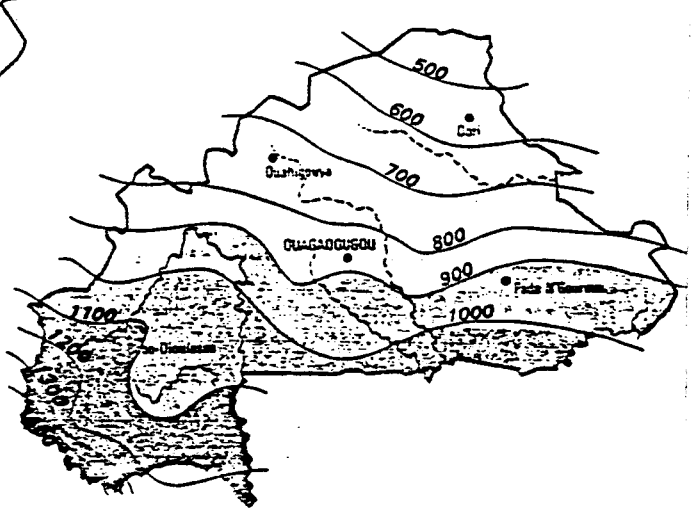
Source: Peron. 1975.

7. Precipitation Average for January, August, and Annually Over 25 Years

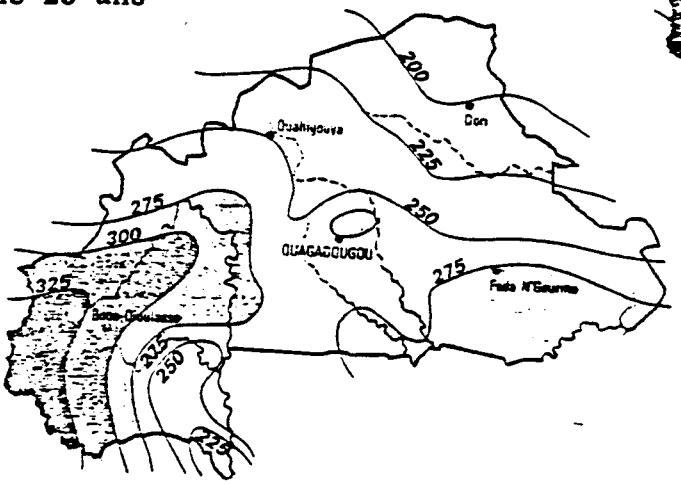
Précipitations moyennes en janvier (en mm), sur une période de 25 ans



Précipitations moyennes annuelles (en mm) sur une période de 25 ans



Précipitations moyennes en août (en mm), sur une période de 25 ans



(D'après les cartes des principaux éléments climatiques, Atlas de Haute-Volta, C.V.R.S.)

Echelle 1/10 000 000
0 100 200 km

Source: Peron. 1975.

8. Precipitation Records since 1970

La baisse des précipitations depuis 1970

Moyenne des précipitations annuelles			Précipitations moyennes annuelles					
	1961-1970		1970		1971		1972	
Gorom-Gorom	495.5	(33 j)	325.3	(30 j)	200.3	(34 j)	348,3	(26 j)
Dori	590.6	(54 j)	406,8	(48 j)	426,6	(42 j)	471,7	(46 j)
Aribinda	538.2	(41 j)	439,2	(35 j)	373.6	(37 j)	298,9	(32 j)
Ouahigouya	698,8	(62 j)	521,7	(57 j)	481,4	(55 j)	501,5	(57 j)
Bogandé	659,3	(48 j)	415,2	(47 j)	440.6	(46 j)	652,0	(48 j)
Ouagadougou (aéroport)	846,1	(75 j)	728,0	(68 j)	726,4	(60 j)	1 060,0	(73 j)
Bobo-Dioulasso	1 180,9	(93 j)	1 404,3	(89 j)	963,6	(85 j)	894,2	(85 j)
Banfora	1 179,2	(82 j)	1 158,8	(72 j)	1 070,6	(68 j)	1 047,5	(76 j)

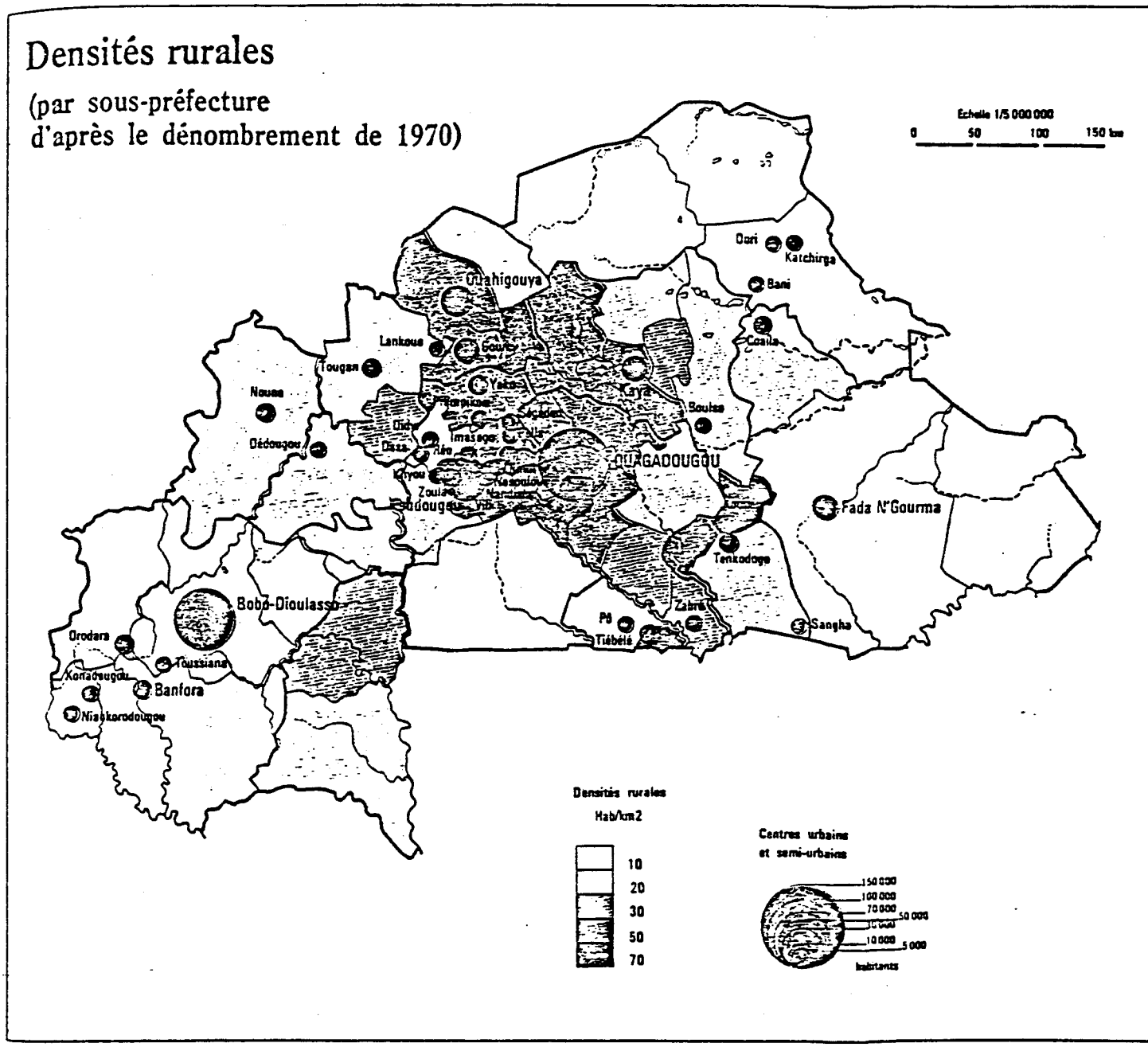
Source: Peron. 1975.

Appendix II

Demographic and Economic Data

1. Rural Population Density
2. Ethnographic Division of Population in Upper Volta
3. Economic Resources and Rainfall

1. Rural Population Density

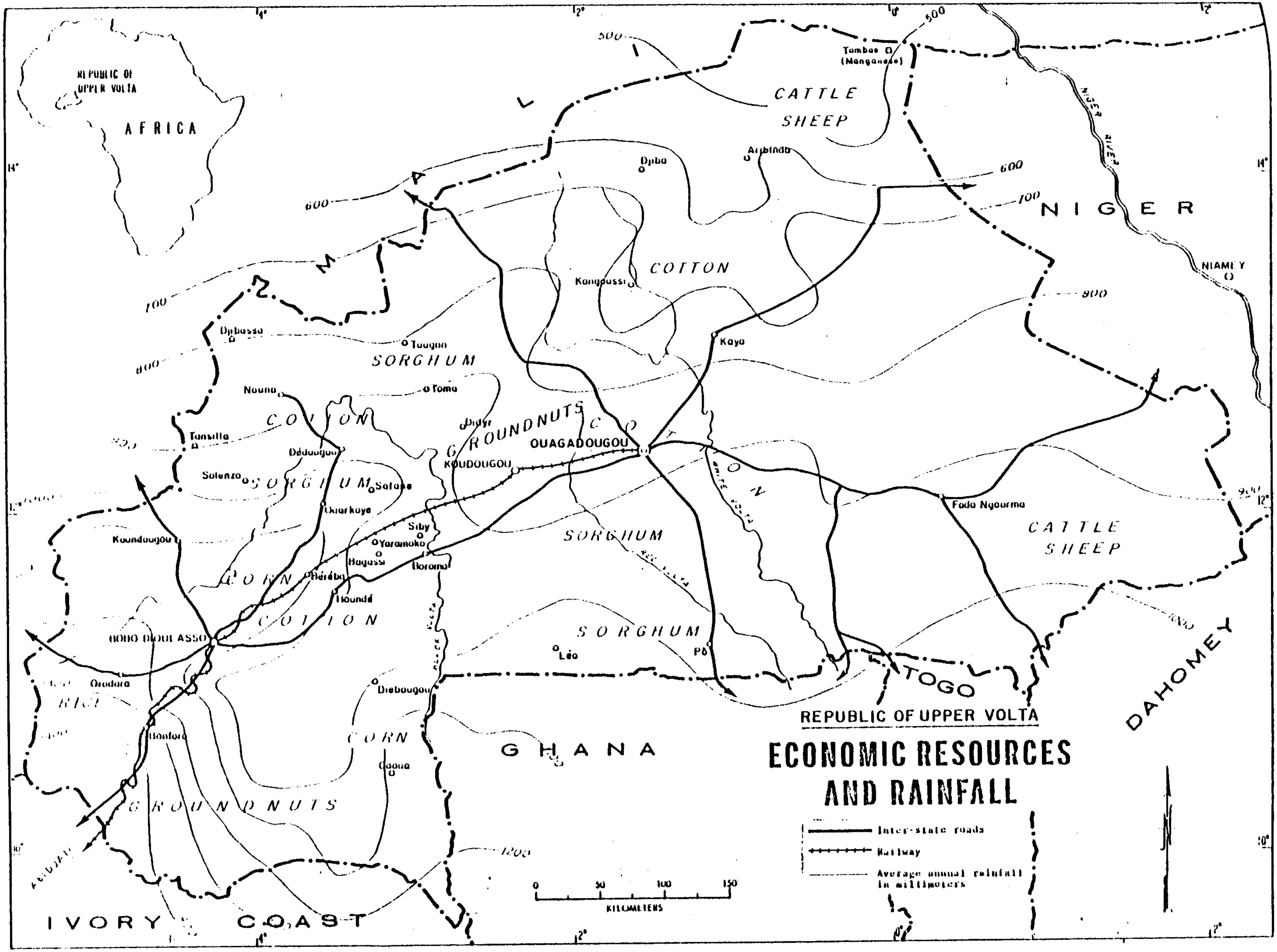


Source: Peron. 1975.

2. Ethnographic Division of Population in Upper Volta

IDENTITY GROUP	TRIBES	POP. 1967	%	LOCATION	OCCUPATION
MOSSI	OUAGADOUGOU TENKEDOGO YATENGA	2,542,000	50-65	CENTRAL PLATEAU BETWEEN BLACK & WHITE VOLTAS	SEDENTARY FARMERS
WESTERN MANDE	BOBO BARKA SAMO DYULA	880,000	16	BOBO NEAR MALI BORDER; OTHERS ALONG IVORY COAST & GHANA BORDERS IN SOUTH	SEDENTARY FARMERS WEAVERS TRADERS
SENUFO	5	363,000	7	IVORY COAST BORDER	SEDENTARY FARMERS
GRUNSHI	4	341,000	6	VICINITY OF HOUNDE, BOROMO, DEDOUGOU	SEDENTARY FARMERS
FULANI	FULANI SERFS(RIMIBES)	313,000	6		-SEMI-NOMADIC HERDERS (CATTLE)
LOBI	9	291,000	5	NEAR IVORY COAST BORDER IN SW	SEDENTARY FARMERS
GURMA	-	275,000	5		
BUSANI	-	242,000	5		NEAR GHANA BORDER
TOUAREG AND BELLA	-	220,000	4	NORTHEAST	NOMADIC PASTORALISTS CAMELS, (SHEEP &GOATS)
ALSO 3,000 EUROPEANS	-	-	-	OUAGADOUGOU BOBO DIOULASSO	-

Source: U. S. Agency for International Development. 1979.


REPUBLIC OF UPPER VOLTA
ECONOMIC RESOURCES AND RAINFALL
Inter-state roads
Railway
Average annual rainfall in millimeters
KILOMETERS
0 50 100 150
AFRICA
REPUBLIC OF UPPER VOLTA
MALI
NIGER
DAHOMEY
TOGO
GHANA
IVORY COAST
NIGER RIVER
WHITE VOLTA
CATTLE SHEEP
COTTON
SORGHUM
GROUNDNUTS
CORN
RICE
OUAGADOUGOU
KOUDOUGOU
BOBO DIOULASSO
Kaya
Fada Ngourma
Tambao (Manganese)
Aribinda
Djibo
Kongoussi
Niamey
Dibasso
Tougan
Toma
Nouna
Tansilla
Dédougou
Solenzo
Safane
Ouarkoye
Koundougou
Siby
Yaramoko
Hagassi
Boromo
Hérédougou
Houndé
Orodara
Banfora
Diébougou
Gaoua
Léo
Pô
500
600
700
800
900
1200

Appendix III

Demographic Statistics

1. Population of the Sahelian Countries
2. Annual Rates of Growth
3. Population Pyramid
4. Upper Volta Demographic Characteristics
5. Upper Volta Demographic Data by Region
6. Population and Density by Department
7. Upper Volta Rural Population Area and Population Density, 1972.
8. Distribution of Urban Population in Upper Volta, 1959-1970.
9. Health Statistics
10. Upper Volta Education Statistics
11. Education

1. Population of the Sahelian Countries (in 1,000)

Country	Chad	Mali	Mauritania	Nigeria	Senegal	Upper Volta
Urban Population						
1970	411	611	111	330	1 024	388
1975	583	762	146	429	1 262	502
1980	808	970	192	563	1 567	654
1985	1 096	1 252	252	743	1 953	851
1990	1 456	1 621	330	981	2 439	1 107
Rural Population						
1970	3 229	4 436	1 060	3 686	1 901	4 996
1975	2 616	4 906	1 184	4 150	3 190	5 556
1980	4 035	5 518	1 326	4 724	3 519	6 229
1985	4 481	6 268	1 491	5 413	3 880	6 999
1990	4 961	7 132	1 680	6 215	4 267	7 886
Total Population						
1970	3 640	5 047	1 171	4 016	3 925	5 384
1975	4 199	5 668	1 330	4 579	4 452	6 058
1980	4 843	6 488	1 518	5 287	5 086	6 883
1985	5 577	7 520	1 743	6 156	5 833	7 850
1990	6 417	8 753	2 010	7 196	6 706	8 993

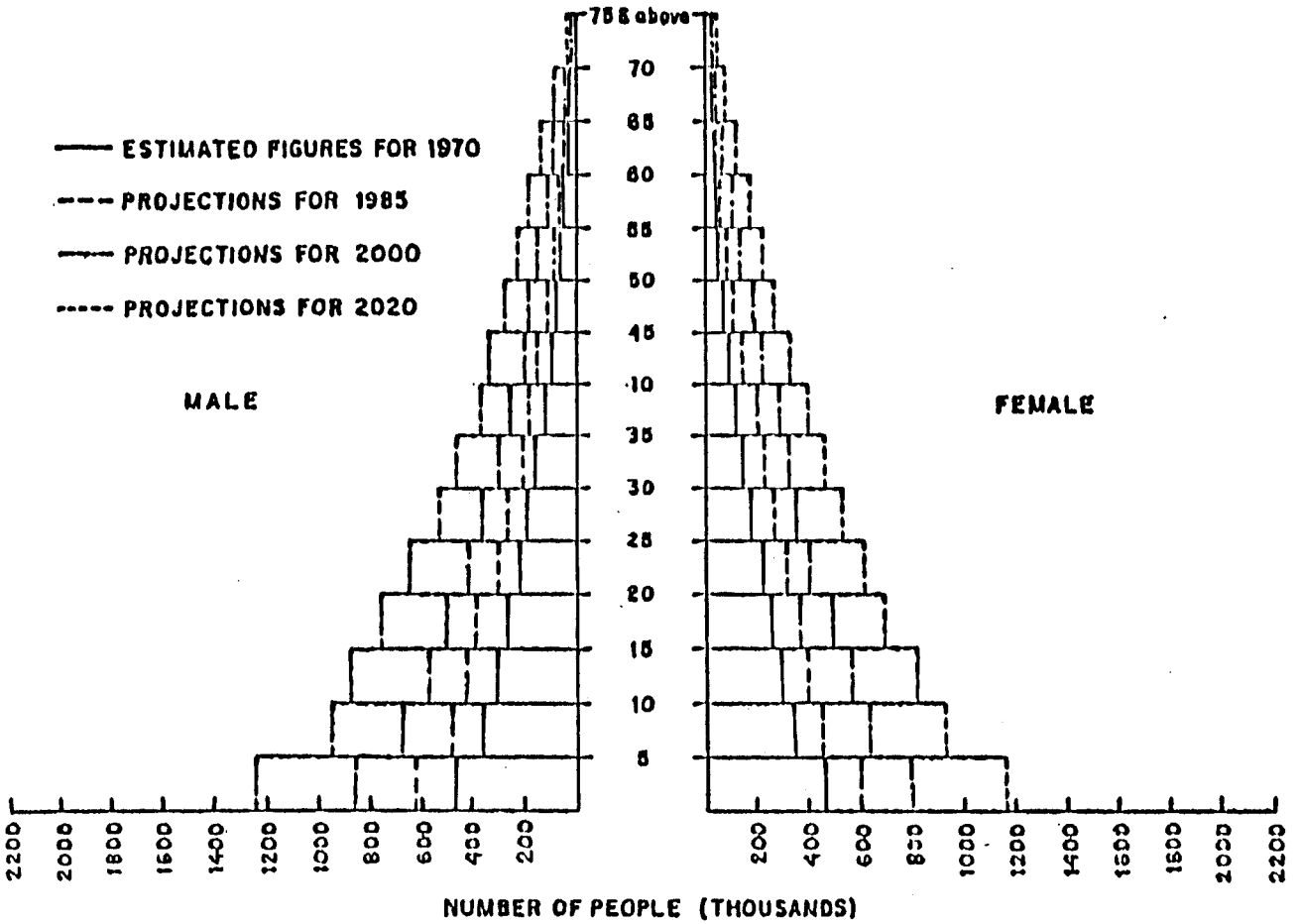
Source: Cohen, et al. 1979.

2. Annual rates of Growth

Country	Chad	Mali	Mauritania	Nigeria	Senegal	Upper Volta
Urban Population						
1970-75	7,2	4,6	5,6	5,4	4,3	5,3
1975-80	6,7	4,9	5,6	5,6	4,4	5,4
1980-85	6,3	5,2	5,6	5,7	4,5	5,4
1985-90	5,8	5,3	5,5	5,8	4,5	5,4
Rural Population						
1970-75	2,3	2,0	2,2	2,4	1,9	2,2
1975-80	2,2	2,4	2,3	2,6	2,0	2,3
1980-85	2,0	2,6	2,4	2,7	2,0	2,3
1985-90	2,1	2,7	2,4	2,8	1,9	2,4
Total Population						
1970-75	2,9	2,3	2,6	2,7	2,5	2,4
1975-80	2,9	2,7	2,7	2,9	2,7	2,6
1980-85	2,9	3,0	2,8	3,1	2,8	2,7
1985-90	2,8	3,1	2,9	3,2	2,8	2,7

Source: Cohen, et al. 1979.

3. Population Pyramid



Age-Structure for Upper Volta, Assuming Constant Fertility and Mortality, 1970, 1985, 2000, 2020.

Source: Stansbury and Childs. 1974.

The Population Pyramid illustrates the age- and sex-related projections for Upper Volta based on the assumption that birth and death rates will not change until the year 2020, and that in- and out-migration will not be significant. In fact if previous trends continue there should be some improvement of life expectancy at birth. Out-migration of men of reproductive age may counterbalance this.

The pyramid makes apparent the broad and rapidly-expanding base, which means a high dependency ratio (the ratio of labor force to dependents). It also illustrates the momentum of population growth because rapid growth will continue as the expanding numbers of children move into reproductive years. The projections and the momentum will change if factors influencing population growth change.

An increase in life expectancy with a constant fertility rate will cause an enormous increase in the population, creating a high dependency ratio and population growth momentum. The accelerated growth rate is particularly noticable amoung the young, causing the pyramid to have a broadening base. This illustrates the general improvement in health services, urbanization and nutrition. The decline in mortality is gradual, with the greatest impact on infant-child mortality.

An increase in life expectancy coupled with a decrease in mortality will show a similar pyramid to the one presented here. However, there will be an improved life expectancy at birth, which suggests the economic advantage of avoiding the wastage of premature deaths.

4. Upper Volta Demographic Statistics

Total Population (1980)	6,738,000		
Growth Rate (1980)	2.3%		
Age Distribution (1975)			
0-14 years	2,555,206		45.3%
15-49 years	2,438,042		43.4%
50 + years	644,955		11.3%
Total Area	274,500 km^2	=	106,000 mi^2
Density			
Population/Surface Area $Mile^2$ (1975)			57
Population/Arable Land $Mile^2$ (1970)			73
Population	1960		1970
%Urban	5%		11%
%Rural	95%		89%

Sources: Cohen, et al. 1979.
U.S. Agency for International Development. 1980.
U.S. Central Intelligence Agency. 1980.
U.S. Department of State. 1979.

5. Upper Volta Demographic Data by Region

	Surface km^2	Population (in 1,000) 1970	1972	1975	Density 1970 - 1972		Rate of Growth	Person Per Household	Rural Population 1970	1975	Per Capita Cultivated Area
Ouagadougou	24.179	934	862	934	38	+ 3.8	2%	8.6	835	109	0.48
Koudougou	26.324	704	694	777	25	+ 1.26	1.9	9	721	810	0.50
Kaya	21.578	581	566	625	27	+ 1.62	1.95	8.4	618	682	0.55
Yatenga	12.297	553	517	572	45	+ 2.23	1.6	8.4	521	563	0.50
Bobo-Dioulasso	28.297	388	260	397	11.3	+ 2.02	1.9	11.7	320	351	0.51
Dedougou	29.588	491	545	635	16.5	- 2.24	2	9	470	513	0.50
Banfora	18.393	176	203	175	9.5	- 1.29	2%	16.8	210	230	0.55
Diebougou	17.484	339	352	357	19	+11.62	1.9	9.7	361	398	
Koupela	9.039	283	537	399	31		2.1	8	267	283	0.48
Fada N'Gourma	49.992	281	537	404	7.3	+ 1.75	1.2	13	272	288	0.49
Sahel	36.870	262	-	356	7	0.36	1.6	7	256	277	0.39

Source: Cohen, et al. 1979.

6. Population and Density by Department

Departments	Subdepartments (Sous-préfectures)	Area (km²)	Population ('000 person)	Density (persons/km²)
Centre (Ouagadougou)	Total	21,952	944,706	43.0
	Boussé	1,912	101,469	53.1
	Kambiriri	2,908	90,791	31.2
	Manga	2,847	91,524	32.1
	Ouagadougou /1	1,708	276,750	162.0
	Po	3,121	22,888	7.3
	Sapone	1,871	73,514	39.3
	Tiébélé	722	50,597	70.1
	Zimiaré	2,776	112,535	40.5
	Zorgho	4,087	124,638	30.5
Centre Est (Koupela)	Total	11,266	404,602	35.9
	Garango	1,423	74,437	52.3
	Koupela	1,627	106,111	65.2
	Tenkodogo	5,989	141,240	23.6
	Zabre	2,227	82,814	37.2
Centre Nord (Kaya)	Total	21,578	632,285	29.3
	Barsalogho	3,610	56,408	15.6
	Boulsa	7,555	168,363	22.3
	Kaya	4,718	209,744	44.5
	Kaugoussi	4,017	145,767	36.3
	Pissila	1,678	52,008	31.0
Centre Ouest (Koudougou)	Total	26,324	788,962	30.0
	Koudougou /1	4,138	310,989	75.1
	Léo	13,736	120,391	8.8
	Réo	1,759	93,373	53.1
	Fenado	3,406	80,069	23.5
	Yako	3,285	184,140	56.0
Est (Fada)	Total	49,992	407,215	8.1
	Bogande	6,548	122,828	18.7
	Diapaga	14,780	92,056	6.2
	Fada N'Gourma	28,664	192,331	6.7
Hauts Bassins (Bobo & Banfora)	Total	43,172	582,810	13.5
	Banfora /1	18,393	175,422	9.5
	Bobo Dioulasso /1	12,222	263,248	21.5
	Orodara	8,307	98,718	11.9
	Houndé	4,250	45,422	10.7
Nord (Yatenga)	Total	12,293	530,192	43.1
	Gourcy	2,003	117,994	58.9
	Ouahigouya /1	4,891	227,680	46.5
	Séguénega	1,515	102,785	67.8
	Tatao	3,884	81,733	21.0
Sahel	Total	36,869	354,079	9.6
	Djibo	13,350	133,153	10.0
	Dori	13,473	146,073	10.8
	Ghidalan	10,046	74,853	7.4
Sud-Ouest (Bougouriba)	Total	17,448	357,592	20.5
	Diebougou	7,087	177,304	25.0
	Gaoua	10,361	180,288	17.4
Volta Noire (Dédougou)	Total	33,106	635,760	19.2
	Boromo	3,518	75,853	21.6
	Dedougou	6,924	124,173	17.6
	Houna	13,177	203,357	15.4
	Toma	2,623	73,286	27.9
	Tougan	6,864	159,091	23.1
UPPER VOLTA	Total	274,000	5,638,203	20.6

/1 Urban population included.

Source: World Bank. 1979

7. Upper Volta Rural Population Area and Population Density, 1972

ORDs	Total Population ('000 inh.)	Total Area (sq. km)	Population Density ($inh. per km^2$)	Area Cultivated Total ('000 ha)	Area Cultivated % of Total Area
Quagadougou[1/]	847.6	24,179	35.1	352.1	14.6
Yatenga	531.5	12,297	43.2	218.4	17.8
Kaya	592.6	21,331	27.8	275.9	12.8
Koudougou[1/]	719.3	26,324	27.9	342.3	13.0
Koupela	272.6	9,039	30.2	124.5	13.8
Sahel	259.6	36,895	7.0	133.0	0.4
Fada n'Gourma[1/]	287.1	47,992	6.0	147.7	3.1
Bobo	326.4	28,297	11.5	157.7	5.6
Volta Noire	479.4	29,588	16.2	239.6	8.1
Bougouriba	360.0	17,448	20.6	143.2	8.2
Banfora	180.0	18,393	9.8	87.0	4.7
TOTAL	4,856.1	271,783	17.9	2,216.4	8.2

1/ Without city population
Source: Cohen, et al. 1979.

8. Distribution of Urban Population in Upper Volta, 1959-1970

	Population		% of Total Urban	Implied Annual Growth Rate %
Ouagadougou	59,126 (1961)	105,000 (1970)	25.8	6.6
Bobo-Dioulasso	54,260 (1959)	94,583 (1970)	23.3	5.2
Koudougou	21,000 (1959)	42,566 (1970)	10.5	6.6
All Secondary Centers	74,130 (1960-61)	164,342 (1970)	40.4	8.3 to 9.3

Source: Cohen, et al. 1979.

9. Health Statistics

Upper Volta and *Average Data for the Least Developed African Countries (LDC)*
Various years according to Data Availibility

	1960	1970	1971	1972	1973	1974	1975	1976
Life expectancy	32.2	35.5			37		38.0	48.0
(LDC)	*58*	*60*						
Birth rate/1000 (5 yr period)	49.6	49.4					48.5	
(LDC)		*37*						
Death Rate /1000	31	28.5	25.4				29.0	
Infant mortality Rate/1000 live births	182			204				
(LDC)	*94*	*60*						
Population/physician	100,000	92,760	75,220		59,760	59,570		57,565
(LDC)	*7,500*	*5,600*						
Population/Hospital bed	1,810	1,670		1,174	1,170			
(LDC)	*930*	*820*						
Population/Nursing Person	4,260	4,230			4,250	4,250		5,110
(LDC)	*4,900*	*3,200*						
Onchoceriasis:								
Population prevalency					10.0%			
Population Blind					1.0%			
Leprosy: Population Prevalency					2.62%			
Average Caloric Intake as % of Requirement (FAO)	85%	80%	73%	71%	70%	78%		
Population with Access to Safe Water Supply		12%				25%		

Sources: U. S. Agency for International Development. 1980. Legum. 1980
U. S. Agency for International Development. 1979.

10. Upper Volta Education Statistics

	1960	1970	1974
Total Primary Enrollment/ 1,000 Population aged 6-11 years	6%	13%	13%
Total Secondary Enrollment/ 1,000 Population aged 12-17 years	5%	1%	2%
Primary Pupils/Teacher	47	44	46
Secondary Pupils/Teacher	20	23	20

Literacy in 1962 was 2%; 1972 11%.

Sources: Legum. 1980.
U.S. Agency for International Development. 1980a.

11. Education
(1975/76)

	Pupils	Teachers
Primary	141,177	2,997
Secondary	16,227	818
General education	13,167	580
Teacher training	391	28
Other	2,669	210
Higher education	1,067	166

Source: Europa Publications. 1979.

Appendix IV

Economic Statistics

1. General Economic Statistics
2. Population and Labor Force
3. Gross Domestic Product by Economic Activity
4. National Accounts: GDP, Breakdown by Sector
5. Agriculture Production, 1969/70-1977/78
6. Land Use
7. Principal Crops
8. Livestock
9. Livestock Products
10. Forestry, Roundwood Removals
11. Fishing
12. Industry, Selected Products
13. Power Production, 1973-1977
14. Government Budget Revenue, 1973-78
15. Government Budget Expenditure (by Function), 1970-1977
16. Development Plan 1977-81
17. Direction of Trade

1. General Economic Statistics

Gross National Product (US $ 1978)	745,000,000
Growth rate (1976)	5.8%
Per Capita GNP (US $ 1975)	100
(US $ 1978)	120
Per Capita GNP Growth Rate (1960-1977)	0.6%
Total Labor Force (1975)	2,855,000
Men (1975)	53.6%
Women (1975)	46.4%
Total participation rate (1975)	54.3%
Agriculture percent of total labor force (1970)	86.8%

Source: Legum. 1980.
Europa Publications. 1980
U.S. Agency for International Development. 1980b.

2. Population and Labor Force[1/] (in 1,000)

	1960	1975
1. Population registered as resident	4,372	5,638
1.1 Rural	(3,977)	(5,127)
1.2 Urban[/2]	(395)	(511)
2. Temporary emigrants during the year	152	302
2.1 Rural	(146)	(277)
2.2 Urban	(8)	(25)
3. Population Present	4,220	5,337
3.1 Rural	(4,088)	(4,850)
3.2 Urban	(387)	(487)
4. People of less than 14 or more than 60 years old	2,034	2,895
5. Labor force resident	2,338	2,743
5.1 Rural	2,118	(2,437)
5.2 Urban	(220)	(306)
6. Labor force present	2,186	-
7. Ratio of labor force to		
7.1 Resident population	53.5	48.7
7.2 Present population	51.1	-
8. Total of permanent emigrants	250	-
9. Ratio of total permanent emigrants to present labor force (%)	11.4	

/1 The 1960 and 1975 figures are based on the results of the 1960/61 sample survey and the recent census (Dec. 1975) respectively.

/2 Fifty-two urban centers.

Source: World Bank. 1979.

3. Gross Domestic Product by Economic Activity*

	1972	1974
Industries		
Agriculture and livestock	35,508	38,841
Forestry and logging	4,467	5,322
Fishing	680	972
Mining and quarrying	74	97
Manufacturing	8,979	11,286
Electricity, gas and water	1,654	1,756
Construction	3,988	5,299
Wholesale and retail trade	14,125	16,515
Restaurants and hotels	120	145
Transport, storage and communications	6,407	8,380
Finance, insurance, real estate and business services	4,747	5,613
Community, social and personal services	476	545
SUB-TOTAL	81,225	94,771
Less Imputed bank service charges	555	1,058
DOMESTIC PRODUCT OF INDUSTRIES	80,670	93,713
Government services	6,167	7,531
Private non-profit services to households	255	326
Domestic services of households	855	985
TOTAL	87,947	102,555

* Excluding import duties (million francs CFA): 4,838 in 1972; 7,043 in 1974.

Source: Europa Publication. 1980.

4. National Accounts: GDP, Breakdown by Sector

	Current CFAF billion		
	1968	1974	1975
1. Primary Sector	32.08	49.31	56.02
1.1 Agriculture	(20.35)	(33.46)	(37.61)
1.2 Livestock	(6.17)	(9.60)	(12.41)
1.3 Hunting, Fishing and Forestry	(5.56)	(6.11)	(7.00)
2. Secondary Sector	14.31	21.23	22.87
2.1 Manufacturing	(12.66)	(17.81)	(19.20)
2.2 Construction	(1.65)	(3.42)	(3.67)
3. Tertiary Sector	12.86	28.26	27.54
3.1 Transport and Communication	(2.56)	(4.20)	(4.39)
3.2 Commerce	(8.26	(19.39)	(19.13)
3.3 Other Services	(2.04)	(4.67)	(4.02)
4. Gross Domestic Production (1+2+3)	59.24	98.80	107.41
5. Government Sector /1	7.17	12.12	17.93
6. Gross Domestic Product at Factor Cost (4+5)	66.41	110.92	125.34
7. Indirect Taxes - Subsidies	4.02	9.90	11.36
8. Gross Domestic Product at Market Prices (6+7)	70.43	120.82	136.70

/1 Includes foreign administration in Upper Volta.

Source: World Bank. 1979.

5. Agricultural Production, 1969/70 - 1977/78

Production (in '000 tons)	1969/70	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78 /1
Millet and sorghum	946	758	759	782	987	1,130	872	1,170
Maize	55	59	58	60	70	80	60	97
Rice (paddy)	39	37	29	32	39	39	40	48
Groundnuts	12	15	25	29	33	19	7	7
Seed cotton	36	28	33	27	31	48	55	45
Sesame	5	4	5	4	5	5	-	-
Sheanuts	20	16	5	11	5	48	32	50
Cultivated Area (in '000 ha)								
Millet, sorghum, maize	1,977	1,761	1,757	2,080	2,140	2,193	-	-
Yield (kg/ha)								
Millet, sorghum, maize	506	463	464	405	489	644	-	-

/1 Provisional.

Source: World Bank. 1979.

6. Land Use (in 1,000 hectares)

	1966	1971	1976
Arable land	5.100*	5.360*	5.600†
Land under permanent crops	10*	12*	13†
Permanent meadows and pastures	13.750*	13.755*	13.755†
Forests and woodland	4.200*	4.101	3.600*
Other land	4.320	4.152	4.412
Inland water	40	40	40
TOTAL AREA	27.420	27.420	27.420

* FAO estimate. † Unofficial estimate.

Source: Europa Publications. 1980.

8. Livestock (in 1,000 head)

	1975	1976	1977
Cattle	1,700	1,900	1,900
Sheep	1,200	1,400	1,300
Goats	2,100	2,300	2,377
Pigs	140	150	158
Horses	90	100	90
Asses	165	180	170
Camels	5	5	5
Chickens	8,750	7,280	7,468

Source: Europa Publication. 1980.

9. Livestock Products (in 1,000 metric tons)

	1975	1976	1977
Beef and veal	11	19	17
Mutton and lamb	3	4	4
Goats' meat	7	7	8
Pigs' meat	3	3	3
Horse meat	2	3	3
Poultry meat	4	5	5
Cows' milk	45	51	50
Goats' milk	15	17	18
Butter	0.8	0.9	0.9
Hen eggs	2.0	2.2	2.3
Cattle hides	1.8	3.0	2.8
Sheep skins	0.4	0.6	0.6
Goat skins	1.3	1.3	1.3

Source: Europa Publication. 1980.

10. Forestry

Roundwood Removals
(in 1,000 cubic metres, all non-coniferous)

	1970	1971	1972
Sawlogs, veneer logs and logs for sleepers	2	2	—
Other industrial wood	430	440	450
Fuel wood	3,670	3,840	3,920
TOTAL	4,102	4,282	4,370

Source: Europa Publication. 1980.
1973-76: Annual output as in 1972 (FAO estimates).

11. Fishing

(in 1,000 metric tons, live weight)

	1971	1972	1973
Total catch	5.0	4.0	3.5

1974-76: Annual catch as in 1973 (FAO estimates).
Source: Europa Publication. 1980.

12. Industry

(Selected Products)

		1973	1974	1975	1976
Soap	metric tons	3,101	3,374	3,633	3,900
Groundnut Oil	" "	971	426	607	n.a.
Refined Sugar	'000 metric tons	12.0	n.a.	n.a.	20.8
Beer	hectolitres	117,649	132,972	120,524	183,571
Soft Drinks	"	52,239	63,476	58,218	82,227
Cigarettes	million	313	367	380	460
Footwear	'000 pairs	1,145	1,182	1,531	n.a.
Cotton Yarn	metric tons	605	540	465	535
Bicycles, Motor Cycles and Scooters	'000	29	33	n.a.	n.a.
Bicycle and Motor Cycle Tyres	"	1,282	1,161	n.a.	n.a.
Electric Power	'000 kWh.	42,177	46,109	52,502	60,000

Source: Europa Publication. 1980.

13. Power Production, 1973-1977 (1,000 kwh)

	1973	1974	1975	1976	1977
1. Total Production	42,148	46,077	53,189	59,748	70,327
2. Total Consumption	36,147	40,316	45,763	51,840	67,039
High voltage	20,805	23,821	26,254	29,698	34,689
private	(18,052)	(20,485)	(21,714)	(.)	(.)
public	(2,753)	(3,336)	(4,540)	(.)	(.)
Low voltage	15,342	16,495	19,509	22,228	27,450
private	(12,847)	(13,926)	(16,600)	(.)	(.)
public	(2,495)	(2,569)	(2,909)	(.)	(.)
3. Total population (thousands) /1	5,516	5,577	5,638	5,739	5,842
4. Electric power per capita (kwh) 2/3	6.6	7.2	8.1	9.0	11.4

/1 Resident population estimated; 1975 census results.

Source: World Bank. 1979.

14. Government Budget Revenue, 1973-78

(In millions of CFA francs)

	1973	1974	1975/1	1976/1	1977/1	1978/1 Budget
Tax revenue	10,829	13,319	14,724	19,062	23,321	27,388
Standard tax on income	749	687	745	741	760	1,437
Proportional income taxes	1,323	2,198	2,004	2,385	2,630	3,242
Business profits	(371)	(571)	(724)	(650)	(900)	(900)
Wages and salaries	(832)	(1,482)	(1,068)	(1,456)	(1,450)	(1,950)
Other	(120)	(145)	(212)	(279)	(280)	(392)
Taxes on transactions	2,310	2,647	3,119	4,255	5,330	6,171
Consumer taxes	(1,535)	(1,694)	(1,761)	(2,948)	(3,543)	(4,204)
Turnover tax	(775)	(953)	(1,358)	(1,307)	(1,787)	(1,967)
Taxes on international trade	6,077	7,325	8,315	10,890	14,340	15,412
Import duties and taxes	(5,765)	(7,043)	(7,619)	(9,903)	(13,493)	(14,415)
Export duties and taxes	(312)	(282)	(696)	(987)	(847)	(997)
Other taxes	370	462	541	791	858	1,126
NONTAX REVENUE	1,736	2,221	1,368	2,093	2,221	3,192
Income from property	441	595	110	105	110	492
Dividends from BCEAO	172	110	487	461	461	461
Other domestic revenue	1,123	1,516	771	1,527	1,650	2,239
TOTAL OF DOMESTIC REVENUE	12,565	15,540	16,092	21,155	26,139	30,580
Foreign budgetary subsidies	625	975	550	800	800	..
TOTAL REVENUE	13,190	16,515	16,642	21,955	26,939	30,580

/1 Provisional.

Source: World Bank. 1979.

15. Government Budget Expenditure (by Function), 1970-1977

(In million CFAF)

	1970	1971	1972	1973	1974	1975	Budget 1976	Budget 1977
A. Current Expenditure (by function)	8,616	9,156	9,711	10,357	11,474	14,765	18,057	21,150
General Services	4,524	4,780	4,981	5,358	6,228	..	10,826	12,500
General administration	2,135	2,303	2,387	2,736	3,465	..	4,958	6,015
Foreign affairs	389	435	482	495	209	..	340	478
Defense	1,157	1,196	1,247	1,234	1,509	..	4,324	4,530
Justice and police	843	846	865	893	1,045	..	1,204	1,477
Social Services	2,867	3,118	3,429	3,770	3,701	..	4,529	5,560
Education and sports	1,767	1,931	2,168	2,423	2,150	..	2,466	2,979
Health	789	781	786	824	914	..	1,219	1,688
Veterans and Pension	314	406	475	523	637	..	844	893
Economic Service	1,223	1,258	1,301	1,409	1,545	..	2,702	3,090
Plan, agriculture and Public works	557	584	625	674	680	..	1,401	1,572
Finance and trade	354	374	405	441	488	..	702	815
Postal and telecommunications	3	5	5	5	3	..	125	160
Public debt service	309	266	266	289	374	..	474	543
B. Development expenditure	1,137	890	924	1,309	1,724	1,753	3,066	1,973
Infrastructure	..	..	420	432	459	549	711	706
Construction	..	..	6	20	16	63	731	254
Equipment	..	..	5	94	10	2	532	224
Investment and studies	..	..	448	439	514	514	838	612
Participation at social capital of "Banques et Societes d'Economie Mixte"	..	..	45	137	--	49	254	177
Contribution and "Fonds de Concours"	--	--	--	--	725	..	--	--
TOTAL	9,753	10,046	10,635	11,846	13,189	16,518	21,123	23,123

Source: World Bank. 1979.

16. Development Plan 1977-81

(proposed expenditure in million francs CFA)

Investments	Resources From		Total 1977-81	Total 1972-76
	Public Sector	Private Sector		
Rural sector	23,172	4,680	27,852	18,905
of which:				
Agriculture	19,364	—	19,364	12,516
Modern sector	7,678	61,720	69,398	12,959
Economic infrastructure	64,756	—	64,756	18,221
of which:				
Roads	23,590	—	23,590	11,623
Railways	26,900	—	26,900	1,192
Social sector	9,988	30,100	40,088	8,522
of which:				
Education	3,444	—	3,444	4,626
Health	3,544	—	3,544	2,006
Administration and equipment	6,572	—	6,572	4,616
Total	112,166	96,500	208,666	63,223

Source: Europa Publication. 1980.

17. Direction of Trade (million US dollars)

	1975	*1976**	*1977**
Exports			
France	8.22	12.25	14.04
Italy	2.89	3.04	5.01
United Kingdom	2.81	9.84	4.72
West Germany	1.42	4.83	3.90
Japan	0.71	3.83	3.67
China (Taiwan)	0.25	0.99	2.65
United States	0.17	2.37	1.82
Total (including others)	**43.71**	**44.91**	**44.99**
Imports			
France	65.64	70.36	85.66
Ivory Coast	29.67	37.50	45.34
United States	10.67	12.21	13.75
West Germany	6.30	7.55	10.37
Belgium	3.43	1.71	7.97
United Kingdom	3.85	1.06	7.08
Netherlands	3.86	4.78	5.19
Total (including others)	**151.25**	**154.22**	**195.29**

*Data partly extrapolated and/or derived from partner country.

Source: Legum. 1980.

Appendix V

Environmental Legislation

1. General
2. Fauna
   (including Fisheries)
3. Flora
4. Water
5. Air
6. Protected Area
7. Land Use
8. Minerals
9. Hazardous Substances

Sources: Johnson and Johnson. 1977.
Republique de Haute Volta. Various dates.
U. S. Environmental Protection Agency. 1976.
Van Raay. 1980.

1. General

1. Ordinance 68-50 of 1968 - authorises the government to ratify the government to ratify the African Convention on Nature and Natural Resources. Endangered species are listed.

2. Decree 72-163 of 1972 - establishes a technical school for water and forestry.

2. Fauna
(Including Fisheries)

1. Regulation (A) of 1924 - is a fishing regulation.

2. Regulation (A.G.) No. 1214 of 1943 - prohibits hunting in classified forests.

3. Decree No. 47.2254 of 1947 - regulates hunting (modified by Decree No. 54-1290, 1954).

4. Regulation (A.G.) No. 5661 of 1948 - establishes conditions for hunting application (modified 1949, 1954).

5. Regulation (A) No. 113 of 1951 - relates to tariffs.

6. Regulation (A) No. 594 of 1953 - relates to hunting season.

7. Regulation (A.G.) No. 4262 of 1955 - declares certain harmful animals and authorises their destruction.

8. Deliberation No. 20 of 1959 - relates to taxes.

9. Law No. 27 of 1961 - relates to taxes and hunting.

10. Regulation (A) No. 8 of 1962 - relates to hunting permits.

11. Decree No. 338 of 1962 - gives faunal species protection for 5 years; species are listed.

12. Ordinance No. 68-59 of 1968 - regulates the protection of fauna and the control of hunting (applied by decree No. 68-34, 1968, 69); includes lists of protected animals, national parks, protected areas, and statements on conservation of nature.

13. Decree No. 68-314 of 1968 - concerns the application of Ordinance 68-59.

14. Decree No. 72-245 of 1972 - establishes a committee for hunting and the protection of nature.

-continued-

15. Decision 17 Agri. El. EF. T of 1974 - concerns the hunting and capture of fauna for scientific research.

16. Decision 57 Agri. EL. EF. T of 1974 - concerns water and onchocerciasis.

18. Ordinance No. 74-64 of 1974 - modifies the hunting season.

Note: see also section 9 on hazardous substances.

3. Flora

1. Regulation (A.G.) No. 2195 of 1935 - defines the southern limit of the Sahelienne Zone and regulates exploitation of forests.

2. Decree of 1935 - establishes forestry rules.

3. Regulation (A.G.) No. 3782 of 1938 - regulates industrial exploitation of firewood and charcoal.

4. Regulation (A.G.) No. 5307 of 1946 - (modified by A.G. 3619, 1951) concerns distribution and restoration of , and prohibited acts in,forests.

5. Regulation (A) No. 1762 of 1948 - lists forest rules and regulations concerning exploitation.

6. Regulation (A) No. 10 of 1952 - lists taxes on forest products.

7. Decree No. 485 of 1961 - makes contrameasures against animal and cultivated vegetable plant parasites obligatory.

8. Decree No. 70-302 of 1970 - is concerned with forest pasture of livestock and controls access to and use of forests.

Note: see also section 9 on hazardous substances-

4. Water

1. Decree of 1921 - regulates water which is not public domain.

2. Decree of 1926 - treats hazardous substances as air or water pollution.

3. Ordinance No. 6 of 1966 - relates to the ratification of an accord establishing the Niger River Authority.

4. Decree No. 92 of 1966 - modifies decrees relating to a new definition of water rights.

5. Ordinance No. 70-68 of 1970 - relates to public health and water.

6. Decree No. 74-2 of 1974 - relates to public health and onchocerciasis.

Note: see also Section 9 on hazardous substances.

5. Air

1. Decree of 1926 - treats hazardous substances as air or water pollution.

6. Protected Areas

1. Decree No. 54-471 of 1954 - relates to the protection of nature in reserves.

2. Regulation (A.G.) of 1954 - relates to police changes in nature reserves and natural parks.

3. Regulation (A) No. 982 of 1956 - relates to national park visiting permits.

4. Regulation (A) N. 983 of 1956 - relates to hunting in classified forests and partial faunal reserves.

5. Decree No. 70-175 of 1970 - sets up a forest reserve for fauna.

7. Land Use

1. Decree No. 499 of 1963 - creates a Supreme Council of Planning.

2. Ordinance No. 74-29 of 1974 is concerned with settlement of the Volta Valley.

3. Ordinance No. 74-61 of 1974 - creates the Volta Valley Authority.

8. Minerals

1. Code and Regulation of 1965 - regulates mineral substances other than liquid hydrogen and gas.

9. Hazardous Substances

1. Decree No. 348 of 1961 - establishes phytosanitary control and regulates conditions of import and export of flora and fauna.

2. Ordinance No. 70-68 of 1970 - establishes a public health code governing epidemics, water pollution, pesticides, radiation and radioisotopes, and the medical profession.

Note: see also Section 2 on fauna, Section 4 on water, and Section 5 on air.

Appendix VI

Government Organization

UPPER VOLTA NATIONAL GOVERNMENT

LEGISLATIVE	EXECUTIVE	JUDICIAL
Prime Minister (appointed by President)	President	Supreme Court
	Council of Ministries	
National Assembly 57 members (elected) unicameral	Interior and Security Justice National Defense and Veterans Foreign Affairs Finance Planning and Cooperation Rural Development Commerce, Industrial Development and Mines Public Works, Transport and Urbanism National Education and Scientific Research Public Health and Population Civil Service and Labor Information Postal Services and Telecommunication Youth and Sports Environment and Tourism Social Affairs and the Condition of Women Ministry Charged with the Prime Minister's Relations with the National Assembly	

Source: Republique de Haute-Volta. 1974.
U. S. Agency for International Development. 1979.

Appendix VII

Organizations with Environmental Interests/Responsibilities

1. Governmental
2. Non-governmental
3. International (Upper Volta membership)
4. Universities and Libraries

Sources: Alexander. 1980.
Berquist, et al. 1978.

Europa. 1979.
FAO, Current Agricultural Research Information System. 1978.
Paylore. 1977.
Sierra Club . 1976.
Technical Assistance Information Clearinghouse. 1974.
UNESCO. 1966.
United Nations Economic Commission for Africa. 1972.

1. Governmental Organizations

Centre de Recherches Forestieres en Haute-Volta.
State owned corporation

Centre Voltaique de la Recherche Scientifique (CVRS)
BP Box 7047, Ouagadougou, Upper Volta
Research in drought and desertification, fuelwood and soil erosion, works in conjunction with Man and the Biosphere program as well as other institutions.

Comite de Coordination de Developpement Rural
Ouagadougou
Involved in activities concerning rural development, nutrition, and agricultural tools. Also coordinates eleven regional development offices and is involved in a project to create a center for developing rural machinery.

Direction du Cadastre et Topographie
Service Topographique
Ministére des Finances et du Commerce
B.P. 7054
Ouagadougou

Direction de la Geologie et des Mines
B.P. 601
Ouagadougou

Institut Superieur Polytechnique (ISPO)
Ouagadougou, Upper Volta
Forestry, agronomy, livestock research interests. Key institutions for national training. Can identify environmental departments within government.

Ministére de l'Agriculture (Ministry of Agriculture)
Ouagadougou, Upper Volta

Direction des Eaux et Forêts (Directorate of Water and Forests)
B.P. 4, Ouagadougou, Upper Volta

Ministry of Commerce, Industrial Development and Mines

Direction de la Geologie et des Mines (Directorate of Geology of Mines)
B.P. 601, Ouagadougou, Upper Volta

Ministére de l'Economie Nationale. Direction des Services de l'Elevage et des Industries Animales
Laboratoire de Ouagadougou
Ougadougou

Ministere de L'Environment Et du Tourisme (Ministry of Environment and Tourism)
PO 7044, Ouagadougou, Upper Volta
Infoterra National Focal Point
a) l'Amenagement Forestier et du Reboisement

Ministry of Plan, Rural Devleopment, Environment and Tourism
Ouagadougou, Upper Volta
a) National Office for the Exploitation of Animal Resources
b) National Office of Dams and Irrigation
c) Direction de l'Hydraulique et de l'Equipment
d) Direction de l'Elevage

Ministry of Public Health and Social Affairs
Ouagadougou

Ministry of Public Works, Transport and Urbanism
Ouagadougou

Musee National, Directeur des Affaires Culturelles
Ouagadougou
Studies endogenous technology

2. Non-Governmental Organizations

Africare
B.P. 608
Ouagadougou
Nutrition, Agriculture

AID Mission
American Embassy, Ouagadougou, Upper Volta

Bureau de Recherches Geologiques et Minieres (BRGM)
B.P. 386, Bobo-Dioulasso
BRGM station, public institution of an industrial and commercial nature, central administration in Paris. Engaged in research.

Catholic Relief Services (USCC)
BP 469, Ouagadougou

Centre d'Application des Technologies Rurales et Urbanies (CATRU)
BP 575, Ouagadougou
Primarily concerned with development of local crafts

Centre d'Etudes Phytosociologiques et Ecologiques - L. Emberger (CEPE-Emberger)
Plant ecology, bioclimatology, vegetation mapping, desertification.

Centre National de Perfectionnement des Artisans Ruraux (CNPAR)
BP 575, Ouagadougou
Provides technical assistance to builders, masons, well-sinkers, carpenters and other rural artisans. Also involved in transportation of non-agricultural products, agricultural implements and in building.

Centre ORSTOM de Ouagadougou
BP 182, Ouagadougou
Branch of French organization, Office de la Recherche Scientifique et Technique Outre-Mer, (Office of Scientific and Technical Research Overseas), specializing in water resources and geographic studies.

Centre of Economic and Social Studies in Western Africa (CESAO)
PO Box 305, Bobo Dioulasso
A non-governmental organization concerned with rural development, in particular the training of workers.

Centre Regional de Perfectionnement Artisanal (CRPAR)
Ouagadougou
Trains local craftsmen, offers support service to the craftsmen and identifies craftsmens' inventions.

Centre Regional Pour la Teledetection (CTRO)
BP Box 1762, Ouagadougou
International remote sensing center.

Centre Technique Forestier Tropical (CTFT)
BP 303, Ouagadougou, Upper Volta
Research in deforestration, fuelwood and charcoal problems.

Comite Interafricain d'Etudes Hydrauliques (CIEH) (Interafrican Committee for Hydraulic Studies)
BP 868, Ouagadougou
Research and exchange of technical information and assistance in areas of water resources, development, range management, forestry, remote sensing, land use, and methane production.

Comite Permanent Interetats de Lutte contre la Secheresse dans le Sahel (C.I.L.S.S.)
Club du Sahel, BP 7049 Ouagadougou, Upper Volta
Goal is to increase food production by year 2000 and to increase standard of living and re-establish ecological balance.

Conseil Oecumenique des Eglises, Commission d'Entraide-Equipe du Sahel
BP1006, Ouagadougou, Upper Volta
Private, church-affiliated organization which maintains a library, provides training, technical assistance, financial/material aid, rural extension services, technical information/documentation, and project identification/evaluation. Primary focus to activities is in the rural sector with special programs for women.

Direction de la Geologie et des Mines
B.P. 127, Bobo-Dioulasso
Coordinates U.N. special fund on mineral and hydrological research.

Essor Rural
BP 7007, Ouagadougou, Upper Volta
Develops and promotes improves agricultural methods for rural workers by means of radio clubs, seminars and consultations.

Institut de Recherches Agronomiques Tropicales (IRAT)
Station de Recherche, Saria, Farokobo, Ougadougou
Experiments on methane production, agronomy, pedology, genetics.

Institut Pan-Africain pour le Developpement
BP 1756, Ouagadougou
Trains development staff and undertakes research into small scale development activities.

Institute de Recherches Pour les Huiles et Oleagineux (IRHO)
BP 21, Koudougou
Groundnut research.

Livestock and Veterinary Medicine Institute for Tropical Countries (IBMVT)
Man and the Biosphere (MAB) Program
Ouagadougou

Mission Entomologique (ORSTOM)
Centre MUREZ, BP 171, Bobo Dioulasso
Branch of French organization, Office de la Recherche Scientifique et Technique Outre-Mer (Office of Scientific and Technical Research Overseas) specializing in insect research.

Office de Promotion des Enterprises Voltaiques (OPEV)
BP 94, Ouagadougou and Bobo Dioulasso
Operates a mobile workshop at Bobo Dioulasso; small scale production

Oxfam Regional Office
BP 489, Ouagadougou
Offers assistance to grass roots projects and encouragement of appropriate technology.

Permanent Secretariat of Non-Governmental Organizations (SPONG)
Upper Volta
National NGO group with 28 member voluntary agencies (including American). Purpose is to coordinate policy, exchange ideas and information and foster project cooperation. As of 1977, it was beginning to acquire technical skills and information.

Programme de Recherche Interdisciplinaire Francais Sur Acridiens du Sahel (PRIFAS)
BP 596, Ouagadougou
Botanical, entomological, faunal studies.

Projet d'Egalite d'Access des Femmes
BP111, Ouagadougou
Works in several regions to reduce women's workload by use of appropriate technology.

Service des Chasses et de la Protection de la Nature
BP 4, Ouagadougou

Societe Africaine d'Etudes et de Development (SAED) (African Center for Research and Development)
BP 593, Ouagadougou, Upper Volta
Private non-governmental, profit making organization conducting studies and research on constraints to development in social and economic sectors and seeking means to overcome them. Interests cover rural development, water resources, appropriate technology.

Southern Baptist Convention
BP 580, Ouagadougou
Well-digging

United Nations Sudan and Sahelian Regional Office
BP Box 366, Ouagadougou

Universitat Hamburg, Institute fur Geographie und Wirtschaftsgeographie
Bundesstr, Federal Republic of Germany
Desertification of the Sahelian zone.

World Vision Relief Organization
Dam and irrigation construction.

3. International

African Society for the Development of the Millet and Sorghum-based Food Industry (SADIAMIL)

African Training and Research Center in Administration and Development (DAFRAD)

Council of the Entente States
The Cattle and Meat Economic Community (CEBV)
International agriculture and transport

Instituit Africain de Developement Economic et Social (INADES)

Inter-African Committee for Hydraulic Studies (CIEH)
BP 868, Ouagadougou
Water resources, range management, forestry, land use, legislation.

International African Migratory Locust Organization (OICMA)
Destruction of the locust and conduct research on the location of its breeding areas.

The Liptako-Gourma Regional Integrated Development Authority
Promote regional development of mineral, energy, water, agriculture, fishery, and grazing resources.

Organisation Commune de Lutte Antiaridienne et de Lutte Antiaviaire (OCLALAV)
Destruction of insect pests, in particular locust, and granivorous birds, in particular Quelea-quelea.

Organisation de Coordination et de Cooperation pour la Lutte Contre les Grandes Endemies (OCCGE)
Control of endemic disease, biological research.

OAU Organization of African Unity
Science, technology, conservation.

Permanent Inter-African Bureau for Tsetse and Trypanosomiasis

Permanent Inter-State Committee on Drought Control in the Sahel (CILSS)

The River Niger Commission
Use, development, resources of the Niger River.

Union Africaine et Malgache de Banques por le Developpement (UAMBD)

The United Nations

West African Economic Community (CEAO)
Agriculture and industrialization.

West African REgional Group
Agriculture, transport, energy, migration.

West African Rice Development Association (WARDA)

4. Universities and Libraries

Universite de Ouagadougou
BP 7021, Ouagadougou

- Ecole Superieure des Lettres et des Sciences Humaines (E.S.L.S.H.)
- Institut Universitaire de Technologie (I.U.T.)
- Institut Superieur Polytechnique (I.S.P.)
- Institut de Mathematiques et de Sciences Physiques (I.M.P.)
- Ecole Superieure des Sciences Economiques (E.S.S.EC.)
- Institut Africain d'Education Cinematographique (IN. AF. E.C.)

Centre d'Etudes Economiques et Sociales d'Afrique Occidentale
BP 305, Bobo-Dioulasso

Interafrican Committee for Hydraulic Studies (CIEH) Library
Ouagadougou

Organisation de Coordination et de Cooperation Pour la Lutte contre les Grandes Endemies (OCCGE) Library
Ouagadougou

Direction de la Geologie et des Mines Library
Ouagadougou

United Nations Sudan and Sahelian Regional Office Library
Ouagadougou

Appendix VIII

Dam Sites - Existing or Under Study in Upper Volta

1. Niger River Basin Dam Sites in Upper Volta
2. Volta River Basin Dam Sites in Upper Volta

1. Niger River Basin Dam Sites in Upper Volta

NOM DU BARRAGE : TIN AKOF

NUMERO DE REFERENCE : N 27 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Industriel

SITUATION DU BARRAGE

Bassin	: Niger
Fleuve	: Beli
Pays	: Haute Volta
Latitude/Longitude	: 15°00'N - 0°10'O.

DONNEES TECHNIQUES

Hauteur du barrage (m)	: 6
Longueur de la crête (m)	: 300
Capacité ($10^6 m^3$)	: 10,1
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	:
Coût (10^6 F CFA)	: 975

ORGANISATION RESPONSABLE : Office General des Projets de Tambao, Ouagadougou. Haute Volta

REFERENCES : (Ministère du Commerce, du Développement Industriel et des Mines.)

NOM DU BARRAGE : SITENGA

NUMERO DE REFERENCE : N 28 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Approvisionnement en eau (Humaine/Pastorale)

SITUATION DU BARRAGE

Bassin	: Niger
Fleuve	: Tributaire du Gorol Olo
Pays	: Haute Volta
Latitude/Longitude	: 13°58'N - 0°18'E

DONNEES TECHNIQUES

Hauteur du barrage (m)	: 5,4
Longueur de la crête (m)	: 530
Capacité ($10^6 m^3$)	: 9
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	: -
Production annuelle (GWh)	:
Irrigation (ha)	: ?
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Office National des Barrages et de l'Irrigation. Ouagadougou, Haute Volta.

REFERENCES :

Niger River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : DAKIRI

NUMERO DE REFERENCE : N 29 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	:	Niger
Fleuve	:	Kanbi, tributaire Bouli
Pays	:	Haute Volta
Latitude/Longitude	:	13°16'N - 0°13'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	
Longueur de la crête (m)	:	1800
Capacité ($10^6 m^3$)	:	10 (inclus Le barrage de Liougou)
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	0
Production annuelle (GWh)	:	0
Irrigation (ha)	:	
Coût (10^6 F CFA)	:	

ORGANISATION RESPONSABLE : Office National des Barrages et de l'Irrigation. Ouagadougou, Haute Volta.

REFERENCES :

NOM DU BARRAGE : YALOGO

NUMERO DE REFERENCE : N 30 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Approvisionnement en eau (Humain, Pastoral)

SITUATION DU BARRAGE

Bassin	:	Niger
Fleuve	:	Wanga
Pays	:	Haute Volta
Latitude/Longitude	:	13°35'N - 0°16'O.

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	4 - 5 ?
Longueur de la crête (m)	:	600^{+}_{-}
Capacité ($10^6 m^3$)	:	9 - 12
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	
Coût (10^6 F CFA)	:	

ORGANISATION RESPONSABLE : Office National des Barrages et de l'Irrigation Ouagadougou. Haute Volta

REFERENCES :

Niger River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : DABLO

NUMERO DE REFERENCE : N 31 (VOIR CARTE 1, VOL. 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	:	Niger
Fleuve	:	
Pays	:	Haute Volta
Latitude/Longitude	:	13°43'N-1°10'O.

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	6
Longueur de la crête (m)	:	1225
Capacité ($10^6 m^3$)	:	6,2
Débit disponible ($10^6 m^3$/an)	:	4
Puissance (MW)	:	-
Production annuelle (GWh)	:	-
Irrigation (ha)	:	60
Coût (10^6 F CFA)	:	154

ORGANISATION RESPONSABLE : Office National des Barrages et de l'Irrigation. Ouagadougou. Haute Volta

REFERENCES :

NOM DU BARRAGE : BOUKOUMA

NUMERO DE REFERENCE : N 32 (VOIR CARTE 1, VOL. 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Approvisionnement en eau (humaine & pastorale)

SITUATION DU BARRAGE

Bassin	:	Niger
Fleuve	:	Zimbéogo
Pays	:	Haute-Volta
Latitude/Longitude	:	14°13'N 0°44'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	2,5
Longueur de la crête (m)	:	1145
Capacité ($10^6 m^3$)	:	2,5
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	
Coût (10^6 F CFA)	:	

ORGANISATION RESPONSABLE : Office Nationale des Barrages et de l'Irrigation. Ouagadougou, Haute-Volta.

REFERENCES :

2. Volta River Basin Dam Sites in Upper Volta

NOM DU BARRAGE : BADADOUGOU

NUMERO DE REFERENCE : K 1 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : EXISTANT/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	:	Komoe
Fleuve	:	Komoe
Pays	:	Haute Volta
Latitude/Longitude	:	10°38'N, 4°36'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	
Longueur de la crête (m)	:	
Capacité ($10^6 m^3$)	:	
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	12.000
Coût (10^6 F CFA)	:	9.000

ORGANISATION RESPONSABLE : H.E.R. - Min du Plan, Dev. Rural, Ouagadougou, Haute Volta

REFERENCES :

NOM DU BARRAGE : NOMTOEGA

NUMERO DE REFERENCE : V 4 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Energie electrique

SITUATION DU BARRAGE

Bassin	:	Volta
Fleuve	:	Pendjari
Pays	:	Haute Volta
Latitude/Longitude	:	11°06'N - 1°05'E

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	15
Longueur de la crête (m)	:	?
Capacité ($10^6 m^3$)	:	?
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	8?
Production annuelle (GWh)	:	33
Irrigation (ha)	:	50.000?
Coût (10^6 F CFA)	:	?

ORGANISATION RESPONSABLE : Volteleo, Ouagadougou, Haute Volta

REFERENCES :

Note : barrage à la frontière internationale Haute Volta/Benin

Volta River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : KAMPALAGA

NUMERO DE REFERENCE : V 5 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Volta Rouge
Pays	: Haute Volta
Latitude/Longitude	: 11°12'N - 0°47'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:
Longueur de la crête (m)	:
Capacité ($10^6 m^3$)	: 460
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	: 12.000
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Autorité des Vallées des Volta. Ouagadougou, Haute Volta.

REFERENCES :

NOM DU BARRAGE : BITOU

NUMERO DE REFERENCE : V 6 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Energie electrique

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Nouhao
Pays	: Haute Volta
Latitude/Longitude	: 11°08'N - 0°16'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:
Longueur de la crête (m)	:
Capacité ($10^6 m^3$)	: 275
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	: 0
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas, Ouagadougou, Haute Volta

REFERENCES :

NOM DU BARRAGE : BAGRE

NUMERO DE REFERENCE : V 7 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Energie electrique, Irrigation

SITUATION DU BARRAGE

Bassin	:	Volta
Fleuve	:	Volta Blanche
Pays	:	Haute Volta
Latitude/Longitude	:	11°18'N - 0°33'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	20 - 25
Longueur de la crête (m)	:	2600
Capacité ($10^6 m^3$)	:	1700 - 3400
Débit disponible ($10^6 m^3$/an)	:	630
Puissance (MW)	:	7,2
Production annuelle (GWh)	:	32
Irrigation (ha)	:	30,000
Coût (10^6 F CFA)	:	10.000 Barrage et 5.000 ha. Aménagement

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas

REFERENCES : S.O.G.R.E.A.H. (1977) Etude comparative des différentes sites de barrages possibles sur la Volta Blanche et ses affluents dans la région de bagre. Rapport final. Ouagadougou, Ministère du Développement Rural/A.V.V./ Ministère du Plan.

Note : l'Energie électrique sera partiellement utilisé pour le pompage de l'eau de l'irrigation.

NOM DU BARRAGE : TANEMA

NUMERO DE REFERENCE : V 8 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE :

SITUATION DU BARRAGE

Bassin	:	Volta
Fleuve	:	Dougoula - Moundi
Pays	:	Haute - Volta
Latitude/Longitude	:	11°55'N - 0°38'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	15
Longueur de la crête (m)	:	
Capacité ($10^6 m^3$)	:	263
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	6.000
Coût (10^6 F CFA)	:	5.000

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas, Ouagadougou, Haute-Volta.

REFERENCES :

Volta River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : LOUMBILA

NUMERO DE REFERENCE : V 9 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Alimentation en Eau de Ouagadougou

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Massila
Pays	: Haute Volta
Latitude/Longitude	: 12°30'N - 1°24'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	: 11
Longueur de la crête (m)	: 2990
Capacité ($10^6 m^3$)	: 32,5
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	:
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Office National des Eaux, B.P. 170, Ouagadougou. Haute Volta

REFERENCES :

NOM DU BARRAGE : BUI

NUMERO DE REFERENCE : V 10 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Energie electrique

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Volta Noire
Pays	: Ghana
Latitude/Longitude	: 8°20'N, 2°10'O.

DONNEES TECHNIQUES

Hauteur du barrage (m)	:
Longueur de la crête (m)	:
Capacité ($10^6 m^3$)	:
Débit disponible ($10^6 m^3$/an)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	:
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Volta River Authority
Consultants : - Snowy Mts. Engg. Corpn. (Australia.)

REFERENCES : "The public sector : current overseas jobs for Australia's Snowy Mountains Engineering Coorporation (as of March 1, 1978)," (1978) Worlwide Projects and Installations, April/May, p. 46.

Volta River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : NOUMBIEL

NUMERO DE REFERENCE : V 11 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Energi electrique, Irrigation

SITUATION DU BARRAGE

Bassin	:	Volta
Fleuve	:	Volta Noire
Pays	:	Haute Volta
Latitude/Longitude	:	9°32'N - 2°44'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	
Longueur de la crête (m)	:	
Capacité ($10^6 m^3$)	:	
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	5.000
Coût (10^6 F CFA)	:	

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas, Ouagadougou, Haute Volta.

REFERENCES :

NOM DU BARRAGE : SOUROU

NUMERO DE REFERENCE : V 12 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : EXISTANT/~~EN COURS D'ETUDE/SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation, Pêche, Ouvrage régulateur

SITUATION DU BARRAGE

Bassin	:	Volta (Noire)
Fleuve	:	Sourou
Pays	:	Haute Volta
Latitude/Longitude	:	12°45'N - 3°27'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:	
Longueur de la crête (m)	:	
Capacité ($10^6 m^3$)	:	300
Débit disponible ($10^6 m^3$/an)	:	
Puissance (MW)	:	
Production annuelle (GWh)	:	
Irrigation (ha)	:	10-15.000
Coût (10^6 F CFA)	:	220 Financé jusqu'à présent

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas, Ouagadougou, Haute Volta.

REFERENCES : "Projets de développement de la pêche," (1978) Afrique Agriculture, 30, Fév. p. 11-12.

Volta River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : SAMANDENI

NUMERO DE REFERENCE : V 13 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Volta Noire
Pays	: Haute Volta
Latitude/Longitude	: 11°26'N - 4°29'O.

DONNEES TECHNIQUES

Hauteur du barrage (m)	:
Longueur de la crête (m)	:
Capacité ($10^6 m^3$)	:
Débit disponible ($10^6 m^3$/an)	: 500
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	: 10 - 15.000
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Autorité des Vallées des Voltas, Ouagadougou, Haute Volta.

REFERENCES : Ediafric. La Documentation Africaine (1976) L'Economies des pays du Sahel; l'eau et l'irrigation. Paris.

NOM DU BARRAGE : BANZO

NUMERO DE REFERENCE : V 14 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Volta Noire
Pays	: Haute Volta
Latitude/Longitude	: 11°19'N - 4°49'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	: 8 - 10
Longueur de la crête (m)	: 2000 Max
Capacité ($10^6 m^3$)	: 250 - 500
Débit disponible ($10^6 m^3$/an)	: 80 - 200
Puissance (MW)	: "micro"
Production annuelle (GWh)	: negligible
Irrigation (ha)	: 5 - 12.000
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Office National des Barrages et de l'Irrigation. Ouagadougou, Haute Volta.

REFERENCES :

Volta River Basin Dam Sites in Upper Volta (Continued)

NOM DU BARRAGE : KARANKASSO

NUMERO DE REFERENCE : V 15 (VOIR CARTE 1, VOL 5)

ETAT DU BARRAGE : ~~EXISTANT~~/EN COURS D'ETUDE/~~SITE IDENTIFIE~~

BUT DU BARRAGE : Irrigation

SITUATION DU BARRAGE

Bassin	: Volta
Fleuve	: Bougouriba
Pays	: Haute Volta
Latitude/Longitude	: 10°45'N - 3°50'O

DONNEES TECHNIQUES

Hauteur du barrage (m)	:
Longueur de la crête (m)	:
Capacité ($10^6 m^3$)	: 800
Débit disponible ($10^6 m^3/an$)	:
Puissance (MW)	:
Production annuelle (GWh)	:
Irrigation (ha)	:
Coût (10^6 F CFA)	:

ORGANISATION RESPONSABLE : Aménagement des Vallées des Voltas.
Ouagadougou, Haute Volta.

REFERENCES :

Appendix IX

AID Projects in Upper Volta

EVALUATION DOCUMENTATION

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 6860220

TITLE: DORI INTEGRATED RURAL DEV (PVO PRO) — INITIAL FY: 75 FINAL FY: 79

DOCUMENT TYPE: SPECIAL EVALUATION REPORT — PUBLICATION DATE: 07/23/79
TITLE: PEN OF OBG TO SAVE THE CHILDREN FEDERATION FOR DORI INTEGRATED RURAL DEVELOPMENT PROJECT (UPPER VOLTA). — DIC REFERENCE CENTER NUMBER:
AUTHOR: BECK,LAWRENCE M — ORGANIZATION: SAVE THE CHILDREN FEDERATION
REID,-ILOE

PROJECTS (AND SUB-PROJECTS) EVALUATED: 686022000

ABSTRACT: EVALUATES PROM 7/76 TO 6/79 OPG (AID-AFR-G-1244) TO SAVE THE CHILDREN FEDERATION (SCF) FOR DORI INTEGRATED RURAL DEVELOPMENT PROJ IN UPPER VOLTA (UV). INTENDED TO CREATE COMMUNITY-BASED INTEGRATED RURAL DEVEL PROJS IN 4 UV VILLAGES. EVALUATION, DONE BY SCF, IS BASED ON REVIEW OF PROJ DOCUMENTS, INTERVIEWS WITH PROJ GROUPS, OBSERVATION OF VILLAGE PROJS.
PROJ IMPLEMENTATION HAS BEEN REAL BUT SLOW DUE TO LACK OF QUALIFIED IN-COUNTRY STAFF & FATALISTIC ATTITUDES OF VILLAGERS. VILLAGE OF BAFELE DID NOT PARTICIPATE DUE TO LACK OF HANDOUTS & WILL BE ACCOMPLISHED IN 1979.
MAJOR SCF PROBLEM HAS BEEN LACK OF STAFF. TRAINING, ESP OF FIELD COORDINATORS & THEREBY OF VILLAGERS, HAS BEEN SLOW AND MORE STAFF TRAINING IS NEEDED. ADMINISTRATIVE NETWORK FOR PROJ IMPLEMENTATION IS IN PLACE, WITH FIELD OFFICE & CENTRAL SUPPORTING OFFICE ESTABLISHED & STAFFED. AND EFFECTIVE CONTACT HAS BEEN MADE WITH NATIONAL & INTERNATIONAL SUPPORT GROUPS.
INSTITUTIONALIZATION, HOWEVER, HAS JUST BEGUN & EXPATRIATE STAFF WILL BE NEEDED UNTIL 1980.
TRAINING OF VILLAGE LEADERS HAS ALSO BEEN SLOW. TWENTY ONE OF TARGETED 24 VILL COMMITTEES HAVE BEEN FORMED & HAVE INITIATED 24 OF 40 TARGETED SELF-HELP PROJS, BUT LOSS OF BASELINE DATA SURVEY MAKES ADEQUATE EVALUATION IMPOSSIBLE. SIX OF 4 TARGETED VILL COMMITTEES TO ESNURE INSTITUTIONALIZATION HAVE BEEN FORMED & 4 MORE ARE PLANNED, BUT THEIR ABILITY TO OPERATE AUTONOMOUSLY IS MINIMAL.
GOVT OF UPPER VOLTA (GOUV) IS COMMITTED TO PROJ BUT LACKS ADEQUATE PLANNING CAPABILITY. COMMUNITY DEVELOPMENT WORKERS HAVE NOT YET BEEN TRAINED. ON REGIONAL LEVEL, SCF/GOUV PLANNING SESSIONS HAVE BEEN HELD & SCF HAS PRODUCED 3 REGIONAL PROJ PLANS, BUT TRAINING WORKSHOPS FOR GOUV PERSONNEL HAVE NOT TAKEN PLACE. IN FUTURE, INTER-VILLAGE COORDINATION WILL BE DONE BY MEETINGS BETWEEN VILLAGERS AND GOUV PERSONNEL.
PROJ HAS TAUGHT NECESSITY OF ADEQUATE IN-COUNTRY STAFF FOR VILLAGE PROJECTS.
IT IS RECOMMENDED THAT PRESENT ACCOUNTANT BE REPLACED BY ONE WITH ADEQUATE ACCOUNTING & LANGUAGE SKILLS AND THAT NEW BASELINE SURVEY BE DONE.
ATTACHED ARE 4 APPENDICES, MOSTLY IN FRENCH, ON PROJECT ACTIVITIES AND SUBPROJECTS.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 6860201 SUB-PROJECT: 01

TITLE: INTEGRATED RURAL DEVELOPMENT — INITIAL FY: 76 FINAL FY: 80

PROBLEM: EASTERN REGION OF UPPER VOLTA SUFFERS SEVERELY FROM EFFECTS OF CURRENT DROUGHT WITH PARTICULAR DAMAGE TO LIVESTOCK WHICH PROVIDE 35% OF COUNTRY'S EXPORT EARNINGS.

STRATEGY: PROVIDE CORE FINANCING FOR DELIVERY OF AN INTERMEDIATE TECHNICAL PACKAGE TO SMALL FARMERS & HERDERS IN DROUGHT STRICKEN REGION. GRANT FUNDS & FINANCE EXPANSION AND IMPROVEMENT OF LOCAL ADMINISTRATIVE AND MANAGEMENT INSTITUTIONS. MULTI-DONOR PROJECT INVOLVING UNDP, PEACE CORPS.

SUMMARY: COMPREHENSIVE PRODUCTION APPROACH IS BASED ON RESOURCES, TECHNICAL/ADMINISTRATIVE REALITIES OF EASTERN REGION (EORD). PROJECT CREATES 6 CENTERS OF INTENSIVE PRODUCTION ACTIVITY TOGETHER WITH ESSENTIAL SUPPORTING STRUCTURE/SERVICES. EXISTING EXTENSION, MARKETING ACTIVITIES ARE STRENGTHENED. SATURATION PROGRAM IN FOOD, LIVESTOCK PRODUCTION AND COMMUNITY ACTION IS DEVELOPED IN EACH CENTER. TECHNICAL PACKAGE IS INTRODUCED IN PRACTICAL DEMONSTRATIONS BY LOCAL FARMERS, SCHOOL STUDENTS. LIVESTOCK COMPONENT INTRODUCES ANIMAL HEALTH/RANGE PRESERVATION. EXTENSION PROGRAM COMPLEMENTS INTENSIVE WITH LIMITED INPUTS/SERVICES FOR AREAS NOT SERVED BY CENTER. MARKETING, CREDIT FACILITATED; STAFF INCREASED AND TRAINED.

GOAL: ASSIST IN OVERALL DEVELOPMENT OF RURAL SECTOR IN UPPER VOLTA BY SUPPORTING GOVERNMENT (GOUV) REGIONAL DEVELOPMENT ORGANIZATION (ORD) PROGRAM.

PURPOSE: UPGRADE QUALITY OF RURAL LIFE IN FADA AND PRIMARY BY PROGRESSIVELY INCREASING FOOD SUPPLIES AND SURPLUSES WHICH CAN BE MARKETED OUTSIDE ORD.

OUTPUTS: 6 ENCADREMENT CENTERS, MGMT CAPACITY IMPROVED, FOOD SUPPLIES INCREASED, SURPLUS, INCOME LARGER, IMPROVED PRACTICES ACCEPTED, USE OF COMPLYING AREAS INCREASED BY EFFECTIVE WATER CONTROL, WELLS IMPROVED, INCREASED, RURAL GRADS ACTIVE, FARMER-MGMT BODIES IMPROVED, DIET IMPROVED, WOMEN PARTICIPATE MORE, RANGE MGMT IMPROVED, ENCADREURS TRAINED, MEASURES STANDARDIZED, INSECTICIDE USED, COMMUNICATION FACILITIES INCREASED, MGMT, RESOURCES OF ORD DEVELOPED, IMPROVED BREEDS INTRODUCED.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 6860201 SUB-PROJECT: 02

TITLE: EASTERN ORD NON-FORMAL EDUCATION — INITIAL FY[illegible] — FINAL FY[illegible]

PROBLEM: LACK OF RELEVANT EDUCATION FOR FARM YOUTHS WHOSE PROBABLE FUTURE IS TO REMAIN IN FARMING. INABILITY TO COMMUNICATE EFFECTIVELY WITH VILLAGERS. LACK OF INSTRUCTIONAL MATERIALS. DEARTH OF SKILL IN GROUP PROCESSES.

STRATEGY: ASSIST EASTERN REGIONAL DEVELOPMENT ORGANIZATION (EORD) DEVELOP LEARNING RESOURCES CENTER (LRC) TO PROVIDE LEARNING SUPPORT SERVICES FOR NON-FORMAL, DEVELOPMENT-ORIENTED RURAL EDUCATION.

SUMMARY: PROJECT ESTABLISHES LRC AS INTEGRAL PART OF EXTENSION/TRAINING SECTION OF EORD. LRC SERVES ALL ASPECTS OF ORD ACTIVITIES: EXTENSION, STAFF TRAINING, ADULT EDUCATION, LITERACY, HEALTH, CO-OP TRAINING, ETC. LRC PRODUCES INSTRUCTIONAL PACKAGES FOR USE BY LOCAL "ENCADREURS" TO TEACH SPECIFIC DEVELOPMENT-RELATED TOPIC. PACKAGES EMPLOY SEVERAL COMMUNICATION METHODS TO PROVIDE ENCADREURS WITH AS MANY AIDS AS POSSIBLE. LRC PREPARES TRAINING MATERIALS FOR EXTENSION AGENTS AND ASSISTS EORD PROGRAMS BUT DOES NOT ORGANIZE LITERACY EFFORTS. AID ALSO IMPROVES 25 EORD SCHOOLS AND SUPPORTS 35 POST-SCHOOL COOPERATIVE GROUPS. IN LATTER 15 GRADS FARM 6 HA NEAR SCHOOL.

GOAL: DEVELOP RURAL SECTOR IN UPPER VOLTA BY SUPPORTING GOVERNMENT (GOUV)-REGIONAL DEVELOPMENT ORGANIZATIONS (ORD) EXTENSION AND EDUCATION PROGRAMS. IMPROVE SKILLS OF FARMERS IN EASTERN ORD THROUGH FUNCTIONALLY-ORIENTED NFE PROGRAMS.

PURPOSE: ENHANCE CAPABILITY AND CAPACITY OF EORD TO CARRY OUT EFFECTIVE EXTENSION AND ADULT RURAL EDUCATION PROGRAMS IN ALL AREAS OF EORD PROGRAM BY ESTABLISHING LEARNING RESOURCES CENTER TO SUPPORT DEMO ACTIVITIES REQUIRING EFFECTIVE LEARNING. SUPPORT ONGOING LITERACY PROGRAMS IN EORD TO FOCUS MORE ON PRESSING DEVELOPMENT NEEDS.

OUTPUTS: 1. FUNCTIONING LEARNING RESOURCES CENTER IN EORD STRUCTURE CAPABLE OF PROVIDING LEARNING MATERIALS AND TRAINING SERVICES FOR VARIOUS NFE AND EXTENSION PROGRAMS OF EORD. 2. EXTENSION WORKERS TRAINED TO PROVIDE BETTER SERVICES THROUGH USE OF IMPROVED MATERIALS, TECHNIQUES. 3. TESTED ADULT LEARNING PROGRAMS RELYING ON NEW MATERIALS AND VOLUNTEER EFFORTS OF VILLAGERS THEMSELVES.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 6860202 SUB-PROJECT: 00

TITLE: UPPER VOLTA SEED MULTIPLICATION — INITIAL FY[illegible] — FINAL FY[illegible]

PROBLEM: FORMAL SEED PRODUCTION PROGRAM LACKING, AS IS INTEGRATED SYSTEM TO PLAN VARIETAL TRIALS, UTILIZE RESULTS, PROMOTE IMPROVED VARIETIES. IMPROVED VARIETIES OF SORGHUM, MILLET UNAVAILABLE, DESPITE WIDESPREAD DEMAND. SIGNIFICANT WEAKNESS IS PAUCITY, INADEQUACY OF FIELD TRIALS BY SEED VARIETY AND BY GEOGRAPHICAL LOCATION.

STRATEGY: ASSISTS GOVERNMENT OF UPPER VOLTA (GOUV) INSTITUTE NATIONAL SEED PROGRAM WITH CAPACITY TO PLAN, ABILITY TO PROVIDE TECHNICAL SERVICES, AUTHORITY TO ESTABLISH QUALITY CONTROLS.

SUMMARY: PROJECT PROVIDES FINANCING FOR ESTABLISHMENT OF NATIONAL SEED SERVICE. INSTITUTIONAL BASE SERVES AS FOUNDATION ON WHICH MORE ELABORATE SYSTEMS CAN BE BUILT WHEN PERSONNEL/MONEY ARE AVAILABLE. US ASSISTANCE PROVIDES MINIMUM ESSENTIAL FACILITIES AND EQUIPMENT TO 4 MAJOR SEED MULTIPLICATION CENTERS FOR RICE, SORGHUM, MILLET, CORN, PEANUTS. PRIMARY EMPHASIS IS GIVEN TO TRAINING PROGRAMS ORGANIZED WITHIN UPPER VOLTA AT EXISTING INSTITUTIONS OR IN OTHER AFRICAN NATIONS. BECAUSE REGIONAL DEVELOPMENT ORGANIZATIONS (ORDS) ARE RESPONSIBLE FOR LATER GENERATION SEED MULTIPLICATION, ASSISTANCE PROJECTED TO MEET BASIC REQUIREMENTS IN ADDITION TO TRAINING.

INCREASE DOMESTIC FOOD PRODUCTION, SPECIFICALLY THAT OF RICE, CORN, GROUNDNUTS, SORGHUM, MILLET.

PURPOSE: ESTABLISH NATIONAL SEED SERVICE TO ASSURE CONSTANT SOURCE OF SEED TO FARMER AND TO PROVIDE ORGANIZATIONAL FRAMEWORK FOR MULTIPLYING IMPROVED SEED OF SUPERIOR VARIETIES AS THEY BECOME AVAILABLE.

INPUTS: UPPER VOLTA PERSONNEL TRAINED ABROAD AND IN-COUNTRY. BUILDINGS CONSTRUCTED AND EQUIPMENT IN PLACE. SEED PRODUCED AND DISTRIBUTED. FIELD TRIALS AND DEMONSTRATIONS CONDUCTED.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 6860203 SUB-PROJECT: 00

TITLE: [illegible] LIVESTOCK — INITIAL FY[illegible] — FINAL FY[illegible]

PROBLEM: CURRENT SYSTEM OF LAND USE IN EASTERN REGIONAL DEVELOPMENT ORGANIZATIONS (ORDS) IS REDUCING [illegible]-TERM CARRYING CAPABILITY OF LAND TO SUPPORT BOTH CROP AND LIVESTOCK PRODUCTION. NATIONAL LIVESTOCK SERVICE LACKS FUNDING TO DEVELOP PROGRAMS.

STRATEGY: EXTEND GRANT TO NATIONAL LIVESTOCK SERVICE FOR DEVELOPMENT OF REPLICABLE LIVESTOCK PROJECTS AT VILLAGE LEVEL IN EASTERN ORDS.

SUMMARY: PROJECT SEEKS TO DEVELOP REPLICABLE VILLAGE LIVESTOCK PROGRAM WITH COOPERATION OF LOCAL LEADERS AND ORDS. IDENTIFIES LIVESTOCK ACTIVITIES HAVING POTENTIAL TO IMPROVE PERFORMANCE, EXAMINES THEM IN TARGET VILLAGES AND SUGGESTS PROCEDURES FOR IMPLEMENTING, EVALUATING THEM. OBJECTIVES INCLUDE PROGRAM FOR PEST/DISEASE CONTROL, IMPROVED FEEDING, SELECTION PRACTICES, FARMS EXPLORE METHODS OF FARM FINISHING FOR MARKETS. GRAZING RESERVE IS DEVELOPED IN FADA ORD AND GRAZING IS CONTROLLED IN SELECTED VILLAGE BY ORGANIZING GRAZING ASSOCIATIONS & OTHER CONTROLS. VALIDITY OF BRUSH BURNING [illegible] WITH METHODS REVISED TO CONTROL EXCESS. FUTURE PROJECT LEARNS. VILLAGERS, EXTENSION AGENTS TRAINED IN PRODUCTION MANAGEMENT.

IMPROVE QUALITY OF LIFE OF PEOPLE IN AFFECTED AREA THROUGH INCREASED USE OF RANGE RESOURCES AND OTHER FEED SOURCES AND THROUGH IMPROVED ANIMAL HEALTH AND [illegible]

PURPOSE: DEVELOP CAPABILITY OF CENTRAL LIVESTOCK SERVICE AND 3 REGIONAL DEVELOPMENT ORGANIZATIONS (ORDS) TO PLAN AND IMPLEMENT VILLAGE LIVESTOCK MANAGEMENT SYSTEMS WHICH MAINTAIN INTEGRITY OF ENVIRONMENT.

INPUTS: 1. RESOURCE EVALUATION AND PLANS (BASELINE DATA). 2. TRAINED PERSONNEL. 3. TESTED PRINCIPLES: 1-3 VILLAGES OR VILLAGE CLUSTERS FOR FARM FINISHING OR FATTENING LIVESTOCK; 1 PASTURE RESERVE; CONTROLLED GRAZING SCHEME IN VILLAGE CLUSTER.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 0660211 SUB-PROJECT: 00

TITLE: WOMEN'S ROLES IN DEVELOPMENT — INITIAL FYI 77 FINAL FYI 00

PROBLEM: WOMEN ARE EXCLUDED FROM IMPORTANT ROLE IN DEVELOPMENT. PROGRAMS AND POLICIES THAT REINFORCE WOMEN'S PARTICIPATION IN THIS PROCESS ARE LACKING. (RURAL DEVELOPMENT ORGANIZATION=ORD)

STRATEGY: LONG TERM APPROACH DEVELOPS NEW INSTITUTION IN UPPER VOLTA'S PUBLIC SECTOR.

SUMMARY: GRANT TO DOMESTIC ECONOMY UNIT (DEU) FUNDS PROGRAM TO PROVIDE CREDIT TO WOMEN FOR SMALL DEVELOPMENT ACTIVITIES. INCOME-GENERATING, LABOR-SAVING OR SKILL ACQUISITION MICROPROJECTS ARE PROPOSED BY COMMUNITY, EXAMINED FOR FEASIBILITY BY ORD, MANAGED AND IMPLEMENTED BY WOMEN, EVALUATED BY DEU INFO SYSTEM. ACTIVITIES INCLUDE COLLECTIVE FIELDS, MOTORIZED MILLS, INDIVIDUAL GARDENS. LOANS ARE MADE FROM VILLAGE PROMOTION FUND AT 10% FOR 2-3 YR WITH 1 YR OF GRACE. 20% OF FUND IS ADMINISTERED BY DEU AND 80% BY 8 ORDS, WHILE MANAGING PROJECT, DEU DEVELOPS INFO SYSTEM TO MONITOR MICROPROJECTS & THEIR EFFECTS AND TO IDENTIFY TRAINING NEEDS. 60 FEMALE DEU AGENTS RECEIVE ORGANIZATION AND TECHNICAL TRAINING AT NATL INSTITUTE.

GOAL: IMPROVED ECONOMIC AND SOCIAL WELL-BEING OF PEOPLE IN PROJECT VILLAGES.

PURPOSE: WOMEN'S CAPACITY INDIVIDUALLY OR COLLECTIVELY TO ORGANIZE, MANAGE, INVEST AND CARRY OUT SOCIAL AND ECONOMIC DEVELOPMENT ACTIVITIES DEVELOPED AT VILLAGE LEVEL IN 60 VILLAGES IN WHICH AN EXTENSION AGENT IS ASSOCIATED, BY JAN 1980. 2.THE INSTITUTIONALIZATION OF CREDIT TO SUPPORT THESE ACTIVITIES.

OUTPUTS: 1. 60 VIABLE MICRO-PROJECTS ESTABLISHED IN 60 VILLAGES. 2.ORGANIZATIONAL SKILLS AND TECHNICAL TRAINING RECEIVED BY 60 DOMESTIC AGENTS. 3.RESEARCH AND INFORMATION SYSTEM DEVELOPED AND FUNCTIONING. 4.REGIONAL DEVELOPMENT ORGANIZATION (ORD) SUPPORT MECHANISM FOR VILLAGE LEVEL MICRO-PROJECTS STRENGTHENED IN 4 ORDS. 5.NATIONAL LEVEL SUPPORT MECHANISM FOR ORD LOCAL MICRO-PROJECT OPERATIONS STRENGTHENED.

COUNTRY/BUREAU: UPPER VOLTA — PROJECT: 0660215 SUB-PROJECT: 00

TITLE: EASTERN ORD RURAL ROADS — INITIAL FYI 77 FINAL FYI 00

PROBLEM: INADEQUACY OF RURAL ROAD SYSTEM IN EASTERN ORD IS REGARDED AS PRIMARY OBSTACLE TO DEVELOPMENT IN REGION. CURRENT TRAILS ARE BADLY RUTTED AND IMPASSABLE UP TO 4 MONTHS EVERY YEAR. MANY VILLAGES ARE ISOLATED FROM EXISTING ROADS AND CONSEQUENTLY, UNABLE TO MARKET LOCAL PRODUCTION AND TO RECEIVE GOVERNMENT SERVICES. CONVERSELY, GOVERNMENT CANNOT ADMINISTER THESE ISOLATED AREAS EFFECTIVELY.

STRATEGY: 4-YEAR PROJECT CONSISTING OF GRANT TO UPGRADE SELECTED RURAL ROADS IN EASTERN ORD REGION OF UPPER VOLTA. GOVERNMENT OF UPPER VOLTA (GOUV) PROVIDES 25 OF OPERATING COSTS AND TRAINS ROAD BRIGADE.

SUMMARY: GRANT TO GOVERNMENT OF UPPER VOLTA (GOUV) TO UPGRADE 154 KM OF SELECTED RURAL ROADS IN EASTERN ORD (ADMINISTRATIVE REGION). SECONDARY ROAD MAINTENANCE SERVICE (SERS) IN DEPARTMENT OF PUBLIC WORKS BUILDS ROADS AND ADMINISTERS PROJECT. PRIVATE LOCAL FIRMS ARE CONTRACTED TO PROVIDE DRAINAGE STRUCTURES. CONSTRUCTION OF ROADS RESULTS IN INCREASED AGRICULTURAL ACTIVITY, INCREASED ACCESS TO HEALTH AND EDUCATIONAL SERVICES BY LOCAL RESIDENTS, IMPROVED ADMINISTRATIVE ACCESS TO ISOLATED AREAS. RESIDENTS OF THESES AREAS WILL BE PRIMARY BENEFICIARIES OF PROJECT.
USAID PROVIDES 31 PIECES OF ROAD BUILDING EQUIPMENT FOR ONE ROAD BRIGADE, 75% OPERATING COSTS, PROJECT MANAGER (ROAD CONSTRUCTION SUPERINTENDENT). GOUV SUPPLIES 25% OF OPERATING COSTS AND TRAINS ROAD BRIGADE.
ANOTHER 35 KM ROAD HAS HIGH CONSTRUCTION COST PER INHABITANT. PP PROPOSES CONSTRUCTION OF DRAINAGE STRUCTURE ONLY FOR THIS ROAD IF OPERATING FUNDS REMAIN AFTER ORIGINAL 154 KM. ALSO RECOMMENDS SECOND PHASE CONSTRUCTION OF ADDITIONAL SECONDARY ROADS IN SAME REGION. ROADS ARE LOCATED IN INTENSIVE ZONES OF EASTERN ORD INTEGRATED RURAL DEVELOPMENT PROJECT (0660201).

GOAL: TO INCREASE THE ECONOMIC AND SOCIAL WELL-BEING OF THE RURAL POPULATION IN THE EASTERN ORD.

PURPOSE: 1.TO INCREASE SMALL FARMER INCOME BY PROVIDING MARK ACCESS. 2.TO INCREASE ACCESS OF VILLAGERS TO HEALTH AND EDUCATION SERVICES NOT CURRENTLY RECEIVED BECAU OF ISOLATION. 3.TO INCREASE EASTERN ORD'S MANAGEMEN EFFECTIVENESS BY PROVIDING ACCESS TO REMOTE AREAS UNDER ITS JURISDICTION.

OUTPUTS: 1.COMPLETED HYDROLOGICAL STUDIES. 2.DRAINAGE STRUCTURES DESIGNED. 3.PROJECT MANAGER HIRED. WORKING. 4.EQUIPMENT IN COUNTRY. 5.ROAD BRIGADE ORGANIZED, OPERATIONAL. 6.ROAD CONSTRUCTION COMPLETED ON FADA-BILANGA, DIABO COMIN-YANGA, [illegible] OUAGADOU-MASSOUGOU.

COUNTRY/BUREAU: UPPER VOLTA	PROJECT: 6860212 SUB-PROJECT: 00
TITLE: [illegible] VILLAGE DEVELOPMENT FUND	INITIAL FY: 78 FINAL FY: 81

...EM: THE DEVELOPMENT OF UPPER VOLTA HAS BEEN HINDERED BY ONCHOCERCIASIS (RIVER BLINDNESS). MANY AREAS HAVE NOW BEEN FREED OF THIS DISEASE AND THE VOLTA VALLEY AUTHORITY (AVV) IS UNDERTAKING A PROGRAM TO RESETTLE THESE FERTILE BUT UNDERPOPULATED AREAS IN ORDER TO RESTORE PROPER PEOPLE TO LAND BALANCE IN THE REGION. THE VILLAGES LACK THE ORGANIZATIONAL CAPABILITY FOR NEEDED SOCIAL AND ECONOMIC DEVELOPMENT PROJECTS AND AVV LACKS A PROCESS FOR INSTITUTION OF CREDIT TO MAKE THESE VILLAGE UNDERTAKING POSSIBLE.

STRATEGY: FOUR-YEAR GRANT TO ESTABLISH AVV DEVELOPMENT FUND TO PROVIDE LOANS FOR 200 SMALL-SCALE, INCOME-GENERATING ENTERPRISES IN 133 VILLAGES. PROJECT WILL BE SUPPORTED BY TRAINING OF VILLAGERS AND OF AVV EXTENSION WORKERS AND BY DEVELOPMENT OF AVVINFORMATION SYTEM. AVV WILL DIRECT PROJECT WITH PROJECTM MANAGER ON THEIR STAFF. ACTIVE PARTICIPATION OF VILLAGERS, ESPECIALLY WOMEN, IS TO BE AN INTERGRAL PART OF THE PROJECT.

...PY:

IMPROVED ECONOMIC AND SOCIAL WELL-BEING OF PEOPLE IN RESETTLEMENT VILLAGES OF THE VOLTA VALLEY AUTHORITY (AVV).

PURPOSE: (1) VILLAGE LEVEL CAPACITY DEVELOPED TO ORGANIZE, MANAGE AND INVEST INDEPENDENTLY IN VILLAGE SOCIAL AND ECONOMIC DEVELOPMENT PROJECTS IN 133 AVV VILLAGES BY JAN 1981; (2) THE INSTITUTIONALIZATION OF CREDIT TO MAKE SUCH VILLAGES UNDERTAKINGS POSSIBLE.

...TS: (1) 200 SELF-SUSTAINING INCOME-GENERATING ENTERPRISES FUNCTIONING IN 133 AVV VILLAGES BY END OF 1980; ORGANIZATIONAL AND TECHNICAL TRAINING COMPLETED; INFORMATION SYSTEM DEVELOPED AND FUNCTIONING; AVV STAFF CAPABILITY DEVELOPED TO OPERATE FUND AND FUND FINANCED ACTIVITIES.

COUNTRY/BUREAU: UPPER VOLTA	PROJECT: 6860219 SUB-PROJECT: 00
TITLE: RURAL ENTERPRISE DEVELOPMENT	INITIAL FY: 77 FINAL FY: 80

...EM: THERE IS VERY LITTLE BASIC DATA ABOUT THE EASTERN ORD, A REGION OF UPPER VOLTA RELATIVELY NEGLECTED IN DEVELOPMENT TERMS. THIS GEOGRAPH REGION, ADMINISTERED BY GOVT OF UPPER VOLTA, LACKS MODERN METHODS FOR PRODUCING OR EXPANDING AGRI-BUSINESSES, SUFFICIENT LOCAL CREDIT RESOURCES, ADEQUATE ROADS, BASIC DATA AND PLANNING CAPABILITY, BECAUSE EASTERN ORD LACKS TECHNOLOGICAL METHODS, CREDIT AND PLANNING CAPABILITY, ITS ENTREPRENEURS ARE HAMPERED FROM SETTING UP NEW BUSINESSES, IMPROVING EXISTING BUSINESSES & INCREASING PRODUCTIVITY.

STRATEGY: 2-YEAR PROJECT CONSISTS OF OPERATIONAL PROGR GRANT & TECH ASSISTANCE TO COLLECT DATA, UPGRADE BUSINESS & AGRICULTURAL PRACTICES, EXPAND CREDIT FACILITIES AND INTRODUCE NEW RURAL ENTERPRISES IN THE UPPER VOLTA AREA KNOWN AS EASTERN ORD. AID PROVIDES TA, GOODS, SERVICES, CREDIT FUND, ADVISERS, TRAVEL AND ORIENTATION COSTS, HOST COUNTRY (THE EASTERN ORD) PROVIDES LOCAL EQUITY FOR EXPERIMENTAL (GRANT) FUND, OFFICE SPACE, EQUIPMENT, MATERIALS, STORAGE, LABOR, HOUSING & FURNISHINGS

...PY:

OPERATIONAL PROGRAM GRANT (OPG) AND TECHNICAL ASSISTANCE (TA) TO UPPER VOLTA TO ENCOURAGE PRIVATE BUSINESS ACTIVITIES IN THE COUNTRY'S RURAL AREA KNOWN AS EASTERN ORD. (ORD IS AN ADMINISTRATIVE DIVISION--ORGANISME REGIONAL DE DEVELOPPEMENT.) IMPLEMENTER AND CATALYST OF PROJ IS PARTNERSHIP FOR PRODUCTIVITY, A US PRIVATE, VOLUNTARY ORGANIZATION. BENEFICIARIES SHOULD BE RURAL FARMERS, BUSINESS PERSONS AND RESIDENTS WHOSE INCOMES WOULD IMPROVE. ALSO, RURAL MARKETS SHOULD EXPAND AND LABOR-INTENSIVE TECHNOLOGIES SHOULD INCREASE.
PROJECT COMPONENTS INCLUDE TECHNICAL ADVISORS; REVOLVING CREDIT FUND; ENTREPRENEURS PROPOSING LOAN-WORTHY PROJECTS; A SHORT RUN TO SUPPORT WAYS TO INTRODUCE NEW ENTERPRISES; TECHNOLOGIES; EQUIPMENT. TA WILL BE DIVIDED BETWEEN 2 OPERATIONAL LOCATIONS--DIAPAGA AND FADA N'GOURMA--ACCESSIBLE TO PARTICIPANTS. 2 ADVISORS WILL: 1. DESIGN AND TEST PURPOSE CREDIT VEHICLES. 2. DESIGN/TEST APPROPRIATE TA--OPERATING SMALL EXPERIMENTAL CREDIT FUNDS--TO UPGRADE BUSINESS PRACTICES. 3. SUPPORT APPROVED ENTREPRENEURIAL ACTIVITIES. 4. SUPPORT GOVERNMENT AGENCIES OR PRIVATE GROUPS THROUGH SEMINARS ON ASSISTANCE ON RURAL ENTERPRISES. 5. EVALUATE SERVICES NEEDED BY ENTREPRENEURS. 6. INSTALL AND TEST ONE MARKETING SERVICE. 7. RECOMMEND FOLLOW-UP PROGRAMS. PROJECT WILL ALSO ESTABLISH AN INDIGENOUS MGMT GROUP FOR FUTURE OPERATIONS. PROJECTIES IN WITH GOUV'S PRIMARY GOAL FOR EASTERN ORD WHICH IS TO INCREASE LIVESTOCK/CROP PRODUCTION AS A MEANS OF INCREASING FARMER/HERDER INCOME LEVELS AND THUS EXPANDING THE AREA'S ECONOMY.
AID SUPPLIES TA, GRANT FOR REVOLVING CREDIT FUND, 2 FOUR-WHEEL DRIVE VEHICLES, TRAVEL AND ORIENTATION COSTS. HOST COUNTRY PROVIDES LOCAL EQUITY FOR EXPERIMENTAL FUND, OFFICE SPACE, MATERIALS, EQUIPMENT, STORAGE, LABOR, HOUSING AND FURNISHINGS, SHIPMENT OF GOODS, (MACHINERY, EQUIPMENT, LABOR OFFICE SPACE CONTRIBUTED BY LOCAL BUSINESS PERSONS.) SOME TA COMES THROUGH VOLUNTEERS IN TECHNICAL ASSISTANCE, INC. (VITA), WHICH IN TURN IS BACKSTOPPED BY SOCIETE AFRICAINE D'ETUDES ET DE DEVELOPPEMENT (SAED), US GROUPS WITH OFFICES IN UPPER VOLTA. AID FUNDING: 75% OTHER--25%.

...: IMPROVED QUALITY OF LIFE OF HERDSMAN AND SMALL FARMERS IN THE EASTERN ORGANIZATION FOR REDEVELOPMENT (ORD).

PURPOSE: TO DETERMINE THROUGH EXPERIMENTATION AND DATA COLLECTION AN APPROPRIATE TECHNICAL PACKAGE AND CREDIT SYSTEM FOR RURAL ENTERPRISE DEVELOPMENT AS A SECOND PRODUCTION PHASE OF THIS PROJECT.

...TS: 1. BUSINESS PRACTICES OF SELECTED ENTREPRENEURS UPGRADED. 2. CREDIT TO FINANCE CAPITAL REQUIREMENTS OF BUSINESS OPERATIONS PROVIDED. 3. RECENTLY INTRODUCED NEW ENTERPRISES APPRAISED FOR SOCIAL SOUNDNESS. 4. USE OF EXISTING ORD CREDIT SYSTEMS MAXIMIZED. 5. FORMAL REPORTS ASSESSING GROWTH OF AGRIBUSINESS AND SERVICES TO SMALL FARMERS SUBMITTED TO AID.

Appendix X

Bibliographies

1. General Bibliographic Sources for Africa
2. Agricultural and Related Activities
3. Water, Soils, Geology, and Energy
4. Development and Social Aspects
5. Flora and Fauna

1. General Bibliographic Sources for Africa

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E: sedimentology.
F: regional and community planning.
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