ASSESSMENT OF AGRICULTURAL RESEARCH RESOURCES IN THE SAHEL

VOLUME III
NATIONAL REPORT: UPPER VOLTA

by

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Note: As this report was going to press the Government announced that it had changed the name of "Upper Volta" to "Burkina Faso."

PREFACE

ASSESSMENT OF AGRICULTURAL RESEARCH RESOURCES IN THE SAHEL

This document has been prepared by DEVRES, Inc. and the Sahel Institute (INSAH) in accordance with the terms of a contract with the U.S. Agency for International Development.

The national agricultural research resources assessments which provide the necessary background information for this document were conducted by national agricultural research scientists from Sahelian countries under the guidance of DEVRES and INSAH with financial support from the U.S. Agency for International Development (under Contract No. AFR-0435-C-00-2084-00 and Project No. 698-0435 entitled Strengthening African Agricultural Research) on behalf of the member countries of the Cooperation for Development in Africa (CDA).

The results of the assessment are contained in the following reports.

Volume I - Regional Analysis and Strategy

Volume II - Summaries of National Reports

Volume III - National Reports:[1]

Cape Verde
Chad
The Gambia
Mali
Mauritania
Niger
Senegal
Upper Volta[2]

These reports are available in microfiche or printed form in French and in English at a cost determined by document size at the following address:

U.S. Agency for International Development
Document and Information Handling Facility
7222 47th Street
Suite 100
Chevy Chase, MD 20815
Telephone: 301-951-7191 ext. 26

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[1] Each national report is printed separately.

[2] As this report was going to the printers in August 1984, the change of name of "Upper Volta" to "Burkina Faso" was announced. While Upper Volta was the correct name of the country as of the date of the inventory (December 1983), readers should take note of this recent change.

LIST OF ACRONYMS AND ABBREVIATIONS

ACDI	Canadian Agency for International Development
ADRAO	Association for the Development of the Cultivation of Rice in West Africa
AGRHYMET	Agro-Hydro-Meteorology
ARCOMA	Regional Workshops for the Construction of Agricultural Equipment
AVV	Volta Valley Management Authority
BECEAO	Central Bank of West African States
BIA	Bureau of Agricultural Inputs
BIV	International Bank of Volta
BOAD	West African Development Bank
CAP	Agricultural Training Center of Matourkou
CCCE	Central Fund for Economic Cooperation
CEAO	Community of West African States
CEE	European Economic Community
CEPE	Primary Elementary Education Certificate
CER	Center for Rural Education
CERCI	Center for Experimentation on Rice and Irrigated Crops
CES	Soil and Water Conservation
CFJA	Training Center for Young Farmers
CIDR	International Company for Rural Development
CIEH	Inter-African Committee for Hydraulic Studies
CILSS	Permanent Inter-State Committee on Drought Control in the Sahel
CIMMYT	International Cenbter for the Improvement of Corn and Wheat
CIR	Rural Intensity Coefficient
CMRPN	Military Rectification Committee for National Improvement
CNACB	National Commission for the Granting and Regulation of Scholarships
CNCA	National Fund for Farm Credit
CNDA	National Center for Agricultural Information
CNDI	National Fund for Deposits and Investments
CNEA	National Center for Agricultural Equipment
CNESRS	National Council of Higher Education and Scientific Research

CNPAR	National Center for the Promotion of Rural Craftsmen
CNR	National Council of the Revolution
CNRST	National Center for Scientific Research and Technology
COREMA	Regional Working Center for Agricultural Machinery
CPCR	Commission for Research Planning and Coordination
CRDI	Research Center for International Development
CRST	Commission for Scientific and Technological Research
CRST/OUA	Scientific, Technical and Research Committee of OUA
CRTA	Research Center on Animal Trypanosomiasis
CSPPA	Fund for Price Stabilization of Agricultural Products
CSPPN	Senior Advisory Council for National Planning
CSRA	Specialized Committee for Animal Husbandry Agronomic Research
CSRAZ	Specialized Committee for Agricultural and Zootechny Research
CTFT	Technical Center for Tropical Forestry
CVRS	Voltaic Center for Scientific Research
DAFR	Division of Forest Management and Reforestation
DAFS	Department of Selective and Functional Literacy
DDP	Department of Information and Publications
DEA	Diploma of Higher Education
DEP	Department of Studies and Projects
DGRST	Department of Scientific and Technological Research
DPP	Division of Fisheries and Fish Research
DSA	Division of Agricultural Services
DSEIA	Division of Livestock and Animal Industries Services
EIER	Inter-State School of Engineering and Rural Equipment
ELAT	Anti-Tsetse Fly Training School
ENESA	National School for Animal Production and Animal Health
ENFD	Dinderesso National Forestry School
ESD	National School of Law
ESSEC	National School of Economic Sciences

FAC	Fund for Aid and Cooperation
FAO	United Nations Organization for Food and Agriculture
FDR	Fund for Rural Development
FED	European Fund for Development
FIDA	International Fund for Agricultural Development
FIT	Intertropical Front
FSU	Farming Systems Unit
GERDAT	Study and Research Group for Tropical Agronomical Development
GTZ	West German Agency for Technical Cooperation
HER	Division of Rural Water and Material Resources
IBPGR	International Board for Plant Genetic Resources
ICRISAT	International Research Center of Semi-Arid Crops of Tropical Regions
IDA	International Development Association
IEMVT	Institute for the Study of Tropical Veterinary Medicine
IFDC	International Fertilizer Development Corporation
IFPRI	International Research Institute for Food Policies
IITA	International Institute for Tropical Agriculture
ILCA	Internal Center for Livestock Raising in Africa
IMP	Institute of Mathematics and Physical Sciences
INAFA	National Institute for Literacy Training of Adults
INAFEC	African Institute for Cinematographic Education
INSAH	Sahel Institute
IRA	Institute for Agronomic Research
IRAT	Research Institute of Tropical Agronomy and Food Crops
IRBET	Institute for Biological and Tropical Ecology Research
IRCT	Research Institute of Cotton and Textiles
IRFA	Institute for Research on Fruit and Citrus Fruits
IRHO	Research Institute of Oils and Oleaginous Plants
IRRI	International Rice Research Institute
IRSN	Research Institute for Natural Substances

IRSSH	Research Institute for Social Science and Humanities
ISNAR	International Service of National Agronomic Research
ISP	Advanced Polytechnical Institute
IVE	Voltaic Energy Institute
IVRAZ	Voltaic Institute for Crop and Animal Husbandry Research
MDR	Ministry of Rural Development
ME	Ministry of Equipment
MESRS	Ministry of Higher Education and Scientific Research
MET	Ministry of Environment and Tourism
MSU	Michigan State University
OCAM	Joint African and Malegacon Organization
OFNACER	The National Office of Grains
OMM	World Organization of Meteorology
ONBI	National Office of Dams and Irrigation
ONEPAFS	National Office of Permanent Education and of the Functional and Select Literacy Development
ONERA	National Office for the Improvement of Animal Resources
ONUDI	United Nations Industrial Development Organization
OPEP	Organization of Petroleum Exporting Countries
ORD	Regional Development Offices
ORSTOM	Office of Overseas Scientific and Technical Research
OUA	Organization of African Unity
OVEA	Voltaic Educational Organization
PAPEM	Mini-Station for Pre-Extension Experimentation
PIB	Gross National Product (GNP)
PNRA	National Program for Agronomic Research
PNUD	United Nations Program for Development
PTS	Supplementary Technical Personnel
RAN	Abidjan-Niger Railroad
RFA	The Federal Republic of Germany
RHV	The Republic of Upper-Volta
RPAA	Director of Accelerated Agricultural Production
SAFGRAD	Semi-Arid Food Grain Research and Development
SNS	National Service of Certified Seeds
SOFITEX	Association of Fibers and of Textiles
UMOA	West Africa Monetary Union

UNDP	United Nations Development Program
UNICEF	United Nations International Childrens' Fund
UVOCAM	Voltaic Union of Cooperative Market-Gradening

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INTRODUCTION

A. Background

The Agricultural Research Resources inventory and assessment for Upper Volta was also conducted in the remaining seven countries of the Sahel (Cape Verde, Chad, Mali, Mauritania, Niger, Senegal, and The Gambia), all of which are member countries of the CILSS, the Permanent Interstate Committee for Drought Control in the Sahel. The eight national reports taken together comprise Volume III of this report. They are bound separately and are available from the United States Agency for International Development in Washington.[1]

The inventory and assessement was carried out within the framework of the high priority accorded by the member countries of the CDA (Cooperation for Development in Africa) and the CILSS to the need to develop and strengthen agricultural research capability in the region. As the World Bank noted in its September 1983 report entitled "Sub-Saharan Africa: Progress Report on Development Prospects and Programs"[2]:

> "Even within the present state of technical knowledge, improved incentives and marketing arrangements would permit very large increases in agricultural output [in Africa]. However, for the longer term, increased output will depend on the development of effective technical packages, pest and disease control and developments in animal husbandry... In a situation of budgetary stringency and of immediate crises, expenditure on research having a possible, but uncertain payoff, ten years or more in the future is frequently seen as dispensable. This danger is increased when research programs are manifestly weak and unfocused. It is, therefore, essential that these programs be formulated and implemented in ways which will enable them to contribute more effectively to the process of development...,"

The CDA is an informal association of donors including Belgium, Canada, France, Italy, West Germany, the United Kingdom and the United States. The United States, assisted by other CDA donors, was assigned

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[1] Volume II, Summary of Agricultural Research in the Sahel, contains summaries of each of the eight countries' national reports. Volume I is a "Regional Analysis of Agricultural Research Resources in the Sahel". Both may be obtained from AID as well.

[2] World Bank, Sub-Saharan Africa: Progress Report on Development Prospects and Programs, Washington, D.C., World Bank, (September 1983, pp. 30-31.

the specific responsibility for coordinating the development of CDA-supported agricultural research programs in the Sahelian and Southern African regions.

This CDA initiative responds to initiatives already undertaken by many national governments and regional entities (such as the OAU, and CILSS) to emphasize the development of a strong capability in the Sahel to increase agricultural productivity. The donors, therefore, joined with African regional agencies such as INSAH in the Sahel and the Southern Africa Development Coordination Conference (SADCC) in Southern Africa to develop country-specific, regionally-sensitive analyses of existing resources and to identify medium- to long-term needs and opportunities in support of agricultural research that will lead to increased agricultural productivity.

The assessment and preparation of this report were financed by the U.S. Agency for International Development (AID) and carried out by DEVRES, Inc., a U.S.-based private contractor located in Washington, D.C. engaged by AID. DEVRES was assisted by two sub-contractors, the Institut du Sahel (INSAH) and the Midwest Universities Consortium for International Activities (MUCIA). INSAH was established in 1976 and given prime responsibility by CILSS for the collection, analysis and dissemination of research results; for the promotion and coordination of research; for the training of researchers and technicians; and for the adaptation and transfer of technology. The MUCIA consists of seven universities, with administrative headquarters at Ohio State University. Michigan State University was identified by MUCIA as its lead institution for this assessment due to its experience in Africa.

The CDA mandate for the assessment and this report preparation was to consider programs up to 20 years in duration. Few specific project ideas were developed with this timeframe in mind. However, in developing proposals for future programs, this long term emphasis maximized flexibility to focus on the needs of agricultural research regardless of the timeframe involved. Ultimately, the research priorities and activities were set out as needed, while remaining sensitive and responsive to the severe budgetary constraints in the Sahelian countries.

B. Methodology

Sahelian participation in the process of carrying out the inventory and assessment--the collection of data, the preparation of national reports, and the subsequent regional assessment--has been a central aspect of the design and implementation of this study. In May 1983, INSAH, cooperating with DEVRES, invited agricultural researchers from Upper Volta and other Sahelian countries to INSAH headquarters in Bamako, Mali to discuss the study and examine the first draft of a series of questionnaires intended to inventory the resources (both

resources (both physical and human) available for agricultural research in the region. The questionnaires were then revised in light of the researchers' knowledge of the technical areas and local conditions.

Senior researchers from each of the Sahelian countries were hired by INSAH as National Coordinators and placed in charge of obtaining the answers to the questionnaires and preparing the national reports for their respective countries. National Coordinators in turn hired experienced researchers for short periods of time in their respective countries to help with the completion of the questionnaires in specific subject matter areas such as export and food crops, livestock, agro-forestry, fisheries, and farming systems. The questionnaires included not just the research institutions in these fields, but also the training institutions, and the extension institutions which provide the link between the research and the farmers who utilize the research results.

DEVRES fielded a team of experienced agricultural researchers and development specialists to assist the National Coordinators and their staffs, help with the establishment of a data bank at INSAH on research resources, and develop the regional program. The DEVRES staff consisted of a team leader, a regional coordinator, a technical consultant, one sub-regional coordinator for Cape Verde, The Gambia, Mauritania and Senegal, and another for Chad, Niger, and Upper Volta. Mali was assisted by the technical consultant stationed in Bamako. In addition, INSAH made available two of its senior staff--the Director of its Research Department and the Coordinator of the Research and Documentation network (RESADOC)--who were responsible for coordination between the DEVRES staff and the National Coordinators. MUCIA participated in the design of the questionnaire, furnished country background data for the survey and the sub-regional coordinator for the Eastern Sahel.

INSAH, because of its regional responsibilities for coordination of agricultural research and dissemination of the results, became the repository of the results of the questionnaires in the form of a data bank located at INSAH headquarters. The data collected from the study has been organized using a standard software package--"dBase II"--and can be accessed on the microcomputers available at INSAH headquarters.

More information on potential uses of the data bank can be found in Volume I. The survey has been an important first step in creating a data bank which (when combined with other information available at INSAH) will provide a foundation of practical, useful data that can be updated and refined. It will be a valuable tool for those designing programs and projects in agricultural research in the Sahel and it will also be a source of providing information for researchers in the Sahel and in other neighboring countries.

The inventory and assessment were carried out from May 1983 to April 1984. The bulk of the data collection and the writing of the national reports were carried out from September to December 1983 by the National Coordinators and their consultants in cooperation with the DEVRES/INSAH staff. The national reports are es entially the product of the work of the National Coordinators, assisted by their consultants, based on the responses to the questionnaires. The regional analysis and research strategy were developed by the DEVRES staff in consultation with INSAH in light of the national reports, the questionnaire, and contacts with international research organizations, bilateral and multilateral donors and developement organizations (such as the Club du Sahel, the various UN agencies, and the World Bank) and other written information available to the team. The DEVRES/INSAH staff collaboratively designed the proposed regional projects and activities to carry out the strategy elements.

In carrying out the inventory and analysis and in preparing recommendations for programs and projects in this report, the national Coordinators team made special efforts to take into account research work already carried out, underway or proposed. This is consonant with one of the principal objectives of the assessment--to seek ways to strengthen existing national and regional research activities. Further, specific recommendations are placed in a wide context, involving not only the research institutions, but also the training of researchers and the dissemination of research results to the farmers.

II. GENERAL INFORMATION ON UPPER VOLTA

The Upper Volta territory became a French colony in 1919 as a result of the disassociation of Upper-Senegal and Niger. It remained as such until 1932 when it was partitioned between the Ivory Coast, Niger and Sudan (Mali). It was reconstituted in 1947 within its present boundaries. Upper Volta was proclaimed a republic on December 11, 1958 and became an independent state on August 5, 1960.

A. General and Ecological Data

1. Geographic location

Upper Volta is located at the center of the Niger loop, between $9^{o}20'$ and $15^{o}05'$ of latitude north and between $5^{o}30'$ of longitude west and $2^{o}20'$ of longitude east. It is bordered to the north and to the west by Mali, to the east by Niger and to the south by Ivory Coast, Ghana, Togo and Benin. (See Figure 1.)

Its territory, made up of 274,000 square kilometers, is approximately 800 km wide from west to east and 600 km long from north to south. See Table 1 for a general phytogeographic outline.

Upper Volta is a land-locked country without any direct access to the sea and without any navigable river.

Links with neighboring countries are possible, however, by road, by rail and by air.

2. Communications

a. Roads

In the beginning of 1980, the road network of Upper Volta consisted of 8,714 km of official roads, 4,606 km were national roads, 1,244 km were departmental roads, and 2,437 km were regional roads to which must be added 2,437 km of unofficial roads.

Links between Upper Volta and Ghana on the one hand, and between Upper Volta and Togo on the other are provided by major roads that are entirely paved.

b. Railroad

Links between Upper Volta and the Ivory Coast are provided mainly by rail. The Abidjan-Niger railroad (RAN-la Régie de chemin de fer Abidjan-Niger) consists of a single metric line, 1,146 km long, between Ouagadougou and Abidjan, of which 517 km run inside Upper Volta. This rail system consists of 76 stations or stops. Within Upper Volta, it links four large cities: Ouagadougou, Koudougou, Bobo-Dioulasso and Banfora. It not only provides passenger

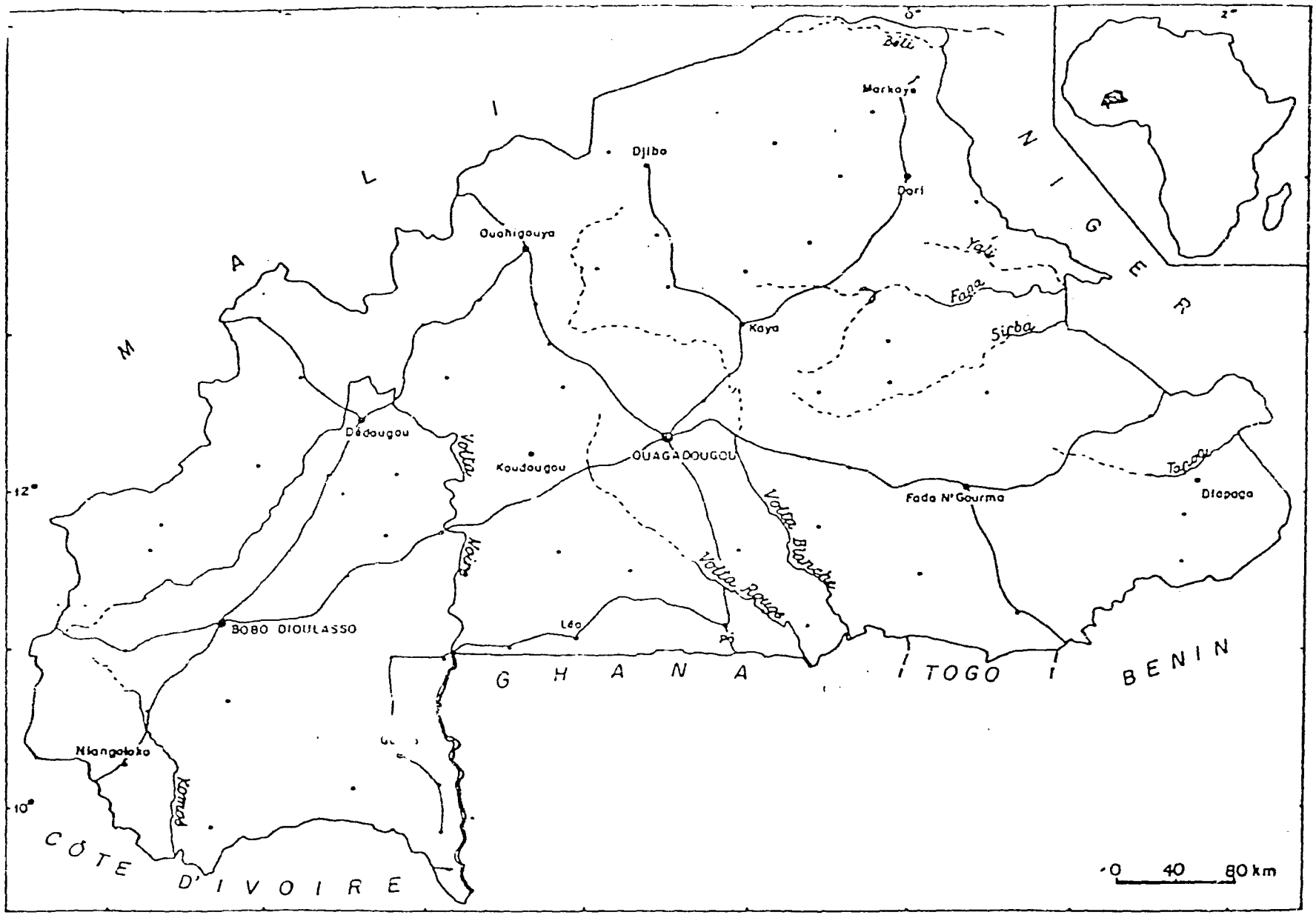

Figure 1: Map of Upper Volta

service, but also insures the movement of close to 95 percent of the merchandise exchanged between Upper Volta and the Ivory Coast.

c. Air travel

There are two Class "A" airports: Ouagadougou (paved runway 2,500 m long) and Bobo-Dioulasso (paved runway 2,050 m long), as well as 47 Class "C" landing areas (runways of compacted laterite).

In addition to the domestic flights, the Upper Volta National Airline provides air communications with neighboring states such as the Ivory Coast, Togo and Benin and plans to extend its services to numerous other countries.

3. Climate

As is usually the case in West Africa, the climatic conditions are determined by the confrontation of Atlantic ocean air masses with air masses from the Sahara desert. This action creates the intertropical front where clouds are formed. The amount of rainfall determines the following seasons:

- A dry season: mid-November to mid-April;
- A transition period during which the dry season can be interrupted by forays of humid air: mid-April to mid-June;
- A rainy season: mid-June to mid-September; and
- A second transition period similar to the earlier one: mid-September to mid-November.

a. Temperatures

Temperatures are generally quite high throughout the country. The hottest period occurs during the months preceeding the rainy season:

- March for southern areas: $30^{\circ}9$ at Gaoua, $30^{\circ}4$ at Léo;
- April for the center of the country: $32^{\circ}1$ at Ouagadougou; and
- May for the north: $32^{\circ}7$ at Dori, $32^{\circ}8$ at Markoye.

After the rainy season, October is invariably the hottest month, except in the extreme south-west region where November peaks. The lowest temperatures of the year usually occur during January when temperatures drop as low as 13° or 14° C.

b. Rainfall

The annual rainfall varies roughly from 300 mm in the north to 1,250 mm in the south. Markoye, the dryest station in the

country receives an average annual rainfall of 350 mm while at Niangoloko, the country's wettest area, rainfall amounts to more than 1,200 mm per year. The number of days on which rain is recorded each year averages about 30 in the north and 90 in the south-west.

The annual isohets are generally formed along the parallels with a small incline from west to east, causing a slightly higher rainfall in the west than the amount recorded at the same latitude in the eastern part of the country. (See Figure 2.)

In a recent study, Fontes (1983) suggested for Upper Volta the bioclimactic and phytogeographic outline, summarized in Table 1.

4. Topography

Upper Volta is a flat country. The average altitude is less than 400 m. About half the country's altitude is between 250 and 350 m and nowhere does it exceed 600 m.

The few areas of high altitude can be found in the sandstone mass which is located in the southern and western parts of the country. This sandstone plateau, with an average altitude of about 500 m dominates the peneplain of the surrounding base with its steep slopes as high as 150 m, currently called cliffs. These cliffs are rectilinear (Banfora region) with steep or tiered slopes; they can also soften so as to present an indented terrain, such as the extraordinary "needles" of the Sindou region.

The highest peak in Upper Volta is the Tenakourou (749 m) in the country's westernmost area.

5. Hydrography

There are three main sources from which Upper Volta's water flows: the Voltas, the Comoé and the Niger rivers.

a. The Volta basin

The Volta basin is situated in the central part of the country. The rivers of this source are:

- The Black Volta, by far the most important water source in Upper Volta, flows the year round. It originates in the Orodara region, with a watershed area of 92,000 km^2. The distance covered within Upper Volta is 960 m and the average flow is 108 m^3 per second at Dapola (Gaoua region);

- The White Volta, a "temporary" river, flows during seven months of the year. It originates in the Ouahigouya region, close to the Sahelian zone; with a watershed area of 50,000 km^2, and a distance within Upper Volta of 575 km;

- The Red Volta, a "temporary" river, flows during six months of the year. It originates in the Mossi plateau, with a

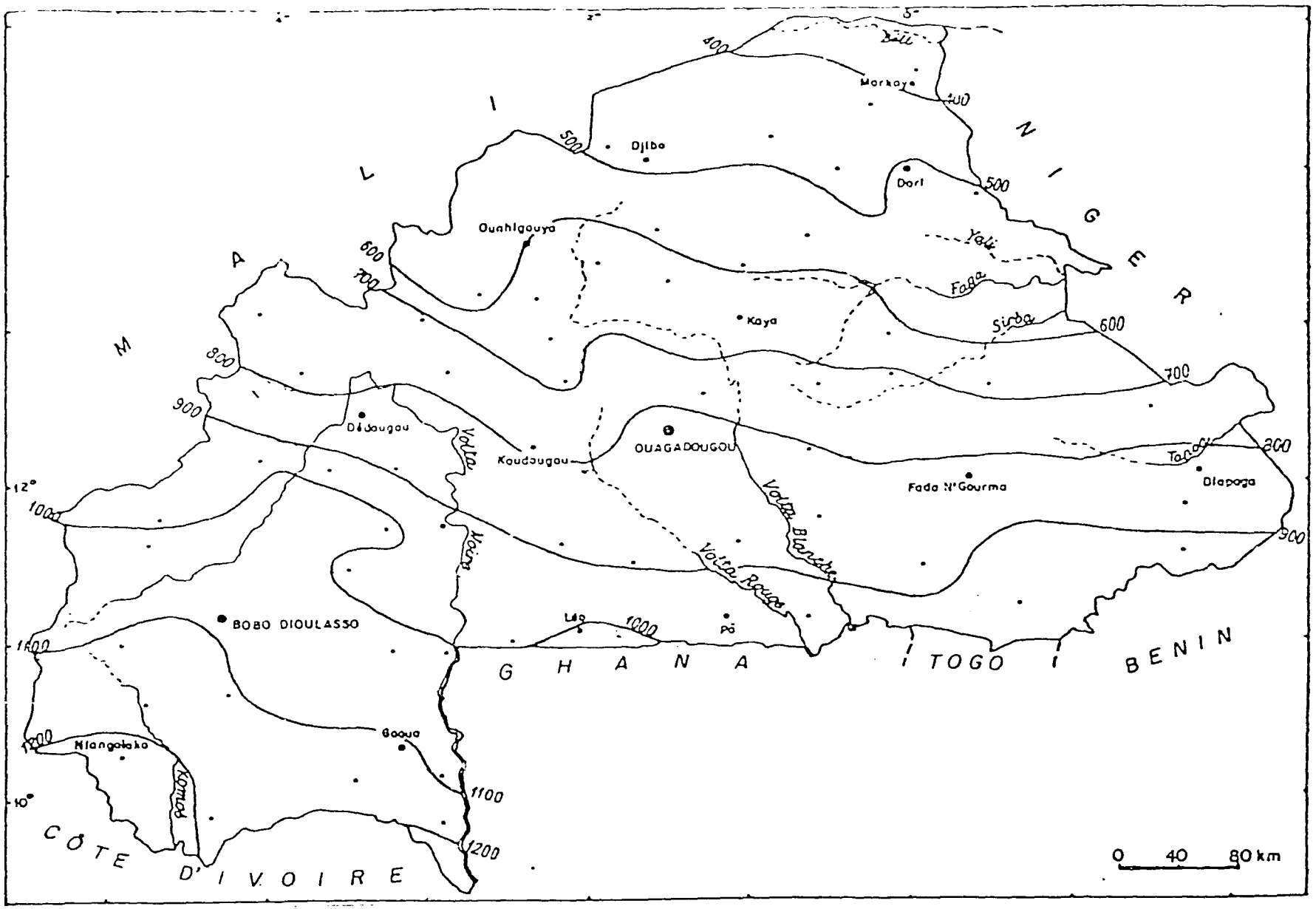

Figure 2: Average Isohyets, 1963-1979

Source : Fontes, 1983.

Table 1: General Phytogeographic Outline

I - SAHELIAN DOMAIN

Pa[1] < 600 mm and ms[2] ≥ 8-9

Two sectors are identified:

* The Pure Sahelian Sector: Pa ≤ 500 mm and ms ≥ 9-1/2
  The voltaic portion has been identified as the Southern district extending into Mali.
  Predominant vegetation: shrub or grass steppe.

* Sahelo-Sudanian Sector: 500 < Pa < 600 and ms = 8-10
  Predominant vegetation: shrub steppe.

II - SUDANIAN DOMAIN

Pa ≥ 600 mm and ms < 9

Three sectors are identified:

* Sudano-Sahelian Sector: 600 ≤ Pa < 700 and ms = 8-9
  Predominant vegetation: shrub steppe with few trees.

* Pure Sudanian Sector: 700 ≤ Pa < 1,100 and ms = 6-8
  - North district with 700 ≤ Pa < 900 and ms = 7-8
  - Central-South district with 800 < Pa < 1,100 and ms = 6-7
  Predominant vegetation: savanna with shrubs and/or trees.

* Sub-Sudanian Sector: Pa > 1,000 mm and ms < 6
  - North district with 1,000 < Pa ≤ 1,100 and ms < 6
  - South-West district with Pa > 1,100 and ms < 6
  Predominant vegetation: densely treed savanna and clear forests.

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[1] Pa = Precipitation
[2] ms = No. of dry months

watershed area of 20,000 km^2, and a distance within Upper Volta of 300 km; and

- The Pendjari, a natural frontier between Upper Volta and Benin, originates in Benin, with a watershed area in Upper Volta of 2,000 km^2, and a distance within Upper Volta of 180 km.

b. The Niger basin

The Niger basin extends over 72,000 km^2 of Upper Volta throughout the northern and eastern parts of the country. Many small rivers in this area are connected with the Niger basin, and flow almost immediately into Niger. The water flow of these rivers is very low within Upper Volta, and is often restricted to a string of ponds.

c. The Comoé basin

The Comoé basin is fed by rivers which run twelve months a year (Comoé, Yanon and Leraba). Some connect with permanent ponds located at the base of the Banfora cliff.

In addition to the hydrographic network, there are a number of permanent or temporary ponds in low-lying areas or sand-hills.

6. Geology

Two main geological formations can be found in Upper Volta.

a. The granito-birrimian system

By far the most often encountered in Upper Volta, this system consists of schisto-volcanic rocks and various granites, which spread out from the base of the Banfora cliff to Niger.

b. The sedimentary system

This system is less frequently encountered in Upper Volta than the system previously named and surfaces only in three areas:

- In the south-west, as a system of "horizontal sandstones", so called because of their slight incline (5 to 10° NW). It is often encountered in the Bobo region and consists mainly of fine sandstones;
- In the north, as the "Nigerian" system, which is also present in Niger and Mali, and is predominantly made up of coarse and crumbly sandstones; and
- In the south-east, as the "Voltaic" system, mostly found in Ghana, with a predominance of schistic sandstone formations.

This sedimentary system rests on the granite-birrimian base with over-hanging cliffs which can reach a height of more than 150 m.

7. Soils

The most thorough pedological study of Upper Volta was carried out over a period of more than three years, by the Office of Overseas Scientific and Technical Research (ORSTOM) center of Dakar, and was completed in 1970.

All of Upper Volta was included in this study. The country was divided into five distinct regions: North-Center, South-Center, Northwestern, Southwestern and Eastern. This resulted in the systematic mapping of the area, using a scale of 1:500,000. Different types of soils were defined and identified on about 30 maps using the same scale. From this voluminous "Upper Volta soil dictionary" it is possible to list briefly the following principal soil groupings.

a. Soils with rough mineral content and the less mature soils

Soils with rough mineral content can be identified by the horizon line (A) C, or the horizon line A, which is faintly outlined. It is made up of rocks in their natural state or only slightly decomposed. These types of soil are found almost everywhere in Upper Volta, and consist mainly of denuded outcroppings.

Less mature soils have an AC profile where the humidity rests upon a similar or identical original material. These soils are found especially in the center and in the northern part of the country. They become less prevalent in the south where the pedogenic action of the climate increases in relation to the amount of rainfall.

b. The vertisols, the eutrophic brown soils and the halomorphic soils

These types of soils are noted for the more or less important presence of clay minerals inflated under the influence of the moistening process. They can be identified from one another by the relative proportion of the inflated substances and also by the quality of the external and internal drainage.

The vertisols are capable of a high degree of inflation, and contain a satisfactory amount of moistness throughout their surface. In the northern regions, these soils mature over a formation of basic rocks, while in intermediary regions, over a basic rock and granito-gneiss formation.

The brown eutrophic soils are capable of a low degree of inflation. These soils mature over a basic rock formation in the north center region and over birrimian rocks in the south center region.

As far as the halomorphic soils are the concerned, the moistening process occurs only within the area close to the surface as a result of the impermeability of the material of which this soil is composed.

Encountered mostly in the eastern part of the country, these soils are linked to the group of granite rocks.

c. The sub-arid vertic soils

These soils are found mainly to the north of Dori (Eastern Oudalan), and are linked to the Sahelian landscapes. In appearance they resemble the eutrophic brown soils with a Sahelian exterior. Despite their average-to-high degree of fertility, the use of these soils for agriculture is difficult today because of the insufficient supply of water.

d. The reddish brown ferruginous soils only slightly leached over eolian sand

These soils have some common features such as high degree of porousness and permeability as a result of the sandy nature of the original rock. The major portion of the sandy rock which is available for agricultural purposes is located to the south of Markoye and of Oursi.

e. The tropical ferruginous leached soils

These soils are formed over sandy colluvions, originating from granites in the northwest, kaolinitic material in the center and eastern sectors, and maturing granite rocks in the south west. These soils cover vast areas of Upper Volta, south of the 14th parallel.

f. Ferralitic soils

These very deep red-colored soils are found from Bobo to Orodara.

B. Demographic Data

1. Numbers and structure of the population

The 1975 census (the most recent one to date) indicated a total population of 6,147,508 inhabitants of which 3,157,483 were men and 2,990,025 were women. The resident population, however, only amounted to 5,638,203 inhabitants, as the higher figure included a significant number of emigrants.

The migration studies during the period from 1969 to 1975 show that other countries were the main destination for migrants, primarily in the Ivory Coast where, in 1975, Upper Volta natives represented about 70 percent of the foreigners in that country. Within Upper Volta, quite apart from the classic movement of inhabitants from the rural areas toward the urban centers, an important migratory movement from the Mossi zone toward the western and southern parts of the country was identified.

A study of the population age-mix pyramid shows a high proportion of young people. (See Figure 3.) According to the numbers, 45.3 percent of the resident population is less than 15 years of age and more than 50 percent is under 21.

The population's natural growth rate is estimated at 2.06 percent. Projections based on this growth rate indicate that the resident population, which was estimated to be 5,638,200 inhabitants in 1975, will total 7,655,504 in 1990, and 9,387,053 in the year 2000. A more detailed description of this evolution by different age groups is presented in Table 2. Important changes will then occur in the age profile of the population of Upper Volta. (See Figure 4.)

With regard to the development of the agricultural activities, it is important to note that the rural population makes up 93.6 percent of the total population. Tables 3 and 4 detail the distribution of the population by residence, by gender and by areas of activity.

According to the definition used by the 1975 census, there are five cities in Upper Volta: Ouagadougou, Bobo-Dioulasso, Koudougou, Ouahigouya and Banfara. Together these five cities amount for 362,610 inhabitants or 6.4 percent of the total resident population. (See Table 5.)

2. Principal ethnic groups

There are about 60 separate ethnic groups in Upper Volta, whose numbers vary considerably. Together, they can be classified within about ten families whose location within the country is approximately outlined as follows:

The Mossi occupy the central plain and make up about half the total population, while their neighbors to the east, the Gourmanthes, occupy a territory only slightly smaller than that of the Mossis, although they only account for 4.5 percent of the population.

The Gourounsis, the Lelas around Reo, the Nounas in the center region, the Sissalas around Leo, the Akulos or Deghas on the Ghana boundary, the Kassenas around Po, the Nankanas around Zabou and the Koussasses around Zoaga occupy a relatively large territory in the south-west portion of the Mossi plain and make up 5.3 percent of the population. The Bissas or Boussances occupy a territory located between the Mossi country and Ghana.

The northern part of the country, the Sahelian zone, is mainly inhabited by the Peuhls, 10.4 percent of the population, and also by the Touaregs, and the Bellas. One also finds a few Songhais, very few of which live in Upper Volta, and the Deferobes. The Foulses or Kouroumbas can be found between this area and the Mossi country.

The western and south-western map is even more complex. Two Mande populations are to be found in the northern part of this region. They are the Samos and the Markas, and also the Panas and the Dogons. In the center are found the Bobos (Bobo-Fing in the vicinity of Bobo-

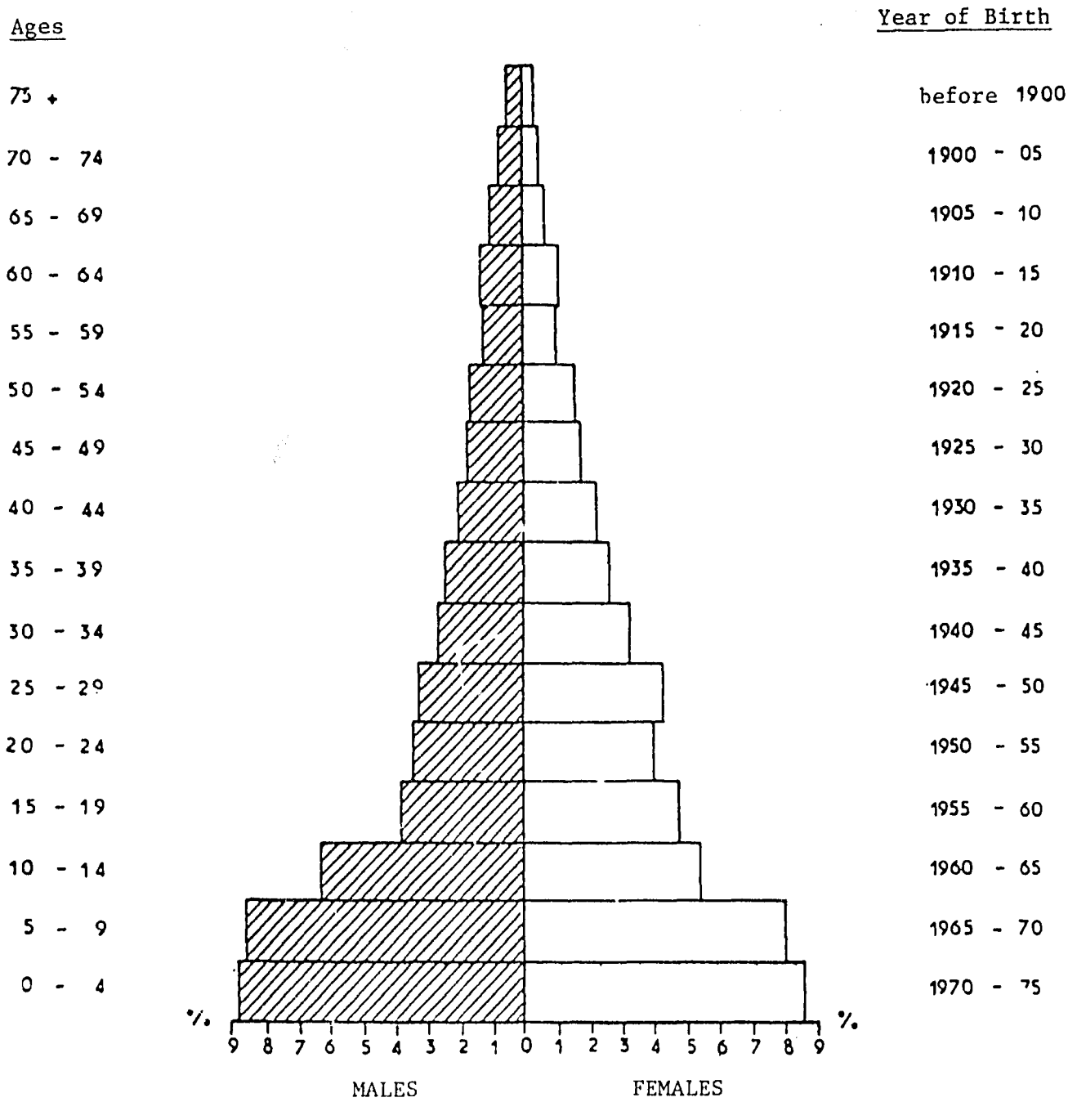


Figure 3: Age Pyramid, 1975

Source: Department of Demographic Research.

Table 2: Population Expansion in Upper Volta from 1975 to 2000

Age Group	Years					
	1975	1980	1985	1990	1995	2000
0-4 years of age	1,058,850	1,196,660	1,325,100	1,437,699	1,592,010	1,762,883
5-9	830,507	919,647	1,018,350	1,127,656	1,248,690	1,382,714
10-14	687,861	761,690	843,444	933,973	1,034,218	1,145,222
15-19	520,406	576,262	638,113	706,603	782,445	866,426
20-24	437,525	484,485	536,486	594,068	657,831	728,437
25-29	398,057	440,781	488,091	540,479	598,490	662,727
30-34	347,313	384,591	425,869	471,579	522,195	578,243
35-39	286,984	317,786	351,895	389,665	431,488	477,801
40-44	241,879	267,840	296,588	328,422	363,672	402,705
45-49	205,231	227,259	251,651	278,661	308,570	341,690
50-54	172,529	191,047	211,552	234,259	259,402	287,241
55-59	137,008	151,713	167,997	186,028	205,995	228,109
60-64	105,998	117,375	129,973	143,923	159,371	176,476
65-69	755,520	836,611	926,406	102,584	113,594	125,777
70 and over	132,498	146,719	162,467	179,905	199,214	220,596
Total	5,638,200	6,371,970	7,055,890	7,655,504	8,477,185	9,387,053

Source: Department of Demographic Research.

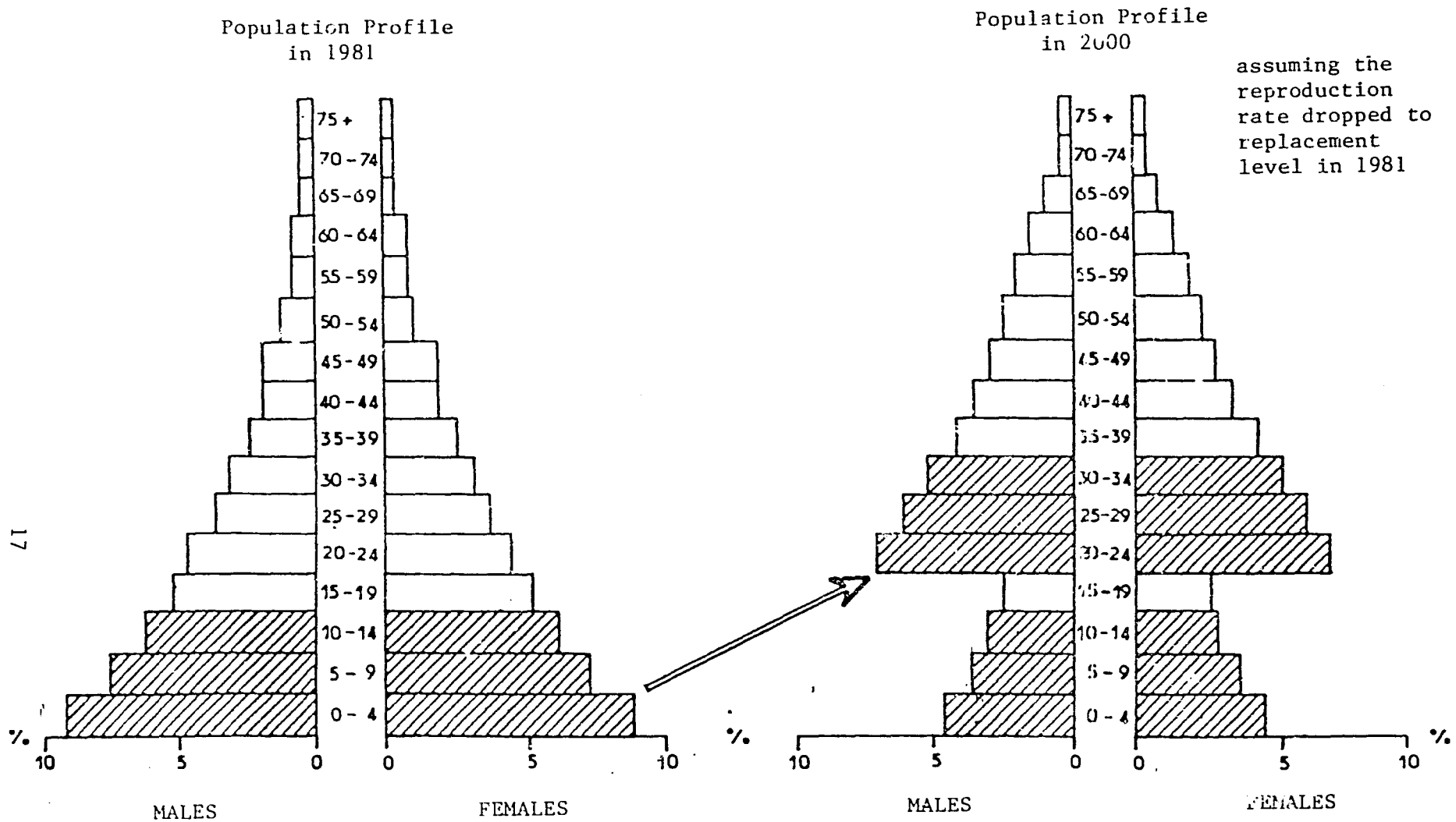


Figure 4: Demographic Changes

Source: Department of Demographic Research.

Table 3: Population Distribution by Residential Zone and by Sex

Zone	Population		Total	Percent
	Males	Females		
Urban	185,174	177,436	362,610	6.4
Semi-Urban	72,452	76,549	149,001	2.6
Rural	2,569,952	2,556,640	5,126,592	91.0
Total	2,827,578	2,790,625	5,638,203	100.0

Source: Department of Demographic Research.

Table 4: Active Residents[1] According to Sector, Activity, Environment and Sex

Sex	Sector	Environment			
		Rural	Semi-Urban	Urban	Total
Male	Primary	96.2	75.6	31.0	92.1
	Secondary	2.0	11.2	33.8	4.0
	Tertiary	1.8	13.2	35.2	3.9
Female	Primary	90.9	57.3	13.1	79.2
	Secondary	4.0	7.6	11.9	5.2
	Tertiary	5.1	35.1	75.0	15.6

[1] 15 years of age and over.

Source: Department of Demographic Research.

Table 5: Population of Upper Volta Cities by Sex

Cities	Population		Total	Percent
	Males	Females		
Ouagadougou	89,245	83,416	172,661	47.6
Bobo-Dioulasso	57,765	57,298	115,063	31.8
Koudougou	18,918	17,920	36,838	10.1
Ouahigouya	12,648	13,042	25,690	7.1
Banfora	6,598	5,760	12,358	3.4
Total	185,174	177,436	362,610	100

Source: Department of Demographic Research.

Dioulasso and of Nouna, Bwaba in the vicinity of Dédougou and of Houndé, and Ko in the Boromo-Siby region). The Bobo group make up 6.7 percent of the population.

The extreme western part of the country, along the Mali frontier, is inhabited mostly by the Senoufos, 5.5 percent of the population, but also by the Tourkas near Sindou, the Gouins, the Karaboros, the Toussians, the Tyefos, the Syemous in the vicinity of Orodara, the Samoghos, the Semblas, the Bolons, the Waras, the Natioros and the Blés.

The extreme south, near the Ivory Coast and Ghana, is inhabited by the Lobis and the Dagaris, 7 percent of the population. They share this territory with the Pougoulis or Pwas, the Birifors, the Gans, the Dérobés, the Komonos, the Padoros, the Vigues, the Wilés, the Dyans and the Nabés or the Lorons.

3. Religions

The three main religions in Upper Volta are Animism, Islam and Christianity. According to the 1973 statistics published by the Minister of the Interior, the following is the official breakdown amongst the three: the Animists make up 56 percent of the population, the Moslems 33 percent, and the Christians 10.44 percent (1.04 percent Protestant and 9.40 percent Catholic).

4. Languages

Each ethnic group has its own language. French is the official language, but only about 10 percent of the population speak it.

C. Education System

The education system consists of a formal education program and a program for promoting literacy within the adult population. The formal education program has three cycles: primary, secondary and college levels.

1. Formal education (classical system)

a. Primary education

Students are enrolled at ages five to six. This phase lasts six years and is recognized by a diploma knows as Certificate of Primary Elementary Studies (CEPE - Certificat d'etudes primaires elementaires).

At the beginning of the school year in October, 1982, there were 28 elementary school inspections, 1,176 schools (1,088 public and 88 private), 3,967 classes (3,559 public and 408 private) serving a total of 251,269 pupils. This number included special sections annexed to the primary schools and set up for pre-school age children, or where

manual or housekeeping subjects are taught. The percentage of the population having some schooling was estimated at 16.51 percent.

The breakdown between the public and the private sector was the following: 128,854 boys attending public schools and 12,935 attending private schools. As for the girls, 74,712 attended public schools and 8.069 attended private. The total of those students attending public schools was 203,566 and 21,004 for the private schools.

Compared to the statistics for the beginning of the 1980 school year, the numbers reflect a growth of 139 schools, 338 classes and 26,699 students, or a percentage of 0.76 percent in the enrollment growth rate.

Table 6 shows the progressive change in the number of pupils in both the public and private sectors of education, from 1976 to 1983. Generally, more boys than girls take advantage of the education program. The public sector schools attract the majority of the pupils, as opposed to a considerably lesser number who enroll in the private institutions.

Table 7 shows the distribution of the funds made available for primary education during the years 1979 to 1982.

An important program calling for an in-depth reform of the education system is currently under experimentation. It aims, in part, at integrating the use of national languages into the education system.

b. Secondary education

The secondary level of education calls for schools of general instruction as well as schools in which technical skills are taught. Both types of schools can be found in private and public sectors. Some of the private schools are identified as "conventional schools" and as such receive substantial financial subsidies from the State, while others are totally private. The Diplomas are a School Learning Certificate (BEPC - Brevet d'etudes du premier cycle) after four years of schooling, and a High-School Diploma (the Baccalauréat) after seven years (three additional years after the BEPC).

At the beginning of the school year, in October 1983, there were 93 secondary schools in Upper Volta, divided as indicated in Table 8.

These numbers make apparent the predominance of general instruction institutions as opposed to the technical schools (72 vs. 21). They also reveal that private schools considerably outnumber those in the public sector.

In most instances, these institutions are ill-equipped to house the pupils, due to the very large number of students in each class. From 1968 onwards, the secondary cycle pupils were given day-school status (4th grade and up) in order to free the dormitories which could then be converted into classrooms. Despite these measures, the

Table 6: Number of Pupils Enrolled in Elementary Schools from 1975-76 to 1982-83

School Years		Public Schools	Private Schools
1975-76	Boys	82,722	6,454
	Girls	48,743	3,773
	Total	131,465	10,227
1976-77	B	87,632	7,070
	G	50,974	4,323
	T	138,606	11,393
1977-78	B	93,311	8,121
	G	54,041	5,055
	T	147,352	13,176
1978-79	B	99,542	8,282
	G	57,817	5,150
	T	157,359	13,176
1979-80	B	107,901	9,012
	G	62,872	5,873
	T	170,773	14,885
1980-81	B	117,076	10,565
	G	67,683	7,003
	T	184,759	17,568
1981-82	B	128,854	12,935
	G	74,712	8,069
	T	203,566	21,004
1982-83	B	145,547	13,055
	G	84,114	8,553
	T	229,661	21,608

Source: Department of Elementary School Education
Report on current conditions - 1983

Table 7: Operating Budget for Elementary Education[1]
(millions of CFA francs)

	1979	1980	1981	1982
National Budget	45,552	37,700	34,200	34
Departmental Budget	199,260	176,615	180,500	229,500
Foreign Aid	15,000	24,528	24,000	24,016
Total	259,812	239,043	238,700	287,516

[1] Public Sector.

Source: 1983 Report of the Department of Elementary Education.

Table 8: Distribution of Secondary Schools

	Public	Private		Total
		Conventional	Unconventional	
General Education	28	15	29	72
Technical Schools	5	4	12	21
Total	33	19	41	93

institutions are still unable to accept all of the available candidates because of the large number of applicants.

Information about the number of teachers and students for all institutions within the various categories is contained in Tables 9 and 10.

c. Higher education

The only university in Upper Volta was founded in 1974, replacing an earlier institution called "Center of Higher Education". The university is located in Ouagadougou and consists of seven education and research establishments, as well as the following schools and services:

- o School of Letters and Humanities;
- o University Institute of Technology;
- o Polytechnic Institute
- o Institute of Mathematics and Physics;
- o School of Economics;
- o African Institute of Film-making;
- o School of Law;
- o University library;
- o Baccalauréat office; and
- o National Commission on the Equivalence of Titles and Diplomas.

The student population in the various institutions of Ouagadougou University for the years 1982-83 and 1983-84 is shown in Table 11. The number of students increased from 3,086 in 1982-83 to 3,685 in 1983-84. The increase amounted to 19.41 percent.

2. The programs to eliminate illiteracy

Because of the failure of the formal education program to reduce significantly the illiteracy rate, the Voltaic authorities began to develop an adult education program in the national languages in order to increase the literacy rate of the adult population. The National Institute for Adult Training and Literacy (INAFA - l'Institut national pour l'alphabétisation et la formation des adultes) coordinates and oversees the implementation of this program.

Historically, efforts to establish a literacy program began in 1966. In fact, that same year the government of Upper Volta sought help from UNESCO in order to create and utilize a ten-year

Table 9: List of Public Sector Institutions Offering Secondary Education of a General Nature, 1982-83 School Year

Foundation and Name of Institution	Number of Classes	Number of Teaching Personnel	Number of Students		
	Total	Total	Boys	Girls	Total
Zinda KABORE High School	48	115	1,768	593	2,361
Community High School Ouaya	11	30	382	209	591
Normal School	8	23	299	101	400
Military School	15	29	518	-	518
Mixed High School Gounghin	6	23	71	186	257
Fem. Teachers' College	10	29	-	419	419
Quezzin Coul. High School	34	73	1,289	443	1,732
Community High School Bobo	21	49	746	319	1,065
C.E.G. Bobo	6	15	274	96	370
Community High School Banford	11	26	398	155	553
C.E.G. Banford	5	9	191	50	241
C.E.G. Dedougou	4	9	174	68	242
Diaba Lompo Fada High School	10	21	449	158	607
C.E.G. Boromo	4	12	162	52	214
C.E.G. Dori	4	8	179	49	228
C.E.G. Kaya	8	15	416	72	488
C.N. Koudougou	10	21	451	26	477
C.N. Ouahigouya	7	14	362	0	362
Yadega Ouahigouya High School	9	22	384	62	446
Riale Tenkodogo High School	8	19	284	54	338
C.E.G. Diapaga	4	13	129	55	184
C.E.G. Gaoua	6	15	226	77	303
C.E.G. Leo	6	13	238	73	311
C.E.G. Tougan	4	8	176	52	228
C.E.G. Yako	6	11	289	63	352
C.E.G. Tita	2	6	101	5	106
Community High School Koudougou	2	3	33	23	56
C.E.G. Koupela	1	5	38	10	48
Total	270	628	10,026	3,470	13,427

Source: Department of Secondary Education.

Table 10: Technical Schools, 1982-1983

List / Institutions	Number of Classes	Number of Teaching Personnel			Number of Students				
					Boys		Girls		
	Total	Nation	Ass. Tec Etra	T	B	NB	B	NB	Total
Technical High School	21	37	30	67	136	210	28	153	527
C.E.T.	9	24	15	39	267	163	6	6	438
C.E.T.F.	4	13	4	17	-	-	82	40	122
Austro Voltaic Center	10	27	12	39	232	31	-	2	265
C.F.F.A	3	12	1	13	-	-	34	124	158
Private Conventional Institutions									
C.T. Lavigerie	5	12	6	18	-	-	-	36	36
C.T. Hamdallayo Bobo	6	7	7	14	-	-	85	100	185
C.F.P. Faoa	9	12	3	15	88	51	-	-	139
C.F.P. Nouna	6	7	1	8	23	50	-	-	73
Private Non-conventional Secondary Schools									
CE.P.E.C. Bobo	-	20	5	25	-	134	-	81	215
Bobo Promotion High School	4	11	4	15	-	458	-	183	641
C.V.F.T. Bobo	12	5	-	5	-	48	-	184	232
CE.U.I.C. Bobo	-	8	3	11	-	66	-	40	106
C.P.F.T.C. Banfora	-	-	-	-	-	-	-	-	-
C.F.T.P. Koudougeu	9	2	-	2	-	-	-	34	36
C.M.F. de Reo	4	3	3	6	-	-	-	96	96
C.T.F. Ouahigouya	4	7	6	13	-	-	-	73	73
Pigier Course	8	17	3	20	-	217	-	100	317
Godogo Center	1	2	-	2	-	9	-	95	104
CE.P.E.C. Ouaga	15	35	-	35	-	598	-	188	786
C.F.P.S.	6	7	-	7	-	15	-	269	284

SOURCE: Department of Secondary Education.

Table 11: Student Population at Ouagadougou University

Institution	1982-83	1983-84	Increase (in percent)
E.S.D.	544	700	+ 30
E.S.S.EC.	441	550	+ 25
I.S.P.	471	560	+ 20
I.M.E.	176	190	+ 10
E.S.I.S.H.	1,135	1,300	+ 15
I.U.T.	147	160	+ 10
I.NA.F.E.C.	52	55	+ 5
E.S.S.SA.	120	170	+ 40
Total	3,086	3,685	19,41

Source: Schooling Service, University of Ouagadougou.

experimental program which would make it easier for a young girl or woman to have access to the benefits of education.

The experience gained from this program led to a number of initiatives on the part of various private sector organizations and to the establishment of the Voltaic Organization for Education , a non-profit association under the protection of the Minister of National Education.

These various initiatives resulted in the creation, in 1974, by the Upper Volta government, of the official National Office of Permanent Education and of the Functional and Select Literacy Development (ONEPAFS - L'Office national de l'education permanente et de l'alphabétisation fonctionnelle et sélective), which became the Department of Selective and Functional Literacy (DAFS - L'Alphabétisation fonctionnelle et sélective) in 1978.

The program's goal is to develop within a relatively short time frame (six days a week for six weeks) managers of such economic units as cereal banks, mills, country shops and market gardening areas. Teaching is done entirely in the national language and each session calls for different phases, i.e. lectures, discussions, writing and calculations.

In 1981, these literacy activities were held in 1,684 centers with 50,680 attendees. Figures 5 and 6 show the changes in the number of centers and attendees from 1979 to 1983.

Finally, it is noteworthy that Upper Volta has had its own alphabet since 1979, for the translation of the national languages (Decree #79/055/PRES/ESRS dated February 2, 1979, which codifies the National Voltaic alphabet.)

D. Brief Outline of the Government Structures

1. Principal structures

The current government of the Republic of Upper Volta, a result of the political changes which took place on August 4, 1983, consists of a President, a Chief of State and 19 ministers.

The President of the National Council of the Revolution (CNR - Conseil national de la révolution) is the President of the Republic and its Chief of State. The 19 ministries are:

- Ministry of the Interior and Security;
- Ministry of State, Presidential Delegate;
- Ministry of National Defense and Veterans' Affairs;
- Ministry of Foreign Affairs;

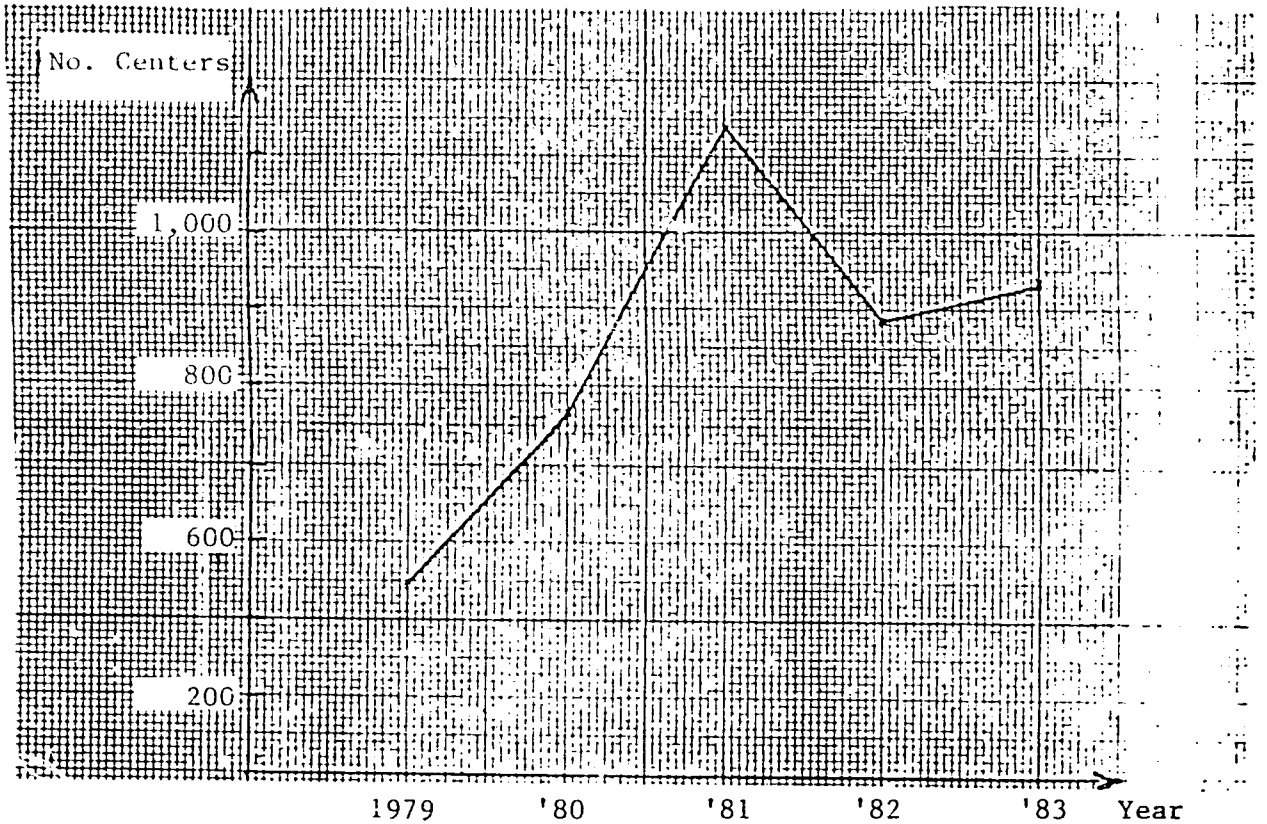


Figure 5: Variations in Number of Literacy Centers

Source: National Institute for Adult Education and Literacy.

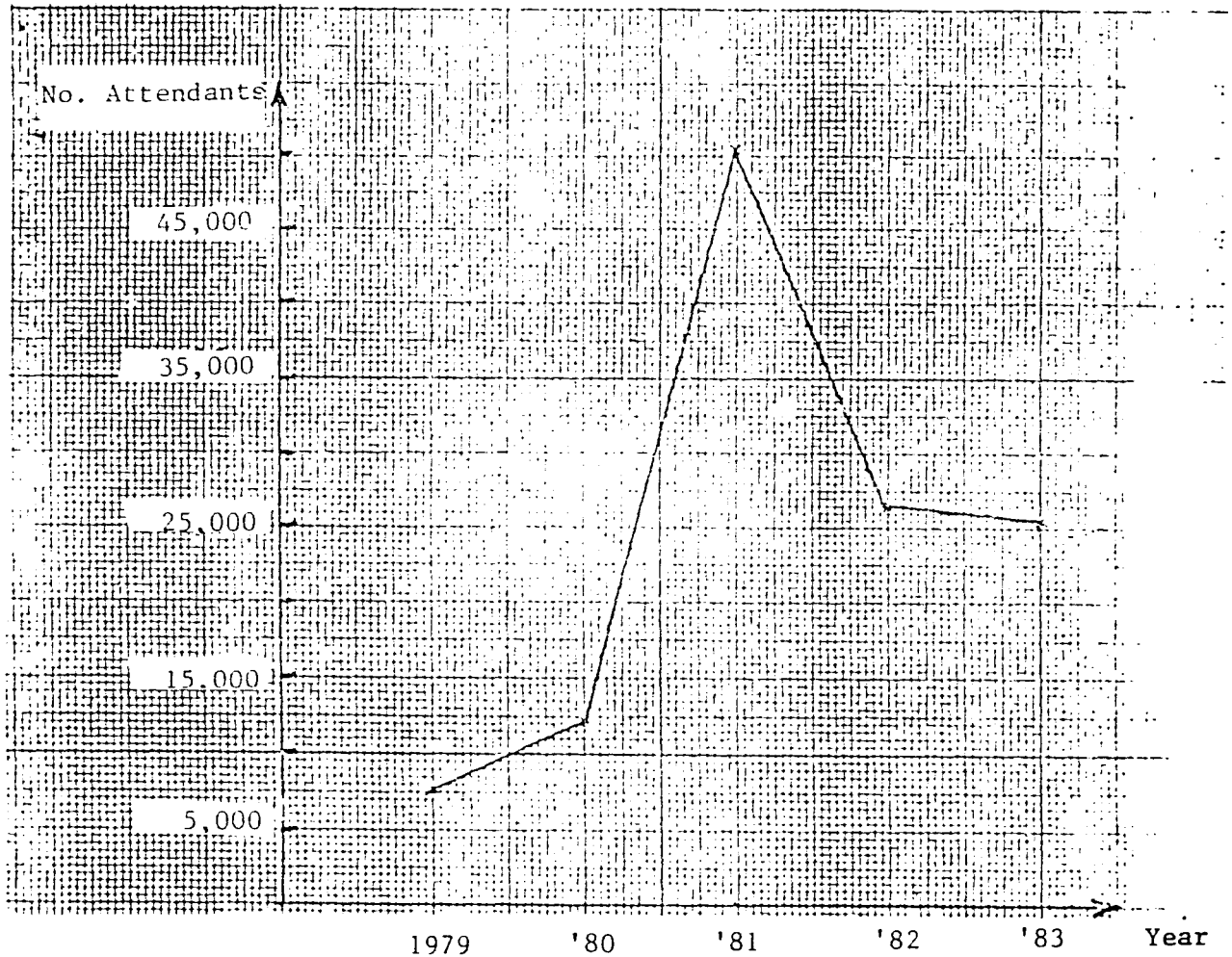


Figure 6: Variations in Program Attendants, 1979-1983

Source: National Institute for Adult Education and Literacy.

- Ministry for State Corporations;
- Ministry of Justice, Keeper of the Great Seal;
- Ministry of Equipment and Communications;
- Ministry of Planning and Cooperation;
- Ministry of Finance;
- Ministry of Rural Development;
- Ministry of Public Health;
- Ministry of Commerce, Industrial Development and Mines;
- Ministry of Labor, Social Security and Public Service;
- Ministry of Scientific Research and University Education;
- Ministry of Education, Arts and Culture;
- Ministry of Information;
- Ministry of Youth and Sports;
- Ministry of Tourism and the Environment; and
- Ministry of Social Affairs.

For a considerable period of time, the administration of the territory was organized on the basis of the division of Upper Volta into eleven departments, ten of which were set up in 1974, with the eleventh created in 1979. These eleven departments are indicated below with the regional capital in parentheses:

- Center (Ouagadougou);
- East-Center (Tenkodogo);
- North-Center (Ouahigouya);
- West-Center (Koudougou);
- East (Fada N'Gourma);
- High Basins (Bobo-Dioulasso);
- North (Kaya);
- Sahel (Dori);
- South-West (Diébougou);

- Black Volta (Dédougou); and
- Comoé (Banfora).

Since September 15, 1983, in accordance with an order of the Chief of State, Upper Volta was divided into 25 provinces which are listed in Table 12, along with their territorial relation to the old departments.

2. National budget

For the past three years, the national budget was balanced in income and expenditures. The total amounts (in thousands of FCFA) are 47,391,120 for 1981, 48,949,413 for 1982, and 54,224,678 for 1983.

A study of the budget reveals the following points:

a. Income

The principal sources of income consists of indirect taxes (66.65 percent) and direct taxes (15.42 percent). Receipts from customs duties account for 48.55 percent of the total budget income. Other sources of income bring in only marginal amounts.

The detailed income reports are shown in Tables 13 and 14, in accordance with the first Law of Finances enacted in 1982.

b. Expenses

Operating expenses (personnel and equipment) account for up to 69.46 percent of the total budget. The national debt represents 11.90 percent of the budget.

The expenses of the state are detailed in Tables 15 and 16 for the year 1982, according to an administrative classification and to a functional classification.

The distribution of the investments within the various sectors for the years 1967 through 1981 is as shown in Table 17

3. Important policies which have an impact on agriculture or agricultural research

The government has given high priority to the general goal of self-sufficiency in providing foodstuffs for its people.

A speech given on October 2, 1983, by the Chief of State, to the CNR, about the direction policital action should take, reveals that the goals of the land reform policy will be:

- Growth in labor productivity by improving the organization of the peasants and by introducing modern agricultural techniques to the rural population;

Table 12: Provinces in Upper Volta

Province	Regional Capital	Districts
Bam	KONGOUSSI	Bourzanga, Kongoussi, Sabsé et Tikare
La Bougouriba	DIEBOUGOU	Dano, Diébougou, Dissin, Tiankoura
Boulgou	TENKODOGO	Bittou, Garango, Combousgou, Ouargaye, Tenkodogo, Zabré.
Bourkina	KOUDOUGOU	Didyr, Kindi, Kokologo, Nanoro, Pouni, Réo, Sabou, Tenado.
La Comoé	BANFORA	Banfora, Bérégadougou, Loumana, Mangodara, Niangoloko, Sidéradougou, Sindou, Soubakaniedougou, Tiefora.
Ganzourgou	ZORGHO	Meguet, Togtedo, Zorgho
Gnagna	BOGANDE	Bilanga, Bogandé, Coalla Piella.
Gourma	FADA N'GOURMA	Comin-Yanga, Diabo, Fada N'Gourma, Pama
Houet	BOBO DIOULASSO	Bobo-Dioulasso, Po, Houndé, Toussiana
Kenedougou	ORODARA	Koloko, N'Dorola, Orodara, Samorogouan.
La Kossi	NOUNA	Djibasso, Kouka, Nouna, Solenzo, Tansila.
Moun-Hou	DEDOUGOU	Bagassi, Boromo, Dédougou, Ouarkoye, Safane.
Namentenga	BOULSA	Boulsa, Koupèla, Pouytenga, Tougouri.
Naouri	PO	Pô, Tiébélé, Zion.
Oubritenga	OUAGADOUGOU	Boussé, Dapelogo, Ouagadougou, Saponé, Tanghin-Dassouri, Ziniaré, Zitenga, Kombissiri, Toece.
Passore	YAKO	Arbole, Bagare, Bokin, Samba, Yako.
Poni	GAOUA	Batie, Gaoua, Kampti, Loropeni, Nako.
Sanmatenga	KAYA	Barsalogo, Boussouma, Kaya, Korsimoro, Mane, Pissila.
Sahel	DORI	Dori, Gorom-Gorom, Markoye, Sebba, Tin-Akoff.
Sissili	LEO	Cassou, Fara, Ouessa, Léo.
Soum	DJIBO	Aribinda, Baraboule, Djibo.
Sourou	TOUGAN	Kassoum, Kiembara, Toma, Tougan.
La Tapoa	DIAPAGA	Botou, Diapaga, Kantchari, Logobou.
Yatenga	OUAHIGOUYA	Gourcy, Koumbri, Ouahigouya, Seguenega, Titao, Thiou.
Zounweogo	MANGA	Manga, Nobere, Guiba.

Source: Order No. 83-012 of September 15, 1983 - President of the Republic.

Table 13: Government Receipts

Headings	Amount (in thousands of CFA francs)	In Percent	Increase 1982/81	Increase 1981
CATEGORY I - FISCAL RESOURCES	40,256,327	84.13	10.71	46
Section I - Direct Taxes	7,376,500	15.42	34.34	45
Item 1 Lump Sum Income Tax	800,000	1.67	1,677.78	- 44
Item 2 Property and Progressive Income Tax	5,845,000	12.22	18.92	80
Item 3 Employer's Apprent. Tax	725,000	1.52	38.10	81
Item 4 Television Viewers' Tax	6,500	0.01	8.33	160
Section II - Indirect Taxes	31,893,527	66.65	6.40	47
Item 5 Duties and Import Taxes	20,017,834	41.84	5.98	47
Item 6 Consumption Taxes	5,450,429	11.39	7.80	29
Item 7 Transaction and Production Taxes	3,645,000	7.62	6.55	85
Item 8 Duties and Exit Taxes	1,419,302	2.97	4.64	47
Item 9 Tax on Research and Approval	38,539	0.08	18.44	56
Item 10 Duties and Accessory Taxes	1,322,423	2.76	8.14	58
Section III - Registration Fees and Stamp Duties	986,300	2.06	10.45	36
Item 11 Registration Fees	686,300	1.43	10.16	36
Item 12 Stamp Duties	300,000	0.63	11.11	36
CATEGORY II - OTHER ORDINARY RESOURCES	5,803,663	12.13	87.83	106
Section IV - Income from Assets	1,524,129	3.19	16.72	59
Item 13 Real Estate Income	115,000	0.24	- 7.70	935
Item 14 Income from Movable Property	30,000	0.06	0	- 69
Item 15 Forestry Income	63,308	0.13	112.91	20
Item 16 Income from Mining	PM	-	-	-
Item 17 Income from Stocks and Bonds	1,315,821	2.75	17.92	67
Section V - Receipts and Incomes from the Use of Services	534,498	1.12	20.84	40
Item 18 Receipts from Services	534,498	1.12	20.84	40
Section VI - Miscellaneous and Incidental Products	845,036	1.67	218.07	182
Item 19 Miscellaneous Products	845,036	1.67	218.07	182
Section VII - Receipts from Former Budget Periods	2,900,000	6.06	169.52	147
Item 20 Receipts from Former Budget Periods	2,900,000	6.06	169.52	147
CATEGORY III - EXTRAORDINARY RESOURCES	1,789,423	3.74	70.47	361
Item 21 Remittances from Neighboring Countries	6,820	0	- 23.97	40
Item 22 CEAO--Distributions from the Community Fund of Western African States	900,000	1.88	18.42	212
Item 23 Interest on Loans and Advances	602,632	1.26	198.93	533
Item 24 Principal Repayments on Loans and Advances	259,971	0.54	313.95	-
Item 25 Receipts from Diminished Expenses	20,000	0.04	22.70	-
A. TOTAL DOMESTIC RESOURCES	47,849,413	100	18.15	56
Item 26 Foreign Aid	-	-	-	-
Item 27 Borrowed Funds	-	-	-	-
B. TOTAL EXTERNAL RESOURCES	-	-	-	-
TOTAL OVERALL RECEIPTS	47,849,413	100%	18.15%	56%

Source: Budget Management.

Table 14: Comparison of Collections, 1980

	1980 Collections (in thousands of current FCFA)	1980 Collections (in thousands of 1982 FCFA, inflation 13%)	Receipts Based on the Initial Finance Act (in thousands of current FCFA)
CATEGORY I - FISCAL RESOURCES	33,255,704	42,464,209	40,256,327
Section I - Direct Taxes	7,387,849	9,433,545	7,376,500
Item 1 Lump Sum Income Tax	618,787	790,129	800,000
Item 2 Property and Progressive Income Tax	6,125,910	7,822,175	5,845,000
Item 3 Employer's Apprent. Tax	641,825	819,546	725,000
Item 4 Television Viewers' Tax	1,326	1,693	6,500
Section II - Indirect Taxes	25,147,356	32,110,659	31,893,527
Item 5 Duties and Import Taxes	16,027,347	20,465,320	20,017,834
Item 6 Consumption Taxes	3,921,140	5,006,904	5,450,429
Item 7 Transaction and Production Taxes	2,919,224	3,727,557	3,645,000
Item 8 Duties and Exit Taxes	1,183,253	1,510,896	1,419,302
Item 9 Tax on Research and Approval	30,125	38,466	38,539
Item 10 Duties and Accessory Taxes	1,066,365	1,361,514	1,322,423
Section III - Registration Fees and Stamp Duties	720,498	920,004	986,300
Item 11 Registration Fees	487,110	621,990	686,300
Item 12 Stamp Duties	233,388	298,013	300,000
CATEGORY II - OTHER ORDINARY RESOURCES	2,311,117	2,951,066	5,803,663
Section IV - Income from Assets	247,341	315,829	1,524,129
Item 13 Real Estate Income	9,834	12,557	115,000
Item 14 Income from Movable Property	17,507	22,354	30,000
Item 15 Forestry Income	19,999	25,537	63,308
Item 16 Income from Mining	-	-	PM
Item 17 Income from Stocks and Bonds	200,000	255,380	1,315,821
Section V - Receipts and Income from the Use of Services	241,168	307,948	534,498
Item 18 Receipts from Services	241,168	307,948	534,498
Section VI - Miscellaneous and Incidental Products	583,856	745,526	845,036
Item 19 Miscellaneous Products	583,856	745,526	845,036
Section VII - Receipts from Former Budget Periods	1,238,751	1,581,761	2,900,000
Item 20 Receipts from Former Budget Periods	1,238,751	1,581,761	2,900,000
CATEGORY III - EXTRAORDINARY RESOURCES	4,647,465	5,934,348	1,789,423
Item 21 Remittances from Neighboring Countries	-	-	6,820
Item 22 CEAO--Distributions from the Community Fund of Western African States	1	1	900,000
Item 23 Interest on Loans and Advances	2,798,499	3,573,403	602,632
Item 24 Principal Repayments on Loans and Advances	1,829,632	2,336,258	259,971
Item 25 Receipts from Diminished Expenses	19,332	24,685	20,000
A. TOTAL DOMESTIC RESOURCES	40,214,288	51,349,624	47,849,413
Item 26 Foreign Aid	-	-	-
Item 27 Borrowed Funds	-	-	-
B. TOTAL EXTERNAL RESOURCES	-	-	-
TOTAL OVERALL RECEIPTS	40,214,288	51,349,624	47,849,413

Table 15: Government Expenditures: Services, 1982

	Amount (in thousands of CFA francs)	In Percent	Increase 1982/81	Increase 1982/78
GENERAL SERVICES				
General Expenses	8,557,626	17.88	96.91	107.31
Supreme Court	28,051	0.06	14.68	72.25
Presidency of the Republic	791,673	1.65	107.47	93.23
Government Secretary of State				
Ministry of the Interior and Security	3,248,259	6.79	30.03	72.15
Ministry of Justice	223,148	0.47	14.30	13.68
Ministry of Foreign Affairs and Cooperation[1]	873,970	1.82	- 8.38	52.06
Ministry of National Defense	8,691,428	18.16	5.3	54.35
Ministry of Labor and Public Service	469,341	0.98	11.90	258.46
Ministry of Postal Services and Telecommunications[2]	36,482	0.08	-9[illegible].66	-85.78
S/Total, General Services	22,919,978	47.90	30.45	72.33
SOCIAL SERVICES				
Ministry of National Education and Culture	5,316,960	11.11	7.11	)
Ministry of Higher Education and Scientific Research[3]	3,500,614	7.31	45.07	) 44.71
Ministry of Public Health	2,807,727	5.86	- 0.56	)
Ministry of Social Affairs and the Status of Women[3]	422,337	0.88	- 3.72	) 51.69
Ministry of Youth, Sports, and the Arts	301,787	0.63	- 3.07	70.69
S/Total, Social Services	12,349,425	25.81	12.92	47.03
ECONOMIC SERVICES				
Ministry of Finance	1,382,214	2.88	- 0.71	-12.33
Ministry of the Economy and Planning	167,695	0.35	0.08	-21.21
Ministry of Rural Development	2,464,092	5.14	- 1.29	13.24
Ministry of Commerce, Industrial Development, and Mining	234,817	0.49	25.3[illegible]	-67.85
Ministry of Public Works, Transportation, and Urban Planning	2,141,927	4.47	-37. .	- 1.41
Ministry of the Environment and Tourism	359,777	0.75	4.28	24.67
S/Total, Economic Services	6,750,522	14.11	-15.56	- 6.58
Debt Service	5,829,488	12.18	45.76	252.26
TOTAL	47,849,413	100%	18.15%	56.17%

[1] In 1978 the Ministry of Cooperation was not attached to the Ministry of Foreign Affairs.

[2] Previously Information, Postal Services and Telecommunications.

[3] In 1978 the Ministry of Higher Education was attached to the Ministry of National Education; similarly, the Ministry of Social Affairs was attached to the Ministry of Public Health.

Source: Budget Management.

Table 16: Government Expenditures: Administration, 1982

Heading	Amount (in thousands of CFA francs)	In Percent	Increase (in percent) 1982/81	1982/78
CATEGORY I - PUBLIC DEBT	5,829,488	12.18	45.76	252.26
CATEGORY II - MANAGEMENT OF THE SERVICES				
A-Personnel	25,641,796	53.59	11.75	58.38
(of which shared expenditures)	(3,215,905)	(6.72)	(228.51)	(191.27)
B-Material	8,360,324	17.47	33.44	89.96
(of which shared expenditures)	(5,341,721)	(11.16)	(58.65)	(93.06)
TOTAL FOR CATEGORY II	34,002,120	71.06	16.41	65.13
CATEGORY III - PUBLIC TRANSFER PAYMENTS				
School Grants and Scholarships	3,357,367	7.02	61.20	69.39
School Subsidies	312,455	0.65	- 7.25	78.73
Contributions to Commissions and Subsidized Enterprises	350,000	0.73	0	-33.33
Contributions to International and Various Inter-African Organizations	402,000	0.84	9.26	-52.54
Subsidies to the Community and to Public Establishments	1,103,200	2.31	263.53	172.52
TOTAL FOR CATEGORY III	5,525,022	11.55	60.57	40.46
CATEGORY IV - EQUIPMENT AND INVESTMENTS				
Infrastructural Works	1,000,000	2.09	-55.16	42.10
Purchase of Land and Buildings	126,888	0.27	-50.53	-
Construction and Major Repairs of Buildings	10,000	0.02	-81.82	-98.18
Purchase and Installation of Equipment	20,000	0.04	-60.00	-97.81
Studies and Research Concerning Investments	816,895	1.71	+21.04	-17.14
National Contributions to Foreign Aid for National Projects	34,000	0.07	-77.25	-79.87
Recurrent Investment Costs	485,000	1.01	+11.83	43.79
State Contribution Toward the Creation of Capital for Banks, State-Owned Enterprises, and Enterprises with Mixed Economic Partnerships	-	-	-	-
Indirect Investments, Equipment Subsidies for Public Insti. ns	-	-	-	-
Contribution and Assistance Fund	-	-	-	-
TOTAL FOR CATEGORY IV	2,492,783	5.21	-35.24	-42.35
GRAND TOTAL OF EXPENDITURES	47,849,413	100%	18.15%	56.47%

Source: Budget Management.

Table 17: Investment Planning
(in thousands of CFA francs)

	1967 - 1979		1971		1972 - 1976		1977 - 1981	
	Amount	in Percent	Amount	in Percent	Amount	in Percent	Amount	in Percent
Rural	7,812	28.5	1,994	23.4	19,897	31.5	78,500	21
Infrastructure	8,326	30.3	3,722	43.8	17,413	27.5	143,600	38
Modern Industry	5,508	20.1	1,704	20.1	12,795	20.2	112,100	30
Social	4,831	17.4	559	6.6	8,522	13.5	39,400	11
Others	1,035	3.8	519	6.1	4,616	7.3	-	-
Total	27,512	100	8,498	100	63,243	100	373,600	100

Source: 1982 World Bank Report.

- o The development of a diversified agriculture along with specialized regional activities;

- o The abolition of all the constraints related to the traditional social and economic structures which have oppressed the peasants; and

- o Basing industrial development on agriculture.

These goals are possible if new meaning is given to the concept of self-sufficiency which has grown old by its frequent use with too little conviction. The first step towards these goals will be the battle against nature itself which is not any more unproductive in Upper Volta than in other countries where great success has been met by the national agricultural plan. The CNR holds no illusions of gigantic, sophisticated projects. Quite the contrary, a large number of small accomplishments within the agricultural industry will enable us to transform our country into one vast field, an infinite network of farms.

Prices which permit a profit and agro-alimentary, industrial units will provide markets for the peasants' production during all seasons of the year.

In the area of research, the government of Upper Volta created the Upper Volta Research Institute of Agronomy and Animal Husbandry (IVRAZ - l'Institut voltaïque de la recherche agronomique et zootechnique) in March of 1981, thus confirming the willingness of authorities to plan and direct efforts in the area of agronomic research.

4. International organizations

Upper Volta is a member of the following important international organizations:

- o United Nations and its specialized agencies;

- o Organization of African Unity;

- o Joint African and Mauritian Organization;

- o Council of Understanding (Conseil de l'Entente);

- o West African Rice Development Association (WARDA);

- o West African Monetary Union (UMOA - Union monétaire ouest africaine);

- o Permanent Inter-State Committee for Drought Control in the Sahel (CILSS - Comité permanent inter-états de lutte contre la sécheresse dans le Sahel); and

- o Central Bank of West African States (BCEAO - Banque centrale des états de l'Afrique de l'ouest).

E. Economic Data

1. General data

The gross domestic product (GDP) of Upper Volta amounts to about FCFA 270 billion. These last few years, imports made up about one third of the GDP. Table 18 outlines the various uses of the GDP and corresponding price indices (values are in constant 1970 FCFA) for the period from 1970 to 1979.

Exported goods, almost entirely in the form of agricultural products, do not manage to compensate for the cost of imported goods. As a result, the balance of trade deficit totals nearly 20 percent of GDP.

The importance of agriculture in the total amount of exports is illustrated in Table 19. In particular, the importance of the cotton trade can be observed, as this sector of the total amount of exports increased 2 percent to 37 percent from 1975 to 1977.

The World Bank estimates that the rate of growth of GNP is less favorable for long-range projections. The annual growth of the GNP from 1977 to 1979 averaged only 0.4 percent.

2. International trade

The estimated value of imports and exports are shown in Table 20 for the years 1976, 1977 and 1978. However, one should be careful when referring to these numbers, as much data related to exports remains unrecorded.

The major customers and suppliers of Upper Volta for exports are Belgium (Luxembourg), France, West Germany, Canada, Italy, Ivory Coast, Japan, and Great Britain; and for imports, Belgium (Luxembourg), China, France, East Germany, Canada, Italy, Ivory Coast, Japan, Holland, Great Britain, and the United States.

The principle commercial products for export consist of live animals, cotton, oleaginous products, and leather and hides. For importation, the products are petroleum products, chemical products, raw materials, machinery, foodstuffs, textiles, and transport and construction equipment.

3. Finance and currency

The currency is the CFA Franc which has fixed parity with the French Franc, as in all member countries of the UMOA. The current exchange rate is one French Franc for FCFA 50.

Each year, an "Act on Finances" determines the amount of the Upper Volta budget, balanced in income and expenses.

Table 18: Use of the Gross Domestic Product

At Constant (1970) Prices (millions FCFA)	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Final Public Sector Consumption	7,948	8,350	8,750	9,675	10,203	14,993	12,612	13,813	15,461	17,322
Final Private Sector Consumption	92,076	92,265	95,097	88,040	82,862	80,989	83,170	98,267	98,351	106,122
Increase in Stocks	2,250	2,502	3,439	2,960	4,508	3,176	4,025	2,568	3,085	1,841
Gross Fixed Capital Formation	7,500	11,172	12,979	15,701	16,745	15,920	15,538	15,761	16,120	15,493
Exports of Goods and Services	8,615	8,675	11,667	10,782	11,631	11,523	10,460	10,935	13,811	14,201
Imports of Goods and Services	-19,640	-23,314	-25,041	-26,032	-26,723	-31,584	-27,685	-26,639	-33,508	-33,511
Gross Domestic Product	98,749	99,650	106,871	101,126	99,226	95,017	98,120	114,705	113,320	121,468
Related Price Index										
Final Public Sector Consumption	100.0	101.9	108.9	112.5	131.5	155.0	168.4	180.7	193.5	215.2
Final Private Sector Consumption	100.0	102.6	104.1	110.1	129.0	155.8	160.7	184.4	189.9	229.4
Increase in Stocks	100.0	107.3	103.2	111.5	183.3	176.3	161.5	199.4	220.4	268.4
Gross Fixed Capital Formation	100.0	109.2	119.2	127.7	160.2	185.3	219.0	227.6	243.3	265.4
Exports of Goods and Services	100.0	104.8	99.3	109.3	160.7	162.0	228.5	250.5	210.6	239.7
Imports of Goods and Services	100.0	109.2	119.4	127.7	160.2	185.3	219.0	227.6	243.3	265.4
Gross Domestic Product	100.0	102.1	102.1	108.5	132.1	152.0	161.4	163.3	187.7	211.8
Volume Index	100.0	100.9	108.2	102.4	100.5	96.2	99.4	116.2	114.8	123.0
Annual Growth Rate (in percent)	-	0.9	7.2	-5.4	-1.9	-4.3	3.3	16.9	-1.2	7.1
Annual Inflation Rate (in percent)	-	2.1	-	6.3	21.8	15.1	6.2	4.3	11.5	12.8

Source: Department of Economic Accounts.

Table 19: Exports of Agricultural Products
(in millions of CFA francs)

Years (3 Year Periods)	Total Exports (CFA francs)	Cotton (1) CFA francs	Cotton (1) per cent	Cereals (2) CFA francs	Cereals (2) per cent	Oil Yielding Products (3) CFA francs	Oil Yielding Products (3) per cent	Fruits and Vegetables (4) CFA francs	Fruits and Vegetables (4) per cent	Total Agricultural Exports CFA francs	Total Agricultural Exports per cent
1960/62	1,174	20(5)	2	0	-	119	10	53	5	192	16
1963/65	3,096	143	5	9	-	307	10	88	3	547	18
1966/68	4,529	762	17	8	-	591	13	127	3	1,488	33
1969/71	6,480	1,324	27	9	-	989	20	226	5	2,548	52
1972/74	6,480	1,419	22	5	-	1,434	22	204	3	3,062	48
1975/77	11,891	4,434	37	94	1	2,826	24	388	3	7,742	65

(1) Includes Cotton-Fibre, Grains and Cake.
(2) Includes Flour.
(3) Includes Groundnuts, Sesame, Karite, Groundnut Oils and Karite Butter.
(4) Mainly Green Beans, Onions and Mangos.
(5) Only Raw Cotton.

Source : Report of the Joint World Bank/FAO/ISNAR Mission on Agronomy Research in Upper Volta, 1983.

Table 20: Estimated Imports and Exports, 1976-1978
(in millions of U.S. dollars)

	1976	1977	1978
Exports of Goods	83.1	94.8	107.8
Imports of Goods	-167.4	-220.8	-255.4
Trade Balance Deficit (Goods)	- 84.3	-126.0	-147.6
Exports of Services	23.4	23.7	28.5
Imports of Services	-93.3	-121.7	-151.1
Trade Balance Deficit (Services)	-154.2	-224.0	-270.2
Trade Balance Deficit (Goods and Services)	-321.6	-350.0	-418.8

Source : 1982 World Bank Report.

The public debt, which includes the expenses for which the State has committed itself for a number of years (amortization of contractual debts, estimates of guarantees in future years, pensions, etc.), represented 9.87 percent of the 1981 budget. This increased to 11.90 percent in 1982.

The main banks in Upper Volta are: the National Development Bank, with holdings of FCFA 1.1 billion; the International Bank of the Voltas, with holdings of FCFA 600 billion; the International Bank of Commerce, Industry and Agriculture, with holdings of FCFA 4.5 billion, 51 percent of which is under state control; the West African Countries Central Bank, consisting of six West African countries, with holdings of FCFA 12.8 billion; the National Bank for Agriculture Credit, with holdings of FCFA 1.3 billion, 51 percent of which is under state control; and the National Bank of Deposits and Investments, with holdings of FCFA 1.7 billion.

The official rate of exchange for the US dollar into FCFA over the last 12 months is as follows: 353 in September of 1982; 307 in October of 1982, 360 in November of 1982; 342 in December of 1982; 339 in January of 1983; 340 in February of 1983; 350 in March of 1983; 366 in April of 1983; 370 in May of 1983; 383 in June of 1983; 389 in July of 1983; and 400 in August of 1983. The average rate of exchange over this 12-month period was one US$ for FCFA 364.

4. Current economic program

Following the political changes which occurred on August 4, 1983, the Chief of State, in a speech delivered in October of 1983, listed the main orientation to be pursued by the government and the CNR. A formal economic program in the usual sense has not yet been structured. However, the various departments of the different ministers have been asked to define short-term programs, by sector, which are based essentially on the finances of the national budget. These programs are currently underway.

5. Foreign aid including food aid

The annual report on foreign aid to further the development of Upper Volta (1980-1981), prepared by UNDP, mentions that by December of 1982, more than 1,500 separate development projects would be underway. These projects were financed by bilateral or multilateral funds or by non-governmental organizations. To these must be added hundreds of other projects which are currently pending. This aid is provided by 17 bilateral donors, by more than a dozen multilateral organizations sponsored by the UN and by the EEC, by about half a dozen international and inter-regional development banks, and, finally, by about 150 non-governmental organizations.

The total amount of foreign aid for the years 1980 and 1981 is indicated in Table 21. Details concerning the food aid received over the same period of time are given in Table 22.

Table 21: Foreign Development Assistance
(US$)

	1980	1981
Disbursements		
Bilateral	49,910,000	69,356,000
(Commitments, approx.)	121,591,000	114,788,000
Multilateral		
UNDP	5,681,939	6,253,000
Other U.N. Agencies	6,400,342	10,414,000
EDF	5,684,364	10,599,000
IBRD	8,385,000	5,870,000
BAD, BOAD, etc.	10,606,980	10,902,000
	86,668,620	113,394,000
Non-Governmental Agencies approx.	20,000,000	35,000,000
Food Aid approx.	50,000,000	50,000,000
Government of Upper Volta Budgetary Expenses	141,875,000	170,245,000

Source : Annual Report on Foreign Development Assistance to Upper Volta, UNDP, 1982.

Table 22: Food Aid
(in thousands of U.S. dollars)

Sources	Expenditures 1980	Expenditures 1981	Nature of Assistance
Belgium	NA[1]	428	1,500 tons Wheat Flour
Canada	NA	2,410	4,966 tons Wheat Flour (1981/82)
CHE	278	280	
West Germany	NA	1,938	1,500 tons Maize imported from West Germany, Warehouse, Working Capital
France	1,250	2,800	4,000 tons Sorghum (1980) 8,000 tons Maize (1981)
Netherlands	NA	785	Local Market Purchases of Cereals
USA	13,452	14,989	Corn Meal, Powder Milk, Vegetable Oil, Rice, Sorghum
EDF	39[illegible]	(1980,1981)	Corn Semolina, Powder Milk, Butter Oil
WFP	4,278	5,337	
CRS	18,068	20,913	

[1] NA = Not available.

Source : Annual Report on Foreign Development Assistance to Upper Volta, USAID, 1982.

F. Rural Sector

1. Agriculture

a. Natural resources related to the development of agriculture

According to the uses Upper Volta makes of its lands, the country can be divided as follows: the rain-watered cultivation zones have a surface area of 88,290 km^2 or 32.2 percent of the total area; the irrigated lands have a surface area of 874 km^2; the pasture lands have a surface area of 129,570 km^2 or 47.3 percent of the total area; the timber and forests have a surface area of 34,760 km^2 or 12.7 percent of the total area; and the remaining miscellaneous lands have a surface area of 21,380 km^2.

Of the 88,290 km^2 of water-supplied agricultural land, it is estimated that from 24 to 25,000 km^2 are cultivated each year.

Upper Volta is a country destined to rely on agriculture. As indicated earlier, more than 93 percent of the resident population lives in a rural area. It is estimated that about 62 percent of Upper Volta is within climatic zones favorable to agriculture.

The water resources include:

(1) Underground water

The underground waters consist of: the continuous aquifers of the depressed Gondo plain whose depths vary between 10 m and 80 m, and whose annually renewable resources have been estimated at 430 million m^3 (with an annual infiltration of 38 mm); the aquifers from the precambrian soils which depend on the fissuring, the break-up or the weathering of rocks, and whose annually renewable resources are estimated between three and four billion m^3 (with an annual infiltration equivalent to 17 mm); and, finally, sources from primary and infracambrian sandstones, which are estimated at 1.9 billion.

(2) Surface water

Surface water, in addition to that of the streams and rivers, can be found in about 300 reservoirs which vary in size from a few ha to several hundred. About 50,000 ha are estimated to be available as this type of water source.

The irrigation potential within the entire country is close to 150,000 ha.

In 1979, irrigation installations were distributed throughout the country as follows: Niéna Dionkélé with 400 ha, Sourou Valley with 150 ha, SOSUHV Banfora with 3,900 ha, Kou Valley with 940 ha, Banzo with 180 ha, Bangré with 80 ha, various low-lands with 2,900 ha, Bam Lake with 170 ha, and Bazega, whose irrigation surface is unavailable.

b. Arable land

It is estimated that there are about nine million ha of arable land of which only about three million are currently being cultivated, or one-third of the total available arable land. However, there is very little likelihood that the cultivated land in certain regions can be increased because of the mediocre quality of the soil, the lack of available water sources, or the already heavy cultivation of these soils.

Table 23 gives information concerning population figures and available farm lands by region. From this data, one can observe that the ratio of cultivation use exceeds 50 percent in certain regions, such as in Yatenga and in the center region.

The population distribution in most areas is very uneven. (See Figure 7.)

In the Mossi region, the maximum population density, compatible with the fertility of the soil, under present technical conditions, is estimated at 40 inhabitants per km^2. However, the limit is considerably exceeded in many instances, and, in estreme cases, it reaches from 80 to 120 inhabitants per km^2. Thus, in the Ouagadougou region, one can witness the stagnation of areas with average to above average use; there is very little land available for cultivation because of this high population density.

In the Sahelian region, the cultivated land primarily located at the bottom of the dune slopes, increased 45 percent from 1955 to 1975, or an average of 2.2 percent per year, which almost equals the demographic growth in Sahel. As a result, any extension of agricultural effort is currently restricted; increased arable land per inhabitant is difficult to find.

c. Land tenure system

There are two separate types of rural land: the land surrounding the farmers' homes, which benefits from the availability of human waste and household refuse; and pasture lands more or less distant from the farmers' homes, which are usually cultivated on a rotating crop program.

As far as land tenure is concerned, it is important to differentiate between land owned personally, and land owned collectively. Lands owned personally, whether pasture lands or lands nearer the homes, can be cultivated by any person old enough to work the land, to whom the village chief has granted rights of ownership. No restriction is placed on the type of produce cultivated and each individual keeps the income earned at harvest time.

Land owned collectively is cultivated by all members of the family old enough to work. They grow foods which meet the needs of family life, that is, home use and eventual market sale.

Table 23: Resident Rural Population and Available Land

	Total Area Measurement (in km^2) (1)	Rural Population per 1000 ha (2)	Land Use (in thousands of hectares) S.A.U. (3)	Pasture (4)	Cultivated (5)	C.I.C. (5)/(3) (6)	Land Use (ha per Resident) Agriculture (7)	Pasture (8)	Rural Density pop/km^2 S.A.U (9)
Sahel Region	36,869	354	980	2,045	140 (6)	14	2.8	6.79	36
Central Region	93,991	3,023	2,835	5,725	1,332 (56)	47	0.9	1.9	107
- Yatenga	12,293	493	350	800	244.5	70	0.7	1.6	141
- North Central	21,578	626	615	1,395	242.1	39	1.0	2.2	103
- East Central	11,166	402	325	510	165.4	43	0.8	1.2	124
- Center	21,952	762	740	1,445	374.8	56	1.0	1.9	103
- West Central	26,992	740	805	1,575	305.4	38	1.1	2.2	92
Eastern Region	49,992(18)	403	1,550	3,010	203 (8)	13	3.8	7.5	26
Western Region	93,766(34)	1,447	3,560	5,105	705 (30)	20	2.5	3.5	41
- Black Volta	33,106	633	930	1,780	304.5	29	1.5	2.8	68
- Upper Basins	24,762	270	1,150	1,475	180.5	17	4.3	5.5	23
- Comoé	18,390	186	760	950	86.8	12	4.1	5.1	24
- Bougouriba	17,488	358	720	900	132.7	18	2.0	2.5	50
Upper Volta	274,040	5,227	8,925	16,245	2,380 (100)	27	1.7	3.17	58.5

N.B. : The total area measurement given in the table is 274,040 km^2; in fact the sum of the O.R.D. measurements is 274,608 km^2.

Source : Directorate of Agricultural Services.

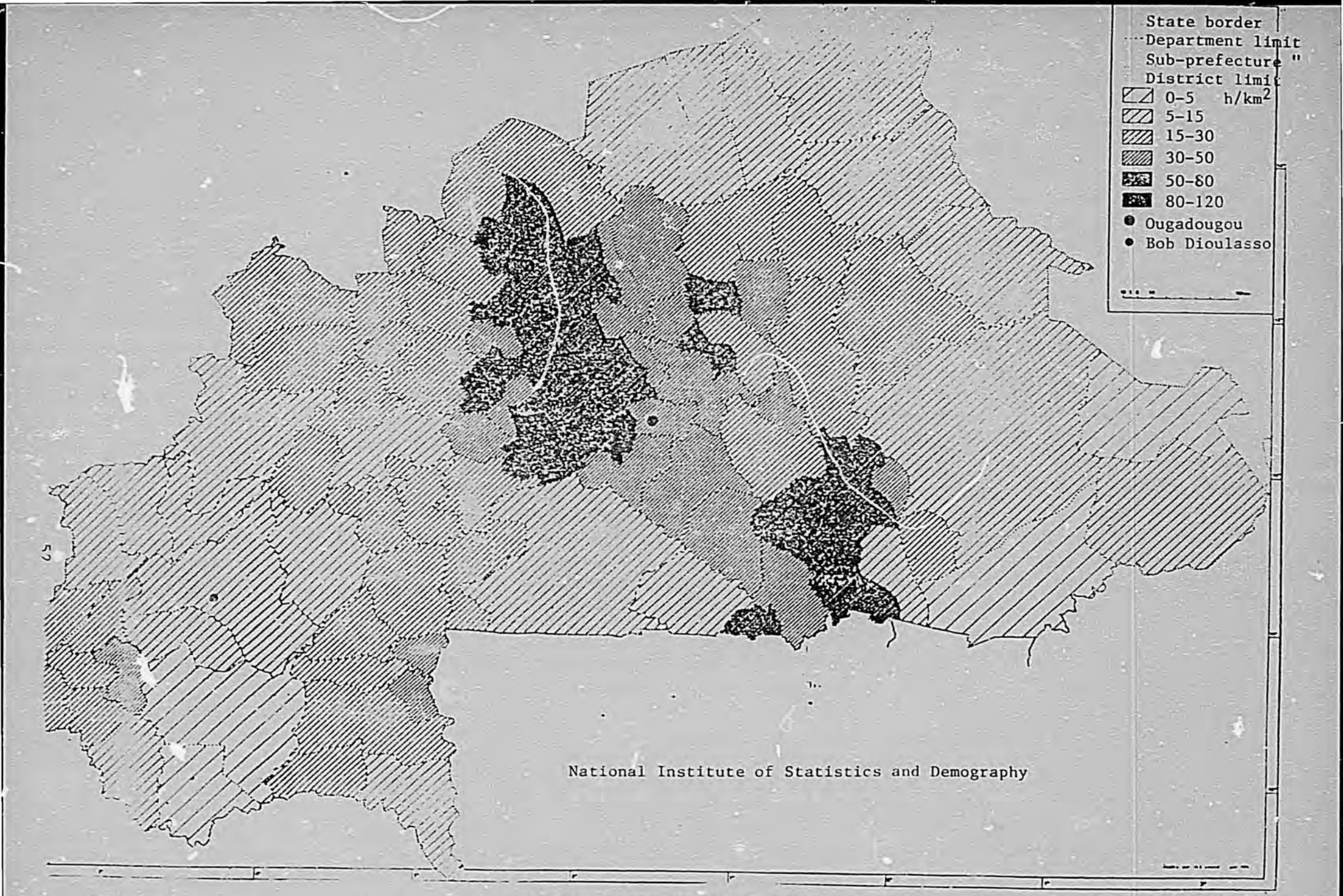


Figure 7: Population Density

Census, December 1973

d. Principal crops

The overall agricultural production can be divided into four categories: cereal, oleaginous plants, fibers, and fruits and vegetables, taking into consideration the comments of a 1983 joint report of the World Bank / FAO / ISNAR concerning agronomic and zootechnical research in Upper Volta.

Cereals, along with tubers and seed-bearing vegetables which are cultivated together with cereals, are the most important crops. Sorghum and millet are the most frequently planted throughout the country as a whole, because they adapt more easily to the pedoclimatic variations. The production of corn and rice is restricted due to limited rainfall and the absence of adequate irrigation, particularly in the case of rice. Except in the south-west region, corn is cultivated close to the farmers' homes where fertility of the soil is the greatest. Fonio is a minor crop, used in periods of drought.

Cowpeas, which are generally cultivated in association with cereals, are grown in small amounts.

Tuber plants, such as yams and cassava are not produced in significant quantities, although they are well suited to the agro-climactic conditions of the south-east and of the south-west parts of the country.

The oleaginous plants include karite (the second-most important vegetable for export, but one which is harvested only by hand-picking); groundnuts (the most important oleaginous plant in the country), and sesame (a traditional oleaginous plant of minor importance).

The cotton plant is the only export crop of the country. The land used for its production has moved progressively from the center towards the south-west, where the greater rainfall insures both higher and more stable yields.

The production of fruits and vegetables is speculative but has considerable potential. They can be found traditionally in small, house-based gardens, in low-lying lands, or close to the water reservoirs.

The statistics concerning the principal harvests are indicated in Tables 24 and 25.

Table 26 illustrates the evolution of all crops produced from 1961 to 1979.

2. Main livestock products

Livestock is one of the main supports of the Upper Volta economy. The bovine livestock was estimated at 2,550,000 heads of cattle in 1975 and the small ruminants at 4,000,000, divided into

Table 24: Factsheet on Main Agricultural Crop Production, 1980

	Millet	Sorghum	Maize	Rice	Cotton	Groundnuts	Cowpeas	Sesame
Total Production Area (in thousands of hectares)	900	1,000	90	40	70	170	NA	40
Total Production (in thousands of tons)	400	650	60	35	60	75	40	7
Value (Productivity Level) (in millions of CFA francs)	28	45.5	4.1	2.7	4	4.1	2.6	0.8
Average Return (tons/hectare)	0.39	0.59	0.62	0.82	0.67	0.46	NA[1]	0.17
Price per Kilogram (FCFA /kg)	40	40	40	63	First Choice 62 Second Choice 45	with shell 56 shelled 62	NA	NA

[1] NA = Not available.

Table 25: Distribution of Main Crops by Province

Province	Millet, Sorghum and Maize	Rice	Cotton	Groundnuts	Sesame
	(percent)				
Ouagadougou	16	4	2	11	-
Koudougou	10	4	4	7	-
Kaya	10	3	4	15	20
Yatenga	6	1	0	4	9
Dédougou	16	11	41	7	19
Koupèla	6	23	0	18	4
Banfora	7	11	0	16	26
Bourgouriba	7	7	6	4	22
Bobo-Dioulasso	10	25	40	13	-
Fada N'Gourma	8	11	0	6	-
Sahel	3	0	0	0	-

Table 26: Production Statistics of Selected Crops, 1961-79

Year	Sorghum			Millet			Maize			Rice			Groundnuts			Sesame			Cotton		
	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha	1000ha	1000T	kg/ha
1961	908	411	453	615	195	317	149	75	502	54	30	560	n.d	n.d	n.d	n.d	n.d	n.d	22.9	2.3	111
1962	1642	508	488	597	261	438	160	78	487	67	45	677	277	113	500	15	5.7	380	36.0	6.6	180
1963	908	460	507	823	316	383	160	109	689	33	25	762	100	50	500	21	4.1	197	45.8	8.0	190
1964	1173	660	563	807	378	469	167	127	761	35	34	977	127	70	551	30	6.0	200	52.5	8,8	170
1965	964	530	550	800	350	438	164	110	667	35	34	986	130	73	562	25	6.0	240	49.7	7.5	140
1966	1018	540	530	800	350	438	165	124	752	35	34	980	136	76	559	25	6.0	240	52.4	16.3	310
1967	1312	604	460	700	300	429	225	124	550	36	44	1215	142	80	563	25	6.0	240	65.4	17,3	260
1968	831	530	638	612	368	601	228	137	600	46	40	871	150	85	567	20	7.9	379	71.6	32.0	450
1969	1094	547	500	867	382	440	100	60	600	40	34	836	137	71	519	22	3.7	171	84.1	36.2	430
1970	1041	563	541	850	378	444	85	55	645	40	34	850	140	68	484	26	6.3	238	80.6	23.5	290
1971	1070	576	538	672	397	591	90	55	655	41	36	891	144	66	458	21	4.0	182	74.1	28.1	380
1972	1051	512	488	711	400	373	81	59	725	32	30	941	105	60	577	34	5.6	166	70.1	32.6	470
1973	1037	481	464	720	253	351	89	58	658	39	31	799	167	63	376	35	5.2	143	66.6	26,7	410
1974	1200	705	588	850	370	435	90	62	683	40	36	906	120	65	382	30	8.0	150	61.9	30.6	500
1975	1200	650	542	850	350	412	90	62	683	42	40	952	180	80	444	40	8.0	175	68.0	50.7	750
1976	1138	717	630	911	406	370	[illegible]	45	511	45	41	911	164	87	533	40	7.0	179	79.2	55.3	700
1977	1000	610	610	900	350	350	9[illegible]	50	556	47	23	548	165	85	515	40	6.0	150	68.8	38.0	550
1978	1100	621	565	910	404	404	150	101	673	40	32	748	170	70	412	40	7.0	175	71,7	60.0	840
1979	n.d	640	n.d	n.d	430.5	n.d	n.d	104.5	n.d	n.d	47.2	n.d	144.6	69.9	480	27.1	5.4	200	77.8	75,1	960

Source : Report of the Joint World Bank/FAO/ISNAR Mission on Agronomic Research in Upper Volta. 1983.

goats (2,400,000 head) and sheep (1,600,000 head). Table 27 shows the estimated number of cattle to 1986.

Livestock makes a noteworthy contribution to the national economy. Prior to 1975, livestock accounted for 20 to 25 percent of the primary sector and represented from 10 to 12 percent of GDP. (See Table 28.) The estimated income from the livestock industry in 1979 was between FCFA 20 and 22 billion.

As far as the geographic distribution of livestock is concerned, the density expressed in head of cattle by km^2 is far greater in the north than in the south. The number of animals to be found in natural pastures is considerably larger in the northern part of the country, despite this area's less favorable climatic conditions.

In the southern regions, tripanosomiasis is a serious impediment to optimal development of animal production. Statistical data concerning the most important products from animal sources are listed below. These products include meat and milk (from cattle, sheep and goats), eggs and poultry meat, and pork.

a. Cattle

(1) Beef

In 1981, the general data for beef meat was a volume of 32,600 tons. The total value for 1981 of this meat was FCFA 21,700,000, or a value per kg of FCFA 700. The number of cattle in 1981 was 2.8 million, with a rate of growth of 2 percent. The average weight per carcass was 120 kg. The annual consumption amounted to 10 kg per person per year (cattle plus small ruminants).

(2) Milk

As for milk, the figures consist of a total volume for 1981 of 52,000 t, and a total value of FCFA 12,900,000 or a value per liter of between FCFA 200 and FCFA 250. The annual rate of consumption was 8 liters per person.

b. Sheep and goats

The volume for sheep and goats for the year 1981 was 9,600 t, and their total value amounted to FCFA 4,800,000,000. The number of heads for 1981 amounted to 4,280,000, with a value per kg of FCFA 500 to 600 and a rate of growth of 3.5 percent. The average weight per carcass was 7.5 kg.

c. Poultry

The volume of poultry eggs for 1981 amounted to 57 billion, with a total value of 57 billion times FCFA 25 to 50 per egg, or a value of FCFA 300 to 600 per dozen. The number of poultry for 1981 was 20,000 to 30,000 including both the poultry laying eggs

Table 27: Livestock: Official Estimates, 1975-1986

Species	1975	1976	1977	1978	1979	1980	1981	1986
Cattle	2,550	2,550	2,601	2,653	2,706	2,760	2,815	3,107
Sheep	1,600	1,648	1,697	1,748	1,800	1,855	1,910	2,362
Goats	2,400	2,472	2,556	2,712	1,712	2,793	2,877	2,754
Hogs	150	154	159	164	169	174	180	208
Donkeys	200	--	--	--	--	--	--	--
Horses	70	--	--	--	--	--	--	--
Poultry	10,000	10,200	10,404	10,612	10,824	11,031	15,000	32,000

Source: Second Confere . Management of the Ministry of Rural Development, July 1981.

Table 28: Portion of GDP Allotted for Livestock Production

Allotments	1964	1965	1968	1970	1971	1972	1974	1975
Primary Sector	29,289	19,448	34,327	36,360	37,360	40,061	45,074	47,324
Livestock Production, Fishing, Hunting	6,248	5,913	8,645	8,350	8,690	10,808	12.606	10,402
Proportion of Livestock Production in the Primary Sector (in percent)	21.3	20	25.2	23	23.3	26.6	28	22
Gross Domestic Production	50,385	51,670	70,727	78,790	82,980	85,508	100,508	106,844
Proportion of Livestock Production in GDP (in percent)	12.4	11.4	12.2	10.6	10.5	12.6	12.5	9.7

Source: Second Conference, Management of the Ministry of Rural Development, July 1981.

and the non-productive poultry. The guinea-fowl represented one-third of the 20 to 30 million chickens used for meat.

As far as poultry meat is concerned, the data includes a volume for 1981 of 20,000 t and a total value of ten billion or a value per kg of FCFA 500. The number of head for 1981, including the egg-laying hens, was 20 to 30 million, with a rate of growth of 5 to 10 percent for the years 1978 to 1981. The average weight per carcass was 800 to 1,000 kg. The annual rate of consumption per person was one to 1.2 kg per inhabitant per year.

d. Pigs

As for pigs, the volume for 1981 amounted to 98.1 t, with a total value of 226,000 or a value per kg of 200 to 300. The number of heads for 1981 was 226,000, and the average weight per carcass was 46 kg. The annual consumption per person is not available.

3. Forestry

Wood is the forestry product which has been the subject of a serious evaluation. Apart from its use in various handicrafts, wood is the principal source of energy for the cooking of food and drink, for the heating of water and of homes, and for lighting. Daily consumption of wood per person is estimated at 1.65 kg (including charcoal from the wood). The consumption per person is less in urban areas (1.42 kg per person) than in rural areas (1.69 kg per person).

According to a national survey started in 1979, it is estimated that throughout the 274,000 km^2 of Voltaic lands, approximately 154,000 km^2 are covered by forests, or 57 percent of the total surface. Officially-recorded properties which include forests, national parks and fauna reserves, cover 38,000 km^2 or 25 percent of the total forest area. The volumes of planted forest are estimated at 350 million m^3. However, this total planted volume does not make clear the heterogeous nature of the forest throughout the country. Wood is heavy and difficult to transport. The transfer of wood from the areas with excess wood to these areas in shortage is a difficult and expensive operation.

Tables 29 and 30 give details about the forestry resources by department, in planted volumes and in categories of potential uses. Keeping in mind their annual rate of consumption, one can identify distribution of the sous-préfectures of the central department as follows:

- The sous-préfecture of Ouagadougou has a serious situation;
- The sous-préfectures of Boussé, Ziniaré, Zorgho, Sapone, Kombissiri, Manga and Tiébélé have a difficult to average situation; and
- The sous-préfecture of Po has a good situation.

Table 29: Forest Resources: Breakdown, by Region, of Total Planted Volume
(m^3)

Regions	Tree-covered Savanna	Shrubby Savanna	Mixed Thickets	Total Forests	Unploughed Land	Total
SAHEL	-	25,109,627	4,921,527	30,031,153	5,674,420	35,705,573
EAST	37,245,447	37,104,607	-	74,350,034	16,017,138	90,367,192
CENTER	13,331,878	6,406,657	-	19,740,535	15,513,842	35,254,377
WEST CENTRAL	31,911,960	6,084,140	-	37,996,100	17,524,805	55,520,905
EAST CENTRAL	7,986,683	2,498,458	-	10,485,141	9,496,472	19,981,613
NORTH CENTRAL	1,014,170	4,239,379	-	5,253,549	20,217,326	25,470,875
NORTH	50,313	1,624,501	665,894	2,340,708	13,213,923	15,554,631
BLACK VOLTA	10,183,563	16,789,004	-	26,972,567	23,158,263	50,130,828
UPPER BASINS	26,005,451	16,269,576	-	42,275,028	12,162,616	54,437,644
SOUTH-WEST	10,662,438	14,784,066	-	25,446,504	12,414,391	37,860,895
COMOE	55,412,088	19,043,923	-	74,456,011	7,459,361	81,915,372
TOTAL	193,803,991	149,955,938	5,587,421	349,347,350	152,852,557	502,199,907

Table 30: Forest Resources: Breakdown by Utilization

Region	Lumber Timber	Potential Lumber, Timber	Service Wood	Fire Wood	Fruit-Tree	Total
SAHEL	696	258	1,702	26,937	438	30,031
EAST	1,254	4,750	3,101	58,944	6,301	74,350
CENTER	250	1,190	970	12,840	4,490	19,740
WEST CENTRAL	108	3,535	4,725	23,665	5,963	37,996
EAST CENTRAL	323	328	359	7,818	1,657	10,485
NORTH CENTRAL	-	-	308	4,696	250	5,254
NORTH	-	14	46	2,189	92	2,341
BLACK VOLTA	161	644	2,093	16,828	7,247	26,973
UPPER BASINS	1,895	2,643	7,374	21,152	9,211	42,275
SOUTH-WEST	1,418	1,174	2,159	12,376	8,319	25,446
COMOE	4,726	7,958	5,517	51,853	4,402	74,456
TOTAL	10,831	22,494	28,354	239,298	48,370	349,347

Source : Direction de l'aménagement forestier et du reboisement.

Table 31 shows an assessment of the economic dimensions of the firewood sector. At the national level, the economic contribution made by firewood and charcoal amounted to FCFA 12 billion in 1980, or 4.5 percent of GDP.

Self-supply is the form of provision prevailing in the rural areas. Wood purchases are quite infrequent. By contrast, in the urban areas purchases predominate and expenses can reach FCFA 4,295 per household per month. It is estimated that the city of Ouagadougou alone uses 300 tons of wood per day (without counting charcoal), which requires the following daily suppliers: 342 pedestrians, 831 cyclists, 203 donkey carts, 129 vans and 58 trucks. In the last few years, the distances covered by these various providers has dramatically increased. Today, the averages are approximately 30 km for unmotorized transport and 70 km for motorized transport. One can thus witness the creation of worsening degradation pockets around the urban centers.

The national forestry strategy aims mainly at two objectives. First, it attempts to increase wood production through various complementary approaches - industrial plantings, village or family reforestation, and the development of natural formations. Second, the reduction of wood consumption (through the extension of improved stoves, and the support of research efforts concerning new and renewable energies) is being attempted.

4. Fishing

Fishing in Upper Volta is at a disadvantage because of the lack of large rivers and lakes. However, authorities have clearly expressed their desire to develop the existing stretches of water, or to create, through piscicultural activities, a protein supply to aid the efforts at food self-sufficiency. Thus, since 1976, there has existed a Division of Fisheries and Fish Research (DPP - Direction de la pêche et de la pisciculture).

Fishermen are organized in collective fishing centers, which include ten to 30 fishermen. Tables 32 and 33 show the centers existing as of December 31, 1980.

It is estimated that the annual fish production from Upper Volta waters is 6,000 tons. More than 50 percent of these catches come from open river waters, while the remainder come from enclosed waters.

Aside from the national production, the people of Upper Volta eat between 600 and 1,200 t of dry or smoked fish (the equivalent of between 2,000 and 4,000 t of fresh fish) which come from Mali. Upper Volta is also a traditional area of transit for fish from Mali to Ghana and the Ivory Coast.

Aside from interannual changes observed in production and in external trade, one can estimate that approximately 9,000 t is the average quantity of fresh fish or fresh fish equivalent annually

Table 31: Economic Contribution of Firewood, 1980

Importance per day (in thousands of CFA francs)

Urban Sector	Production	Transport	Commercial Use	Total	Total	Charcoa
Ouagadougou	1,138	1,894	1,452	4,484	4,819	(335)
Bobo-Dioulasso	676	828	397	1,901	1,951	(50)
Other Urban Centers	448	621	375	1,444	1,474	(30)
Fuel Supply (004)	139	176	-	315	315	-
Urban Sector	2,401	3,519	2,224	8,144	8,559	(415)
Semi-Urban Sector						
Purchases	227	397	317	991		
Fuel Supply (0.28)	80	80	-	160		
Semi-Urban Sector	357	477	317	1,151		
Rural Sector						
Sahel	621	621	-	1,242		
East	699	699	-	1,398		
Center	7,202	7,202	-	14,404		
North-West	1,253	1,253	-	2,506		
South-West	2,056	2,055	-	4,111		
Rural Sector	11,831	11,830	-	23,661		
Importance per year (in millions of CFA francs)						
Urban Sector	876	1,284	812	2,973		
Semi-Urban Sector	130	174	116	420		
Rural Sector	4,318	4,318	-	8,636		
Total, Upper Volta	5,324	5,776	928	12,029		

Notes :
1. The totals could be inexact due to rounding.
2. The value of production for the standing tree comprises the equivalent of forest tax only.
3. The (minimum) values for commercial use are not included in the rural sector because purchases in rural regions mainly cover the transport costs.
4. The value of charcoal has only been included in the urban sector.

Source: Directorate of Forest Parcelling and Afforestation.

Table 32: Fishery Centers

Fishery Centers/Finance	Year Started	Number of Fishermen
Nagbangré/EDF	1978	20
Tapoa/EDF	1978	20
Bazéga/US-AID	1979	20
Mogtédo/TCP/UPV/8906 (I)	1980	20
Mare aux Hippos " "	1980	27
Vallée du Kou " "	1980	23
Dem/kaya/MISEREOR	1980	26
Bam/Kongoussi/MISEREOR	1980	20
Tougouri/MISEREOR	1980	20
Yalogo/MISEREOR	1980	20
TOTAL =		216

Source : Directorate for Fishery and Fish Culture Research.

Table 33: Production Volume of Fishery Centers, 1980

FISHERY CENTER	INSPECTION	ANNUAL PRODUCTION (in kilograms)	REMARKS
Bazéga	Center	1,900	Insignificant part of the Center's production.
Mogtédo	Center	6,500	The Center was not in operation for almost 3 months.
Nagbangré	Center	10,310	
Tapoa	East/Fada-N'Gourma	33,036	
Mare aux Hippos	Bobo	13,036	?
Vallée du Kou	Bobo	35,242	3 months
Yalogo	Kaya	6,310	2 months
Bam	"	?	
Dem	"	?	
Tougouri	"	?	
Total		106,334	

Source : Directorate for Fishery and Fish Culture Research.

available to Upper Volta's population. This number corresponds to an average annual availability per capita of 1.5 kg.

In addition to internal consumption, exports (about 10 percent of total production) at FCFA 4?0 per kg of fresh fish, bring FCFA 2?0 million per year to the national economy. Of course, in the absence of reliable statistics, this number is only a rough estimate.

By the year 1990, the total quantity of fish that will be available to satisfy the protein needs of the population have been estimated at 18,000 t, of which 14,000 t might come from rational production and 4,000 t from imports. Beyond 1990, it is likely that the increasing consumer demand for fish products will only be met through imports or through the development of pisciculture.

In the long-term, objectives in the fishing sector include increasing the contribution of fishing to the GNP from 0.3 percent (estimated 1977 level) to more than one percent in 1990, and increasing pisciculture production from almost none currently to 10 to 12,000 t. The latter can only be accomplished if the large dams at Bagré, Moumbul and Kompienga are built.

5. Principal agricultural production and livestock system

Although the main crops (millet, sorghum, corn, and groundnuts) are sometimes single-cropped, the norm is mixed-cropping. Field observations in the villages of Né dogo (in the Ouagadougou area), Aoré ma (in the Ouahugouya area), and Digré (in the Zorgho area) are presented in Table 34. Nearly ten types of mixed-cropping are found in the millet fields of these areas.

Human labor is the principal source of energy for Upper Volta's agriculture. Members of the family provide the main source of labor, but there are also many forms of collective operations at the village level. Moreover, the use of paid labor is increasing. It is estimated that a male adult can cultivate about one ha of grain by using traditional manual methods.

The use of mechanized equipment is still limited. Animal-driven equipment is the most widely used mechanized form.

Aside from the harvesting of sugar, vegetables for export, and cotton, almost all the harvesting is done by manual traditional methods on small familial farms. The surface area of such holdings vary from three to seven ha. Farm size is determined by the availability of land and the size of the family.

Sugar cane is produced on a vast irrigated plantation and is the only crop produced on an industrial scale.

Most of the cotton fields receive a certain amount of fertilizer and insecticide treatment, but the production work is still largely done by hand.

Table 34: Distribution of Different Types of Mixed-Cropping

Crops	Distribution of Cultivated Areas by Village		
	Nedogo	Korema	Pigre
	percent		
Millet mono	5.0	2.[illegible]	0.4
Millet & cowpea	3.0	8.[illegible]	2.2
Millet + roselle	5.0	6.3	0.4
Millet + red sorghum	1.0	-	0.7
Millet + earthbean	0.3	-	-
Millet + cowpea + bitto	20.5	-	15.0
Millet + bitto + cotton	0.6	-	-
Millet + red sorghum + cowpea	0.6	-	14.0
Millet + white sorghum + roselle	0.6	-	0.4
Millet + cowpea + rice	0.3	-	-
Millet and other	0.8	11.[illegible]	0.7
Red sorghum mono	2.5	-	1.0
Red sorghum + maize	0.8	-	-
Red sorghum + white sorghum	0.6	-	-
Red sorghum + white sorghum + roselle	0.3	-	0.7
Red sorghum + cowpea	1.0	-	4.0
Red sorghum + cowpea + roselle	2.5	-	14.0
Red sorghum + cowpea + sesame	0.3	-	-
Red sorghum + roselle	1.0	-	1.0
Red sorghum and others	-	-	1.0
White sorghum mono	0.6	-	3.3
White sorghum + cowpea	0.8	-	-
White sorghum + cowpea + millet +roselle	0.3	4.0	-
Maize mono	1.0	2.0	0.4
Maize + red sorghum	0.8	-	0.7
Maize + white sorghum	1.3	-	-
Maize + roselle	1.3	2.2	0.4
Maize and other	7.0	4.0	4.0
Peanut mono	8.0	12.4	10.0
Peanut + roselle	9.0	3.7	5.2
Peanut and other	0.3	10.7	4.8
Okra mono	10.0	-	4.4
Okra and other	0.6	5.4	0.7
Rice mono	0.8	-	-
Earthbean mono	2.0	10.4	3.6
Earthbean & roselle	5.0	4.8	1.8
Earthbean and other	-	3.6	2.5
Others crops	0.3		2.5
Total	100.0	100.0	100.0

Source : FSU sample survey, 1979-1980.

Vegetables are the main dry-season crop, and receive more intensive efforts than do grains.

In animal production, herds number 30 to 80 head, and are supervised by one to three herders. In general, their only source of food is the natural pasture, which forces herds to move constantly, in search of water and appropriate forage resources. The traditional system of animal production remains quite extensive.

At the national level, the entire country is divided into 11 Regional Development Offices (ORD - Organisme régional de développement), which are responsible for the promotion of agricultural production (training personnel, extension and marketing).

6. Marketing systems

Upper Volta has agencies or state companies which control the marketing of agricultural products.

- o Grains: The National Office of Grains (OFNACER - Office national des céréales);
- o Cotton: The Association of Fibers and of Textiles (SOFITEX - Societé des fibres et des textiles);
- o Vegetables and fruits: The Voltaic Union of Market-Gardening Cooperatives (UVOCAM - Union voltaïque des coopératives maraîchères);
- o Export crops other than cotton: National Agricultural Products Price Stabilization Fund (CSPPA - Caisse de stabilisation des prix des produits agricoles);
- o Meat: National Office for the Exploitation of Animal Resources (ONERA - Office national de l'exploitation des ressources animales); and
- o Agricultural equipment: National Center for Agricultural Equipment (CNEA - Centre national d'équipement agricole).

7. Production factors

a. Agricultural inputs

(1) Production factors

Most of the available data concerns chemical fertilizers. Little information has been collected concerning organic fertilizers. Table 35 illustrates the development of fertilizer use between 1972 and 1983.

Mineral fertilizers were first widely used in cotton cultivation. In 1973, the total amount used for cotton reached 1,680 tons, compared to only 561 tons for all other crops combined. This trend is

Table 35: Fertilizer Consumption
(tons)

Agricultural Season	Fertilizer-Cotton on Cotton	Fertilizer-Cotton on Other Crops	Peasant Urea	Sugar Cane	Volta Phosphate	Other Fertilizers	Total (1)
1983	NA	NA	1,700	3,115	NA	NA	NA
1982	8,162	10,152	1,250	3,410	239	55	23,268
1981	7,539	8,436	700	3,810	859	40	21,384
1980	9,569	7,955	800	2,700	233	NA	21,257
1979	7,607	6,464	500	3,100	373	NA	18,044
1978	5,930	5,545	NA	2,650	13	NA	14,138
1977	5,277	3,422	NA	NA	-	NA	8,699
1976	3,810	1,793	NA	NA	-	NA	5,603
1975	2,403	1,362	NA	NA	-	NA	3,765
1974	1,782	1,060	NA	NA	-	NA	2,842
1973	1,680	561	NA	-	-	NA	2,241
1972	1998		NA	-	-	NA	1,998

NA = Not available.

(1) The total results are incomplete until 1978.

Source : Direct[illegible] of Agricultural Services. Provisional Report on the Organization of the Office for Agricultural Inputs, August 1983.

changing, however. Mineral fertilizers are increasingly being used with other crops. In 1982, mineral fertilizers used for cotton amounted to 8,162 tons compared to 10,152 tons for other crops. In Upper Volta, the net cost of fertilizers for agricultural use is very high. In 1981, the estimated cost of fertilizer imports was FCFA 1,702 million. (See Table 36.)

(2) Pesticides

Pesticides are most widely used for cotton cultivation: 417,000 liters of insecticides were sold in 1982, for a total of FCFA 423 million. Weed killers are mainly used by the Sugar Association for sugar cane in an area covering 700 ha per year (value: FCFA 20 million).

In addition to the imported fertilizers, efforts are being made to develop national production of fertilizers through the Voltaphosphate project.

(3) Certified seeds

Certified seeds are not sufficiently used, except for sugar cane, cotton plants, irrigated rice and some cases where the recommendations made by researchers are actually applied. The price of basic seeds is rather high (FCFA 300 to 800 per kg), but the sale price to ORD is fixed by ministerial decrees at a much lower level (in particular, FCFA 200 per kg for grains).

To deal with these problems, a Bureau of Agricultural Inputs (BIA - Bureau des intrants agricoles) was established in 1981. The areas outlined in the legislation which established it are: fertilizers, pesticides, salt licks for cattle, and agricultural equipment. Certified seeds are the domain for another service, the National Service of Certified Seeds (SNS - Service national des semences).

The overall objectives of the BIA are to promote the growth of agricultural production through the use of inputs and to advance the national production of inputs.

In this respect, BIA activities for 1983-84 will focus on the following activities:

- o The establishment of a service responsible for investigating agricultural production costs;
- o Import and extension of a special fertilizer for grains in pilot areas;
- o Campaign to intensify the use of urea;
- o Legislation for authorized pesticides and for certification approval of selected seeds; and
- o Analysis of the problem of organic manure.

Table 36: Fertilizer Imports

Year	Quantity (in tons)	Value (in millions of CFA francs)
1977	15, 271	826
1978	16, 331	963
1979	23, 156	1, 525
1980	17, 402	1, 314
1981	23, 195	1, 702

Source : Directorate of Agricultu Services. Provisional Report on the Organizatio.. f the Office for Agricultural Inputs, August 1983.

b. Agricultural equipment

Substantial efforts have been made to build agricultural equipment locally, and there exist several channels contributing towards this effort:

- o National Center for Agricultural Equipment (CNEA - Le Centre national d'équipement agricole);
- o National Center for the Promotion of Rural Craftsmen (CNPAR - Le Centre national pour la promotion des artisan ruraux);
- o Rural craftsmen; and
- o Private companies and individuals.

The CNEA replaces the former Regional Workshops for the Construction of Agricultural Equipment (ARCOM - Atelier régional pour la construction du matériel agricole) and the Regional Working Center for Agricultural Machinery (COREMA - Centre opérationnel régional pour la méchanisation agricole).

According to the CNEA, the national stock was composed of the total number of draft animals and agricultural equipment for the year 1982 as is indicated in Table 37.

8. Description of the agriculture related departments

Three technical departments are directly involved in agricultural problems.

a. The Ministry of Rural Development (MDR - Ministère du développement rural)

This ministry is responsible for extension and production-related problems with the 11 ORDs, as well as with the Volta Valley Management Authority (AVV - L'Authorité des ménagements des vallées des Volta), the training of technicians in agriculture and in veterinary science, and the marketing of agricultural produce.

Listed below are several related institutions with agricultural functions:

- o Voltaic Union of Agricultural and Horticultural Cooperatives;
- o Funds for Rural Development (FDR - Fonds de développement rural);
- o National Office of Dams and Irrigation (ONBI - Office national des barrages et de l'irrigation);

Table 37: National Census: Animal Traction, 1982

Draught Animals	ORD des Hauts Baumn Bobo-Dioulano	ORD Centre ouest Koudougou	ORD Volta Noue Dedougou	ORD Centre Nord Kaya	ORD du Sahel Dori	ORD Yatemga Ouahigouya	ORD Centre Est Koupela	ORD du Centre Ouagadougou	A.V.V.	ORD de l'Est Fada N'Sourma	ORD de la Comoi Banfora	ORD de la Bougount Dielorigon	Total
	December 1982 Census									December 1982 Estimate			
Ox	16,681	3,415	24,938	4,204	1,964	7,507	7,925	7,161	3,484	3,500	1,375	2,000	85,279
Donkeys	3,704	8,851	8,630	8,855	12	4,377	2,431	18,214	783	2,000	254	100	57,557
Horses	35	404	485	116	27	555	89	1,032	23	-	-	-	2,766
Dromedaries	-	-	-	-	23	33	-	-	-	-	-	-	56
Equipment													
Cattle Plough	4,828	983	4,768	924	1,087	1,625	1,698	198	1,674	-	574	-	17,779
apicoma (C.N.P.A.R.)	27	184	1,104	488	-	38	478	340	6	-	-	-	2,665
Others	1,770	279	6,076	965	-	2,012	1,582	842	74	-	211	-	14,600
Donkey Plough	79	569	98	567	-	637	766	185	1	-	1	-	2,902
apicoma (C.N.P.A.R.)	8	58	60	3,931	-	42	59	578	-	-	-	-	4,736
Others	147	83	135	1,840	-	489	131	51	2	-	211	-	2,878
Hoes													
Manga	755	5,636	3,291	2,864	1	1,144	667	20,126	61	-	8	-	34,545
Triangle	3,050	987	1,723	1,800	1,016	332	909	346	1,709	-	499	-	11,872
Others	73	82	129	1,865	5	61	157	37	2	-	52	-	2,411
Ridging-Ploughs. Cattle	3,115	770	2,127	-	13	326	1,499	1,428	1,063	-	707	-	10,341
Donkeys	29	5	11	-	-	-	233	14,990	1	-	1	-	5,326
Carts													
P.P.	3,108	410	7,518	136	33	3,522	554	19	2	-	485	-	15,302
O.P.	769	134	319	17	270	32	10	54	138	-	125	-	1,743
Theoreau	176	4,379	656	5,038	-	196	2,326	9,029	613	-	45	-	22,413
Seeders	384	46	41	-	-	-	1	47	1	-	14	-	420
Tractors	33	9	11	-	-	-	29	46	-	-	1	-	127

SOURCE: National Center for Agricultural Equipment.

- o National Office on the Use of Animal Resources (ONERA - Office national de l' exploitation des ressources animales);
- o Voltaic Association for Leathers and Hides; and
- o The Poultry Center.

b. Ministry of Higher Education and Scientific Research (MESRS - Ministère de l'enseignment supérieur et de la recherche scientifique)

The MESRS is responsible for agricultural and animal research activities, carried out by the Voltaic Institute of Agricultural and Animal Husbandry Research (IVRAZ - l'Institute voltaique de recherche agronomique at zootechnique), as well as forestry research activities, carried out by the Institute for Biological and Tropical Ecology Research (IRBET - l'Institut de recherche de biologique et d'écologie tropicale). This ministry supervises the training of senior professors at the University of Ouagadougou, where the ISP trains development engineers in three fields: agronomy, animal husbandry and forestry.

This Ministry is responsible for the WARDA.

c. Ministry of the Environment and Tourism

The MET is responsible for forestry extension and production which include numerous industrial and local reforestation projects, and the development of natural sites. This ministry trains technicians at the Forestry School of Dinderosso (Bobo-Dioulasso).

9. Food production

The increase in food production, as a whole, has remained below the population growth, due to little expansion of cultivated land, a stagnation of yields, and a migration towards the cities.

The 1982-1983 crop season shows a deficit of approximately 198,000 tons of grains. (See Table 38.)

The deficit of the last five years can be described as follows: for the years 1982 to 1983, the deficit was 198,000 tons of grains (with a calculation basis of 215 kg per year per person); for the years 1981 to 1982, 90,000 tons of grains; for the years 1980 to 1981, 93,000 tons of grains, for the years 1979 to 1980, 26,000 tons of grains (with a calculation basis of 180 kg per year per person); for the years 1978 to 1979, 52,000 tons; and for the years 1977 to 1978, 150,000 tons.

Projections of consumption needs in relation to the population growth, for the period 1982-1986, are indicated for each ORD in Table 39. On a basis of 215 kg per year per person, the overall consumption is expected to increase from 1,367,400 tons in 1982 to 1,464,580 tons

Table 38: Agricultural Season 1982-1983: Estimation of the Food Situation (cereals)

		Tons
Resources		
Stocks on September 30, 1982		136,497
OFNACER (Stability and Security	36,497	
Private Businesses	100,000	
Stock Producers	-	
Production		1,194,227 *
Imports		49,380 **
OFNACER Commercial Imports	-	
Others	49,380	
Foreign Aid		
US/AID, FAC, EEC, F.R.G., Belgium, Canada	21,370	21,370 ***
Regular Food Programs		15,369
WFP	3,625	
CATHWEL	11,744	
Total		1,416,843
Allotments[1]		
Consumption Based on 215 kg/ha/year		1,390,835
Losses and Seed (15 percent of Production)		181,853
Other Uses (Industry and Livestock)		15,000
Rebuilding of Stock and Security Reserve		27,142.2
Total		1,614,830.2
Deficit		197,987.2

* Estimate
** Extrapolation beginning with January 1982 imports
*** Partial

[1] Population : 6,469,000 inhabitants

Source : Directorate of Agricultural Services.

Table 39: Projections of Cereal Consumption Needs
(in kilograms)

	1982	1983	1984	1985	1986
Upper Volta Population (000)	6,360	6,469	6,582	6,696	6,812
Consumption at 215 kg/year	1,367,400	1,390,835	1,415,130	1,489,640	1,464,580
ORD Center	1,066	1,084	1,108	1,122	1,142
Consumption at 215 kg/year	229,190	235,210	237,145	241,230	245,530
ORD East Central	457	465	473	481	481
Consumption at 215 kg/year	98,255	99,975	102,985	103,415	105,135
ORD North-Central	713	725	738	751	764
Consumption at 215 kg/year	153,295	155,875	158,670	161,465	164,260
ORD West Central	890	905	921	937	953
Consumption at 215 kg/year	191,350	194,575	198,015	201,455	204,895
ORD Bourgouribe	403	410	417	425	132
Consumption at 215 kg/year	86,645	88,150	89,655	91,375	92,880
ORD Comoe	198	201	205	207	212
Consumption at 215 kg/year	42,570	43,215	44,075	44,505	45,580
ORD East	459	467	475	483	492
Consumption at 215 kg/year	98,685	100,405	103,125	103,845	105,780
ORD Upper Basins	461	468	476	484	493
Consumption at 215 kg/year	99,115	100,620	102,340	104,060	105,995
ORD North	598	608	619	629	640
Consumption at 215 kg/year	128,570	130,720	133,085	135,233	137,600
ORD Sahel	399	406	413	421	428
Consumption at 215 kg/year	85,785	87,290	88,795	90,515	92,020
ORD Volta-Noire	717	730	742	755	768
Consumption at 215 kg/year	154,155	156,950	159,530	162,325	165,120

SOURCE: Directorate of Agricultural Services.

in 1986.

10. Agricultural credit

The National Fund for Agricultural Credit (CNCA - Caisse nationale de crédit agricole) was established in 1979 as a national banking institution. Its mission is to lend its technical and financial cooperation to any project promoting rural development in Upper Volta, especially agricultural production and the marketing of produce related to development and production. The main activities for the realization of this mission are: equipment for small producers; development of a modern agriculture; mobilization of local resources; and short, medium and long term loans.

11. List of agricultural research institutions

The following are the regional, national and international organizations operating in Upper Volta:

- Voltaic Institute of Agricultural and Animal Husbandry Research (IVRAZ - Institut voltaïque de recherches agronomiques et zootechniques). The sponsoring ministry is the Ministry of Higher Education and Scientific Research (MESRS - Ministère de l'enseignement supérieure et recherche scientifique);
- Directorate of Agricultural Services (DSA - Direction des services agricoles). The sponsoring ministry is the Ministry of Rural Development (MDR - Ministère du développement rural);
- Institute of Research in Biology and Tropical Ecology (IRBET - Institut de recherche en biologie et écologie tropicale). The sponsoring ministry is the MESRS;
- Office of Overseas Scientific and Technical Research (ORSTOM - Office de recherche scientifique et technique d' outre-mer). The sponsoring ministry is the MESRS;
- Agrometeorology service;
- International Crop Research Institute of the Semi-Arid Tropics (ICRISAT);
- International Institute of Tropical Agriculture (IITA); and
- Farming Systems Unit (FSU) of SAFGRAD (Semi-Arid Food Grains Research and Development) of Purdue University.

III. AGRICULTURAL RESEARCH INSTITUTIONS

Listing all agricultural research institutions in Upper Volta is not an easy task. In fact, these activities are carried out by a number of unrelated institutions, each of which has its own by-laws which often do not relate to other institutions. The disparity and the multiplicity of these institutions make it difficult for the government to put into effect the programs and research activities it has been coordinating for a number of years. The establishment of the IVRAZ in 1981 is part of this coordination effort. In the face of such difficulties, a restructuring of agronomical research has been planned since February, 1984, through a national seminar. One should also note that research institutions that have been listed in this survey are provisional, and may disappear after the seminar. In the meantime, eight institutions (five national, and three regional) are considered as agricultural research institutions in Upper Volta.

The ISP of the University of Ouagadougou carries on several research programs. However, because its prime activity is training, this institution will be presented in section IV which deals with training institutions.

A. The Various Institutions

1. Voltaic Institute of Agricultural and Animal Husbandry Research

a. Responsible ministry

IVRAZ is one of the five specialized institutions of the General Department of Scientific and Technological Research (DGRST - Direction générale de la recherche scientifique et technologique) of the MESRS. Its responsibilities and organization have been determined in joint decision #30/ESRS/MDR of May 5, 1982, by the MDR.

b. Mission and objectives

IVRAZ, which has its headquarters in Ouagadougou, has the following responsibilities:

- To undertake and develop all studies and research activities in the fields of agriculture and animal husbandry;
- To assure the coordination of national and international programs in these fields;
- To promote the training of national scientists by both initiating this training, and participating in the training process;

- o To direct agricultural and animal research stations;
- o To establish and develop the sub-structures of research institutions;
- o To collect, to develop and to protect the national scientific knowledge resulting from the different research organizations operating in Upper Volta;
- o To carry out or to participate in the study of all national and international projects which are submitted to it;
- o To produce publications concerning scientific disciplines relevant to its various fields of activity; and
- o To act as supervisor and as intermediary for the implementation of agreements and accords between Upper Volta and other countries or organizations, in the fields of agronomic research and animal science.

c. Organization

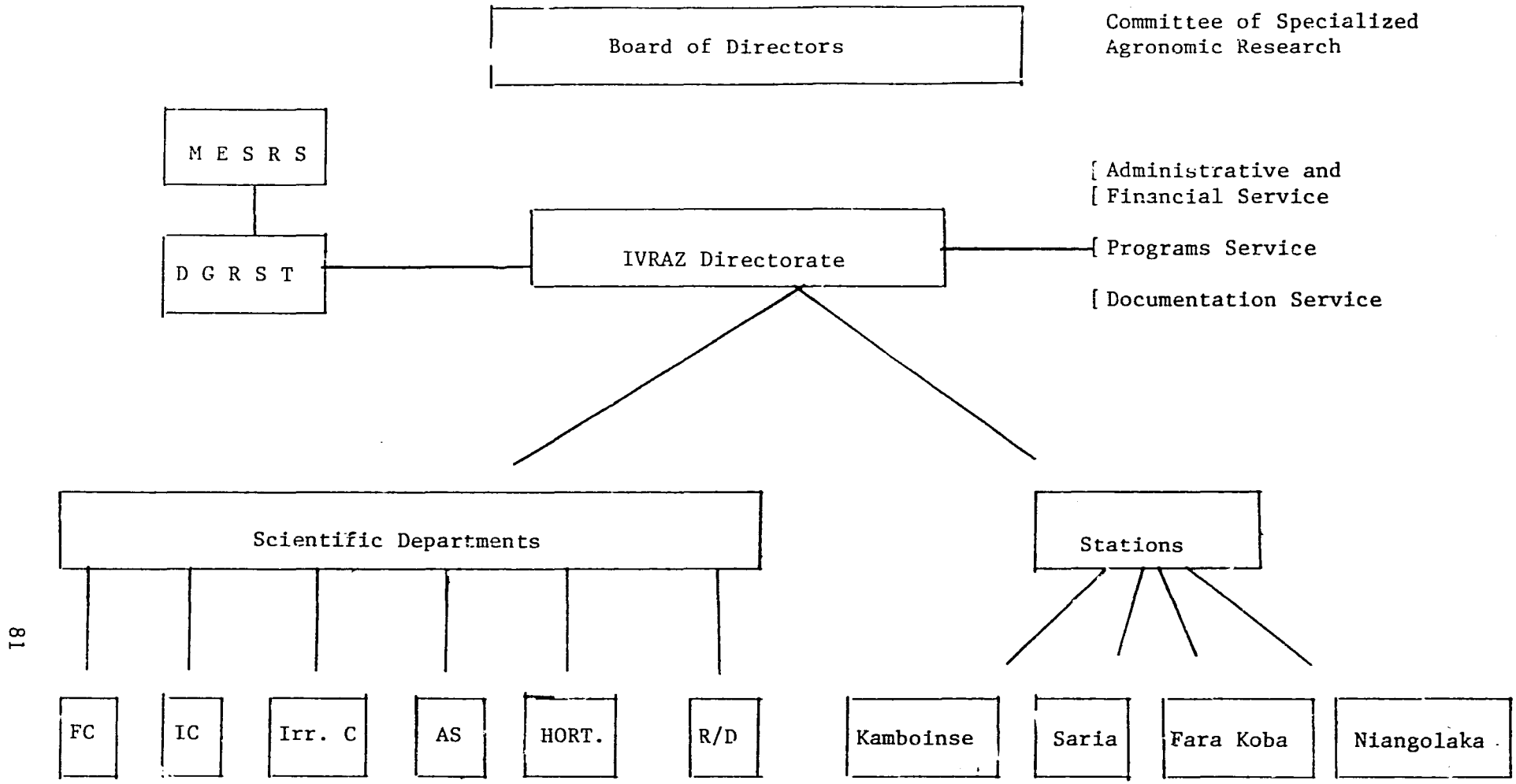
(1) Principal structures

The structure provided for by the joint decree is the following: (See Figure 8.)

- o A governing board in charge of making decisions regarding research programs, administrative problems of personnel, property, and IVRAZ budget proposals;
- o A department made up of an administrative and financial office, a program office and a documentation office; and
- o Five scientific departments: food crops, cash crops, horticulture, irrigated crops, and animal science.

Besides these organizational divisions, the following organizations are responsible to IVRAZ: The institutes of the Group for the Study and Research of Tropical Agronomy (GERDAT - Groupement d'études et de recherches pour le développement de l'agronomie tropicale): The Research Institute of Tropical Agronomy and Food Crops (IRAT - Institut de recherches agronomiques tropicales et des cultures vivrières), the Research Institute of Cotton and Textiles (IRCT - Institut de recherches sur le coton et les textiles), and the Research Institute of Oils and Oleaginous Plants (IRHO - Institut de recherches sur les huiles et les oléagineux). These institutes support the research programs (by providing researchers, as well as materials, and financial assistance).

The Center for Experimentation on Rice and Irrigated Crops (CERCI - Centre d'experimentation sur le riz et les cultures irriguées) - a project financed by the United Nations Development Program (UNDP) and the Food and Agricultural Organization of the United Nations (FAO) also falls under the rubric of IVRAZ.



FC Food Crops
IC Industrial Crops
AS Animal Sciences
HORT Horticulture
R/D Research/Development

Figure 8: Organizational Chart of IVRAZ

The ICRISAT, IIIA, and FSU receive IVRAZ administrative supervision only.

(2) Research stations

There are four research stations in Upper Volta:

- o Kamboinsé: Situated 11 km from Ouagadougou and managed directly by the IVRAZ director, Kamboinsé covers a surface of 170 ha. Its soils are heterogenous, of the tropical ferruginous genre. It is the site of the international institutes (ICRISAT, IITA), which make it the best equipped station in the country. About 25 researchers work there (four of whom are from IVRAZ). The IVRAZ infrastructures are restricted to an administrative premises covering about 100 m^2, laboratory of 70 m^2, two warehouses for storing the harvest and two repair workshops. The agricultural equipment is nearly non-existent. IVRAZ's operating budget varies from FCFA two to four million;

- o Saria: Situated 80 kilometers from Ouagadougou in the same ecological area as Kamboinsé (Soudano-sahelian), Saria has an average rainfall of 750-800 mm and the same type of soils. This station covers 400 ha and has serious problems of isolation due to the lack of infrastructure, which restricts a great deal the development of research programs. IRAT is in charge of the management of the station. The research staff is made up of a core of ten reseachers, 11 technicians, and five observers. The operating budget is approximately FCFA 80 million, with the government's share of the cost amounting to about 50 percent. Infrastructures include 13 houses (eight for researchers and five for technicians), nine offices (quite insufficient), three poorly-equipped laboratories of 200 m^2 and a few warehouses and workshops for maintenance purposes. The biggest obstacle for the station is the permanent lack of electricity (only six hours of electricity per day);

- o Farako-Ba: Situated 10 km from Bobo-Dioulasso, Farako-Ba covers 475 ha. Twenty-five researchers work there. The operating budget varies between FCFA 150-200 million. Infrastructure (offices and laboratories) is sufficient, and the proximity of the city solves the problem of housing for the researchers. So far, IRAT has been in charge of the management of the station; and

- o Niangoloko: Situated 130 km from Bobo-Dioulasso, Niangoloko has an average annual rainfall of 12,000 mm. Its main activity is groundnut research. IRHO is in charge of the management. Infrastructure (offices, housing and stores) is insufficient and in very poor condition. There are no researchers from IVRAZ at this station. Only two expatriates conduct experiments with the help of a staff

which is reduced to a minimum (15-20 employees).

d. Research programs for plant production

For rainfed food crops the programs consist of sorghum, maize, millet, cowpeas, roots and tubers (yams, sweet potatoes, cassava), and are conducted with the support of IRAT and projects such as "cowpea storage" and the "improvement of cowpeas," funded by the International Development Research Center (IDRC), and the project for "Improvement of sorghum, millet, maize and cowpeas" funded by INSAH.

For cotton and textile fibers, research is mainly conducted with the support of IRCT in the west area and in some parts of the east area.

Research on annual oleaginous plants is conducted with the support of IRHO on soya, sesame and above all on groundnuts. Market-gardening is researched with the support of IRAT and of the project UNDP/FAO (CERCI). Rice cultivation, irrigated crops and forage crops are researched with funds from UNDP/FAO.

All these activities are multi-faceted, involving varietal improvement, agronomy, crop protection and relations between research and development.

In general, research on production systems is carried out in collaboration with ORDs within the context of the relation between research and development.

Apart from the research activities, stations conduct basic seed multiplications of main crops for the seed service reports.

e. Human resources and training policies

At present, IVRAZ is made up of 35 Voltaic researchers, 20 expatriate researchers, 19 technicians, and 191 administrative staff members, short-term technicians and employees.

At the level of national researchers, only eight have a "third cycle" doctorate or a Ph.D.; the others are on the level of agronomic engineers or zootechnical engineers with or without the Diploma of Higher Education (DEA - Diplome d'études approfondies).

The present policy consists of promoting the training of researchers who are relatively young. However, this results in serious problems since the annual average number of available grants varies between two and four.

At the technician level, besides the civil servants who have the required level of education but are insufficient in number, the others (contractuals) are trained on the job according to the scientific activities. Generally, the problem concerning technicians is the real bottleneck for the development of research activities. Very often the same technician has to work with several researchers, which makes observations or follow-up work much more difficult. An adequate

policy to handle this problem would consist of introducing a hiring policy (quota applicable only to people having the level of research training schools) and a re-orientation policy through internships. Unfortunately, these cases are rare.

f. Financial resources

These are exclusively assigned to operating costs. Apart from a few rare projects concerning the stations, credit for investment is minimal. These resources include state participation of FCFA 321,850,000, French financing (IRAT-IRHO-IRCT) of FCFA 147,750,000, various projects (INSAH and the International Board for Plant Genetic Resources) contributing FCFA 20,500,000; and an FAO project with FCFA 69,900,000. The total of these resources comes to FCFA 560 million.

g. Scientific and technical information resources

These resources are nearly non-existent. In the stations, a few attempts have been made to introduce information centers. But the lack of funds and, more importantly, of skilled personnel thwart these attempts. These centers are limited to the documents produced by the headquarters of the cooperation institutions (tropical agronomy, fibers and textiles, etc.). At the national level, only the Department of Information and Publications of the DGRST is presently in charge of scientific and technical information resource management, at least as far as the research structures dependent upon DGRST are concerned.

2. Directorate of Agricultural Services

DSA is one of the technical departments of the MDR. Its organization has been determined by the decree No. 061/DR of October 7, 1981. Its budget may be found in Table 40.

a. Mission and objectives

The DSA, whose headquarters are in Ouagadougou, is in charge of the following:

- Studies necessary to determine a development and plant production policy;
- Preparation of national programs for plant production;
- Technical assistance to agencies responsible for the implementation of applied research and experimentation programs;
- Technical relations with the MESRS in the field of agronomic research; and
- Research of a direct or indirect nature in the agricultural section.

Table 40: Budget of the Directorate for Agricultural Services
(FCFA)

Soil Maintenance		Investments	Operation
State			
External funding sources (UNDP/FAO, The Netherlands, USAID)	))	estimated at	300,000,000
Integrated Competition Project			
State			15,000,000
External funding sources (CILSS, USAID, FAO)	))	75,000,000	198,000,000
Project PV Bobo			
State			15,500,000
External funding sources (Canada)	))	195,000,000	175,500,000
Seed Service			
State			4,200,000
External funding sources (USAID, CEAO)	))	80,000,000	8,400,000
Experimentation Service			

Thus, within its departments, the DSA coordinates certain agricultural research activities.

b. Structures

The precise services consist of the following:

- The administrative and accounting service;
- The information, statistics and program planning service;
- The agricultural production service;
- The seed service;
- The supervision of packaging and product-quality service;
- The plant protection service;
- The experimentation and related studies service;
- The national soil service;
- The food and food technology service; and
- The training and agricultural extension service.

In the past, agricultural research stations depended on DSA. Today, stations depend on IVRAZ, and have been described further above in connection with the IVRAZ structures. (See Figure 9.)

c. Research programs

(1) The National Soil Service

This service is responsible for water and soil preservation studies, for control of erosion, and for soil fertility and fertilization problems. It is financed by two projects: UNDP/FAO and aid from the Netherlands. This service, which is based in Ouagadougou, has well-equipped laboratories for analyses of soils, water and plants.

(2) The National Service of Plant Protection

This service is responsible for phytosanitary protection in general. It supervises two projects:

- The Plant Protection Laboratory, which is based in Bobo-Dioulasso, and is funded by CIDA, includes six researchers and nine technicians; and
- The Integrated Fight Project, funded by CILSS/USAID/FAO, whose objective is to develop systems integrating cultural

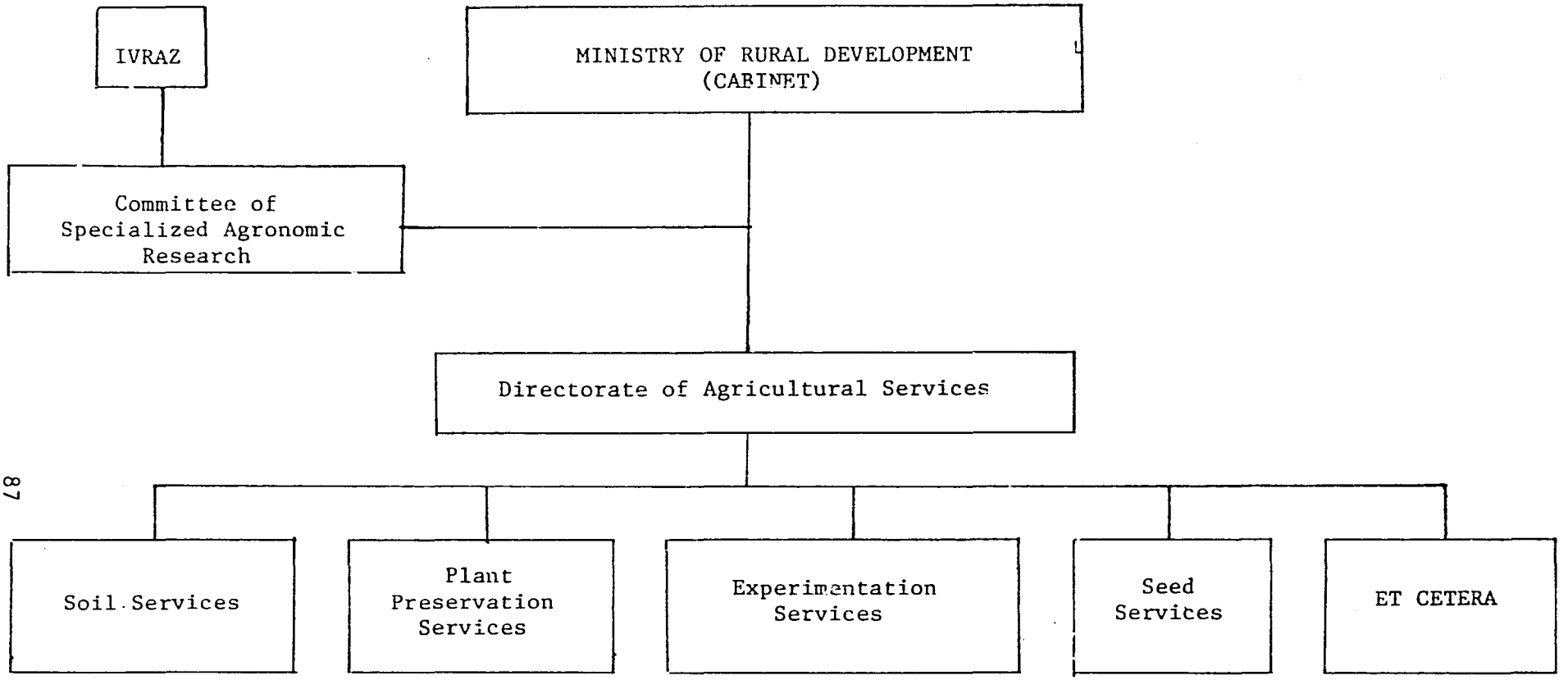


Figure 9: Organizational Chart of DSA

practices and biological control practices in order to reduce the use of pesticides as much as possible. This project is implemented in the stations (laboratories and experimentation fields) of Saria, Kamboinsé and Farako-Ba. A team of eight researchers (three expatriates), and 23 technicians develop an average testing ground of 48 ha in these stations. As for the budget, the project is funded exclusively by USAID and FAO (75 million for investment and 198 million for operation). The government contribution is represented by 15 million for wages.

(3) The Experimentation Service

This service is responsible for providing technical support to the research and development structures of the ORD. It is made up of four national researchers and has very few operating funds at present.

(4) The National Seed Service

Even though this service does not actually conduct research, it works very closely with the research structures. This service takes care of the improved seeds in all plant species and varieties cultivated in Upper Volta and includes a production section, as well as a supervision and certification section. The service includes five engineers, one of whom is an expatriate, eight agricultural technicians, and five executives. The annual budget is FCFA 55 million, 15 million of which is used for investment (USAID funds). The service works with the research stations, and places warehouses for storing seeds and a large assortment of agricultural equipment at their disposal. It has two laboratories (Ouagadougou and Bobo) each covering 50 m^2, and each used for germination tests, for quality control and for measuring humidity. These laboratories are all in excellent condition and well-equipped. This service also has TRS 80 mini-computers for data processing.

d. Scientific and technical information

The problem concerning information is similar. Each service has at its disposal a small information center where an average of 200 books are available, and about ten new books are purchased per year. The magazines used belong specifically to the service: Commonwealth Agricultural Bureau documents from INRA, FAO documents, Crop Science, etc. However, financing of the services by sponsors like FAO and USAID makes it easier for researchers to have access to external information centers. In addition, the creation of the National Center for Agricultural Information (CNDA - Centre national de documentation agricole) within the ministry (funding by FAO-AGRIS-CARIS) will facilitate the distribution of information. Each program also publishes a report of its research activities.

3. Institute of Research in Biology and Tropical Ecology

a. Responsible ministry

IRBET is one of the five specialized institutes of the DCRST exists under the MFSRS. The IRBET was created by decree No. 81-144/CMRPN/ESRS of March 16, 1981. (See Figure 10.)

b. Mission and objectives

The IRBET is intended to contribute to an inventory and a better knowledge of Upper Volta's biological resources, to promote the use of biological data for the purpose of development, to act to preserve the country's floristic and zoological resources, as well as those ecosystems which are fragile and threatened or which harbor a specific scientific interest, and to contribute to the fight against desertification through forestry research.

c. Structures

(1) Divisions

The Technical Center of Tropical Forestry (CTFT - Centre technique forestier tropical) is headed by IRBET. IRBET is made up of four scientific and technical departments--botany, zoology, ecology and forests, and natural history.

(2) Stations

In addition to two stations of the CTFT at Gonsé (in the Ouagadougou region) and at Dindéresso (in the Bobo-Dioulasso region), IRBET is now planning to establish a station at Saponé (about 30 km south of Ouagadougou) in cooperation with the Department of the Planning of Forestry and Reforestation, a station at Oursi in the Sahelian zone, with the help of ORSTOM, six small houses for researchers, and one kitchen and dining room combination, six small houses for on duty staff, one garage, and one installation for electrical and water supply.

All of these are built entirely with dirt bricks, and covered by sheet metal. The total surface covered is 335 m^2

A landing strip of 700 m exists permitting light plans to have access to the encampment year-round.

d. Research programs

The research programs of IRBET are varied and certain ones are not directly related to agricultural problems. For example, certain research activities concern the waste waters of the major cities of Upper Volta.

The programs of IRBET, as related to the present investigation, consist of the following: biology, ecology and the economic

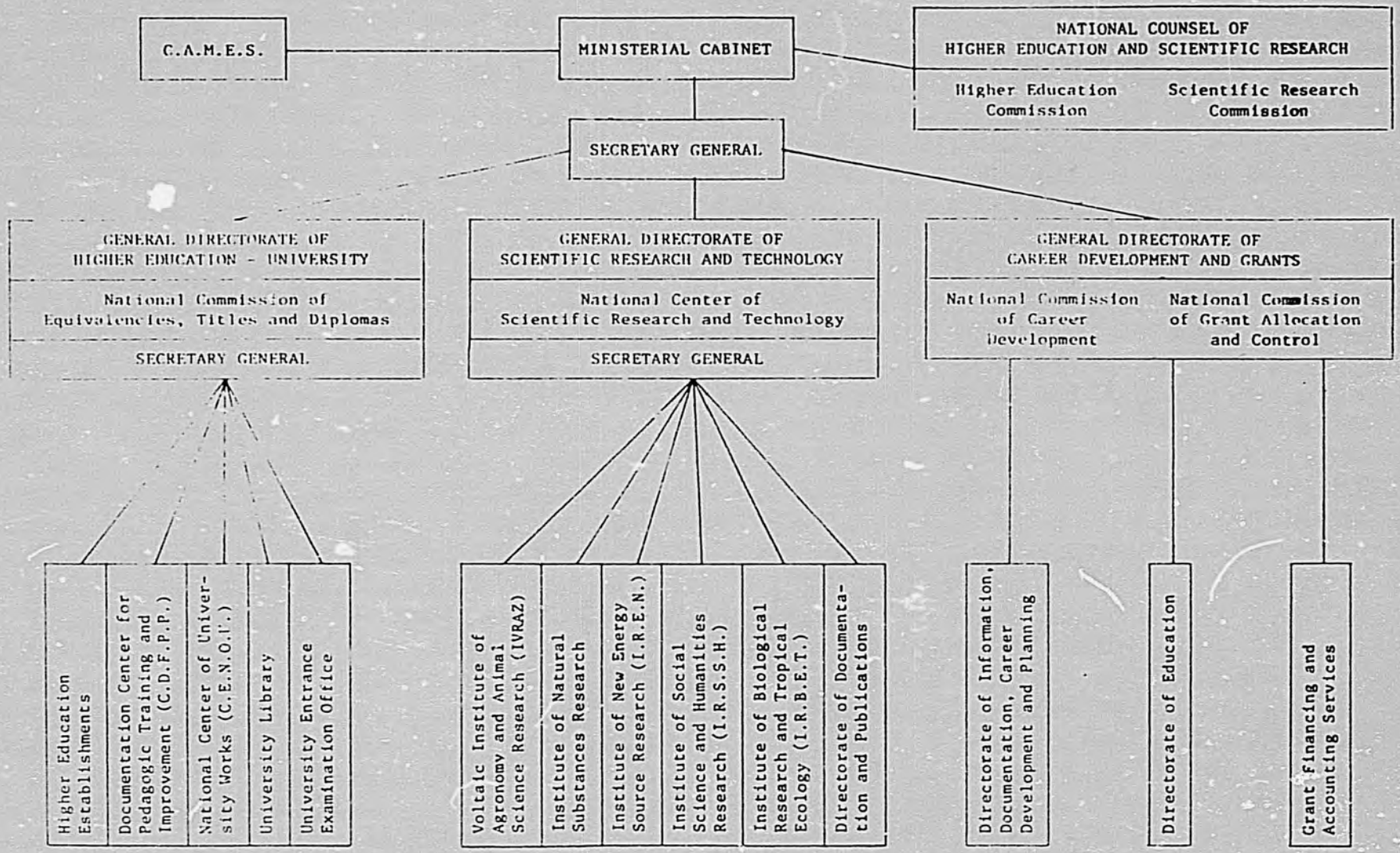


Figure 10: Organizational Chart of the Ministry of Education

importance of the main forest tree species of Upper Volta. This includes the biology and chronology of forest trees and resources, and the programs of the CIFT (pending the revamping of all of IRBET's programs). Also included are the introduction of eucalyptus in the Sahelo-sudanese region (numerous topics relate to this introduction, especially concerning the elimination of sources and species), the introduction of exotic species other than eucalyptus, the elimination of sources and species, research on local species with focus on their rehabilitation, regeneration of natural forest planning, and the Water and Soil Conservation/Protection and Restoration of Soils Project (CES/DRS - Conservation eaux et sols/Défense et restauration sols).

e. Resources

(1) Human resources

The group of permanent personnel of IRBET (including the CTFT) is composed as follows: research personnel are eight, technical personnel are seven, administrative personnel are three, and general laborers are 33.

In addition to the permanent personnel, IRBET employs two technicians and a driver to carry out a research program in collaboration with the Department of Forest Management and Reforestation.

At the moment, there is no definite training program but the efforts in progress mostly aim at retraining and advanced training courses for the technicians, so as to maintain contacts with students for future recruitment efforts.

(2) Financial resources

The entire operating budget of IRBET is financed by state funds and approximates FCFA 4,800,000.

(3) Scientific and technical resources

These resources are very underdeveloped, nearly non-existent. Outside of annual operating reports and accounts which are given by the Committee of Forestry Research, IRBET's own documentation fund is merely in the fundamental stages, with proposed purchases. However, the CTFT has 270 books at its disposal and a rate of 12 additions per year.

At the present time, the researchers are using the documentation centers of the entire DGRST (managed by the DDP).

4. Office of Overseas Scientific and Technical Research

a. Responsible Ministry

ORSTOM is a French institution. The sponsoring Ministry in Upper Volta is the MESRS.

b. Mission and objectives

ORSTOM covers a wide variety of research areas: human and social sciences, biological sciences, hydrological and geological sciences.

The programs and projects which relate to agricultural production are mostly concerned with grain crops and animal production. These include range/farming studies in the Sahelo-sudanese zone, the study of harmful rodents in Upper Volta (in Banfora, the study of small rodents harmful to sugar cane), the structure, function, and evolution of Sahelien phytocenoses, and the analysis of Sahelien pastures, to determine quality, quantity and evolution.

c. Resources

The human resources are composed mainly of expatriates at the research level, but the office does employ nationals: 30 technicians, and 20 in other employment categories. All employees are full-time.

Contacts are currently being made between the persons in charge of ORSTOM and the Voltaic authorities in order to find a means of closer cooperation between ORSTOM and the national structures of research, notably concerning the matter of training programs of Voltaic research personnel and the execution of joint research projects.

ORSTOM does not have a definite recruitment program for the forthcoming ten years. Everything is done according to the growth of the programs.

The entire investment and operating budget is supported by France. Operating expenses are FF 3,234,900.

The main buildings at the Ouagadougou Center contain four laboratories (111 m^2; 74 m_2; 89 m^2; 129 m_2), in good condition and well-equipped; one administrative office (197 m^2); one library (46 m_2); and workshops (196 m^2).

The library's documentation center is estimated at 1,850 books with 100 new additions per year. There are 128 scientific magazines and journals.

5. Agrometeorology Service

a. Responsible ministry

This is one of the services of the Department of National Meteorology, of the Ministry of Equipment, and the Ministry of Communications. (See Figure 11.)

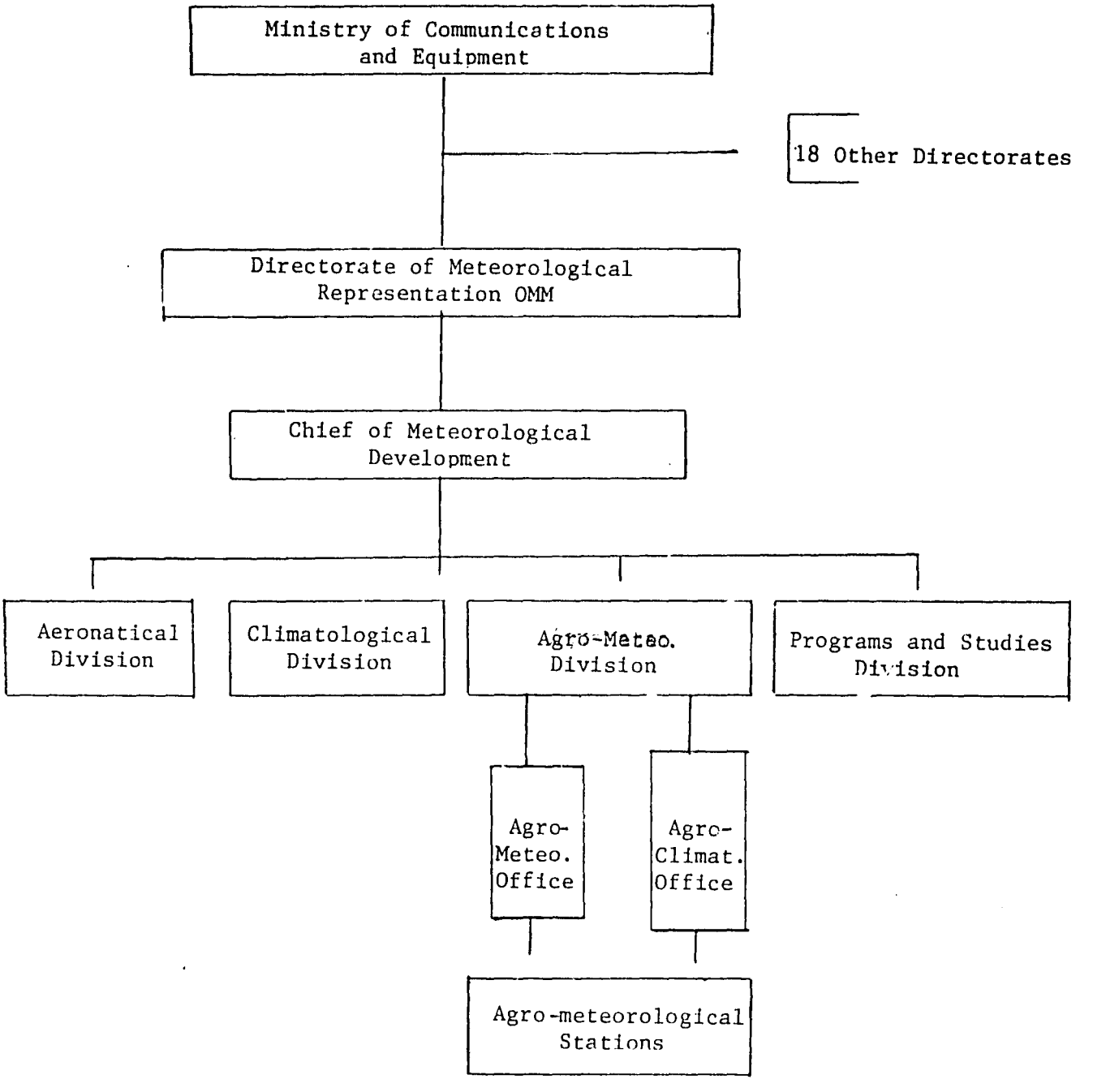


Figure 11: Organizational Chart of the Agrometeorology Service

b. Mission and objectives

The mission of the agrometeorological service is to help increase food production (broadly defined) by applying meteorological knowledge to agriculture. This service works in very close collaboration with other national research structures: IVRAZ, DSA (soil and production service), the university (ISP) and especially with Agro-Hydro-Meteorology (Niamey), which maintains a part of the operating budget for the regional level, and the seven other countries which are members of CILSS. The activities mostly concentrate on the agrometeorological readings and the evolution of climatic risks involved at the level of farmer's plots. To this effect, the service has at its disposal nine synoptic stations, nine agrometeorological stations, 12 climatological posts and 107 pluviometric posts covering, as such, the entire country: 1,100 to 450 mm. The research operations are led by a team of ten researchers, 20 technicians and 40 employees. It is useful to emphasize that other staffs which are not part of the service often intervene to insure the collection of data. Such is the case with the staffs of the ORD or of the research stations for rainfall or climatic readings.

c. Resources

The service's own staff is well qualified as far as training is concerned, but has an insufficient number of personnel. In general, internship scholarships exist to train staff members, either at the AGRHYMET Center of Niamey, or in the developed countries.

The financial resources are subdivided into investment and operation. Investment represents an annual total of FCFA 193,680,000, of which FCFA 148,000,000 comes from the national budget, and FCFA 45,680,000 from sponsors. As far as operation is concerned, the total is FCFA 140,546,000, of which FCFA 88,200,000 is provided by the national budget and FCFA 52,346,400 by sponsors. The general total budget of investment and operation is FCFA 335,226,400.

The agrometeorology service has at its disposal relatively good sources of information. It has access to documentation at the level of the general secretariat of the World Organization of Meteorology and of the AGRHYMET center. The bulletins of the WOM and those of the other meteorological services are the periodicals most widely used by this service. At the national level, this service publishes bulletins every ten years focusing on development and research structures.

6. International Crop Research Institute of the Semi-Arid Tropics

The introduction of ICRISAT in Upper Volta dates from 1975 when the UNDP invited this institution, with the consent of the Voltaic government, to work on a West African program for the improvement of millet and sorghum. This program was based at the research station of Kamboinsé ICRISAT, although under the administration of IVRAZ (See Figure 12.), is directly dependent upon

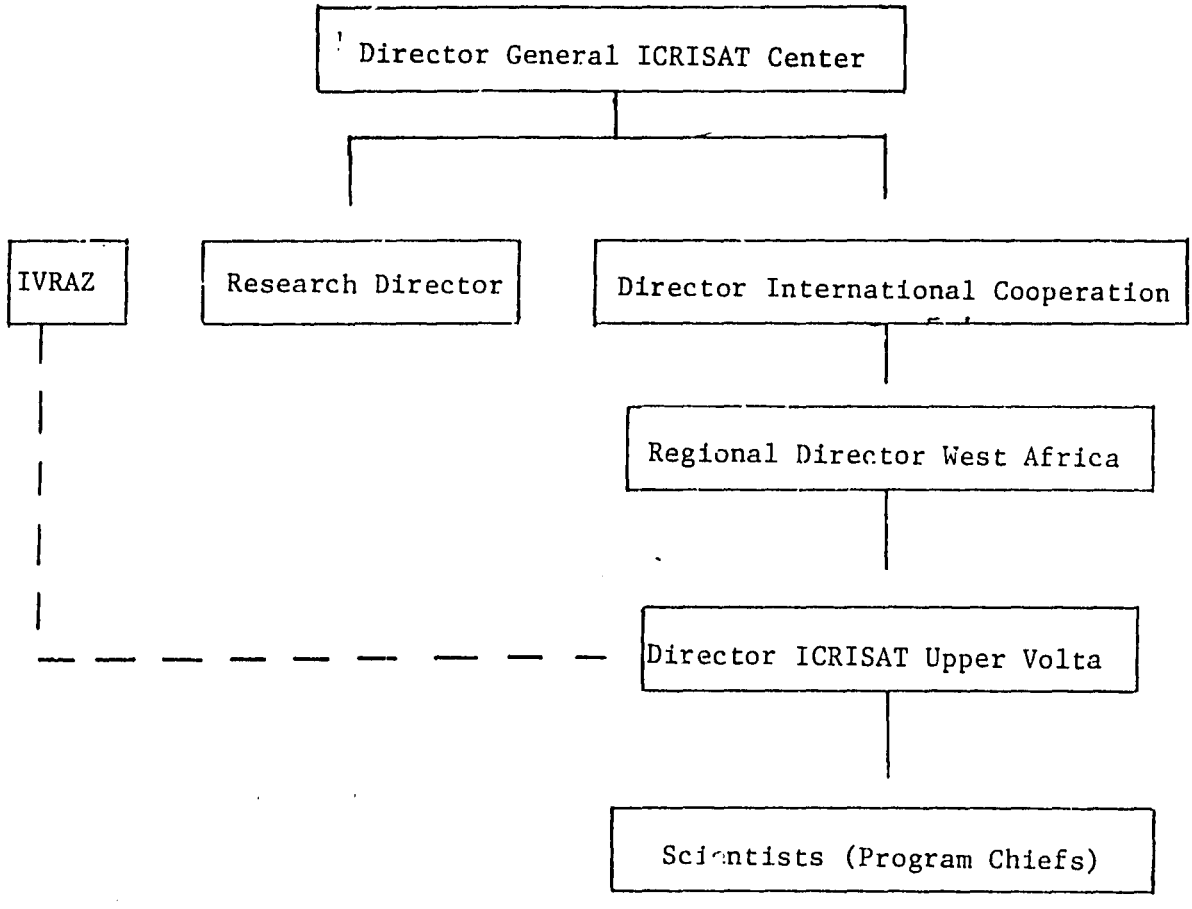


Figure 12: Organizational Chart of ICRISAT

its headquarters in Hyderabad and has other financing sources--UNDP, SAFGRAD and IDRC. ICRISAT's objectives are: to develop better varieties of sorghum and small millet; to develop crop techniques that allow stable and greater yields, raised under conditions that are both traditional and improved, and to avoid the long-term soil erosion; to develop sources of genetic resistance that are stable; to find ways in which to fight against animals or insects that damage crops, and against diseases and striga; to better understand traditional agricultural systems; and to identify the socio-economic impediments to agricultural development and the consequences of adopting new technologies.

The ICRISAT program comprises many sections, which consist of the improvement of sorghum, the improvement of millet, the improvement of the resistance to striga, agronomy, soil and water management, and socio-economics.

The ICRISAT team is made up of six expatriate researchers and two native researchers, 30 technicians (two at the CTAC level and 28 at the BEPC level or lower), three administrators and two secretaries.

Financial resources amount to approximately FCFA 320 million, of which 15 percent are investments. These resources come from the following contributors: the headquarters of ICRISAT, UNDP, IDRC, and USAID/SAFGRAD.

ICRISAT spends at least FCFA 5.2 million per year for the purchase of scientific documents. It has at least 300 books and about 20 scientific journals. Its main information source is the ICRISAT headquarters in India.

7. International Institute for Tropical Agriculture

IITA administratively comes under IVRAZ, and thus, also under the MESRS. Its introduction in Upper Volta dates from 1977, along with project SAFGRAD financed by USAID. Its headquarters are in Ibadan in Nigeria. (See Figure 13.)

IITA's mission is the research and development of maize and cowpeas in 27 countries, specifically those that are members of SAFGRAD and are in semi-arid zones.

The research program consists of several sections: the improvement of maize and cowpeas, the agronomics of corn and cowpeas, and the entomology of maize and cowpeas.

The team of IITA is composed of five expatriate researchers and one native researcher, 12 technicians with the CTAS and the others at the level of the BEPC or lower, five administrators, and five secretaries. The team is based in Kamboinsé, where it has at its disposal two well-equipped laboratories (agronomy and entomology), 12 offices, two greenhouses and two sheds.

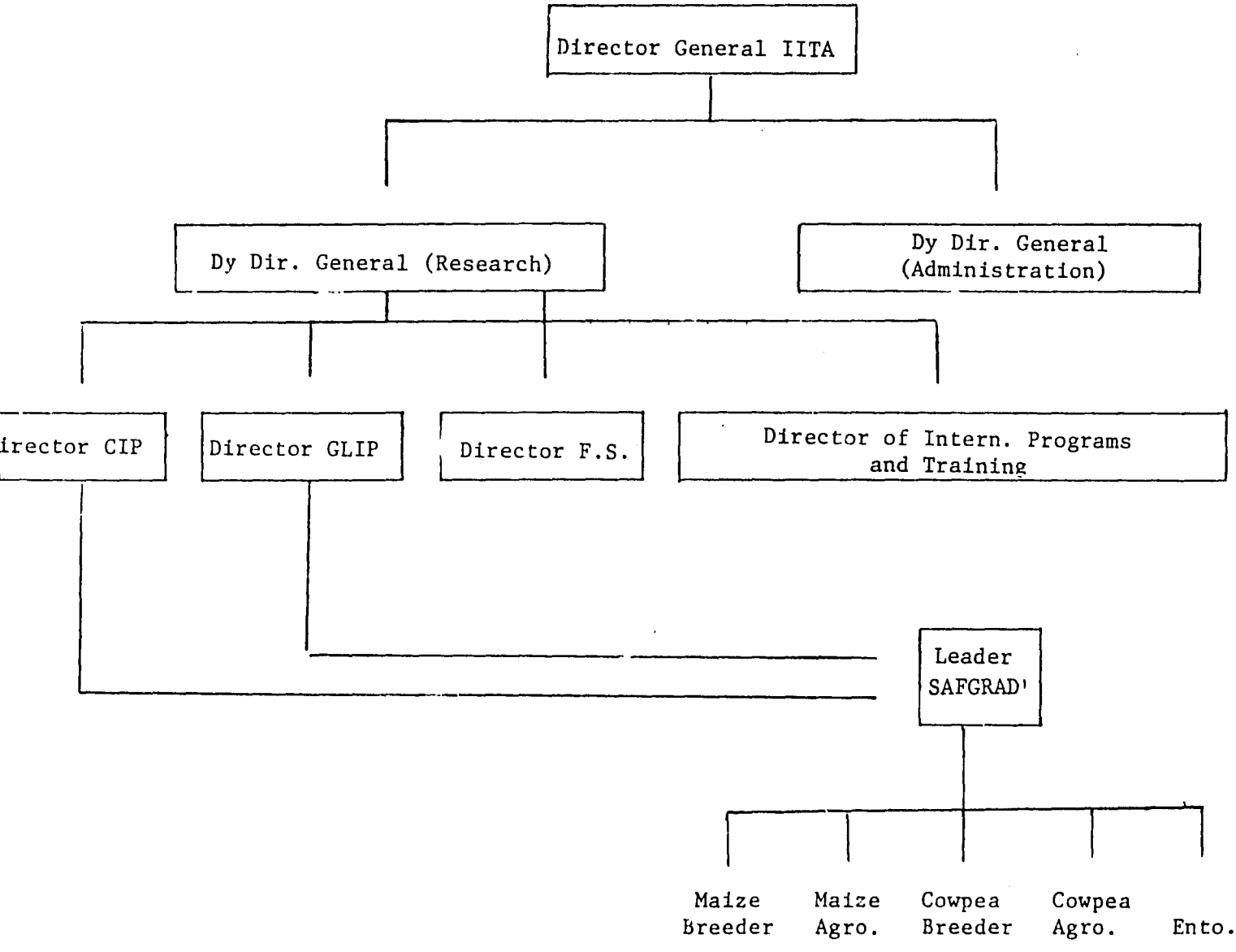


Figure 13: Organizational Chart of IITA

The team also works in the area of Loumbila (with an out-of-season crop area of ten ha) and at Farako-Ba, Gorom-Gorom. The total surface areas of the experiments covers 502 ha. Each year, ten researchers and technicians of the countries belonging to SAFGRAD come for a six-month training course at Kamboinsé. There are also all the facilities offered by the headquarters (including periodic training courses at Ibadan).

The annual budget is approximately FCFA 320 million: 80 for investments and 240 million for operations.

IITA houses 100 books, and four scientific newspapers that it receives regularly. Each month IITA receives the latest scientific articles from its headquarters.

For the processing of data, IITA uses a mini-computer located in SAFGRAD's headquarters.

8. Farming Systems Unit of the University of Purdue

A team at this university has worked since 1979 on production systems within the framework of a regional program (SAFGRAD) financed by USAID. It is composed of three researchers, 15 technicians (natives under contract) and ten other persons for administration and land labor. Although this program is regional, it exists in collaboration with IVRAZ and especially the ORDs. (See Figure 14.) The team has FCFA 190,000,000 per year at its disposal, in a budget allocated by USAID (90 million for operations).

The goal of this team is to conduct experiments and to make collections of agro-socio-economic information, for the purpose of proposing new technologies more suited to the farmer's situation. The work is carried out in collaboration with the workers (in laboratory-villages) and focuses on the main food crops. There are five laboratory-villages in Upper Volta.

B. Analysis by Sector

1. Sectoral summary

As has been emphasized, the over abundance of research institutions in Upper Volta creates many problems for the overall coordination of research activities. This is why a restructuring of agronomic research was planned for the beginning of 1984.

Other than the international institutes, all the other structures encounter serious problems:

- At the station level, the infrastructure is old and so limited that it considerably limits an expansion of the programs;

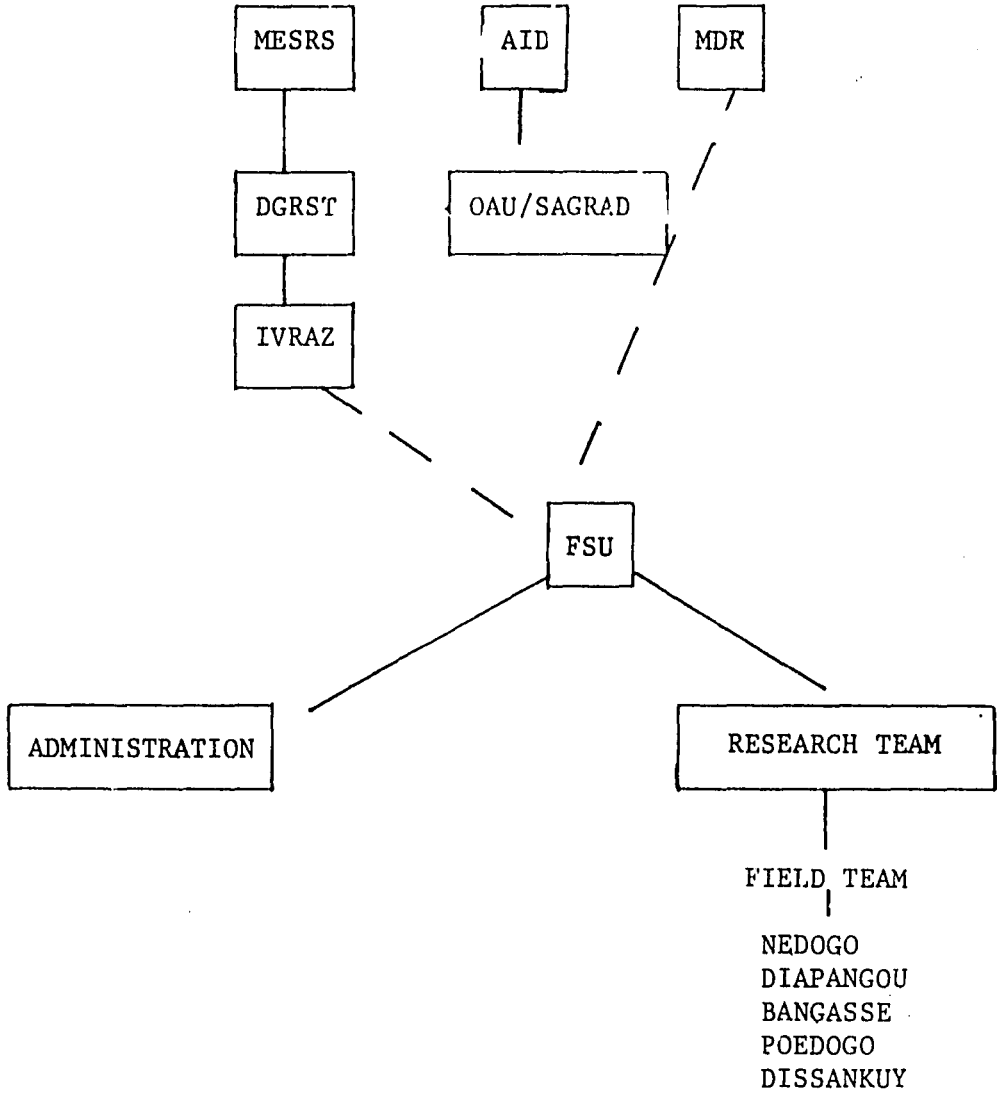


Figure 14: Organizational Chart of FSU

- o The native research staff is relatively young and encounters serious training problems (lack of scholarships or of professional advancement);

- o The technicians are few in number and do not learn enough from retraining courses. The workers under contract have a limited education (BEPC or CEPE) and have no job security;

- o Even if the researchers enjoy reasonable status (which is often contested), the administrative and technical personnel do not. This often leads employees to venture towards other sectors where the benefits are more attractive; and

- o Although the level of the budget may be adequate, the system of obtaining credit is slow, which results in diminishing productivity. This set of problems can be summed up as the absence of a coherent policy for agricultural research: a policy of program planning, of research resources, and of training and information.

2. The evaluation of problems by research personnel

Generally, in all the personnel categories, the common problem is a lack of means (personnel, infrastructure and budget).

The administrators in charge, particularly identify the problem of lack of sufficient credit as well as the slow issuance of these credits.

The researchers judge the quality of their training to be satisfactory for the program at hand. However, they feel that the personnel is clearly insufficient in number, especially due to the length of time required to process an application for the specific position of researcher (certain researchers disagree), which risks further slowing down the recruitment of new researchers. In the same way, the number of technical personnel is also considered inadequate to insure an accurate follow-up of experiments.

As far as the technical personnel is concerned, the major problems have to do with working conditions (lack of a particular status) and with the shortage of opportunities for advanced training courses.

3. Analysis of specific problems

a. Vegetable production

Vegetable production is linked to numerous interdependent factors: biological, dealing with the nature of plants; ecological, dealing with soil, climate, predators and parasites; and socio-economic, dealing with the knowledge of surrounding environments.

With these factors in mind, research efforts over the last 20 years have concentrated on the following aspects. First, the improvement of varieties, mainly sorghum, maize, millet and rice has been a priority. There is an important variety of maize in the humid zones as well as in the dry zones, but this does not hold true for sorghum and millet. In terms of sorghum, the varieties accepted by farmers are local varieties, which are improved within the Sahelian-sudanese zone. In contrast, in the Sudanian zone, where the cycle is longer, the stock being proposed is maladapted; the same holds true for millet. Thus, a serious effort has yet to be made in delocalizing existing programs in terms of ecological zones for these two crops.

As for rice, the program at the present time is in the introductory stages. Considerations should be made for consistently canvassing for local ecotypes and for working on selection.

The work on cowpeas, although recent, gave promising results. Nevertheless, all the programs are financed through outside sources, a fact which has the potential to create serious problems at the end of each project.

As for tubers, the program has just begun and does not yet have sufficient means (that is, one researcher for three basic tubers: yam, sweet potato, and cassava).

Research on cotton is still in the introductory stages at the present time.

The groundnut has experienced highs and lows. The stock that presently exists allows for a serious consideration of the revival of this crop. Thus, the severe problem of plant blight needs to be attacked, as it constitutes a serious constraint.

As for soybeans, the results obtained are interesting. However, this cannot cover the fact that the consumption of this crop is limited by the lack of outlets, and the lack of internal channels of consumption.

As for research concerning the knowledge and conservation of the environment, results have been obtained in fertilization and cropping techniques. But, quite often, the proposed solutions are beyond the means of the average farmer. For this reason, the real impact of these results cannot be seen, with the exception of the cotton zone. The current programs aim at minimizing general costs, especially that of manure, through the use of local products. A specific effort is also being made for the study of the water-soil-plants relationship. This study concerns the management of surface water, plant water needs, and control of climatic risks.

As far as the protection of crops is concerned, the work is conducted in cooperation with programs for plant improvement. This research sector is fairly well-equipped in terms of material as well as human means.

b. Animal production

In spite of various constraints, animal production remains one of the pillars of the Voltaic economy (contributing approximately ten percent of the GDP).

The long-term objectives of pastoral development concern a transition from the current system of extensive and transhumant animal production to a progressively more settled and more intensive animal production. Equal emphasis is placed on the diversification of efforts, in view of a greater value being placed on small ruminants.

In addition to the specific constraints of each ecological zone and for each type of animal species and breed, one must also add generally insufficient effort in the area of livestock development (for example, the under-equipped extension structures, the reduced capacity of the training structures, etc.). Most of the projects are financed through outside resources, which presents the problem of completing the project activities according to the deadlines. The nation's contribution to the activities of the departmental services of livestock production suffered severe budget cuts (FCFA 4,000,000 two years ago; only FCFA 900,000 in 1983).

c. Forestry production

The current situation in the forestry sector is marked by a persistent and more progressively accelerated erosion of the forest grounds (agricultural deforestation, the felling of firewood, the effects of brush fires).

Efforts are aimed as much at a growth in production as at a reduction in consumption. As far as production is concerned, since about a year ago, the Forestry Development Service has formulated tests for the development of natural forests. The Reforestation Service benefits from the numerous projects with outside financing for the operation of village wood lots. Two reforestation projects are underway at Wayen through the reforestation section of the AVV, and at Maro (in the Bobo region) through the International Development Association (IDA) project. As indicated above, the problem of the supply of heating wood remains a serious national concern.

Similarly, with the effort to increase production, a service for "improved stoves" was set up in the hope of significantly reducing the consumption of firewood.

In the majority of cases, these are the first of the project phases, thereby making it difficult to form an objective appraisal.

In addition to the efforts by the technical departments, a National Committee of Forestry Research was created in 1981 which united researchers, teachers and extension agents. In 1983, the central topic of this committee focused on brush fires, a national problem for forest rangers, animal breeders and agriculturists.

d. Fish production

Fish breeding is not well-developed in Upper Volta. The water resources are not very promising for high-level fish production, but it is certain that an effective development of existing bodies of water or of those to be created, will significantly improve the current situation of fish breeding.

Nevertheless, it is impossible to foresee a spectacular and immediate evolution in this area because of the constraints imposed by nature (waterways and artificial reserves that are temporary or of little importance). Also, the use of water reserves for essentially agricultural activities (irrigation) poses the problem of optimal distribution of its uses (irrigation and fish breeding development).

It is, however, evident that within the framework of the national policy of self-sufficiency in food production, this is an area which cannot be neglected in that it promises to bring in a supplement of quality food protein.

e. Production systems

This approach is of a definite interest and merits being developed in order to unite the farmers in helping with the efforts of rural resource development. There is much to learn from the thousands of years of experience of the farmer in the management of his ecosystem. Numerous research programs are underway in Upper Volta to describe the systems, and the socioeconomic factors of production (studies of ecosystems in rural surroundings by ORSTOM; socio-economic studies, and experiments of a technical nature in the village environment by IVRAZ/IRAT, ICRISAT, and FSU-SAFGRAD; and the regional project CILSS/FAO).

However, the results of these research projects have not, as yet, been as spectacular as expected.

4. Outline of solutions and possible courses of action

In the orientation policy speech of the CNR, given on October 2, 1983, by the president, self-sufficient food production was re-emphasized as a government priority, .

Agricultural reform will have as its goals:

- The increase in work productivity by means of a better organization of the farmers, and the introduction of modern agricultural techniques to the rural domain;
- The development of a diversified agriculture coupled with regional specialization; and
- Making agriculture the starting point for industrial development. Instead of projects that are too extensive and too complicated, the CNR opts for small operations which

will help make Upper Volta a vast field of crops, an infinite succession of farms.

The outline of solutions should be found within the framework of these main objectives of the CNR and its governing structures.

It should also be emphasized that the structures described above will become obsolete in the near future, in research as well as in extension.

In terms of research, a brainstorming committee is already in place to discuss proposals of reorganization, to consider the administrative division of the country into 25 provinces.

The outline of solutions and identified priority projects are only listed here in titular form and will not be definitely confirmed until these reorganizations are completed. Keeping this in mind, the analysis of the current realities of the agricultural sector calls for the following outline of solutions:

a. Vegetable production

In this category, the solutions might include:

- Creation of a unit for planning, programming and coordination at IVRAZ, (urgently needed);
- Establishment of a strategy to link research and development;
- Strengthening of a decentralized national network of the research stations of IVRAZ, taking into account the absence of research units in the north and the east of the country;
- Intensification of relations between IVRAZ and ISP and the eventual creation of a center of training-research allowing for a profitable relationship to develop from the mutual efforts of these two institutions;
- An increasingly "disciplinary" approach, rather than one based on "products" or "production" in the stablishment of research programs to resolve the fundamental priority problems, for example: a knowledge of the natural environment, a study of water-soil-plant relationships, and an inventory of natural resources. As for genetic improvement, which has been an area of intense activity up to the present time, the emphasis should be placed mostly on adaptability to those ecosystems already established and on resistance to diseases, rather than placing an emphasis on increases in yields; and
- Research programs to combat serious diseases (for example, groundnut mildew).

b. Animal production

In view of the enormous potential of Voltaic animal production and of the major constraints listed, the following recommendations can be presented subject to the conclusions of the dicussion committee of the MDR:

- o Better management of breeders, by supplying all necessary food products for modern animal production, and agro-industrial by-products needed for extensive breeding during the dry season;
- o Management which is more extensive during the periods of animal marketing;
- o Use of audio-visual methods in the training of breeders;
- o Training of agents more adapted to the areas of extension and to the real needs of the herders; and
- o Implementation of regular inter-institutional meetings between research, training, and extension, for the purpose of increasing collaboration between the institutions, and thus benefiting the breeders.

c. Forestry production

Most of the programs in progress are considered adequate as far as their purposes are concerned, and simply require reinforcement of human resources, equipment and financing.

Thus, efforts for the management of natural training programs are to be very seriously encouraged so as to complement the vast program of reforestation, which should increasingly strive to emphasize the use of local species, especially in the northern region of the country where reforestation using exotic species had mediocre results.

Brush fires, one of the principal constraints of Voltaic forestry, remains a national concern, which as yet has no program of solutions. Recently, the National Committee of Forestry Research, under the IRBET, organized a meeting to discuss both the legislative and technical aspects of controlling fire in the management of rural land. An additional meeting is anticipated during the first trimester of 1984 to finalize the precise recommendations for the authorities.

A seminar on agroforestry is also anticipated in the near future.

d. Fish production

The objectives of the DPP are primarily aimed at the significant increase of national production in order to reduce the costs of importation.

The proposed solutions are:

- o A major program dealing with re-orientation, training, and recruitment of personnel, notably management personnel;
- o Development of fish breeding organization efforts, with a more decentralized and more appropriate management, along with a number of possibilities for acquiring fishery equipment;
- o Development of fish breeding activities through a strengthening of programs in this area; and
- o Better organization of marketing channels (accessibility to areas of sales and price incentives).

5. List of program suggestions

This list is presented as a general approximation. Because many different reorganizations are currently in progress, this list could be substantially amended.

a. Vegetable production program

This program is made up of the following projects:

- o Implementing a research program on groundnut mildew (medium-term);
- o Strengthening food crop program (medium-term);
- o Biologically fixing nitrogen (long-term);
- o Creating an agronomic and animal husbandry research station in east Volta and the Sahel (short-term);
- o Implementing a research program of animal science (long-term); and
- o Strengthening agronomy and animal science research stations (short-term).

b. Animal production program

There are two projects for this program:

- o Marketing of cattle food (long-term); and
- o Development of animal species that mature quickly (long-term).

c. Fish production program

This program concerns two projects:

- Training seminar on a cooperative for the small-scale fishing industry for supervisors and fishermen (short-term); and
- Extension of rural fish breeding.

d. Forestry production program

There is a project, on a short-term basis, for the strengthening of infrastructures and research programs in the Mare d'Oursi station in the Sahelian zone.

IV. TRAINING INSTITUTIONS

A. List of Institutions

1. Advanced Polytechnic Institute (ISP - Institut supérieur polytechnique)

The ISP is a university institution coming under the MESRS. It was created in 1973 at the University of Ougadougou. Education at ISP leads to the rural development engineering degree. The level for recruitment is the baccalauréat. The education consists of two training cycles: a long cycle (five years, one year of which is committed to a field work for the preparation of a final dissertation) for the attainment of the rural development engineering degree; and a short cycle (consisting of three years with six weeks field work during the second and third years) leading to an engineering Diploma in Rural Development Techniques.

In each of these cycles, there is the option of studying one of the following specialized areas: agronomy, animal science, and waters and forests.

The total number of students was 471 in 1982-1983 and 560 in 1983-1984, which constituted a 19 percent increase. Job prospects for the graduates are basically found in the sectors of rural development corresponding to the three options. In 1983, ISP trained 18 Rural Development Engineers (nine in agronomy, five in animal husbandry, and four in waters and forests) and 28 recipients of the Diploma in Rural Development Techniques (14 in agronomy, eight in animal husbandry, and six in waters and forests).

In addition to these technical sectors, the ISP also provides the option for studying biology through the usual university methods.

The permanent teaching staff (full-time) is composed of 35 nationals and 15 expatriates. At present, there is no specific training program for the next ten years.

The annual operating budget of the ISP is FCFA 35,000,000.

For the calendar year 1982-1983, the premises were divided into: premises not belonging to the university but provisionally made available to the ISP; premises belonging to the university and allotted to ISP; and premises belonging to the ISP.

The library contains 1,647 books and 15 scientific magazines and newspapers. The audio-visual accessories include slide projectors, overhead, and film projectors.

The ISP has an experimental station with experimental plots for student training (at the Gampela station).

2. Polytechnic Agricultural Center of Matourkou (CAP - Centre agricole polyvalent de Matourkou)

Its supervisory department is the MDR. Of the resources of CAP of Matourkou, 50 percent is derived from the State for operations and 50 percent from donors (USAID) for investment.

The CAP of Matourkou trains extension agents on two levels: superior technicians, with a BEPC plus three years of academic study and two years of training courses; and agricultural technical agents, at the fourth school level plus four years of training.

In the course of their training period, the students take short courses concerning a certain technical topic in extension and research institutions. The main subjects being taught in the area of general education are French, math and physiology-biology; and in the area of technical education, all the subjects deal with general and special agriculture. The degrees earned are the superior technician degree and the technical agricultural degree.

Upon graduation, students at both levels are employed by the ORDs, the research institutions and the central departments of the MDR.

The CAP of Matourkou annually receives an average of 60 students on the technical agent level and 30 students on the superior technician level.

CAP possesses 12 classrooms, each 80 m^2 in area, and each with room for 85 students; nine dormitories with 30 beds each; and a cafeteria, 350 m^2 in area (with a capacity to hold 300 students).

Human resources are made up of the following: two administrators; 33 teachers, including ten part-time; seven auxiliary teachers; 15 others (term teachers); and three trainees.

Hiring needs for the next ten years include six teachers in the following subjects: chemistry-physics, French, mathematics, English, and soil science. Additional people should be hired to replace some of the term teachers, with whom it is impossible to complete the curriculum.

The government contributes FCFA 125,000,000 for the school's operation. Sponsors provide investment funds of FCFA 125,000,000 (USAID). The main assets are four buildings, 12 classrooms which hold an average of 25 students, or 300 students altogether, nine dormitories for 228 students, one cafeteria, one kitchen, two nonfunctional laboratories for teaching, one sports field, one library with 500 books and 12 scientific newspapers, and one farm covering 1,000 ha, with 70 ha of grain crops and 40 ha of pasture.

3. National School for Animal Production and Animal Health (ENESA - Ecole nationale de l'élevage et de santé animale)

The sponsoring ministry is the MDR.

Its resources come from the national budget and the Netherlands.

The ENESA is responsible for animal production training of middle management personnel: animal production assistants in three years, after having completed the first C or D; and technical agents in two years at the second level.

Veterinary medicine and livestock production are the subjects taught at ENESA. In contrast to past methods of instruction, the school now plans to train students in health as well as in livestock production, two permanent components of Upper Volta livestock development.

Human resources are poor, since the school's principal is the only permanent teacher. The faculty mainly consists of visiting-term teachers from the Animal Production Services Management and other services.

The school has a serious shortage of resources. It needs audio-visual aids, a library, and a farm.

4. School for Tsetse Fly Control (ELAT - Ecole de lutte anti-tsé-tsé)

The sponsoring ministry is the MDR. Its resources come from the West German Agency for Technical Cooperation and Assistance and the Fund for Aid and Cooperation (FAC-Fonds d'aide et de coopération). Originally, ELAT was a school for specialized training for the control of trypanosomiasis, but it later became a retraining school for senior and junior management in the fields of veterinary medicine and animal production.

5. Dineresso National Forestry School (ENFD - Ecole nationale forestière de Dinderesso)

This school functions under the MET. The school assures training in the field. When the school was first created in 1956, it trained ten agents in a year. Gradually, the capacity grew to 20, then 40, and finally 70 students. However, at the present time, the school accommodates only 40 students trained in two years. The subjects taught have gradually been adapted to the needs of the employer. The following subjects are taught: forestry, systematic botany, forest laws, administrative process, topography, measuring of lumber, fishing and fish breeding, soil study and soil conservation, sociology and extension, cynegenetics, environmental protection, and, finally, military practice.

The school offers only the degree of National Forestry Commission Agent. However, it is expected that soon technical agents in water

and forestry will be trained there. Currently, this training is provided as well as can be expected at the CAP of Matourkou. It is useful to mention how the National Corps of Water and Forests is subdivided: water and forestry engineers, with a baccalauréat plus five to seven years of training; forestry techniques engineers, with a baccalauréat plus three years of training; water and forestry supervisors, with a baccalauréat plus two years of training; forestry technical agents, with a BEPC plus two years of training; and employees of the National Forestry Commission, with a CEPE plus two years of training.

The employees of the National Forestry Commission work mostly under the direction of the forestry services, in forestry projects, the AVV and the CTFT.

The school has five permanent teachers, four visiting-term teachers, who are all graduate-level, and three auxiliary teachers supervising the practical work, apart from the administrative staff (secretaries, accountants and others). At the present time, only one teacher is being trained, and seven teachers are expected to be hired in the next ten years in order to replace the expatriates and fill the vacancies in the faculty.

Thirty-eight percent of the school budget is provided by the national budget (FCFA 7,966,960) and 62 percent by the USAID project. The investment budget has been fully provided by the USAID project three years ago, and the sum amounts to approximately FCFA 199,815,000 per year. This investment budget is used for extension or remodeling of the school's infrastructures (classrooms, laboratory, library, faculty housing, purchase of audio-visual aids, travel, etc.).

A library exists, but it is not supplied. In terms of audio-visual aids, the school has four cameras, two slide projectors and a film projector.

Including expatriate teachers, the total number of teachers is still insufficient. Their promotion process is the same as that of their colleagues who do not teach, and they enjoy certain advantages (free housing and various allowances).

B. Human Resources and Conditions of Employment

At the higher level (ISP), the permanent teaching staff is insufficient, especially now that the biology section has been expanded, and despite the fact that some teachers teach overtime in addition to their already overloaded schedule. Consequently, the time available for research activities is very limited. Teachers benefit by a special status (housing benefits and special allowances).

In the three other institutions, the faculty does not have the benefit of a special status. The main advantages are housing possibilities, but these are gradually disappearing. The number of permanent teachers is considered to be very insufficient.

C. Nature of Major Problems Identified by the Teaching Staff in the Institutions

At the ISP level, several problems may be identified: not enough means and time for research; the budget of the institution does not allow for the purchase of adequate products and equipment for the practical work sessions; a crucial problem concerning building sites existed in previous years, but it is now partly resolved.

In the three other institutions, the major problems are: not enough teachers, and the problem of their pedagogical training; the future of the institution itself (for instance the ENFD) once its external financing no longer exists, as the cost is too high for the natural budget; housing can no longer be provided to all of the teachers, as in Matourkou, where the teachers who are not housed have to commute from Bobo-Dioulasso to Matourkou (15 km), which involves high transport costs. The Matourkou students' registration dates in July only allow them to attend two or three months of classes. Thus, it would be preferable to have the registration occur in February.

D. Links Between Training Institutions/Research Institutions/ Extension Institutions

At the upper level, the existing links are important. ISP teachers involved in research take part in the implementation of some IVRAZ research programs (for example, groundnut blight) and train researchers at the executive level for IVRAZ Gampela station, which belongs to ISP, and obtains certain experiments from IVRAZ. Some researchers from IVRAZ teach or lecture at ISP, supervise students in training and belong to the dissertation jury for final presentation of their work.

Relationships between ISP and extension institutions are also very important. Extension services supervise students when they are in training in the field. In return, these services employ the executives training by ISP.

In regard to the other institutions, relationships with research structures are less important. In fact, they do not even exist in the case of the ENESA. However, in Matourkou, for example, where the school is very close to the Farako-Ba station, researchers from this station teach at the school and accept students in training into the stations.

In contrast, relationships with extension institutions are very important. All three institutions train technicians who are eagerly hired by the development services, due to an insufficient number of graduating students who can satisfy the needs of the user services in the agronomic sector (CAP), in the forestry sector (ENFD), or in the animal production sector (ENESA).

E. Recommendations

Strengthening of relationships with research and with extension is needed not only in the form of personnel exchanges, but also in the actual participation and adaptation of programs accordingly.

It is also important to strengthen the institutions' capacity for receiving employees so that a greater number of personnel may be hired, while at the same time guaranteeing the quality of training. This necessitates a strengthening of human resources, as well as scientific equipment.

V. EXTENSION INSTITUTIONS

A. The Various Institutions

The extension institutions include the Volta Valley Management Authority; the Regional Development Offices of the central region, of the western center, of the eastern center, of the northern center, of the east, of the Upper-Basins; of the Comoé, of Bougouriba, of the Black Volta, of the north, of the Sahel; the Division of Fisheries and Fish Research; the Division of Forest Management and Reforestation; and the Division of Livestock and Animal Industries Services.

AVV, the 11 ORDs and the DSEIA depend on the MDR. The AVV and the ORDs are responsible for the organization of the rural sector, the extension of technical themes, the introduction of inputs and credits, and the organization of marketing. These structures work through the technical support of services of the MDR and of the research institutes. The two other institutions (fishing and forests) depend on the MET.

1. Volta Valley Management Authority

The AVV was created in 1972 in order to develop healthier valleys (fight against onchocercosis) situated along the Black Volta, the White Volta and the Red Volta. Its activities take place in the Sudano-sahelian zone, the Sudanian zone, and the Sudano-guinean zone with a rainfall ranging from 700 to 1,100 mm. These activities mainly focus on grains (white and red sorghum, maize and millet) and cotton. Emphasis is also placed on systems of production, specifically the application of crop rotation type AVV, and the introduction of fallow fields in rotation. As far as hydroagricultural developments are concerned (Bargé, Lanfiera), irrigated crops dominate (rice cultivation and market gardening).

The annual operating budget is about FCFA 2,550 million (with funding from the government of 50 million). The main sponsors are France, the Netherlands and West Germany. As for personnel, AVV has 25 senior managers whose level is equal to or higher than the baccalauréat, plus four years (administration and technical services), five mid-level managers (baccalauréat plus two years) and 71 supervising agents whose levels are very often not high. There are few women (five on the middle management level). AVV does not have any staff in training. The senior and middle management personnel come from a general pool operated by the MDR. By contrast, almost all supervisory staff need to attend orientation training sessions with the country or in Africa during the next ten years.

The system of management of the AVV is very strict. Workers have to respect certain basic principles, mainly the AVV rotation type of system. This principle has promoted fairly good results, leading to an increase of cultivated areas (animal traction cultivation), and crop yields, particularly sorghum and cotton.

Until 1981, AVV had its own structures designed for research. From 1982 onwards, when the system was reorganized (eight development units), an effort was made to unite research institutes using technical support based on the level of influence, or to unite the research institutions in the fields of research-development of certain projects (for example, fara-poura).

The technical personnel, nevertheless, believes that efforts should be made to strengthen relationships with research. Overall, the opinion is that the delay in agricultural production can be attributed to price policies (the purchase price to producers, which is not encouraging).

2. The Regional Development Office (ORD) of Black Volta (Dédougou)

Situated in the western portion of Upper-Volta (loop of the Black Volta), this ORD covers two zones: the Sudanian in the south and the Sudano-sahelian in the north. It is made up of six agricultural sectors. The ORD's main activities are with grains (sorghum, millet, rice), cotton (one of the main cotton areas in the country), groundnuts and market gardening (covering many perimeters). The annual budget is approximately FCFA 784 million, of which the government contributes 112 million. The ORD has sufficient personnel (about 200 persons). Working conditions are good because finances are available. The awarding of bonuses and allowances provides incentives for agents. However, since most agents are on a contractual basis, job security is a crucial problem. The projects plan and provide training sessions for technical personnel. The ORD has eight high level management staff (baccalauréat plus six years) and about 20 women (in general, office workers or agents in the field). During the coming years, 51 people will be needed (three engineers and 48 technicians including 20 women). Extension results are rather clear-cut, especially in the south and west (cotton areas) where farmers practice different techniques. In order to obtain these results, the ORD uses a system of presentations for managers, radio broadcasts aimed at farmers, and the development of demonstration lots. Relationships with research are good, due to the Mini-station for Pre-Extension Experimentation (PAPEM - point d'appui de prévulgarisation-et d'expérimentation multilocale), multilocal experimen , visits to research stations, participation of researchers in ORD training sessions, and ORD participation in the annual research committee.

As far as the ORD technical personnel are concerned, the crucial problems are material ones for the agents, particularly transportation and housing.

3. The ORD of the Upper-Basins

This ORD is situated in the west of the country, in the Sudanian zone, with rainfall ranging from 900 to 1,100 mm. It is made up of five agricultural sectors. The agricultural activities include grains (maize, rice, sorghum, and millet), cotton, market and fruit gardening, and tubers. The annual budget amounts to about FCFA 1,500 million, with more than 700 million belonging to the ORD itself. The

ORD has about 250 employees, 75 percent of whom are in the management sectors. There are 15 senior managers (seven expatriate) and 200 technicians in the field, and a total of 20 women (in administration). About three persons are in training. During the next few years, 75 persons will be needed and 25 persons will have to be trained (six senior management staff).

Results obtained by the ORD are favorable--increased technical level of farmers, and high yield and production rate. Close relationships between research and the ORD facilitate the circulation of technical innovations.

As far as technical staff is concerned, it is necessary to provide specialization to managers and to motivate the support staff. It is also necessary to guarantee the marketing of grain products.

4. The ORD of the western center (Koudougou)

This ORD is made up of seven agricultural sectors, and its efforts focus on grains (sorghum and millet), cotton in the southern areas, and market gardening and groundnuts. Of the 220 persons who make up the ORD, there are senior managers and 36 technicians. The rest of the staff is mainly made up of contractual staff working in the management units. There are few women (about ten). The annual budget is FCFA 100 million (33.6 million from the government). This ORD has serious budget problems, which makes it difficult to hire new management personnel. There are tremendous needs for new personnel and for personnel in training. The ORD estimates that in the next ten years its staff will have to be increased by 10 percent. Right now, 19 persons need to be trained, including seven managers.

Relationships with research are good. The Saria station is in this ORD. In addition, the multi-site experiments and the demonstrations provided an opportunity to popularize technical themes: varieties, cultural techniques, etc. The ORD is going to create two PAPEM (in the northern and southern areas). As far as technicians are concerned, any delay can be attributed to the financial situation. This presents serious problems to personnel in management units. The necessity for increased training is uncontested. In addition, production costs often surpass the farmers' means.

5. The ORD of the northern center (Kaya)

This ORD is made up of four agricultural sectors, its ecological area consisting of the Sudano-sahelian area. Agricultural activities focus on grains (sorghum and millet), combined with cowpeas and market gardening. The annual budget is FCFA 150 million (government funds). This ORD has 250 employees (11 expatriates), of which 183 persons are in management positions (contractuals). The staff is insufficient and the education level of management staff is rather low. The ORD needs ten agronomists and 20 middle management people for the next ten years. Only two people need to be trained.

The ORD collaborates with research institutions.

The technical staff believes that the ORD's method of funding constitutes the first constraint to its activities. However, the training level of the junior technical staff should also not be ignored, because it is in great need for retraining. Budget problems are at the root of job insecurity for this category of personnel (contractuals).

6. The ORD of the Sahel (Dori)

Dori is situated in the northern portion of the country and largely in the Sahelian zone. This ORD's activities focus mainly on animal production. But, in the south and east, agricultural production is fairly important: millet, cowpeas and sorghum. This ORD contains 160 persons including five expatriates. The staff includes eight senior managers (three nationals) and 106 contractuals. There are few women (two secretaries). Twenty-five persons should be trained in the near future to satisfy the needs of the ORD.

The budget is about FCFA 96.5 million (32 million provided by the government). This amount is insufficient to cover the activities of the ORD.

Relationships with research are close. Considering the specificity of the area, research should propose appropriate solutions adaptable to this area, such as short-cycle varieties of millet and especially of cowpeas.

The lack of funds restrains the activities of this ORD. Living and working conditions for the personnel are difficult.

7. The ORD of North Yatenga (Ouahigouya)

This ORD is situated in the north of the country: 500 to 600 mm of rainfall (the Sudano-sahelian zone). Activities focus on sorghum and millet cultivation and small ruminant production. The ORD has a staff of 320 persons including nine expatriates. Most of this number, 162 do not have the BEPC. There are about 50 women. For the next two years, the ORD needs two engineers and 35 technicians (CTAS and ATAS). This ORD did not mention any additional training needs. The budget is FCFA 137,950 million (25 million provided by the government). There are serious problems in both the investment and the operation sectors.

Research institutes work with the ORD in the area of research-development programs.

From the staff's point of view, the inadequacy of funds is among the most serious constraints. As a result of this, living and working conditions are poor. The level of the management staff is insufficient and unstable. Generally, the farmers are quite motivated, but the results are insignificant due to the climate.

There is a need for research into the problems of climatic risks (water conservation, short-cycle varieties, etc.).

8. The ORD of the central region (Ouagadougou)

This ORD is situated in the central part of the country (Sudano-sahelian). Activities focus on the production of sorghum, millet, cotton (southern area), and groundnut production. This ORD has 200 persons including ten senior managers, 22 technicians (ATAS and CTAS), and 165 managers. Overall, the ORD has 20 women (15 management staff). The annual budget is 170 million, 100 million of which is provided by the government. This ORD has great difficulties. Its budget covers the salaries, but hiring and training strategies are inhibited.

Contacts with research are pursued diligently: multi-site experiments, participation in research committees.

9. The ORD of Comoé (Banfora)

Banfora is situated in the south-western part of the country, in the Sudano-guinean zone. The main activities focus on grain cultivation (rice, maize and sorghum), cotton, tubers, groundnut and animal production (cattle and poultry). The ORD's staff has 128 persons including four expatriates. Out of this number there are nine senior managers, 37 technicians (CTAS and ATAS), and the remainder consist of basic agents (trainers). In the years to come, the ORD will need 30 more people. The annual budget of the ORD is FCFA 70 million (23.5 million provided by the government), and thus appears to be quite insufficient.

The results obtained by this are quite promising, in the area of rice cultivation, in which collaboration with research structures is good.

The serious problem faced by the ORD is financing. But, the inadequacy of the staff and the difficult working conditions are also factors.

10. The ORD of Fada

Fada is situated in the eastern part of the country and covers the Sudanian and Sudano-sahelian zones. The ORD is composed of agricultural sectors. This ORD's staff has 220 persons including 13 agronomists (six expatriates), 30 technicians (ATAS and CTAS) and 153 managers. For the next ten years, the ORD needs 60 more people, including 11 senior management and ten middle management persons (all men). Activities focus on sorghum, millet, rice, cotton and groundnut production. As far as the budget is concerned, the ORD is well-funded (FCFA 1,030 million as a whole). However, the credit issuance system restricts enormously the ORD's potential (less than 270 million of expenses). The ORD has two multi-site experiments, and demonstration lots.

Besides its financial problems, which are exemplified in the staff's working conditions, the ORD does not have enough staff in the field (being a very large ORD). There is a lack of agricultural inputs and crucial problems related to pricing policies (agricultural products).

11. The ORD of the eastern center (Koupéla)

It includes five agricultural sectors and is situated in the Sudano-sahelian zone. Activities focus on sorghum, millet, rice, cotton, groundnuts, and market gardening production. This ORD's staff has about 150 persons (including seven expatriates), ten agronomists, 37 technicians (ATAS and CTAS), and 57 managers. The staff is inadequate (qualitatively and quantitatively). The ORD hopes to have 100 additional personnel in the near future. Three senior management people (two in developed countries) should be trained as soon as possible (reorientation), and about 60 managers. The operating budget is FCFA 65 million (28 million provided by the government), which is partly reserved for salaries. But starting 1983-1984, an Italian financing program is planned: 420 million in investments and 646 million for operations.

Relationships with research are good. There are multi-site experiments, demonstration plots, etc.

Up to now, the main problems faced by the ORD staff concern financing, job security and training. The unavailability of factors of production hinders an increase in production, in spite of the farmers' willingness to accept innovations.

12. The ORD of Bougouriba (Diébougou)

Situated in the south-western portion of the country, this ORD covers two ecological zones: Sudano and Sudano-guinean. It is comprised of seven agricultural sectors. Its main activities focus on grains (sorghum and millet), tubers (yams), and cotton and, secondarily, on rice, market gardening, groundnuts and legumes with seeds.

The annual budget is about FCFA 571 million. Government participation is very limited (appointment of the civil servants).

This ORD has enough staff (218) to implement its extension program. However, it will be useful to hire 13 additional managers in order to satisfy all of the needs.

Thanks to AID funds, working conditions are satisfactory--agents have access to resources, wages are fair, and there are allowances. The real problem for this ORD was job security, but this has been solved because of the progressive integration of junior agents as government agents.

The project trains the technical staff.

The ORD has 13 senior managers, including six expatriates (baccalaureat plus six years), with about 30 women involved in administrative work and in women's activities.

During the next few years, staff needs will be for about 13 persons, consisting of two agronomists, five foremen and six ATAS. The ORD does not hire women anymore, because of the difficult working conditions.

Extension results are visible, especially in the area of cotton production. A certain number of flyers explaining extension themes are made available to the agents. The agents and extension workers have a radio program at their disposal as well. Demonstration plots exist to make the farmers aware of the various themes.

Relationships with research are very good. There are PAPEMs, multi-site testing in rural areas, visits to research stations, participation of researchers in preparatory meetings for the ORD's research-development program, and the ORD's participation in the Specialized Committee for Agricultural and Animal Husbandry Research (CSRAZ - Comité spécialisé de la recherche agronomique et zootechnique).

The director identifies two problems: the low level of recruitment for managers and pricing policy problems (prices set too low and too late). For the supplementary technical personnel, problems lie within the operating budget (transport means), the development of inputs, and the lack of grain marketing structures.

13. Division of Fish and Fish Breeding

In the fish-breeding field, the DPP is the only division which can be classified as an extension institution. This institution results from the dissolution of the former Division of Forestry, Environment and Environmental Protection Services in 1976.

The DPP, which is dependent upon the MET is in charge of promoting and developing fishing and fish breeding. Even though its activities are important, this institution has a very low operating budget (the national budget averages FCFA 5,450,000 per year).

At the central level, the DPP has a director (water and forestry engineer), two water and forestry engineers (one of whom is a woman), one engineer of water and forestry works; two water and forestry technical agents in the fish-breeding service, one engineer in forestry techniques, and two water and forestry supervisors in the fish service apart from the administrative staff. In the decentralized areas, the DPP has 26 agents working in the fishing centers, fish-breeding stations or in fish-breeding projects, and six departmental directors (water and forestry engineers) working part-time for this institution. For the sake of developing its activities, the DPP expects to train or hire five water and forestry engineers or agronomists, five agents having a level of water and forestry engineer, or a level of water and forestry supervisor, and 20

technicians (technical agents or employees). During seven years of activities the DPP has been able to establish:

- o A fish-breeding station for production and restocking in Bazéga (with ponds covering 1.8 ha);
- o A structure for breeding fish (Sarotherodon niloticus) at Banfora (aquaculture project); and
- o Twenty-three fishing centers, which are precooperative structures of 20 to 30 fishermen for fish-breeding in the Voltaic rivers or other Voltaic bodies of water, and which are equipped by the DPP (credit refunds for equipment by the fishing centers allows for the existence of floating capital mostly used for new fishing equipment).

In addition to all this, the DPP, which is now in the departments of the Upper-Bassins and of Comoé, has already created 15 rural ponds.

On the technical level, a lack of understanding of the many uses of water (previous samples for irrigation and for fish-breeding) makes the functioning of this institution difficult.

14. Division of Forest Management and Reforestation (DAFR)

This division is under the MET and is divided into three services:

- o The Forestry Development Service, which is in charge of increasing production and soil conservation through appropriate natural forest cover techniques, especially in protected forests, for which a program has been established and is underway;
- o A Reforestation Service, in charge of artificial plantings (especially exotic, but also local, species); and
- o The Improved Stove Service, a national coordinating campaign to encourage the use of improved stoves in order to reduce the consumption of firewood.

The personnel includes: 45 engineers, two of whom are women; 43 field engineers; 33 persons at the BEPC level plus two years, 98 persons at the BEPC level, and 142 sub-BEPC level personnel. The annual budget is FCFA 15 to 20 million per year. There is always a great deal of foreign participation, especially in reforestation programs. Between 1977 and 1981, this participation totaled (in million FCFA): 205 for Switzerland, 483 for West Germany, 1,125 for FAC, 161 for UNDP, and 87 for USAID.

The total area subject to reforestation (village level plus large industrial reforestation) is more than 14,000 ha.

The relationship with research is very good. There is a Committee on Forestry Research and various conferences to establish certain guidelines, especially for the development of natural forests and for testing the technical performance of different types of improved stoves.

15. Division of Livestock and Animal Industries (DSEIA)

DSEIA and its associated organizations and stations, as well as its husbandry projects, are under the direction of MDR.

DSEIA and its departmental husbandry service covers the entire country and carries out its activities in all the ecological zones of the national territory.

The human resources situation is as indicated in Table 41.

The annual budget of DSEIA is FCFA 524.5 million (management, poultry centers and husbandry stations included). The results of extension services are summarized in the numerous direct contacts between extension agents and breeders, either through periodic visits or through husbandry campaigns; in the radio program developed by the extension service of the DSE; in the training and retraining sessions for both the vaccinators of different projects, and for the senior and middle level supervisors; and in the supervision and assistance to breeders in the fields of health and feeding of their livestock.

It is unfortunate that radio is not fully used to keep breeders aware and informed of technical advances since present diffusion methods are ineffective and animal husbandry stations are separated by great distances.

The links between the research program and the extension service are good but should be consolidated, to make research findings accessible to the extension service, and so that the extension service can submit problems to the researchers.

The principal programs and projects underway are:

- Poultry Development Project at the village level (financed by FAC);
- Traditional Husbandry Improvement Project in the Upper-Basins and in Comoé (financed by FED);
- Small Ruminants and Poultry Project in Yatenga (financed by FED);
- Bovine "Feed Lot" Project in Banfora (financed by GTZ);
- West Volta Livestock Project for Semi-Extensive Ranching (financed by the World Bank);

Table 41: Human Resources at DSEIA

	Currently	Projections for 1986
National Veterinarians	38	60
Expatriate Veterinarians	22	-
Livestock Engineers	33	-
Chemical Engineers	3	3
Biochemical Engineers	1	1
Livestock Technicians	2	22
Agricultural Technicians	1	-
Livestock Assistants	62	121
Technical Assistants and Veterinary Nurses	182	294
Farmer or Vaccinator	20	175
Administrative Secretaries	1	2
Staff Assistants	6	15
Typists	9	20
Drivers	31	66
Laborers	65	190
Gardeners	9	32

- o Animal Productivity Improvement Project in the Sahel ORD (financed by UNSO); and

- o Livestock Development Project, Sahel ORD (financed by FED).

B. Analysis of Problems

1. Human resources

The extension agencies, as a whole, do not face human resources problems to the same extent as do other sectors. Those who benefit from financing (Upper-Basins, Bougouriba, the Black Volta, and AVV) are very well staffed and have the resources for training and retraining agents and other personnel. On the other hand, those who do not benefit from financing operate with a skeletal staff: agents hired in large groups without the possibility of a training period, and in insufficient numbers. But, for the agencies as a group, there are enough supervisors, all of them government officials. For those under contract (supervisory agents), the most difficult problem is that of job insecurity and irregular salaries (those not financed by ORD).

2. Research-extension-production relationship

The relationship between research, extension and producers is improving. From the point of view of the extension agents, research should take into account the specific needs of zones and crops, and should direct its programs according to this basis. An effort is being made by ORD to integrate research into development service. Each ORD is attempting to equip itself with a research and development service, in charge of working in conjunction with research and installing PAPEMs. The intensification of research on production systems attempts to gather data at the production level (socio-economic data) and to suggest systems which take into account the real needs of the farmers.

One criticism of the research, among others, is the frequent duplication of programs in the same zones. The restructuring of research should solve this problem.

3. Problems identified by personnel

For the extension agencies as a whole, the problems as seen by personnel are in the following areas:

- o Lack of resources due to insufficient budgets;

- o Shortage of field personnel;

- o Lack of training;

- o Inaccessibility of factors of production at the level of non-financed ORDs; and

- o Insecure employment and barely acceptable living conditions.

4. Recommendations

It is difficult to make isolated recommendations in talking about an overall system to improve extension systems in Upper Volta. Furthermore, the ORDs correspond to the old administrative organization of the country; since the 4th of August, 1983, there has been an extensive administrative reorganization which will have repurcussions for the extension system. A commission was established at the MDR to suggest this reorganization. Keeping in mind the government objectives, there will be decentralization and extensive change at the project design and development level.

C. Inter-Institutional Relations

The relationship between research institutions and training institutions have only been developed with ISP.

Among the training institutions, only the ISP has close relations with the research institutions. The other training institutions have limited, or no, relations with research, probably due to insufficient training. Most of the training effort is concentrated on field agents.

Among research and extension institutions, important progress has been recorded; annual sessions of the Specialized Committee of Agronomic Research and the Committee on Forestry Research bring together researchers, teachers, and extension agents.

Among the extension and training agencies, there is close contact so that the number of research personnel will not exceed the school's capacity to train them, nor, more importantly, the needs of extension institutions.

As for purely sectoral needs, the current situation of inter-institutional relations is satisfactory, but efficiency of the relationships on a large-scale level is unknown.

D. Constraints

1. Constraints to crop production

The principal crops that are found in Upper Volta are the following: cereals (sorghum, maize and rice), cotton, oil seeds (groundnuts and sesame), and tubers (potatoes, yams and cassava). The market gardening crops and fruit trees are also important, especially as economic speculations. A product that is gathered, the karite almond, plays an equally important role.

In general, the climate, especially yearly rainfall variations, constitutes the principal obstacle to agricultural production. To this must be added economic factors, particularly the purchase price for producers, the availability of credit for equipment, subsidy policies and marketing systems.

Upper Volta consists of four ecological zones: Sudano-guinean and Sudanian in the west, south-west and south; the Sudano-sahelian zone with the whole of the Mossi Plateau and the Sahelian zone. The distribution and the importance of eight crops takes into account the ecological zones. Each crop finds specific limitation in each given ecological zone.

a. Sorghum

Sorghum is found throughout Upper Volta, except in the Sahelian zone. The varieties grown are almost all local and are adapted to ecological zones. Production is often jeopardized by the distribution of rainfall. The sun can also be a limiting factor especially in the Mossi Plateau where the population density no longer permits the use of fallow cultivation, the traditional way of restoring the soil. In the more irrigated areas (south and south-west), illnesses and weeds are the most serious limitations. In the country as a whole, striga accounts for an estimated decrease of 25 percent in production.

In theory, the application of technical results should permit production to increase from 500 kg/ha to 1,500 kg/ha in the middle-term and 2,500-3,500 kg/ha in the long-term.

b. Millet

Millet's geographic area is the opposite to sorghum's. It is important in the Sahelian and Sudano-sahelian zones, but not in the Sudanian and Sudano-guinean zone, where it is subject to parasites and diseases. It is a versatile crop that adapts to difficult conditions (soils and drought). Production is also kept down by striga. Yields could increase from 300-400 kg/ha to 1,000 kg/ha in the medium-term to 1,500-2,000 kg/ha in the long-term if certain conditions are improved.

c. Maize

Maize is cultivated in open fields in the western zone and in enclosed fields in the Sudano-sahelian zone. The major limiting factors are climate, soil, the availability of water and weeds. Presently, some farmers are producing nearly two to three tons/ha. Yields could surpass four to six tons/ha.

d. Rice

Rainfed rice is grown in the Sudano-guinean and Sudanian zones, in lowlands and in the irrigated peripheries. The major constraints are water and the climate. Yields could surpass one

to five tons for irrigated rice, one to three tons for rainfed rice, and one to three tons for lowland rice.

e. Tubers

Tubers are cultivated in the western and southern zones and a few microclimates from the Sudano-sahelian zone. The major constraints are the climate (need for more rain), the soil (depth), and the commercial network.

Production could reach five to six tons/ha to 15 tons/ha in the medium-term and 25 tons in the long-term (yam).

f. Oil seeds

(1) Groundnuts

Groundnuts are cultivated in all zones, with varieties adapted to each zone. But the crop has some problems in the south and south-west, where the major constraint is blight, which destroys 50 percent of the output. Another difficulty is the purchase price to the producer and the organization of marketing. The output can go from 500-600 kg/ha to 1,000-1,500 in the medium-term, and to more than 1,500 kg/ha in the long-term, if blight is eliminated.

(2) Sesame

Sesame is not cultivated on a large scale. The outputs are generally low, about 500 kg/ha. We could go up to 1,000 kg/ha with better varieties and good farming techniques. The major constraint is climatic (sesame is not cultivated in the Sahel).

(3) Karite

For karite, a product that is harvested, the irregularity of output constitutes a major constraint.

g. Cotton

Cotton is cultivated in the west and south-west of the country, plus a little in the Sudano-sahelian zone. The major constraints are the climate (rainfall distribution and amount of water), the soil (rich), and, above all, parasites.

The unavailability of labor at harvest time could also lower output.

The current national yield is 800 kg/ha. However, this yield could go up to 1.6 tons/ha if certain constraints are lifted.

h. Cowpeas

Cowpeas are generally cultivated in association with other crops. The output is low because of parasites during the growing process, during storage after the harvest, and as a result of the traditional system (low density because of mixed-cropping).

The current yields (200-300 kg) could go up to 1,500-2,000 kg/ha.

2. Constraints connected to the field of animal production

a. Cattle production

(1) Sahelian zone

Serious constraints are related to:

- o Physical factors (rainfall);
- o Nutritional factors (unavailability of natural forage);
- o Watering the cattle (inaccessibility); and
- o Socio-traditional factors (capitalization and non-subsidy of cattle).

Less serious constraints are related to animal health and economic factors.

(2) Sudanian zone

Serious constraints are related to:

- o Physical factors (rainfall), especially brush fires;
- o Nutritional factors; and
- o Product prices.

Moderate constraints are related to watering, health, elements of social tradition, and marketing.

(3) Guinean zone

Serious constraints are nearly non-existent with the exception of preventive health. Moderate constraints are linked with rainfall, watering, the factors fostered by social tradition, and land ownership. Minor constraints are linked to fodder and to economic factors. An increase is possible in the short term (45 percent) and in the long term (60 percent).

b. Sheep and goat production

(1) Sahelian zone

The situation is the same as for cattle in the Sahelian zone.

(2) Sudanian zone

The following constraints exist:

- Serious constraints related to the physical factors of food and health, and to herd management;
- Moderate constraints related to watering, social tradition, and prices and marketing; and
- Minor constraints linked with nutritional factors, to the farming of pastures and watering by the dictates of social tradition.

(3) Guinean zone

In this zone, there are:

- Serious constraints related to the technical know-how of the breeders;
- Moderate constraints related to brush fires, to health, to the prices of animal products, to marketing, and to pasture management; and
- Minor constraints linked to nutritional factors, the farming of pastures, and to a traditional watering system.

The possible short-term yield is seven kg and the possible long-term yield is ten kg.

c. Poultry production

In the Sahelian, Sudanian, and Guinean zones, the following constraints are delineated:

(1) Extensive, traditional raising

Serious constraints are related above all to health and social tradition. Moderate constraints are related to the technical know-how of the breeders. Minor constraints are related to the price of animal products, marketing, and physical and nutritional factors.

(2) Modern urban and suburban raising

Serious constraints are related to food, the technical know-how of breeders, and economic factors (prices of products, marketing and credit). There are moderate constraints for health and minor constraints for the other factors.

The possible long-term yield in the field of traditional breeding is 1.5 kg for the chicken and 50-70 eggs/hen. As far as modern breeding is concerned, the possible yield for a chicken with IC is two kg and, for the layer, 150-180 eggs/hen.

d. Pig production

In the Sudanian and Guinean zone, the following constraints were noticed:

(1) Extensive traditional breeding

Serious constraints are related to nutritional factors: watering, social tradition, the technical know-how of the breeders and economic factors. There are minor constraints related to health and physical factors and to marketing.

(2) Intensive modern breeding or semi-intensive breeding in towns

The powerful constraints are linked to the elements of social tradition, economic factors and credit. The minor constraints are related to nutrition, health and marketing.

The possible short-term yield is 60 percent and the possible long-term yield is 80 percent.

3. Constraints related to fishing

The major constraint on the activities of fishermen is the difficulty involved in providing the supplies of fishing equipment; the pirogues are made locally in the factories of Houet (Bobo-Dioulasso) and of Kadiogo (Ouagadougou). All the rest of the equipment is imported. It would be wise to improve the technical know-how of the fishermen, to organize the marketing network of fish produce, and to fix official prices for the marketing of fish produce. Finally, the productivity of over-fished bodies of water must be improved by subsequently restocking them with fish.

These surveys on the constraints have brought out the fishermen's real concern.

The DPP, for example, has believed that, in the interest of the producers (fishermen), it would be better to leave the market for fish open. The survey brings out, however, the producers' hope of seeing more regulations governing the purchases and sales of fish, notably at the centers of production; the isolation of the latter and the size of

the catches mean that the fisherman is often obliged to sell out his produce at ridiculously low prices to avoid total loss.

The fishermen emphasize the necessity to acquire more technical know-how and hope for a system which would make it easier to acquire fishing equipment.

The fishermen, notably the ones from around Ouagadougou, are aware of the overuse of certain bodies of water. Also, they hope for the restocking of fish in those bodies, restrictions on the number of fishermen who use them, and the strict enforcement of fishing regulations (meshing of nets); others are willing to learn fish breeding techniques when training is possible.

VI. CONCLUSIONS AND GENERAL RECOMMENDATIONS

The recent mission on agronomic and animal science research in Upper Volta jointly conducted by the World Bank, FAO and ISNAR (September-October 1982) gave great emphasis to the fact that agronomical research is highly profitable. However, its impact on the agricultural production of a country depends upon a group of factors which often have little to do with the quality of research findings.

The findings of agronomic research are often presented in the form of isolated technical subjects (varieties, fattening methods, growing techniques, methods of treatment, etc.). Their complete application, at the farm level, implies the use of a "technological package" which alone will lead to optimal levels of production. This "technological package," including a coherent combination of technical data, should take into account the socioeconomic aspects of the rural milieu; otherwise, it will be rejected by the farmer.

Research, regardless of the quality of findings obtained in agricultural stations, achieves its goals only when those findings have been adopted by the farmers and at this point its role is completed. Therefore, it does not stand alone; for this reason a good relationship between research and development is fundamental, in order for research to be completely effective.

In Upper Volta, the Ministry of Rural Development is the principal institution responsible for agricultural and rural development. It is heavily involved in the following areas: agricultural and animal production, rural water resources development, rural credit, rural institutions (village groups, cooperatives, etc.), as well as education and agricultural training at the lower and middle levels.

Due to different approaches to the relationship between research and development according to different schools of thought, there is a serious bottleneck in this link.

At the level of technical sectoral programs, one observes an imbalance in the nature of the programs. There exist, as well, very few programs in the areas of animal science, agroforestry and agro-socio-economic subjects.

These diverse problems will probably have short-term solutions: holding a seminar on agroforestry planned for December, 1983; holding a national seminar on agronomic research planned for March, 1984. The main recommendations will, therefore, not be made until after these important conferences take place; the same is true of final decisions regarding the reorganization of rural structures by the MRD.

ANNEX 1

Bibliography

ANNEX 1

Bibliography

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ANNEX 2

Programs and Projects

I. CROP PRODUCTION PROGRAM

A. Establishment of a Research Program on Peanut Mildew

1. Justification

- Recent rapid extension of the disease in Upper Volta since 1977;
- Effect on yields (50 to 75 percent diminution);
- Absence of high-yield resistant varieties necessitating an urgent action; and
- Regional interest in work to be carried out in Upper Volta. All of West Africa is interested in the results to be obtained.

2. Brief description

- In the short run, research on treatment products will limit the damage caused by mildew-infested stalks;
- In the long run, research will focus on the search for a genetic solution; and
- The duration of the project is five years.

3. Resources

In as far as equipment and construction are concerned, the following will be necessary: a plant pathology laboratory, a genetics laboratory, improved soil and operating material. In terms of human resources, there is need for two plant pathologists (including a national), a plant breeder, and four technicians. The breeder and the plant pathologist will have to be trained.

The budget for five years will be distributed in the following manner:

- Personnel (FCFA 200,000,000);
- Construction (FCFA 85,000,000);
- Equipment (FCFA 70,000,000);
- Furniture (FCFA 75,000,000);
- Foundation (FCFA 20,000,000);
- Transport and travelling (FCFA 10,000,000);

- o Administrative and management expenses (FCFA 15,000,000); and
- o Contingencies (FCFA 72,000,000).

The general total is FCFA 547,000,000.

4. Expected results

- o Appropriate and effective plant treatment products;
- o Productive varieties resistent to mildew; and
- o Increase in peanut production on the order of 50 percent.

B. Project to Strengthen Food Crop Program

1. Justification

- o The importance of food crops in Upper Volta. The cereals (sorghum, maize, millet) cover around 80 percent of the surface area under cultivation;
- o Insufficient resources to carry out present and future programs;
- o Lack of sorghum and millet varieties adapted to different ecological zones;
- o Strengthening of research on tubers which appear to be most promising in the southwest of the country; and
- o Lack of data on the need of food plants for water or the necessity for in-depth research on the links between water-soil-plant.

2. Brief description

- o Infrastructure;
- o Training of personnel; and
- o Work resources.

The approximate cost of the project is FCFA 400,000,000.

3. Expected results

- o Significant increase in production;
- o Improvement in methods of preserving harvests; and
- o Optimal exploitation of water and soil resources for sustained production.

C. Biological Nitrogen Fixation

1. Justification

- o The lack of protein in our country which will grow more acute;
- o The high cost of fertilizer;
- o The research findings of recent years (discovery of the power of certain micro-organisms to fix the level of nitrogen in the air);
- o The importance of nitrogen in crop production and the role of legumes in fixing nitrogen at the level of 80-100 kg/ha/year; and
- o The establishment of a research program permitting an improvement in nitrogen fixation of legumes with the aim of increasing yields.

2. Brief description

- o Production of rhizobia;
- o Plant reaction to innoculation;
- o Innoculation tests in the field;
- o Isolation and cultivation of rhizobia;
- o Study of the impact of innoculation on non-legumes; and
- o The duration of the project is five years.

3. Resources

In as far as personnel is concerned, there is a need for a researcher and three technicians. In terms of materials, the following are necessary: laboratory materials, materials for requesting innoculation, documentation materials and vehicles. For operation, a vehicle and furniture are required. As for training, the researcher must participate in the seminars and undergo a training period; the technicians will also have to be trained.

The budget for the five years is FCFA 76,000,000.

4. Expected results

- o Decrease in nitrogen imports; and
- o Increase in agricultural production.

D. Creation of an Agronomy and Animal Science Research Station in Eastern Volta

1. Justification

The four agronomy and animal science research stations in Upper Volta cover only one part of the country: Niangologho at the extreme south of the country (1200 mm), Farako-Ba in the west of the country (1000 mm) and Saria and Kamboinse on the Mossi Plateau (800-700 mm). There is also an experimental farm in Gampela (university), and one also on the coast of Ouagadougou (800-700 mm).

Also, this distribution does not cover all the ecological conditions of the country, especially in the north and east of the country which do not have a single research station.

The eastern part of Upper Volta has significant agricultural potential. The reserves of arable land are the most important in the country. If this potential were exploited, this region could contribute decisively towards the country's achievement of food self-sufficiency. The potential in terms of pasture land is of a similar scale.

This project has to do with the establishment of an agronomy and animal science research station in the eastern part of the country.

2. Brief description

Among the activities of the station, the project would take up large-scale cultivation: millet-sorghum-maize, rice, cotton-peanut, cowpea, production systems, as well as animal husbandry; cattle, small ruminants, pigs and chicken. Improvements, construction, and experiments will be undertaken.

3. Resources

The necessary construction is: two stores of 00 m2 (400 m2), two laboratories (400 m2), three housing units for the researchers (450 m2), five housing units for technicians (600 m2) and a hangar.

The necessary equipment includes two generating sets of 75 kw/h, a drill, miscellaneous equipment, and vehicles.

The estimated cost breaks down in the following manner:

- Improvements (FCFA 60,000,000);
- Construction (FCFA 454,000,000);

- o Equipment (FCFA 151,000,000); and
- o Miscellaneous-contingencies (FCFA 66,550,000).

The total is FCFA 732,050,000.

4. Expected results

Given the potential of the zone, the development of productive and adapted varieties, appropriate agricultural techniques and workable production systems, production could be increased to the point where the basic needs of the population of the eastern section of the country would be more than satisfied.

E. Establishment of an Animal Science Research Program

1. Justification

- o Complete absence of animal science research in Upper Volta;
- o Importance of livestock in Upper Volta, which was estimated at 7,000,000 head in 1981, not including horses and chickens;
- o Importance of animal husbandry to the national food supply (protein);
- o Importance of animal husbandry as a source of foreign exchange for Upper Volta (second largest export after cotton);
- o Extensive animal husbandry practiced throughout the country;
- o Lack of research on improving stocks and the study of feeding rations;
- o Given the importance of animal husbandry for the country and the current methods in use, an intensification in animal production is necessary as is work on husbandry techniques, breeding, and nutrition.

2. Brief description

The research will focus on cattle and small ruminants and the research team should focus on:

- o The study of local breeds;
- o The improvement of breeds;
- o The study of production systems;
- o The study of feeding and rations; and
- o The project will last four years (renewable).

3. Resources

a. Human

- Four animal scientists including two nationals;
- A veterinarian;
- Lower level national staff; and
- Training of two animal scientists and six technicians;

b. Equipment and investment

- Development of a park, stables, and construction of a hangar;
- Technical equipment;
- Purchase of herds;
- Construction and equipping of laboratories; and
- Purchase of vehicles, including six cars and communal transportation vehicles.

c. Costs

The necessary investments include:

- Improvements (FCFA 30,000,000);
- Equipment (FCFA 50,000,000);
- Herds (FCFA 15,000,000);
- Construction and equipping of laboratory (FCFA 50,000,000);
- Purchase of vehicles (FCFA 25,000,000);
- Operation (FCFA 200,000,000); and
- Miscellaneous and contigencies, 20 percent (FCFA 74,000,000).

The total is FCFA 444,000,000.

4. Expected results

- o To make available to the breeders, breeds which are more productive, perform better and are better adapted to different ecological conditions;
- o To make foodstuffs, forage, and husbandry techniques available taking into account the environmental conditions; and
- o Increase in the quantity and quality of animals.

F. Project to Strengthen Agronomy and Animal Science Research Stations

1. Justification

The creation of the Agronomy and Animal Science Research Institute of Upper Volta aims to lift organizational obstacles blocking agronomy and animal science research.

The agronomy and animal science activities are carried out in four research stations: Niangoloko, Farako-Ba, Saria and Kamboinse. All of these stations are limited in terms of infrastructure and are, therefore, unable to play a significant role.

The present project aims to provide these stations with the infrastructure needed to offer high-level researchers appropriate working conditions.

In general, except for Kamboinse and Farako-Ba these stations are located quite far from all urban centers and suffer from a complete lack of infrastructure which could support research programs.

2. Brief description of needs

- o At Saria, housing for six researchers is needed, as are four laboratory/offices and electricity supply from Koudougo (28 km)-high tension transmission line;
- o At Farako-Ba, four laboratories are necessary;
- o At Niangoloko, four housing units are required, four laboratory/offices and electricity (two groups of 75 KVA) as well as a water supply (well); and
- o At Kamboinse, two laboratory/offices are needed.

3. Cost of the project

- o Construction of ten housing units (FCFA 170,000,000);
- o Construction of 14 laboratory/offices (FCFA 250,000,000);

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- o Electricity supply at Saria (FCFA 120,000,000); and
- o Niangoloko group (FCFA 6,000,000).

The general total is FCFA 548,000,000.

4. Expected results

- o Realization of research programs taking into account development priorities; and
- o Possibility of placing high-level researchers in research stations to carry out these programs.

II. ANIMAL PRODUCTION PROGRAM

A. Livestock Marketing and Feeding Project

1. Justification

Health and feeding are two essential aspects in the development of livestock in Upper Volta. The first of these, health, is more or less resolved thanks to periodic vaccination and anti-parasite campaigns. The second aspect, feeding the animals, suffers the consequences of variable rainfall and competition with humans for certain raw materials. The poor quality and bad distribution of food among the animals produces a very low fertility rate, high mortality among the young, poor growth, and insufficient development in the adult animals which consequently results in poor meat quality for human consumption.

2. Brief description

The project aims to accomplish the following in the 12 principal centers in the country:

- o Promoting the use of feed for livestock;
- o Organizing and utilizing agro-industrial by-products;
- o Optimal distribution of this feed.

3. Resources

The resources the project will require will cost FCFA 1.1 billion for construction of warehouses, molasses tubes, trucks, for agro-industrial by-products and payment of personnel. The duration of the project is two years.

4. Expected results

- o Animal science improvements: higher fertility among the females; greater production of milk, greater weight gains, in the dry season;
- o Economic improvements through increased staff;
- o Social improvements due, for example, to the increase in milk production for the benefit of the poorest groups, which will improve their health; and
- o Improvements in the government's balance of payments (increase in the contribution of animal production to the GNP).

B. Short Cycle Animal Species Development Project

The first part of this project is in regard to the raising of poultry and small ruminants and the second part concerns extension of the Chinese pig [porc chinois].

1. Justification

This project takes place within the framework of the efforts carried out by Upper Volta to achieve food self-sufficiency and especially self-sufficiency for its population in protein from animal sources. Only short cycle development of animal species can easily and quickly lead to attainment of this goal. This type of husbandry is practiced throughout the country by the majority of the rural population. The only thing they lack is technical training to increase the profitability of their production.

2. Brief description

The first part of the project will be carried out like that of the Small Ruminant Development Project in the Yatenga ORD with the collaboration of village vaccinations [vaccinations villageoises]. This project is like the Village Poultry Development Project financed by the FAC in the Central, West Central and North Central ORDs which was very successful and well received by the beneficiaries, the breeders. Several neighboring countries have since imitated it. The project will last five years.

3. Resources

The first part for one ORD will cost FCFA 500,000,000 and the second part for one ORD: FCFA 50,000,000.

4. Expected results

- Increase in the number of available personnel [effectifs];
- Increase in revenues for the farmers who will be able to sell more chickens, small ruminants, and pigs;
- Increase in exports and consequently an improvement in the government's balance of payments; and
- Increase in meat consumption by the population and consequently an improvement in health.

III. FORESTRY PRODUCTION PROGRAM

A. Project to Strengthen Infrastructure and Programs of the Mare d'Oursi Station in Order to Establish a Regional Station on Sahelian Ecosystems

1. Justification

- Upper Volta does not have a single research station in the Sahelian area;
- The Mare d'Oursi observation stations are the last varieties installations for research and study on Sahelian varieties still in operation since the termination of similar programs in neighboring Sahelian countries; and
- The need to save an existing infrastructure which has not been used to full advantage.

2. Brief description

- Experimentation with local species, forestry and pastoral applications;
- Experimentation with natural regeneration and degradation with forestry, pastoral, and agricultural applications; and
- The study of fauna and flora in selected ponds (Oursi and Beli) with application to fishing.

3. Resources

a. Human resource needs

The needs include two consultants on duty from one to three months and one secretary.

b. Equipment needs

The existing infrastructure should be strengthened. This encampment serves as a residential and work center and radio link. This encampment includes the following:

- Six huts for researchers and a dining room/kitchen;
- Six huts for implementation personnel;
- One garage;

- One water and electricity distribution installation (total surface area = 335 m^2 + 50 m^2 of terraces); and

- A landing strip of 700 m allowing light aircraft access to the encampment all year round.

The supplementary needs concern maintenence of this infrastructure, vehicles (cars and motorcycles for surface transportation and one boat for the pond), equipment for the radio link, and an electricity generating set and scientific material.

c. Estimated budget (total for three years in US$)

- Personnel: Consultant, administrative support, study trips, field expenses: 78,500;

- Training: scholarships, on-site seminars: 39,000;

- Material: 135,000; and

- Miscellaneous and contingencies: 22,500.

The total is 275,000.

4. Expected results

Besides research findings on particular subjects, maintaining the Mare d'Oursi station will provide the following benefits:

- Forestry research station promoting better use of local species (regeneration, utilization in reforestation programs, exploitation as "aerial pasture") and agronomical experimentation for the Sahelian environment;

- Support to development programs in the Sahelian zone by making available basic scientific data on the environment and the organization of seminars for re-training of technicians;

- Support for training structures, and especially the University of Ougadougou (information and research activities visits for instructors, training and study visits for students); the station has already contributed to the training of five engineers in rural development;

- System for scientific stimulation and logistical support for training local researchers and, therefore, an increase in national research capabilities; and

- Support for foreign researchers interested in visiting the Sahel. This collaboration could involve individuals or institutions.

IV. FISH PRODUCTION PROGRAM

A. Training Seminar for Supervisors and Fishermen in Cooperative Small-Scale Fishing

1. Justification

This project which focuses on training will help the Bureau of Fisheries to strengthen its small-scale fishing development program by contributing new knowledge to fishermen and to those who train fishermen and supervisors.

2. Brief description

The seminar will be split into two groups:

- The first group consists of thirty supervisory agents from different fishing centers brought together for ten days in Ouagadougou to discuss the following subjects: establishment and management of fishing cooperatives; and management of man-made dams (exploitation, fertilization and re-population);
- The second group, which will meet later, consists of those in charge of the fishing centers (three representatives from each center). The subjects to be discussed with the fishermen are: the fishing cooperative (organizational and management techniques); and the cooperative and regulatory documents (comprehension and regulations governing disputes); and
- The two parts of the seminar will be carried out within six months.

3. Resources

The personnel of the Bureau of Fisheries will implement the project. The project will cover the cost of:

- Travel expenses, accommodations, and meals for seminar participants and facilitators; and
- The purchase of furniture and instructional material.

The project budget is estimated at FCFA 7,089,600.

4. Expected results

- o Improvement in technical knowledge, especially in fishing techniques for higher profit;
- o Mutual exchange of experience in the area of awareness training, and supervision and management of cooperative fish centers;
- o Improvement in the supervision of fishermen which will result in an increase in the fish production (the bodies of water in Upper Volta are currently underutilized).

B. Extension of Rural Fishing

1. Justification

- o Improvement in the quality of meals among the rural population by making animal protein available at reasonable prices; and
- o Ending the exodus of youth from rural areas by providing them with year-round work and a decent income.

2. Brief description

Three teams of supervisors will be trained to work in close collaboration with interested farmers who will be trained in site selection, construction of ponds, supplying ponds with young fish (Sarotherodon niloticus), the feeding of the latter, harvesting and eventual marketing.

The project will be carried out in the western part of the country. This region is better adapted in a technical sense (as far as soil quality, topography and durability and quantity and quality of water, etc.). It has a fishing infrastructure already in place and several agro-industrial by-products are readily available (rice husks, groundnut cakes, molasses, etc.)

The project will last 3 years.

3. Resources

Besides motorcycles for those in charge of supervising teams, the project should acquire two covered vehicles for transporting materials and equipment for the construction of ponds for the young fish. Vehicle operation and maintenance will be assured throughout the project. The wheelbarrows and other construction materials will be purchased and/or manufactured on site to the extent possible. The project will be implemented by the Bureau of Fisheries. The financial needs of the project are estimated at FCFA 64,203,240.

4. Expected results

- o Training of rural fishermen;
- o Production of between three and five tons per year at the end of the third year of the project contributing high quality protein; and
- o Increase in farmers' revenue.