ASSESSMENT OF AGRICULTURAL RESEARCH RESOURCES IN THE SAHEL

VOLUME III
NATIONAL REPORT: CHAD

by

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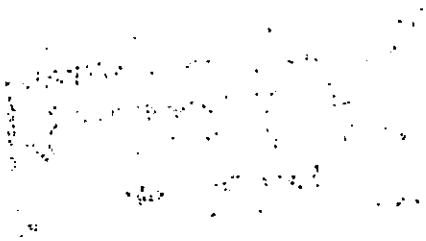

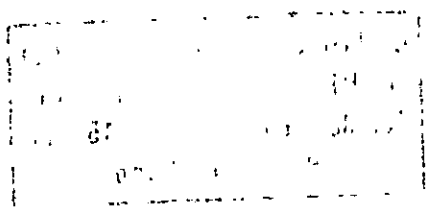

PREFACE

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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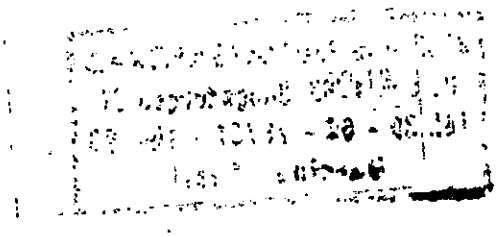
[1]Each national report is printed separately.

[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.



ACKNOWLEDGEMENTS

This study, conducted by INSAH/DEVRES, should lead to a long-term development program for the member countries of the CILSS in general and to Chad in particular. It seems to us therefore, to be of major importance. Given the time available, it could not have been completed without the good will and sense of responsibility shown by the people consulted. We cannot fully express our deepest gratitude to the entire team of senior officials who, despite their many preoccupations, wanted and were able to consecrate so much of their time to the execution of this tedious work.

Our thanks go also to all those at DEVRES and INSAH who spared no effort to furnish us with information which was indispensable for the completion of this task. The same is true for the secretaries and administrative support staff at both institutions and in Chad who spent a great amount of time preparing this document.

May the work lead to material development for the benefit of this sorely wounded land.

FOREWORD

The CDA (Cooperation for Development in Africa) is undertaking a long-term agricultural research program, particularly in the member states of the Sahel region. The task of producing the document which should lead to this long-term program was entrusted to Devres of the United States in collaboration with the Institute for the Sahel (INSAH).

In Chad, the team included the following:

National Coordinator

Mr. Alladoumgue Nadingar,	Director-General in the Ministry of State for Rural Development

Consultants

Mr. Yehouessi Mustapha,	Resident Representative of the IRCT in Chad
Dr. Daounaye Dounia,	Veterinarian, Director of the Modernization Center for Animal Production (CMPA)
Mr. Ndoasngar Nanga,	Assistant-Director of the ONDR Sahel branch
Mr. Ali Ngaram,	Chief of the Fisheries Division in the Waters and Forests Directorate
Mr. Ngamada Maikata,	Agricultural Engineer, Assistant Director of Teaching and Professional Agricultural Training

To complete this work, the team contacted and had discussions with other senior officials and responsible authorities interested in rural development. May they find herein the expression of our gratitude.

The task with which we were entrusted is fascinating and of great importance not only for Chad but equally for those interested in the Chadian problem, in particular international institutions and organizations, and countries friendly to Chad.

The project requires a seriousness in approach particularly in terms of the time required and the importance of the problem. Given that the approach taken was serious, the time available was clearly insufficient to explore in depth the specific reality under

discussion, particularly in Chad which has just emerged from a long and ruinous civil war.

At present there are no data available to ease access to information. To complete this work, the authors had to meet with all those judged capable of remembering something or who were able to provide documents. Needed documentation was found in people's homes or in isolated parts of the country.

This process delayed the progress of the work and the coordinator was unable to get all the necessary materials until December 10, 1983.

It is obvious that the presentation of the case suffers from these deficiencies.

Nevertheless, the essential point remains; that we were able to complete a work whose importance benefits our country.

LIST OF ACRONYMS AND ABBREVIATIONS

ADRAO	See WARDA
AEF	French Equatorial Africa
BAC	Baccalaureat
BAD	African Development Bank
BDT	Chadian Development Bank
BEAC	Bank of Central African States
BEP	Bureau of Studies and Projects
BEPC	General Education Diploma
BETA	Diploma in Agricultural Techniques
BIAT	International Bank of Africa in Chad
BICIT	International Bank for Commerce and Industry in Chad
BTCD	Chadian Bank for Credit and Deposit
CAMAN	Cooperative of Horticulturalists at N'Djamena
CAP	Vocational Training Certificate
CBLT	Lake Chad Basin Commission
CCFAN	Command Council of the Northern Armed Forces
CDA	Cooperation for African Development
CEAC	Central African Economic Community
CEG	School of General Education
CEPE/T	Chadian Primary Elementary School Certificate
CETA	School of Agricultural Techniques
CETI	School of Industrial Techniques
CFPCR	Center for Training Professional Rural Personnel
CFTA	Agricultural Technician Training Center
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
CM2	Second year intermediate course
CMPA	Center for the Modernization of Animal Production
CNA	National Literacy Center
CNDST	National Center for Scientific and Technical Documentation
DEFPA	Department of Professional Agricultural Teaching and Training
DRA	Division of Agronomic Research
DTA	Agricultural Technician Diploma
EDF	European Development Fund
EE	Elementary Teaching
EEC	European Economic Community
ENATE	National School for Animal Husbandry Technical Agents
ENI	National Teacher Training School

FAC	Fund for Cooperation and Aid
FED	European Development Fund
FIR	Fund for Rural Intervention
GDS	Health Protection Group
IEMVT	Institute for Livestock Production and Veterinary Medicine in Tropical Countries
INSAH	Institute of the Sahel
INSE	National Institute for Educational Sciences
IRCT	Cotton and Textile Research Institute
IUTE	University Institute for Animal Husbandry Techniques
MEADR	State Ministry of Agriculture and Rural Development
OMVSD	Development Office of Stategui Deressia
ONDR	National Office for Rural Development
ORSTOM	Office for Scientific and Technical Research Overseas
PA	Administrative positions
RCA	The Central African Republic
SAF	Administrative and Financial Service
SODELAC	Lake Development Corporation
UNDP	The United Nations Development Program
UNESCO	United Nations Educational Scientific and Cultural Organization
WARDA	West African Rice Development Association

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I. INTRODUCTION

A. Background

The Agricultural Research Resources inventory and assessment for Chad was also conducted in the remaining seven countries of the Sahel (Cape Verde, Mali, Mauritania, Niger, Senegal, The Gambia and Upper Volta), 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 Chad 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

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 essentially 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

A. Geographical and Ecological Notes

1. Geographical zones

a. Topography

Chad's territory covers the western half of the Chadian Basin. Considered in its entirety, the Chadian Basin includes two parts of unequal size.

The northern or largest part stretches over several national territories. It includes the area between the Jos Plateau (Nigeria) and the Air (Niger) in the west, the Tibesti to the north, the Ennedi and the Ouaddai in the east, and the mountains of Mandara (Cameroon) and the Guera in the south. The southern part is almost entirely within Chadian teritory between the Mandara Mountains and the Pala Plateau in the west, the Oubangian Dorsal in the south (the Yade Mountains in the Djebel Mela) and the Birao Sill and the Guera Massif in the east and north.

The deepest part of the basin is in the northeast, between 16° and 17° latitude north and 17° to 19° longitude east, in the Djourab and Bodele country (155 to 180 m altitude). Lake Chad is at a higher altitude (about 280 m). It is kept at this level by the Erg of Kanem, a dam of sand dunes. The Bahr el Ghazal or Soro fissure, which formerly drained the lake toward Djourab, no longer functions in the present climate.

The contours of the Kanem, the Eguey, the Toro and the Djourab are essentially made up of dune formations. The alternating dunes and depressions create a relatively flat surface with differences between heights and depths of about 30 m. The dunes held in place by vegetation (at Kanem) are relatively stable. In the Eguey and the Djourab, their movement causes a fluidly shifting landscape.

On the northern and northeastern edge of the basin (Borkou-Ennedi) the landscape gives the appearance of great, carved ruined steps. The mountainous mass of the Tibesti juxtaposes volcanic peaks, which include the highest points in the mountain range (Emi Koussi 3,414 m and Tousside 3,315 m), and the high Tarso plateaus (between 2,000 and 3,000 m).

The eastern edge of the basin rises progressively in a lightly inclined bank to the crystalline peaks of Ouaddai. From slopes of relatively recent accumulation or those covered with dune formations in the center of the basin, the landforms change, as one moves east, to lightly covered eroded slopes and then to uncovered slopes on the edge of the massifs. Crystalline formations rise abruptly as isolated peaks above the gentle slopes. The Guera Massif (Central Chad Massif), where Mont Guedi in the Abou Tefiane rises to 1,508 m, presents similar topography above the nearby strongly plated glacis

sloping towards Lake Fitri in the northwest, the plains of Chari in the west and of Salamat in the south and southeast.

b. Chad in Africa

The territory of Chad covers an area 1,284,000 km^2. It is bordered on the north by Libya, on the east by the Sudan, on the south by the Central African Republic and on the west by Cameroon, Nigeria and Niger. Chad is part of what used to be the colonial regional grouping of French Equatorial Africa (AEF - Afrique équatoriale francaise).

c. Major administrative and territorial divisions

Chad is organized administratively and territorially into counties (prefectures), sub-counties (sub-prefectures), administrative centers, cantons and villages. There are 14 prefectures in Chad. (See Table 1.)

The principal cities are generally the seats and main centers of counties (prefectures) and sub-counties (sub-prefectures): for example, N'Djamena, the capital, Sarh (Moyen Chari), Bongor (Mayo Kabbi), Abeche (Ouaddai), etc. In the south, however, where the population density is very high, some villages can be more important than certain major centers in the north of the country.

2. Hydrography

The Chari is the most important river in Chad. It has its source in the Central African Republic, is 1,200 km long and has several right-bank tributaries: the Bahr Aouk, the Bahr Keita, and the Bahr Salamat. To its left bank flow the Bahr Sara and, at N'Djamena, the Logone.

The Logone is the main tributary of the Chari. It is 1,000 km long and has its source in the Adamaoua Mountains of the Cameroon. It has few tributaries--the Pende on its right bank below Moundou, the Tandjile on its left bank below Lai. Downstream from Lai, the Logone loses a great deal of water. In the rainy season one of its branches flows from its left bank across marshes towards the Mayo-kebbi.

The Chari and Logone are tropical-type rivers. Their waters are at their highest level in November and at their lowest in June.

Lake Chad is at the mouth of the Chari and the Logone Rivers. Its shape is that of an immense triangle and covers an area of between 10,000 and 25,000 km_2 depending on the year. To the north and east, the lake is bordered by several hundred islands. In the center, the lake measures its maximum depth (4-5 m).

Lake Chad experiences major differences in water level. In 1956-57, an exceptionally high water level destroyed most of the polder dikes surrounding the lake. In 1973-74, it was almost completely dry.

Table 1: Organization of Territorial Administration

Districts and Main Centers	Main Centers of Sub-Districts	Administrative Headquarters	Number of Subdivisions
Batha (Ati)	Ati Djedaa	Haraze-Djombo	19
Borkou-Ennedi-Tibesti (Faya-Largeau)	Faya-Largeau Fada Bardaï	--	18
Biltine (Biltine)	Biltine Am-Zoer Guereda Iriba Arada	--	35
Chari-Baguirmi (N'Djaména)	N'Djaména Massenya Bousso Bokoro	Moïto Ngama Massaguet Dourbali	42
Guera (Mongo)	Mongo Bikine Melfi Mangalmé	--	17
Kanem (Mao)	Mao Nokou Moussoro	Salal Méchiméré Rig-Rig	42
Lac (Bol)	Bol Ngouri	Doum-Doum Liwa	14
Logone-Occidental (Moundou)	Moundou Benoye Beinamar	Krim-Krim	29
Logone-Oriental (Doba)	Doba Goré Bededja Baibokoum	Bessao Laramanaye Béboto	36
Mayo-Kebbi (Bongo)	Bongor Fianga Gounou-Gaya Pala Léré	Guelendeng Binder Gagal Torrock	49
Moyen-Chari (Sarh)	Sarh Koumra Moïssala Kybé Maro	Bedaya Bediondo Békamba Goundi Dembo	53
Ouaddaï (Abéché)	Abéché Adre Goz Beida Am-Dam	--	69
Salamat (Am-Timan)	Am-Timan Abou Deïa Haraze-Manguei	--	14
Tandjile (Laï)	Laï Kelo Beré	--	21

3. Ecology

The principal types of climate encountered in North and South Chad are outlined in Table 3.

a. Vegetation

The development of various types of vegetation is a climate and so conforms closely to climatic zones. The following vegetable types in Chad have been defined by J. Cabot in the Atlas pratique du Chad.

(1) Sudano - Guineas (1,000 mm)

This type of vegetation grows well in ferralitic and ferruginous soils. There are essentially two types of growth: the true forest area with predominantly combretaceous trees and leguminous plants; and the savannah trees with varied growth but dominated by the Isoberilina dol , Proosopis Africana, Anogeissus Leiocarpus, Burkea Africana, Butyros pernum Parkii, Kaya Senegalensis, etc.

(2) Sudanian (800 - 1,000 mm)

Vegetation here is basically of the Sudanian Savanah type, rather wooded with combret a ceous trees and certain species from the Sudano - Guinean area.

(3) Sahelo - Soudanian

The vegetation most characteristic of this area are the Savannah bushes especially the Acacias and other thorny bushes (Balanites aegyptica, Ziziphus and Mauritiana).

The gramineous ground cover is composed of Andropogonac types.

On the cleared lands there are calo tropis procera as well as Hypaena Tyebaica.

(4) Sahelian (500 mm)

Here the desert climate supports pseudo - steppe vegetation. There is also, scattered Acacia - based shrubbery:

b. Precipitation and seasons

There are two seasons in Chad. The dry season begins in September and lasts until May when the rainy (or humid) season begins.

The length of these seasons depends on the ecological division of Chad and/or is the basis for this division. In any case, the dry seasons are longer depending on the distance travelled north in the country. In the extreme north, the rainy season is sporadic, if it occurs at all.

Table 2: Climate Variations from the North to the South of Chad

North-South Rank Order No.	Type of Climate	Average Annual Rainfall (in millimeters)	Remarks
1	Desert Climate	< 50	Northern part of the country.
2	Subdesert Climate	50 - 350	
3	Sahelian Climate	350 - 500	
4	Sahelo-Sudanian Climate	500 - 800	
5	Sudanian Climate	800 - 1,000	
6	Tropical Humid Climate (or Sudano-Guinean)	> 1,000	Southern part of the country.

Source : Practical Atlas of Chad, National Chadian Institute for Human Sciences.

The rainy season lasts about six months in the south of the country and only three months in a normal year in the Sahel. It is clear that the amount of rainfall recorded in the south is greater than in the north. (See Table 3.)

4. Channels of communication

In Chad, there are three types of communications channels: roads, navigable waterways and air routes. The construction of a railway is in progress.

a. Roadways

There are more than 40,000 km of trails, most of which are impassable during the rainy season.

The only paved roads run between N'Djamena and Guelendeng and between N'Djamena and Massaguet. However, with the aid of certain international organizations such as the European Development Fund (FED - Fonds européen de développement), Fund for Cooperation and Aid (FAC - Fonds d'aide et de coopération), and African Development Bank (BAD - Banque africaine de développement), road rebuilding projects are underway. They involve routes between Sarh and Lere, N'Djamena and Sarh, N'Djamena and Abéché and Guelendeng and Lai.

A total of 2,500 km of roads are being repaired.

Chad is linked to the Cameroon and the Central African Republic by roads which are passable year-round.

b. Navigable waterways

The Chari and the Logone, the only rivers which are navigable for the part of the year when the water is high, are used infrequently for transportation. Rivers link N'Djamena to Sarh and Moundou. Since the drought, these routes are rarely used.

Before the years 1972-73, Lake Chad could be navigated year-round. The situation has unfortunately changed since that time, depriving N'Djamena of tons of natron, dried fish and hard wheat.

c. Air routes

Air routes provide the primary links between Chad and foreign countries. The principal airports in Chad are N'Djamena (an international airport), Sarh, Moundou and Abéché. In addition, there are several landing strips in major cities such as Ati, Mongo, Am-Timan, Pala, Bongor, Koumra and Biltine.

At one time, Chad exported frozen meat to the Congo, Zaire and Ghana by air. Air Chad, the Chadian national airline, has a fleet of DC-3's, Fockers and other small aircraft. However, it does not have the capacity to meet current demand.

Table 3: Annual Rainfall on the Entire Territory, Season 1982-1983

Districts	Area (in square kilometers)	Average Rainfall Long Period (in millimeters)
Sahel Region		
Batha	88,000	403
B.E.T.	600,350	traces
Biltine	46,850	327
Chari BAG	3,000	612
Guera	59,000	716
Kanem	114,520	331
Lac	22,320	305
Ouaddaï	76,240	574
Total	1,010,280	
Sudanian Region		
Logone occidental	8,700	1,130
Logone oriental	30,150	1,185
M. Kebbi	28,295	913
M. Chari	45,180	1,105
Salamt	63,000	865
Tandjilé	18,055	1,126
Total	193,380	

Source : Annual ONDR Report 1982-1983; Report on Agriculture and Livestock-Breeding in Chad, 1976 Yearbook.

d. Radio and television

The central station of Radio Chad at N'Djamena transmits to the provinces and abroad. A proposal has been made to install antennae at Abéché and Sarh. At the present time there are regional stations at Moundou and Sarh, but their range is very limited. Television has not yet been introduced in Chad.

e. Telecommunications

There are postal centers in almost all major cities. The postal service works reasonably well now that normal activities have resumed in the country.

The radio-telegraph station at N'Djamena used to link Chad with many african, european and american countries. Unfortunately, it was shut down during the war.

B. Demographic Information

1. Population

According to various sources, Chad's population was estimated at 4,550,000 inhabitants in 1981.

Chad's population is in fact higher than this figure would indicate because of the large number of the country's citizens who live outside its borders, particularly in the Sudan and in Nigeria.

2. Demographic growth

The 1981 study also estimated demographic growth at 2 percent per year in Chad.

3. Distribution by major ethnic groups

The multitude of ethnic groups in Chad makes it difficult to identify the divisions in the population. Thus, there is a temptation to simplify and to make only the distinction between the Sudanese settlers (either animists or Christians) in southern Chad, and the nomads, semi-nomads or those in the process of settling down (generally of Islamic faith) in north central and eastern Chad.

It should be noted, however, that among these groups, the Sara and their related peoples between Moundou and Sarh represent 30 percent of the population. The other groups are divided as follows:

- The group including the Massa, Moussei, Mouloui, Mousgoum, Moundang and Toubouri represents 21 percent;

- o In the east, the most important group is the Ouaddai (Maba, Zaghawa, Massalit, Dadjo) which represents 16 percent of the population; and

- o The Arab group in the center of the country represents 9 percent.

4. Language

The large variations in language, particularly in vernacular speech, correspond to the ethnic mosaic in Chad.

However, the government of Chad's Third Republic recognizes only Arabic and French as official languages. Chadian Arabic is spoken by many citizens living in the country's major centers, particularly in N'Djamena.

Sara is the country's third language following French and the Chadian dialect of Arabic.

5. Religion

It is estimated that between 41 percent and 45 percent of the people in Chad are practising Muslims, between 29 and 30 percent are Christians, and that the remaining 25 to 30 percent practice traditional religions.

6. Division of the population by economic activity

More than 90 percent of Chad's population work in the primary sector. Agriculture alone accounts for more than 80 percent, and the remaining 8 to 10 percent are in secondary and tertiary sectors. At the present time, these proportions are still valid and give Chad essentially an agricultural economic base.

C. Educational System

There are three levels of education in Chad: primary, secondary and university.

1. Primary education

No exhaustive list of primary schools can be established. Statistics show 880 schools as an overall number.

The Directorate for Elementary Education is responsible for four principal inspectorates for elementary education, 25 elementary education inspectorates, 3,750 teachers with tenure and 350 volunteer teachers, responsible for the training of 282,398 students.

Students are admitted to primary school at age six. Due to the war, however, they are granted a two to three year dispensation. Primary education lasts for six years.

In sixth grade students take an examination for the Primary Leaving Certificate (CEPE/T - Certificat d'études primaires élémentaires tchadien), to certify their completion of the elementary level and to prove their competence to enter secondary schools.

2. Secondary education

a. General

There are 70 teachers with university degrees, 100 mid-level teachers and about 1,000 contract teachers wth Baccalauréat degrees. They are responsible for training 43,952 students distributed among 50 general secondary education facilities, of which 14 are high schools and 36 are general education schools (CEG - College d'enseignement général).

All students are admitted into seventh grade after a competitive examination, for a period of seven years divided into two academic cycles.

The first academic cycle lasts for four years and leads to a first cycle certificate (BEPC - Brevet d'études du premier cycle), after which the students are directed to section A, C or D depending upon whether they show an aptitude for literature or for science.

The second academic cycle lasts for three years and leads to the Baccalauréat, taken in section A, C or D according to the section studied.

b. Teacher training schools

Chad has five teacher training schools for primary education teachers located in N'Djamena, Sarh, Bongor, Moundou and Abéché. Teachers are trained on two levels. The first is the BEPC level where teachers are recruited by competitive examination and are trained for two years. They are then granted the rank of assistant teachers for primary schools. The senior counselors and counselors with tenure are recruited on this level according to their qualifications after they pass the BEPC. Bilingual and Arab assistant teachers are also trained at this level. Finally, there is training for Baccalauréat graduates recruited according to their qualifications. For the school year 1983-84, these students will number about 200.

The second level is for assistant teachers who may complete four years of service and then take a competitive examination to enter Teachers Training School in the third year. They are then trained for two additional years.

c. Technical and vocational

Before the events of February 1979, there were three technical and vocational educational facilities, made up of two industrial schools and one business school, located in N'Djamena and

Sarh. The industrial technical school recruits at the ninth grade level and trains students to take the Vocational Training Certificate (CAP - Certificat d'aptitude professionnelle). The requirements are the BEPC plus a grade average of at least 12 out of 20 for admittance to eleventh grade in the AB (business) section or T (industrial) section.

Access to preparatory class for the CAP is obtained after a level test in eighth or ninth grade. The CAP is prepared in three years. As in the general education, eleventh grade leads to the Baccalauréat, but the sections are different: Section G1 is for office and secretarial skills, Section G2 for management and accounting, G3 for marketing, and F and E for mechanics and electricity. There are also 12 training schools specialized in carpentry, bricklaying and book binding.

3. Higher education

The university-level Teacher Training School in N'Djamena was created by government order No. 3/PR dated October 25, 1978, but could not actually begin operations until January 29, 1982 for the school year 1981-82. The enrollment consisted of 130 students distributed among five training sections, instructed by a total of 30 teachers. In 1982-83 the school had 82 students in second year, of which 77 graduated and obtained their CAP-CEG diploma, and 118 students in first year. A total of 200 students were distributed among six training sections: history and geography, French, English, Arabic, mathematics, physics, and biology. In 1983-84 the number enrolled is the same, and the faculty is composed of 40 teachers, seven permanent and 33 teachers under contract.

The University of Chad was founded in 1973 for those students holding the Bachelor of arts or sciences. It is affiliated with French universities upon which its training programs are modeled.

Before the war, the University granted Bachelors and Masters degrees (diplômes de license et maîtrise). The University Institute for Animal Husbandry Technicians was also associated with the University. Since the war ended, it has been difficult to obtain reliable statistics.

Table 4 gives more complete information concerning the distribution of students in Chad.

There is also Franco-Arab education in Chad, which starts at the school for the instruction of the Koran and ends at the secondary level. The Franco-Arab High School in Abéché offers secondary education in Arabic. Unfortunately, however, reliable statistical data are not available, due to the destruction of the archives during the war.

Table 4: Distribution of Enrollment in Educational Institutions

Educational Domain	Number of Students		
	Male	Female	Total
Elementary Education	181,965	100,433	282,398
Secondary Education	-	-	43,952
Technical and Vocational Education	1,535	227	1,767
Normal School	481	20	501
Superior Normal School	200	3	203
Chad University[a]	-	-	-

[a]Since Chad University is closed, there are no enrollment statistics available at the moment.

4. Adult literacy program

The National Literacy Center was created in 1962. Since that time a number of adults have been taught how to write and read at various schools in Chad. These classes are held only in the evening. They are taught in french, and the instruction focuses on basic concepts: reading, the four fundamental mathematical operations, and the correct use of language.

Since 1976 the Center has been incorporated into the National Institute for Educational Sciences (INSE - Institut national des sciences de l'éducation). The regular literacy program has taken the form of functional learning in certain pilot schools (20 throughout the county), where adults are taught agriculture, livestock raising and wood working skills in order to emphasize community development at the village level.

In another program similar to this functional instruction, the INSE organizes classes for women in the same pilot schools. All women living within a three km radius around a pilot school are taught personal hygiene, nutrition, child health care, infant nutrition, and sewing. These courses for women are held in the afternoon and are conducted by a female counselor.

5. Agricultural education institutions

The Agricultural Training College (CETA - College d'enseignement technique agricole) in Ba-Illi is located in the county of Cahri-Baguirmi, sub-county of Bousso, on the road between N'Djamena and Sarh, about 300 km from N'Djamena.

The Agricultural Technician Training Center (CFTA - Centre de formation des techniciens agricoles) is located in Sarh. This center is designed for the training of agricultural technicians at the agricultural engineer level. Due to the events of 1979 and the closing of the CETA in Ba-Illi, this facility is used for the education of agricultural workers as well as the education of extension agents.

The National School for Animal Husbandry Technical Agents (ENATE - Ecole nationale des agents techniques de l'élevage) is located in Farcha in N'Djamena. It is designed for training in cattle breeding. The University Institute for Livestock Technicians (IUTE - Institut universitaire des techniciens de l'élevage), incorporated into the University of Chad is, like the university, closed due to the war. It is designed for the training of senior technicians in livestock raising. The Training Center of Tiken in Mayo-Kebbi trains only basic counselors and is in the process of becoming inactive.

D. Government and Institutions

1. General background and institutions

Chad, formerly a French colony, became independent on August 11, 1960. The motto of the Republic is: Unity, Work, Progress.

Three vertical stripes of blue, yellow and red constitute the Chadian flag. The national anthem is the Tchadienne (Chadian). The official languages are Arabic and French. There is no state religion. The head of the Republic is the President, currently Mr. Hissein Habré.

a. Political parties

There is only one recognized political party in Chad, the Command Council of the Northern Armed Forces (CCFAN - Conseil de commandement des forces armées du nord), whose General Secretary is Mr. Hissein Habré, President of the Third Republic. The CCFAN is the governing organization of the National Revolutionary Movement. The National Advisory Council is the legislative body and has thirty members, two from each county and two from N'Djamena.

The basic charter of the Republic (Acte Fondamental de la République), drawn up by the CCFAN serves as the basic legal document and constitution.

b. Ministries

The government of the Republic of Chad consists of the President of the Republic, 20 Ministers, nine Secretaries of State, one General Secretary with ministerial rank and one Deputy General Secretary with the rank of a Secretary of State.

The following is a list of the Ministries:

- State Ministry of Agriculture and Rural Development;
- Ministry of Health;
- Ministry of Labor, Women's Issues and Social Affairs;
- Ministry of Transportation;
- Ministry of Postal and Telecommunications Service;
- Ministry of National Education, Culture, Youth and Sports;
- Ministry of Higher Education, Research and Scholarships;
- Ministry of the Economy and Trade;
- Ministerial Delegation to the President for Public Information;

- Ministry of Tourism, Traditional Crafts, Waters, Forests and Hunting;
- Ministry of Finance and Supply;
- Ministry of Public Works, Mines and Oil;
- Ministry of Justice and Keeper of the Seals;
- Ministry of Civil Service;
- Ministry of Cattle Breeding and Rural Water Supply;
- Ministry of the Interior and Security;[1]
- Ministry for the Control of Natural Disasters;[1]
- Ministry of National Defense, Veterans and War Victims;[1]
- Ministry of Planning and Reconstruction;[1] and
- Ministry of Foreign Affairs and Cooperation.[1]

2. The exercise of power in Chad

In Chad the exercise of power is defined by Constitutional Law No. 2/62, amended by Constitutional Laws Nos. 22/65 and 7/67 as follows:

- Title II, Article 5: "The President of the Republic is Head of State and Government. He determines and leads the nation's policies. He is the exclusive holder of executive power and he ensures that the law of the Constitution is respected...";
- Title III, Article 21: "The National Assembly has the authority to legislate and to levy taxes; it takes part in the election of the President of the Republic and controls the government's actions, in keeping with the framework of Articles 33 through 35 of the present Constitution"; and
- Title VIII, Article 58: "Justice is imposed on the national territory in the name of the people." Article 59: "...The judges, in the execution of their duties, are solely responsible to the law."

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[1] Ministries possessing Secretaries of State. There is also a Secretary of State to the President who acts as the general inspector and controller for the state.

Thus the three powers, executive, legislative and judiciary, are clearly defined and separated.

3. Major policies for agriculture and agricultural research

In his general policy statement, the President of the Republic clearly pointed out that the major priority in the policies of the Third Republic is for the country to become self-sufficient in meeting its food needs. Development of food-producing crops will be emphasized, particularly by improving the water supply for agricultural needs, given the harsh climate of the country.

This statement of priority has resulted in a high percentage of national reconstruction assistance being allocated to agriculture. (See Part E, Section 2 on international aid.)

4. International organizations to which Chad belongs

Chad is a member of nearly all of the United Nations organizations, in particular the Security Council, International Court of Justice, Economic and Social Council, ILO, FAO, UNESCO, WHO, IMF, IBRD, IDA, OACI, UIT, OMM and IFAD.

Chad is also a member of the Organization of African Unity (OUA - Organisation de l'unité africaine) and of all its specialized organizations. Chad is also a member of regional and interstate agencies such as the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS - Comité permanent inter-états de lutte contre la sécheresse au Sahel), the Lake Chad Basin Commission (CBLT - Commission du Bassin du Lac Tchad), the West African Rice Development Association (ADRAO -Association pour le développement de la riziculture en Afrique de l'Ouest) and the Economic Community of Central African States (CEAC - Communauté économique de l'Afrique Centrale).

E. The Economy

1. Economic indicators

The main economic indicators for Chad are listed in Table 5. Table 6 shows the fluctuation in the exchange rate between the West African franc and the dollar from September 1982 to August 1983. Table 7 shows food production in Chad for the years 1978-1981.

a. Prices

According to the Chadian Information Agency, the prices of food products have increased by 300 percent in N'Djamena during the last three years. Today 100 kg of rice and millet cost FCFA 25,000 and 20,000 respectively, compared to FCFA 10,000 and 7,000 three years ago. In spite of the large local production, there is a serious

Table 5: Statistics for the Main Variables of the Chadian Economy

Variable	Statistic	
Area	1,284,000 km^2	
Population	4,710,000 inhab.	1982
Population Density	3.7 inhab./km^2	1982
Population Growth Rate	2.36 percent	1982
Life Expectancy	41 years	1980
Gross National Product (GNP)	530,106 billions FCFA	1982
Per Capita GNP (GNPPC)	US$120	1980
GNPPC Growth Rate	1.5 percent	1977
Exchange Rate	US$1[a] = CFA F[b] 354.57	
Inhabitants Per Physician	40,802 inhab.	1980
Literacy Rate	15 percent	1980

[a]The domestic currency is the CFA franc.

[b]CFA francs 1 = 0.02 French francs = US$0.003.

Table 6: CFA Franc Exchange Rate Against the U.S. Dollar, September 1982 - August 1983

Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
1982				1983							
353	307	360	342	339	344	351	366	378	383	389	402

Table 7: Food Supply[a]

Year	Variation in Percent of Per Capita Production
1978 - 1979	- 2,2
1979 - 1980	0.0
1980 - 1981	- 2,2

[a]Due to unfavorable developments in food production, the caloric intake per person is only 77% of the needed amount.

shortage of beef, although, camel meat from the north is helping to offset this shortage. As most industrial facilities have been damaged during the war, basic needs are now being met by costly imports from Cameroon and Nigeria.

Table 8 indicates the rate of inflation for consumer spending from 1973-1977. In addition, it is estimated that the price of labor continued to increase at a rate of 2 percent during 1982.

b. Budget

In recent years the central government has exerted uneven control over the public finances. In 1981, the half-year budget approved by the government was only partially implemented; in 1982, no official budget was approved. The budget approved for fiscal year 1983 is shown in Table 9.

c. Planning

The stimulation of economic, social and cultural activities after three years of internal upheaval has required the outlining of emergency programs at the expense of a medium- and long-term development plan. As a result, the government has defined a program of action in order to meet the short-term needs of national recovery and reconstruction.

A development strategy which can serve as a basis for a long-range development plan will only be worked out in the coming months. The United Nations Development Program (UNDP) has allocated US$ 400,000 to cover the expenses entailed in the mapping out of this strategy.

It is, therefore, impossible to evaluate either the development strategy or its planned investments.

d. Gross domestic product

The nominal gross domestic product (GDP) fell 32 percent from 1978 to 1979. Undoubtedly the real drop in economic activity has been even greater, as a result of disruptions due to the war. However, there are indications of a recovery in N'Djamena, and, judging from partial reports concerning the improvement of agricultural production in the south, economic performance may improve in 1983. See Table 10 for a breakdown, by sector, of GDP.

e. Foreign trade

In 1981 the cotton crop, which represents two-thirds of export revenue, was affected by the lack of rain. The poor weather conditions caused a 19.6 percent reduction in cultivated land surface and a 16.7 percent drop in production. The 1982-83 harvest should be substantially larger and cotton exports could increase by about 59 percent in 1983. Exports of cattle and food products decreased by 27 percent in 1982. (See Table 11.)

Table 8: Inflation, 1973-1977
(CPI Index Numbers)

	1973	1974	1975	1976	1977
Price Index of Consumption per Family in N'Djamena (Base Year: 1973)	100	110.4	127.8	132.0	143.1

Table 9: 1983 Budget
(billions FCFA)

Receipts	
Customs Duties	6,000.0
Taxes for the Sale of Stamps and Stamp Fees	351.6
Direct Taxes	2 500.0
Income from Veterinary Services	97.5
Income from Forest Development	55.3
Central Hospital	42.7
Miscellaneous	71.1
Total Receipts	9,118.2
Ordinary Expenses	14,276.5
Deficit	5,158.3

Table 10: Gross Domestic Product
(in billions of CFA francs)

	1978	1979	1980	1981
Agriculture, Livestock Production, Fishery	70.1	48.6	49.5	50.5
Manufacturing Industry	27.3	18.9	19.3	19.6
Electricity, Gas	0.9	0.7	0.7	0.7
Construction	1.8	1.2	1.2	1.3
Trade, Hotels, Restaurants	50.0	33.7	34.4	34.2
Transportation and Communication	4.0	2.1	2.1	2.2
Banks, Insurance Companies	8.6	6.8	7.0	7.6
Public Administration	4.2	3.3	3.4	3.7
Indirect Taxes	1.3	1.1	1.1	1.2
GDP (at market prices)	168.2	116.4	118.7	121.0

Table 11: Foreign Trade, 1980-1982
(in millions of CFA frar s)

Exports (fob)	1980	1981	1982
Cotton	12,009	14,116	11,492
Cattle and Other Food Products	3,355	8,663	6,341
Total Exports	15,364	22,779	17,833
Imports (cif)	12,043	22,708	25,343
Trade Balance	+3,321	+ 71	-7,510

Table 12 indicates Chad's balance of payments for the years 1980 to 1982, while Table 13 shows the public debt. Table 14 lists the main banks in Chad.

2. International aid

a. Non-food assistance

The aid mentioned here does not include food, which will be discussed below. The amounts shown in the tables were granted between June 7, 1982 and May 31, 1983. However about 20 percent of the assistance funds provided for projects undertaken before June 7, 1982 and renewed are included here.

Tables 15 and 16 are taken from the report of the Statistics Directorate. They clearly indicate the origins and purposes of this non-food assistance.

In Table 16, 20 percent of the FCFA 26,089,561,105 should be deducted to account for funds from projects before June 7, 1983. The producing sector (rural development, industry, mines and energy) accounts for 38.8 percent of total investments. The rest is divided between infrastructure and communication (14.7 percent) and health, education and administration (45.5 percent).

b. Food aid

Table 17 shows the amounts and types of food aid received as of July 31, 1983. (Data are supplied by the Statistics' Directorate.) This situation may change as the latest data are not yet available.

F. Rural Sector

1. Breakdown by section

a. Agriculture

Chad covers a total of 1,284,000 km_2. Of this area, 16 million ha is cultivable land; only 1.1 million ha are actually cultivated at present.

If all land suitable for cultivation were put to use, Chad would be able to meet its food needs. However, several problems, including poor climate and a lack of funds and equipment, hinder the realization of this goal.

The problem of land tenure in Chad is more serious than is yet realized. It is taking on increasing importance in the north, where poor climatic conditions are forcing both farmers and cattle breeders to seek land elsewhere. It will soon become a problem in all of Chad due to the rapidly advancing desertification of the land.

Table 12: Balance of Payments, 1980-1982
(in millions of CFA francs)

	1980	1981	1982
Trade Balance	+ 3,321	+ 71	- 7,510
Miscellaneous Services	- 5,643	- 5,437	- 4,668
Transfers	6,527	11,825	17,130
Long-Term Capital	- 880	- 525	- 364
Short-Term Capital	- 1,516	- 448	- 1,653
Errors and Omissions	- 6,104	181	801
SDR Allocation	510	338	-
	- 3,785	+ 6,005	+ 3,736

Table 13: Public Debt
(in millions of CFA francs)

	Funds Disbursed	Outstanding
Italy	1,149.2	550.2
Federal Republic of Germany	904.8	389.0
IDA (BRI)	4,595.4	
Miscellaneous	5,296.5	
France[a]	11,781.3	
Amount Guaranteed	28,123.0	
Domestic Debt	8,050.4	
Total	59,900.6	2,694.6

[a]CFA francs 4,775 should be deducted from this amount (transferred to the Loss and Profit Account under an agreement made with the Central Fund for Economic Cooperation).

Table 14: Banks

Name	Origin	Comments
Bank of Central African States (B.E.A.C.)	Central Africa	In operation.
International Bank for Africa in Chad (B.I.A.T.)	B.I.A.C.	In operation.
International Bank for Industry and Commerce in Chad (B.I.C.I.T.)	France (B.N.P.)	Closed.
Chadian Bank for Credit and Deposits (B.T.C.D.)	Chad	Closed.
Chad Development Bank (B.D.T.)	Chad	Closed due to the war; will soon reopen.

Table 15: Foreign Aid

Donor	Sector	Amount (in CFA francs)	Percent of Total Amount	
Countries:				
Federal Republic of Germany	Health	396,517,600	43	
	Mines, Industries, Energy	114,542,550	13	
	General Administration, Banks, Commerce	408,817,200	44	
Sub-Total		919,877,400		3.5
Great Britain	Education	18,200,000		
Sub-Total		18,200,000		0.07
Italy	Agriculture	1,209,700,000		
Sub-Total		1,209,700,000		5
United States of America	Agriculture	2,346,950,000	43	
	Health	737,450,000	13.8	
	Livestock Production	3,500,000	0.1	
	Mines, Industries, Energy	677,000,000	12.6	
	General Administration, Banks, Commerce	1,138,200,000	21.3	
Sub-Total		4,903,240,000		12.6
Swiss Cooperation	Agriculture	140,875,000	28.5	
	Education	266,875,000	54.1	
	Health	85,925,000	17.4	
Sub-Total		493,675,000		1.9

Table 15: Foreign Aid (cont.)

Donor	Sector	Amount (in CFA francs)	Percent of Total Amount	
France	Agriculture	585,000,000	9.5	
	Livestock Production	357,500,000	5.8	
	Transportation	892,000,000	14.5	
	Health	740,000,000	12	
	Education	600,000,000	9.8	
	Mines, Industries, Energy	765,000,000	12.4	
	Postal Service and Communication	315,000,000	5.1	
	General Administration, Banks, Commerce	1,850,000,000	30.1	
Sub-Total		6,104,500,000		23.4
Canada	Education	66,448,400		
Sub-Total		66,448,400		
Intergovernmental Organizations:				
EDF	Agriculture	1,842,000,000	29.9	
	Transportation	2,486,250,000	40.5	
	Health	1,817,625,1[illegible]	29.6	
Sub-Total		6,146,475,130		23.6
BAD	Education	1,509,380,000		
Sub-Total		1,509,380,000		5.8
United Nations Organizations:				
WHO	Health	532,453,775		
Sub-Total		532,453,775		2

Table 15: Foreign Aid (cont.)

Donor	Sector	Amount (in CFA francs)	Percent of Total Amount	
UNICEF	Health	343,350,000	54.9	
	Education	236,250,000	37.8	
	Livestock Production	45,500,000	7.3	
Sub-Total		625,100,000		2.4
UNDP	Education	5,250,000	0.4	
	Transportation	151,900,000	12.1	
	Mines, Industries, Energy	84,000,000	6.7	
	Forests, Water, Fishery, Parks	180,000,000	14.3	
	General Administration, Banks, Commerce	835,480,450	66.5	
Sub-Total		1,256,880,450		4.8
UNDRO	Health	61,250,000		
Sub-Total		61,250,000		0.2
FAO	Agriculture	680,000,000		
Sub-Total		680,000,000		2.6
Non-Governmental Organizations:				
LSCR	Livestock Production	238,000,000	33.6	
	Health	469,381,000	66.4	
Sub-Total		707,381,000		2.7
CICR	Health	5,000,000		
Sub-Total		5,000,000		0.02

Table 15: Foreign Aid (cont.)

Donor	Sector	Amount (in CFA francs)	Percent of Total Amount
COE	Agriculture	13,000,000	
Sub-Total		13,000,000	0.05
Private Donors (Belaco)	Agriculture	60,000,000	
Sub-Total		60,000,000	0.2
Others:			
IBRD/FAC	Agriculture	782,000,000	
Sub-Total		782,000,000	3.0
GRAND TOTAL		26,089,561,105	

Table 16: Distribution of Non-Food Assistance by Sector
(FCFA)

Sector	Amount	Percent of Total Assistance	
Agriculture	7,660,I25,000	29.3	)
Livestock Production	644,500,000	2,5	) 32.5
Water and Forests	I80,250,000	0.7	)
Industries, Mines, Energy	I,640,542,550	6.3	
Transportation	3,530,I50,000	I3.5	
Postal Service & Communication	3I5,000,000	I.2	
Health	5,I88,952,555	20	
Education	2,697,403,400	I0.3	
Administration, Banks, and Commerce	4,232,637,650	I6.2	
TOTAL	26,089,56I,I05	I00	

Table 17: Food Aid
(in CFA francs)

Nature	Donor	Executing Organization	Amount Announced	Total Received	Expected (SODELAC)	Dis-tributed	In Stock
Sorghum	USAID	CARE	9,000	2,788	6,212	14	2774
	WFP	WFP	6,000	3,168.1	2,831.9	575	2593.1
	(Saudi Arabia)	MLCCN					
Subtotal			16,010	6,915.1	9,094.9	1,481	5434.1
Corn	KOWEIT	WFP	2,410	2,072	338	2,072	-
	WFP(Sua)	WFP	3,000	630	2,370	90	540
Subtotal			5,410	2,702	2,708	2,162	540
Rice	KOWEIT	WFP	2,270	2,182	88	2,151	31
		MLCCN	930	727	203	727	-
Subtotal			3,200	2,909	291	2,878	31
Wheat	France	MLCCN	4,500	3,353	1146	2190 - 650	1163.-087
	Saudi Arabia	MLCCN	895	845	50	806	39
	WFP	WFP	2,000	1,014	986	658	356
Subtotal			7,355	5,212 736	2,182	3654. 650	1558.-082
CSM/WSR	WFP	WFP	975	469	506	469	-
Wheat Flour	WFP	WFP	2,200	2,118	82	2118	-
	France	MLCCN	4,040	2019.157	2020..843	1795	224.157
	Belgium	WFP	1,000	-	1000	-	-
	CANADA	WFP	2,127	-	2127	-	-
Subtotal			9,367	4137.157	5229.843	3913	224.157
Corn Meal	Yugoslavia	MLCCN	5	5	-	5	-
Milk	Canada	WFP	717	-	717	-	-
	C.R. R. West Germany	LIG.CR	60	60	-	60	-
	Switz. (CRR)	LIG.CR	100	100	-	100	-
	EEC	LIG.CR	185	185	-	24	161
Subtotal			1,062	345	717	184	161
Millet	EEC	MLCCN	1,000	-	5,000	-	-
	F.R.G.	MLCCN	3,000	-	3,000	-	-
	LIG.CR	LIG.CR	700	700	-	700	-
Subtotal			8,700	700	8,000	700	-
Corn	Netherlands	MLCCN	1,000	-	1,000	-	-
Oil	Saudi Arabia	MLCCN	1,401	1,340	61	983	353
Sugar	Yugoslavia	MLCCN	20	18	2	18	-
	HCR	LIG.CR	160	160	-	160	-
Subtotal			180	178	2	178	-
Canned Food	Yugoslavia	MLCCN	9	7.5	1,5	7,5	-
Miscellaneous	HCR	CARE	562	562	-	562	-
Total			55,276	25,482.- 493	29,793.507	18714.- 592	8305 339

It should be noted that the center of the cattle breeding area is clearly moving toward the south, where there is still land available for grazing.

Chad produces a wide range of crops. Depending upon their intended use, the distinction is made bwtween cash crops and food crops.

Cash crops are the following, in order of importance: cotton, sugarcane, groundnuts and rice.

Groundnuts and rice need also be categorized as food crops. Other food crops include millet, sorghum, corn, tubers (cassava, yam, potato, colocasia), oil-producing plants (sesame and groundnuts), and various vegetables and fruits.

b. Livestock

The principal products of livestock raising are meat, hides, milk and other dairy products. At the time of this survey data on the production of hides and milk were not available. Table 18 shows only those figures for meat inspected at the Farcha refrigerated slaughterhouse in 1982 and 1983.

As a result of years of drought and war, the Farcha slaughterhouse operates at a considerably reduced level of production. Worn out equipment and frequent breakdowns have also contributed to this reduction in output. In November and December 1982 the slaughterhouse processed 648,455 kg of carcasses as compared to 398,990 kg in July 1983.

Tables 19, 20 and 21 illustrate the trends in number of animals slaughtered (under government inspection) at the Farcha refrigerated slaughterhouse in 1981, 1982 and 1983. It should be noted, however, that there were numerous non-inspected slaughters and exports of live cattle during the war.

c. Forestry

In Chad no research has been done that could produce reliable statistical data. Forestry experts, however, estimate the natural forest surface at 16.5 million ha and the forest preserve at one million ha.

Within the framework of the Acacia Albida project in the cotton producing area, a small study financed by the FAC was carried out, but the documents are not easily available at this time because of the war.

Government policy concerning forestry focuses on reforestation, especially around large cities (for example, the N'Djamena "green belt" project). This project was first financed by the UNDP and then by UNESCO (United Nations Educational, Scientifc and Cultural Organization).

Table 18: Reported Local Consumption of Meat[a]
(in kilograms of carcass weight)

Date	Beef	Lamb	Goat	Veal	Pork	Camel	Total
November 1982	284,050	36,225	8,435	5,070	630	-	334,410
July 1983	350,580	13,310	25,465	925	360	8,350	398,990

[a] For November 1982, slaughter is given in total carcass weight and not by head, which represents 314,045 kg.

Table 19: Distribution of Animals Slaughtered, 1981
(weight in kilograms)

Month	Cattle		Calf		Sheep		Goat		Camel		Total Weight
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	
Jan.	1,115	108,020			818	10,980	111	1,370			120,370
Feb.	1,748	165,765				18,325	239	2,630			186,720
March	1,966	191,075	1	50	1,177	12,845	759	7,690			211,660
April	2,270	218,560			234	2,750	977	9,685			230,995
May	1,990	184,475			782	8,395	1,936	18,785			211,655
June	1,933	175,435	4	300	226	3,090	2,886	28,390	50	6,280	213,495
July	1,890	156,945	5	305	167	1,985	3,227	54,400	74	9,145	222,780
August	2,044	207,565	72	4,625	78	1,020	2,779	25,785			238,995
Sept.	1,933	220,350	270	19,460	336	3,980	2,613	23,530			267,320
Oct.	1,919	219,820	367	25	358	7,545	1,735	16,155			268,870
Nov.	2,330	267,445	187	11,475	719	11,140	1,368	14,920			304,980
Dec.	2,621	296,110	107	7,320	894	12,745	1,013	11,625	1	325	328,125
Total	23,759	2,411,565	1,013	58,885	7,240	94,800	19,643	214,965	125	15,750	2,805,965

Source: Refrigerated Slaughterhouse of Farcha.

Table 20: Distribution of Animals Slaughtered, 1982
(weight in kilograms)

Month	Cattle		Sheep		Goat		Calf		Dromedary		Hog		Total
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Weight
Jan.	2,551	266,950	668	9,715	604	8,225	61	4,375	-	-	-	-	289,265
Feb.	2,393	259,710	512	5,715	914	11,655	34	2,200	-	-	-	-	279,280
March	2,901	303,270	515	7,345	1,588	18,110	46	2,930	-	-	-	-	331,655
April	2,847	308,955	319	4,865	1,803	20,910	83	4,670	2	425	-	-	339,825
May	2,723	248,725	170	1,550	224	15,520	114	6,855	59	11,530	-	-	284,180
June	1,631	150,895	307	3,420	1,680	16,990	153	8,830	85	14,325	-	-	194,460
July	1,750	100,745	267	2,880	2,542	25,530	110	10,010	268	44,680	-	-	252,845
August	2,037	212,880	321	3,520	3,237	29,230	101	5,985	86	14,840	-	-	266,455
Sept.	1,931	222,555	647	7,120	2,910	27,300	43	2,520	9	1,270	2	135	260,900
Oct.	2,093	243,615	1,119	13,385	2,787	28,150	81	4,805	1	235	5	280	280,470
Nov.	2,367	256,225	3,332	38,355	1,534	15,735	86	5,050	1	250	7	430	314,045
Dec.	2,674	200,050	3,171	36,225	787	8,435	94	5,070	-	-	9	630	334,410
Total	27,898	2,774,575	11,348	134,095	20,010	225,790	1,066	63,300	511	87,555	23	1,475	3,437,790

Source: Refrigerated Slaughterhouse of Farcha.

Table 21: Distribution of Animals Slaughtered, 1983
(weight in kilograms)

Month	Cattle		Sheep		Goat		Calf		Hog		Camel		Total Weight
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	
Jan.	2,713	310,625	2,601	31,060	1,178	14,455	27	1,375	6	500	4	645	358,660
Feb.	2,349	272,675	2,300	31,520	1,475	15,840	7	465	3	240	28	5,325	326,065
March	3,003	370,380	1,946	29,235	1,483	17,395	8	570	10	595	18	3,715	421,890
April	3,150	398,670	733	12,215	2,013	23,880	7	520	4	235	1	160	435,680
May	3,574	430,915	615	10,640	2,518	30,770	5	350	7	295	1	200	473,170
June	3,462	403,925	450	7,620	2,132	24,940	17	1,120	3	120	41	6,775	444,500
July	3,079	350,580	942	13,310	2,269	25,465	15	925	6	360	46	8,350	398,990
August	3,418	434,770	1,391	19,355	1,930	21,520	17	1,380	-	-	4	960	482,685
Sept.													
Oct.													
Nov.													
Dec.													
Total	24,748	2,977,240	10,978	154,955	15,018	174,265	103	6,705	39	2,345	143	26,130	3,341,640

Source: Refrigerated Slaughterhouse of Farcha.

Since the majority of Chad's territory is located in the Sahel, there is almost no forest large enough to be exploited economically on an international level. The urgency of controlling the desertification of Chadian land dictates the country's forestry policies. Currently, the major forestry production is gum arabic; 1981 production was estimated at 8,000 tons.

d. Fishing

Since fishing takes place largely outside of state control, there are no precise production data. During a normal year, when drought is not a serious problem, about 110,000 tons of fresh fish are caught in Chad. There are more than 1,000 full-time fishermen and more than 35,000 seasonal fishermen.

2. Production systems in agriculture and livestock raising

For several years efforts have been made to improve production systems in agriculture (for example, rice, cotton and groundnut yields) and livestock raising (setting up ranches, and the nomadization project), but the results have not been satisfactory. Traditional systems (extensive) tend to prevail, especially since the implementation of these projects has been disrupted due to the war.

a. Extensive or traditional systems

(1) Agriculture

This system of production has not progressed, particularly in the area of food crops (millet, sorghum, groundnuts, rice). Burning and hoeing are still used in the extensive system. Sowing is followed by some weeding. Yields from this type of production system are very low:

- Millet-sorghum: 500-600 kg/ha;
- Groundnuts: 600-700 kg/ha; and
- Rice: 800-1,000 kg/ha.

The cotton yield is 200 kg/ha with the traditional system, but on the whole the production of cotton tends to be intensive.

(2) Livestock raising

Traditional systems again predominate in the area of livestock. The result is nomadism, transhumance or semi-transhumance.

b. Intensive systems

(1) Agriculture

Only cotton is grown intensively. Under the program to intensify cotton production, the traditional system will be used only by farmers who cannot obtain the required production factors. This intensification program aims at increasing the cultivated areas from 129,000 ha in 1981 to 205,000 ha by 1987, with an estimated input of 100 kg/ha of NKKSB in five sprayings, with a yield of 900 kg/ha.

Another crop intensification program will be implemented on 25,000 ha, with the goal of achieving a yield of 1,400 kg/ha. The area will be treated with 200 kg/ha of NKKSB and eight pesticide sprayings. In addition to the cotton program there have been some efforts directed toward rice and groundnut production, but only on small areas compared to the total cultivated lands. Intensification is also a goal for these crops.

(2) Livestock raising

The project currently underway to settle livestock raisers and to set up ranches can be considered an effort toward creating an intensive livestock raising system. Veterinarians argue, however, that nothing at all has yet been accomplished.

3. Marketing systems

The following examples serve as a summary of the various marketing systems for agricultural products in Chad.

a. Cotton

Cotton is marketed by the company "Coton-Tchad." After a harvest, teams from Coton-Tchad travel to the various purchase centers, and buy cotton from farmers at the price of FCFA 80 per kg for first quality cotton. There are two different grades of cotton: white cotton (first quality) and yellow cotton (second quality).

The cotton seeds are then processed (by ginning) at Coton-Tchad factories, packaged and sold abroad, generally to the European Economic Community (EEC).

b. Rice

The marketing procedure for rice follows steps similar to those for cotton. At the present time, however, hulled rice is not being exported.

c. Marketing procedures for farmers

After the harvest, farmers are literally invaded by merchants from all over the country. These merchants buy the farmers' products, and stock the goods in order to take advantage of the gap period between harvests when the products can be sold for as much as four times the purchase price. Although this system provides no guarantees to the farmers, it is, unfortunately, the most widespread.

It should be noted that the Chadian government has yet to implement any real pricing policy.

4. Production factors

a. Food crops

Insufficiency and poor distribution of rainfall marked the 1982-83 growing season. During the 1982-83 season, 89 mm less rainfall was recorded than during 1981-82.

Agricultural production in the Sudan zone, however, reached an acceptable level, rising slightly over the previous season's production. In the Sahel region, on the other hand, the situation is critical, with only traces of rain reported in most of the zone.

Moreover, agricultural activities have been suspended due to the war. Tables 22, 23, 24, 25 and 26 present only the situation in the Sudan zone. Table 27 indicates Chad's current food supply situation.

As the tables show, millet, sorghum and rice represent most of Chad's grain production, since they constitute the staple foods of the country.

Maize, groundnuts, sesame, vouandzou, and various tubers and vegetables complete the diet. These crops are considered secondary crops, except for groundnuts and maize, whose production has begun to increase in importance.

Maize is becoming increasingly important in the Chadian diet; formerly it was used only during the season between harvests.

The building of an oil and soap factory in Moundou accounts for the expansion of groundnut cultivation in Chad.

b. Cash crops

Two crops, cotton and sugarcane, currently provide revenue in foreign currency.

Table 22: Main Crops by Sector
(tons)

Sector	Millet	Sorghum	Rice	Corn	Groundnut	Sesame	Voundzou	Tubers	Other Crops	Total
GLG	5,314.5	12,433	240	583	2,366	599.5	769.5	696.5	64.5	23,066.5
MKD	2,450	28,167	402	201	11,515	1,764	2,234	2,457	1,230	54,920
MKE	4,320	18,699.5	5,501	832.5	5,316	2,693.5	8,101.5	2,229	464.5	48,157.5
TDJ	16,264.5	17,484	18,878.5	2,630.5	9,403	6,495.5	4,042	4,738.5	446.5	80,446.5
LOC	12,912	8,831	7,348	3,630.5	5,874.5	11,024.5	3,603.5	5,505.5	207.5	58,937
LIM	3,845.5	3,376	148	2,784	3,242	4,396	3,246	4,966.5	550.5	26,554.5
PDE	144.7	14,486	6,285	274.5	5,107	5,362	1,753.5	5,221	598	83,504
MDL	26,256	21,032	2,074	2,884	7,499	4,147	3,366	5,759	1,310	74,327
SRH	13,195.5	14,411	102.5	2,981	6,118	2,703	3,058	8,126	1,068	51,763
EZS	98,875	138,919.5	41,479	20,864.5	56,440.5	39,185	30,174	39,699	5,939.5	471,676

Source: ONDR, 1982-1983.

Table 23: Main Crop Productions
(in tons)

Production	GLG	MKC	MKE	TDT	LOC	LIM	FENDE	MDL	SARH	EZS
Millet	2596	3067	2973	10237	10861	4010	11312	18990	12425	76471
Sorghum	9403	29886	16086	24366	25366	20984	25448	28692	22543	203141
Peanut	1705	13652	3524	12281	10565	5252	7273	12816	10568	77731
Rice	168	586	1980	6666	5948	75	6628	1231	62	23344
Sesame	257	664	783	1918	4134	1476	1810	1242	730	13014
Berbere	4556	7910	6951	774	-	-	-	-	-	372

Source : ONDR.

Table 24: Purchase Price and Trade Volume for Cotton

Season	Purchase Price by Quality Group (in CFA francs)		Tonnage per Quality Group				Average Purchase Price	Tonnage Traded	Total Revenue of Producers (in millions of CFA francs)
	I	II	I	percent	II	percent			
1971-1972	28	26	85137	78.25	23665	21.75	27.56	108,482	2,990
1972-1973	25	24	84329	81.06	19708	18.94	28.05	104,037	2,918
1973-1974	31	24	96780	84.40	17614	15.60	29.90	114,394	3,420
1974-1975	43	25	129922	90.45	13718	9.55	41.28	143,640	5,929
1975-1976	45	25	162278	93.23	11784	6.77	43.65	174,062	7,598
1976-1977	45	25	131938	89.52	15446	10.48	42.90	147,384	6,323
1977-1978	50	30	118476	94.57	6803	5.43	48.90	125,279	6,125
1978-1979	50	30	124142	90.71	12714	9.29	48.14	136,856	6,588
1979-1980	50	30	87755	96.12	3542	3.88	49.22	91,297	4,494
1980-1981	50	30	81824	95.46	3892	4.54	49.09	85,716	4,208
1981-1982	60	30	68446	95.87	2945	4.13	58.76	71,391	4,195
1982-1983	70	40	100249	98.17	1869	1.83	69.45	102118	7,092

Source : ONDR.

Table 25: Distribution of Cultivated Areas
(in thousands of hectare)

Year	Single Crop	Mixed Crops	Berbere	Total
I978	390	395.5	I8.7	804.2
I979	343.I	363.2	I7.5	723.8
I980	35I.I	356.9	9.0	7I7.I
I98I	400.9	36I.7	24.0	786.6
I982	426.5	320.3	22.7	769.5
I983	47I.7	353.4	25.3	850.8

Source : ONDR.

Table 26: Distribution of Main Food Crop Production
(in thousands of tons)

Year	Millet	Sorghum	Berbere	Rice	Groundnut	Sesame
I978	68,5	2I7.5	5.6	6.8	87.6	9.9
I979	66.5	206.6	7.9	20,7	93.8	II.3
I980	67.5	I92.I	4.3	25.7	98.6	8.2
I98I	77.5	209.I	I2.9	46.6	86.I	II.2
I982	65.8	I90.9	I3.2	42.3	73.0	II.9
I983	76.5	203.I	I6.6	23.3	77.7	I3.0

Source : ONDR.

Table 27: Food Situation in Chad, 1983-1984 Season (cereals)[a]
(in tons)

Region	Food Needs	Available Supply	Deficit	Surplus
Sahelian zone	295,426	156,312	139,114	-
Sudanian zone	302,430	304,940	-	2,510
Food Deficit in Chad			136,604	

[a]Emergency Needs: 57,000 tons.
Seed Needs: 3,000 tons.

Cotton is the more important of Chad's two cash crops. Its cultivation, introduced during the colonial period, is now very well organized. It is the major export crop. The production during the 1982-83 growing season has been estimated at 102,000 tons of cotton seeds. Table 28 illustrates the increase in cultivation of cotton between the 1981-82 and 1982-83 growing seasons.

Cotton is grown mainly in the Sudanian zone.

5. Ministries in charge of agriculture

Three ministries are responsible for the different aspects of agriculture. They are:

- The State Ministry of Agriculture and Rural Development (See Figure 1.);
- The Ministry of Livestock and Rural Water Supply (See Figure 2.); and
- The Ministry of Tourism, Small-Scale Industry, Water and Forests.

The Ministry of Planning and Reconstruction works in very close collaboration with these ministries to establish overall plans for the economic and social development of the country.

There is an interministerial office for studies and projects under the supervision of the State Ministry of Agriculture and Rural Development which coordinates the work of the three ministries involved in rural development.

6. Agricultural credit

Chad does not have a farmers' cooperative bank. This problem is a prominent one and should be addressed. Experts are expected in N'Djamena to study the conditions under which an agricultural financial institution could be created.

Cotton-producing farmers do, however, benefit from one special credit arrangement. The National Office for Rural Development (ONDR - Office national de développement rural), through its "productivity policy," lends farmers enough money to cover their production costs. This money is then repaid after the harvest. Although this system is not completely satisfactory for the farmers, it continues to operate for lack of a better arrangement. Given the many advantages of an agri-cultural credit institution, it is easy to understand the need to establish such an institution in Chad.

7. Agricultural research institutions

These institutions have been carefully described in the surveys. The three organizations, of which only two are currently operating under normal conditions, are:

Table 28: Changes in Areas Under Cotton Cultivation
(ha)

	1981/82	1982/83	Change
Total Area	133,899	137,734	+ 38.35
Traditional Crop	77,644.5	61,748	- 15,896.5
Yield	56,254.5	75,986	+ 19731.5

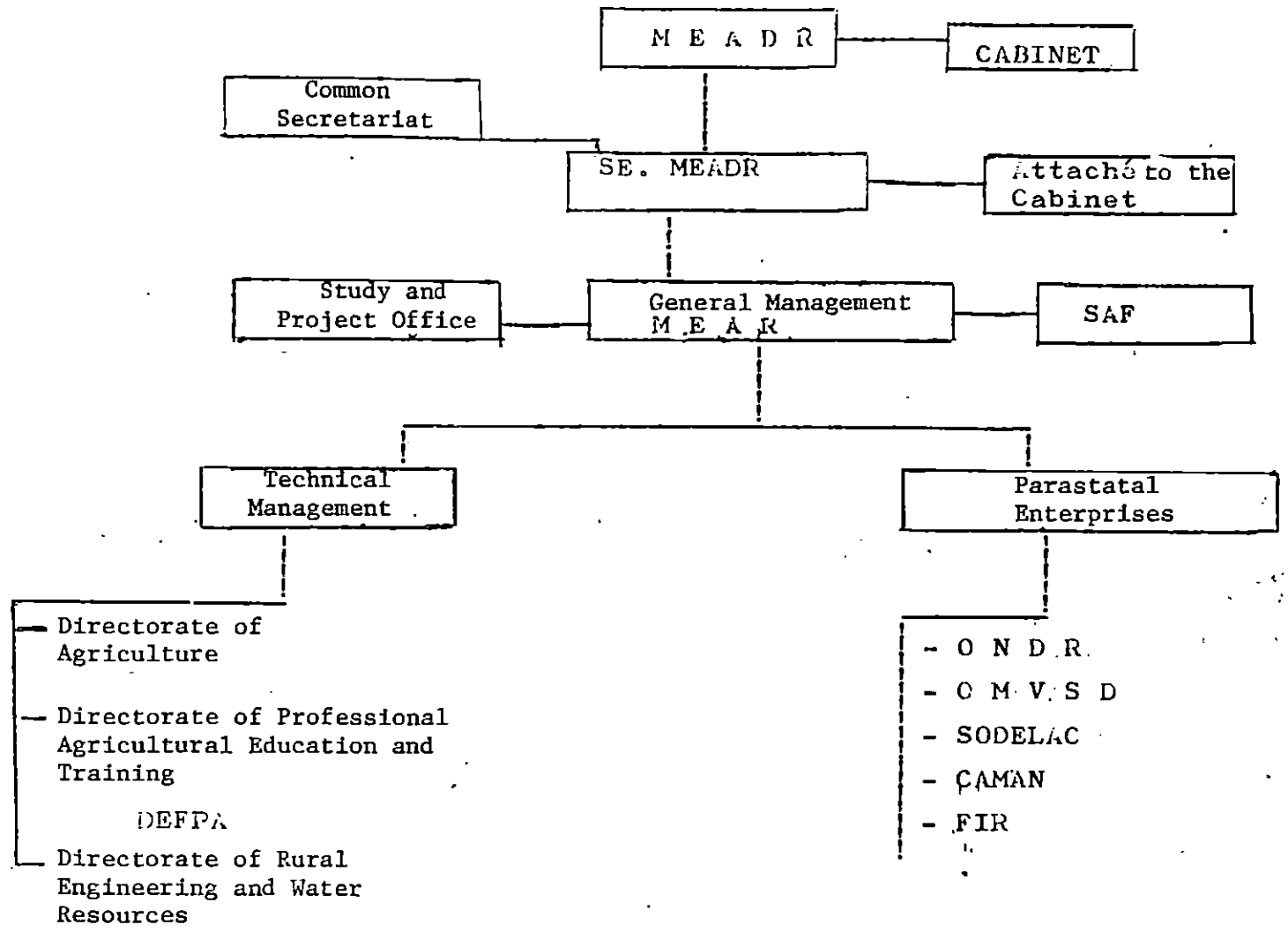

Figure 1 : Organizational Chart of the State Ministry of Agriculture and Rural Development (MEADR)

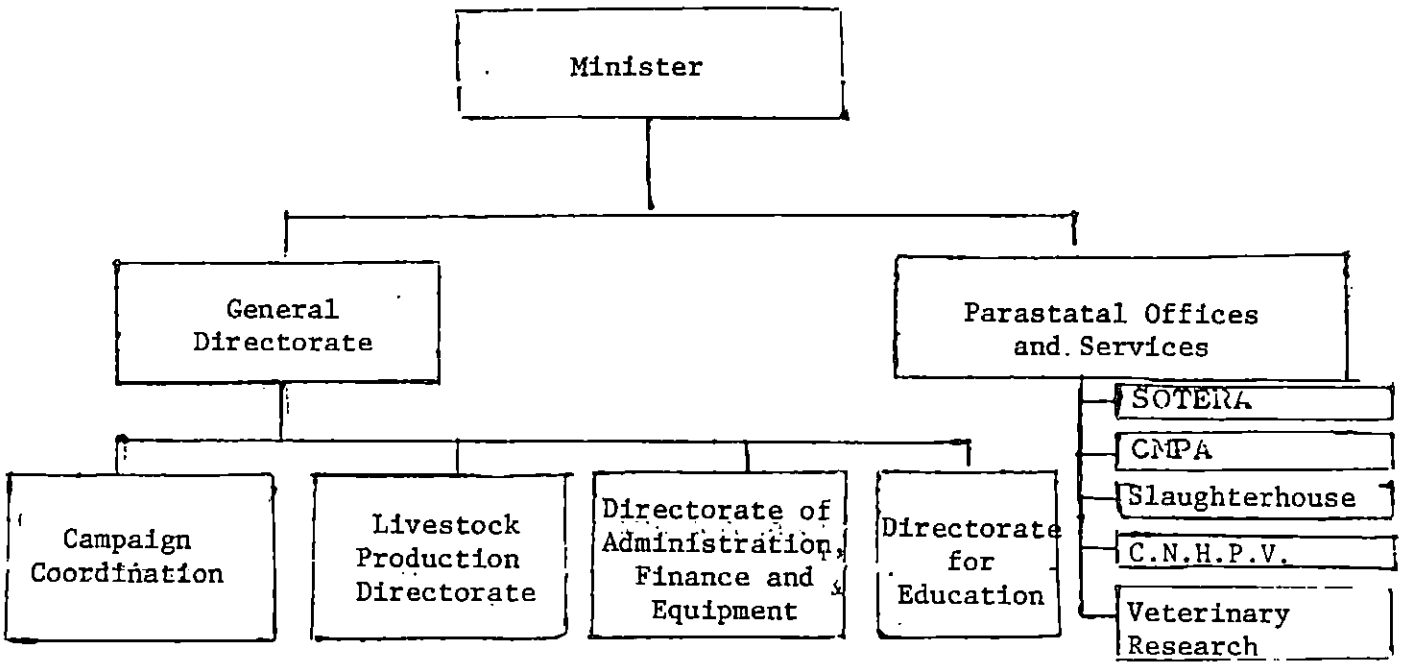

Figure 2 : Organizational Chart of the Ministry of Live tock and Rural Watering Infrastructure

- The Institute for Research on Cotton and Exotic Textiles (IRCT - Institut de recherche du coton et des textiles exotiques);

- The Institute for Livestock Production and Veterinary Medicine in Tropical Countries (IEMVT - Institut d'élevage et de médecine vétérinaires des pays tropicaux); and

- The Division of Agronomic Research (DRA - Division de la recherche agronomique).

The first two institutions receive outside financial support and are currently operating under almost normal conditions. Unfortunately, the DRA, the only national research institution, is idle due to the lack of money, equipment and staff.

Before the war, France's Office for Scientific and Technical Research Overseas (ORSTOM - Organisation de recherche scientifique et technique outre-mer) worked in close collaboration with these institutions. The ORSTOM left Chad in 1979 because of the war.

III. AGRICULTURAL RESEARCH INSTITUTIONS

A. Agronomical Research Institutions

1. Structure and sponsoring ministry

These institutions are the Cotton and Textile Research Institute(IRCT-Institut de recherche du coton et des textiles) and the Division of Agronomic Research (DRA-Direction de la recherche agronomique). (See Figures 3 and 4.) The headquarters of IRCT is located in Paris, with stations at N'Djamena and Bédedja. DRA has stations in Deli and Dougui, and five experimental zones. Both IRCT and DRA are under the authority of the State Ministry of Agriculture and Rural Development.

2. Finances and activities

IRCT is 1/3 subsidized by Chadian funding and 2/3 subsized by French funding. DRA is funded esentially through donor organizations (FAC, FAO, USAID, EDF).

IRCT's activities include the cultivation of cotton and food crops (complementary research). DRA works with food crops.

Current programs include IRCT's integrated development project in southern Chad, composed of two components: cotton crops and crop systems with a staff of seven researchers (two geneticians, two entomologists, two agronomists and one phytopathologist), and a food crops component with a staff of one genetician and two observers.

At DRA projects include the integrated development project in southern Chad and the Sahel Region at Deli which employs two researchers, five senior technicians and 25 observers. At Doughui, two researchers, one senior technician and three observers are employed. The Deli project is for the improvement of millet, sorghum, corn and cowpeas. The Dougui project is for superior seed production and adaptation of food crop varieties in the Sahel.

3. Resources

a. Infrastructure

At IRCT at N'Djamena, physical facilities are in fair condition including offices, laboratories and stores, and adequate equipment for general agronomical research.

At Bebedjia, there are laboratory facilities for agronomy, genetics, entomology, phytopathology and technology. All these facilities are adequate and fitted with the necessary equipment. The offices are also adequately equipped.

At DRA at Deli, all buildings need renovation and the equipment is out of service (laboratories, stores, offices, garage, workshops).

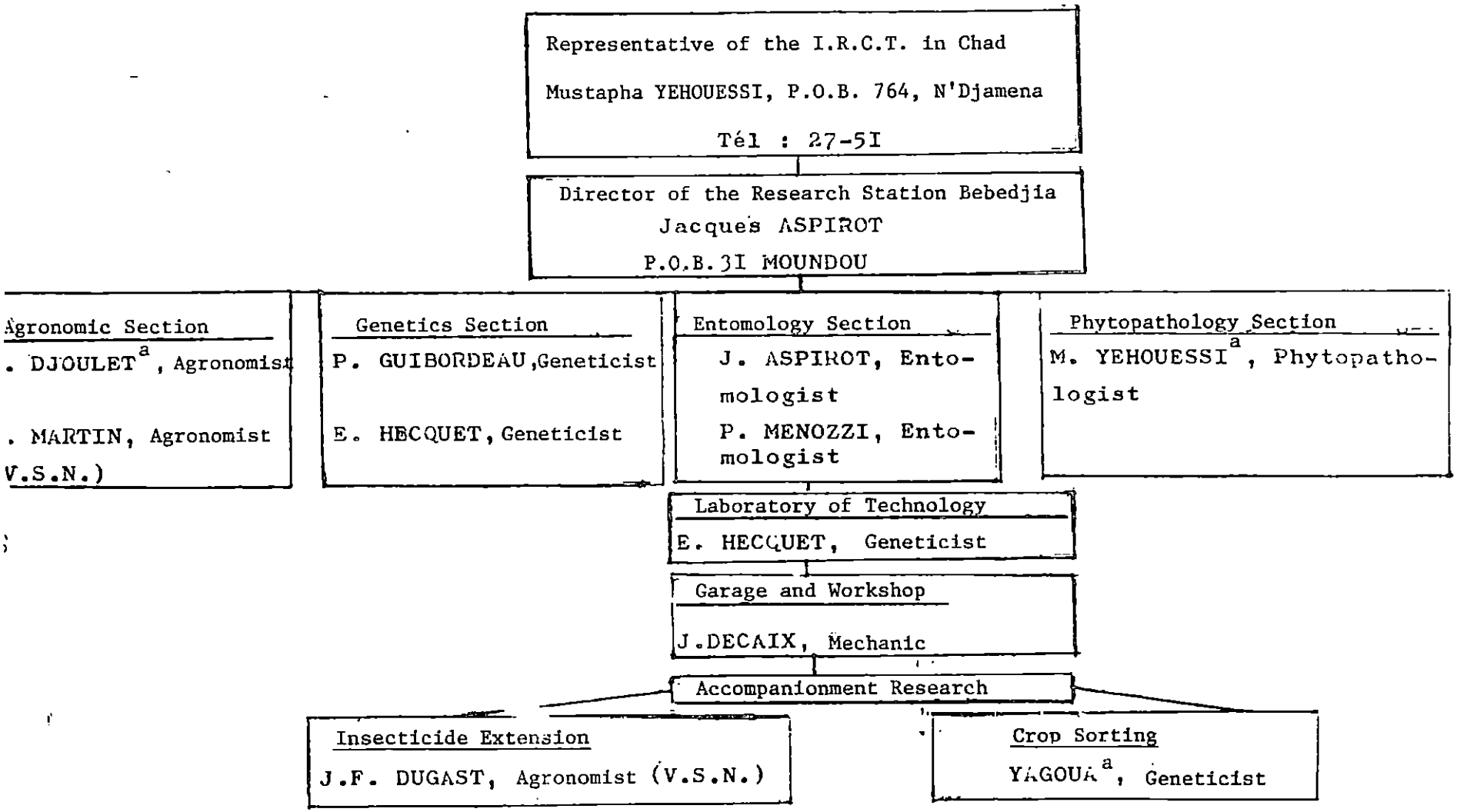

Figure 3 : Organizational Chart of the Research Institute for Cotton and Textiles (IRCT)

[a] Chadian Researchers.

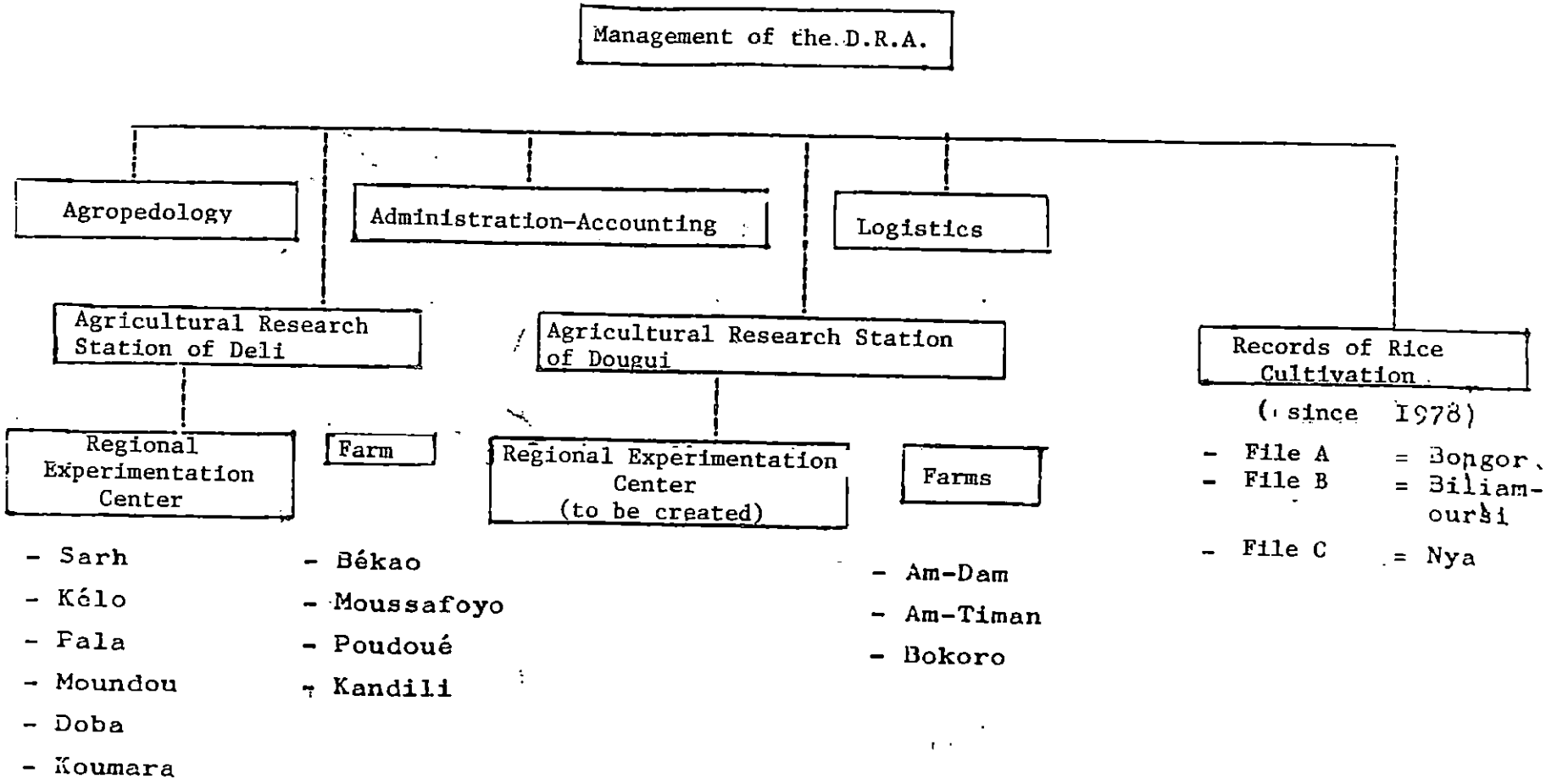

Figure 4 : Organizational Chart of the Directorate of Agricultural Research (DRA)

At Dougui, the buildings are in fair condition, but there is a lack of equipment (for offices, seed analyses, stores, warehouses).

b. Human resources and libraries

IRCT's staff includes five expatriates and three nationals. At DRA at Deli there are two nationals and one expatriate.

The IRCT library is very important in N'Djamena as well as in Bebedjia. DRA's library is adequate in Dougui but nonexistent in Deli (due to the war).

c. Experimental farms

In 1983 the experimental farms of IRCT covered 40 ha, those of the DRA covered 40 ha (cultivated) while those at Deli and Dougui covered 110 ha.

4. Major obstacles to efficiency

These obstacles are as follows:

- The need for regular funding;
- The lack of equipment to meet demand (N'Djamena, Bébedjia, Deli and Dougui);
- The need to reconstruct and equip the Deli station which was made inoperable by the war;
- The need to train Chadian researchers to replace expatriate researchers; and
- The need to improve working conditions, which deteriorated during the war but which could be improved by adequate funding and by the creation of higher status for national researchers.

Training needs for the next ten years would be covered by two researchers and two senior technicians in the following disciplines: general agronomy, entomology, genetics, phytopathology, weed control.

The research staff has defined four problem areas: financing, training, facilities, status.

5. Recommendations

A Research and Development Department and a scientific committee should be established to evaluate programs and develop guidelines according to needs. A grain center should be established to: stabilize the price of grains at a level which would encourage producers to use selected seeds; develop a simple manure for cotton plants; inventory and redefine millet and sorghum varieties; carry out

multilocational testing of plant material for food crops both in the Sudanian and Sahelian zones; intensify production of market-garden crops (variety testing and disease control); and intensify production of berbéré (density, manuring, varieties, seed treatment).

B. Veterinary Research Institutions

The veterinary research institution in Chad is the Veterinary Research and Animal Husbandry Laboratory at Farcha.

1. Structure and sponsoring ministry

The sponsoring ministry is the Ministry of Animal Husbandry and Rural Water Supply. The structure is shown in Figure 5. Funding is provided through the governments of Chad and France.

Main activities include the cultivation of forage crops, cattle breeding and animal health maintenance. The Laboratory has been closed since the 1979 civil war.

2. Assets

The experimental farm at Coton-Tchad, Bekamba, has a total of 14 stables, six sheep pens, one dipping tank, and one weighing corridor, all in good condition. Twelve additional management personnel will be needed within the next ten years.

3. Human resources

The laboratory employs three agropastoralists, one animal scientist, eight veterinarians, and 33 technicians (temporarily laid off).

Working conditions are good, but one specialist for each discipline is necessary.

4. Problems as seen by research personnel

Most problems stem from the operating budget which is inadequate and varies according to conditions, and from the insufficient number of national researchers.

5. Recommendations and projects

First activities should be resumed and should emphasize diagnostics and vaccine production. The following is a list of suggested projects (in order of priority), which should be undertaken as soon as possible:

- Small ruminant pathology;
- Genetic improvement of the Arab zebu;

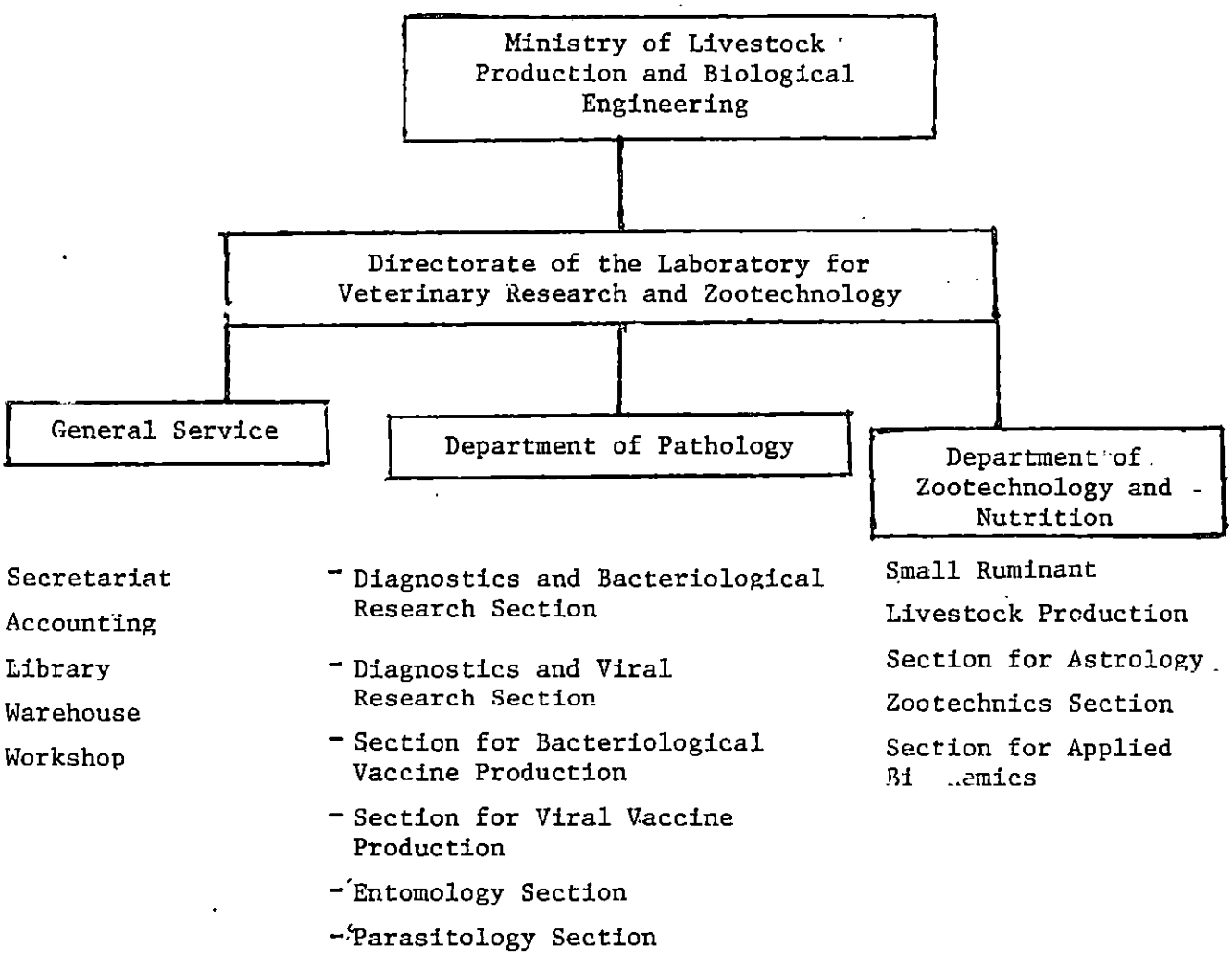

Figure 5 : Organizational Chart of the Laboratory for Veterinary Research and Zootechnology

- Local sheep breed improvement;
- Trypanosomiasis control;
- Search for new pastures;
- Experiments on irrigated forage corps for cattle fattening;
- Survey on Brucellosis in the dairy region around N'Djamena;
- Survey on poultry pathology;
- Dried meat technology; and
- Rural water supply survey.

Some of these research projects have already been launched but were interrupted by the war.

IV. AGRICULTURAL TRAINING INSTITUTES

A. General Information

The institutions, sponsoring ministries, resource origins and diplomas granted are shown in Table 29.

1. Activities

a. Training Center for Agricultural Technicians at Doyaba (CFTA-Centre de Formation des techniciens agricoles de Doyaba).

b. School for Technical Agricultural Training at Ba-Illi (CETA-Collège d'enseignement technique agricole de Ba-Illi).

CETA trains mid-level agricultural technical agents, to supervise farmers. Training lasts for four years and leads to the BEA diploma (Certificate of Technical Agricultural Education).

c. National School for Animal Husbandry Technical Agents (ENATE-Ecole nationale d'agents techniques d'élevage).

ENATE trains technical agents and supervisors for livestock breeding. Training lasts for three years and leads to the degree of Technical Agent for Animal Husbandry.

d. University Institute for Animal Husbandry Techniques (IUTE-L' institut universitaire des techniques de l' élevage).

The ENATE and the IUTE will be discussed separately.

2. Areas of specialization and subjects taught

a. CFTA of Doyaba

CFTA's technical curriculum includes general and specialized agriculture, horticulture and arboriculture, animal husbandry, rural engineering, topography, mechanization, protection of plants, soil conservation, rural economics, and physical education.

The general curriculum includes mathematics, physics, chemistry, French, biology, geography, general economics, and accounting. Students recruited through a competitive examination for BEPC holders follow a technical curriculum which is not significantly different from that for higher-level personnel.

b. CETA of Ba-Illi

CETA has a technical and general curriculum (classroom work and field work).

Table 29: Agricultural Training Institutes

Institutions	Supervising Ministries	Financial Sources	Diploma Awarded	Enrollment Capacity	Comments
CFTA of Doyaba (Training Center for Agricultural Technicians)[a]	State Ministry of Agriculture and Rural Development	Government and Foreign Aid	Agricultural Technician Diploma (D.T.A.)	60 Students	Operated by the State and constructed by IBRD.
C.E.T.A. of Ba-Illi (School of Agricultural Techniques)[b]	State Ministry of Agriculture and Rural Development	Government	Diploma: Certificate of Agricultural Education (B.E.A.)	150 Students	Operated by the Chadian Government; construction by FAD and EDF.
National School for Technical Agents (E.N.A.T.E.)	Ministry of Livestock Production and Rural Water Supply	Government and Foreign Aid		135 Students	
C.F.P.C.R. of TIKEM (Training and Proficiency Center for Rural Senior Personnel)	State Ministry of Agriculture and Rural Development	Government and Foreign Aid	Certificate of Proficiency	60 Students	Chadian Government and FAC and EDF.
Academic Institute for Livestock Production Techniques (U.T.E.)	Ministry of Livestock Production and Biological Engineering	Government	Engineer of Livestock Production Techniques	-	Closed since the events.

[a]The CFTA of Doyaba trains Agricultural Technicians (D.T.A.) and Technican Agents for Agriculture (B.E.A.).

[b]The C.E.T.A. of Ba-Illi is closed at the moment.

The general curriculum is largely modelled on that of identical classes in CEGs, with certain modifications in accordance with the technical and rural orientation of the facility, namely animal and plant biology, agricultural chemistry and economic geography (social sciences). The main technical courses are similar to those followed by the advanced personnel, but are not as well-developed.

3. Employment opportunities and admission

Graduates of CFTA and CETA are employed in various sectors of government and by agricultural firms. Places of employment include the Department of Agriculture (education and vocational training); the Caman, the ONDR, the SODELAC, the OMSVD, farms and research stations, coton Tchad, Sonasud, etc..

At CFTA, admission is granted through competitive examination for applicants holding the BEPC, at 11th grade level, or holding the BETA plus competitive examination. At CETA at Ba-Illi, admission is granted through competitive examinations for applicants holding the CEPE and at the 9th grade level.

4. Human resources

a. CFTA of Doyaba

Administration at CFTA includes six persons, including the director. Faculty includes seven full-time teachers, six part-time teachers and 31 various agents.

Working conditions are difficult due to lack of teaching materials and housing. The great distance between the school and the teachers' housing centers is also a serious problem, as there is no means of transportation.

As the CFTA was originally designed to train agricultural engineers, 14 additional teachers at the level of graduate engineers should be recruited.

There is no teacher training policy at this time. Teachers are recruited among engineers, veterinarians and teachers, that is, among civil servants. The budget varies from one year to the next but ranges between FCFA 11 and 20 million. The Chadian government partly subsidizes salaries and operations.

b. CETA of Ba-Illi

At CETA, there are three general education teachers (CEG teachers) and five technical education teachers (level of Agricultural Engineer).

Administrative personnel includes a director (agricultural engineer), a bursar, an accountant, one typist/secretary, two monitors, one storeclerk, and one nurse.

Presently, there is no high-level management personnel in training. Enrollment is at 400 students.

5. Major assets

a. CFTA of Doyaba

The building includes three classrooms with a capacity of 60 students each. As enrollment is high some rooms designed for the administrators and teachers must be used as classrooms and dormitories. There is an urgent need for additional buildings. There is a 45 m^2 laboratory but it is not equipped. The farm has an area of 140 ha of which only 40 ha are cleared. A tractor is available for training. The school has no audio-visual equipment, and the library contains only a few old books and some FAO magazines about tropical agriculture. At the beginning of the school year the students receive textbooks lent by the library, which they give back at the end of the year. The farm is used for practical course work, such as making plant beds, practicing crop techniques and using agricultural machines.

The school maintains contact with some employers, such as the ONDR. In extension matters they work with SONASUT for spray irrigation techniques on sugar cane and its industrial processing. Contacts with the IRCT are planned, with the intention of sending student trainees to work there.

b. CETA of Ba-Illi

The CETA has seven classrooms with a total capacity of 150 students. It also maintains dormitories for boarders and a school restaurant.

Documentation and textbooks are seriously needed by students and teachers. The farm is well equipped (supplies, buildings, irrigation system, livestock, plantation). Unfortunately, it succeeds neither in providing for the school's food needs, although it does contribute to its food supply, nor in enabling students to learn crop techniques. The lots are shared, there is not enough agricultural equipment, and the oxen are not always fit for work.

All of the farm's agricultural and educational equipment was plundered during the events of 1979 and the students have been transferred to the CFTA of Sarh.

B. Training Institutions for Animal Husbandry

1. National School for Animal Husbandry Technical Agents (ENATE-Ecole nationale des agents techniques de l'élevage)

The Ministry of Livestock and Rural Water Supply is the sponsoring ministry. Resources are state subsidized from EDF and FAC. Here senior extension officers are trained and, upon successful

completion of the course, are granted a Technical Agent Certificate for Animal Husbandry. Students are admitted who hold the BEPC degree or through competitive examination. This is a three-year program.

Subjects taught are: physics and chemistry, geography, mathematics, French, anatomy, physiology, microbiology, general pathology, general agriculture, pharmacology, animal pathology, general animal husbandry, nutrition, surgical pathology, animal production, parasitology, administration, cattle marketing, obstetrics, meat inspection and poultry breeding.

All graduates are employed by the Department of Livestock.

Human resources including permanent employees, and those in administrative training include two full-time and one part-time persons. There are also 17 teachers, of which ten are employed part-time. Staff recruitment needs for the next ten years are anticipated to be 14 teachers. Since 1979 there has been no budget.

The property was ransacked during the war.

2. University Institute for Animal Husbandry Techniques (IUTE-Institut universitaire des techniques de l'élevage)

The institute has been closed since the events of 1979. Students are admitted with the baccalauréat, and training lasts for three years, leading to the Degree of Engineer in Animal Husbandry Techniques. Thirteen students were granted diplomas in the last three years (1976, 1977 and 1978). Twelve graduates were employed by the Animal Husbandry Department and one by a multinational organization, the Lake Chad Basin Organization (CBLT-Commision du bassin du lac Tchad).

Working conditions are difficult, due to an inadequate operating budget and the lack of educational supplies and full-time senior technical teachers. IUTE is fortunate to have as part-time teachers some of the professors of the University of Chad and researchers, veterinarians and technicans from the Jarcha laboratory.

The research institution collaborates closely with the training and extension institution by teaching theoretical and practical courses and by communicating research results about epidemic diseases and immunization needed for animal health maintenance.

From time to time, the training institution receives extension agents for continued training sessions that last for three weeks.

The reopening of IUTE requires renovation of the school and university infrastructure, the development of a training policy for full-time faculty and researchers, and the securing of an operating budget.

C. Problems Identified

1. Human resources and working conditions

In general, education and training have not been neglected by the national government, which has granted them high priority.

The real problems for Chad in this field are lack of material and financial resources. The current priority is to re-launch essential activities in all sectors, which is not an easy task.

Besides the need for teacher training, there is a serious lack of the equipment and infrastructure necessary to improve working conditions.

In other words, good working conditions must be restored and a serious training policy must be considered for higher-level technical teachers, in order to insure the efficiency of future rural development officers in this country (agriculture, livestock, water and forestry).

2. General problems

Educational facilities suffer from a shortage of textbooks. The few available books are outdated and unsuited to local realities. There is no audio-visual equipment, although it is an important teaching aid. Practical training is limited by the lack of laboratory equipment.

Teachers are confronted with serious financial problems. The salaries of civil servants have stayed the same while prices have quintupled. This situation is common to all civil servants, but is worse for teachers because training institutions do not offer as many benefits as do other organizations (vehicles, decent housing, allowances).

For these reasons, teachers cannot remain up-to-date on developments in their fields. As a result, young teach ~ must continue to use older, and possibly less effective, techniques.

3. Relationship between training/research/extension

The few research institutes that exist in Chad (IRCT and DRA) have practically no effective relations with the training institutions, except for the use by DRA of the CETA farm at Ba-Illi for experiments; there again, students do not participate.

The extension institutions, such as ONDR and OMVSD, employ graduates from the training institutions with which they have no relations.

D. Recommendations

Because of the government's current financial difficulties, the training institutions must be supported by private organizations so they can continue to offer training to mid-level personnel, which are badly needed by the state.

To attract more teachers, an improvement of their prospects and status is in order. Teaching is now the least attractive position in rural development. Teachers should receive proper training so that they can effectively communicate knowledge and motivate students to take up careers in rural development.

Seminars should be organized so that teachers can keep abreast of new developments and adaptations in teaching agricultural education.

Training institutions could be associated with agricultural research facilities, since these establishments can be used as stations for plant breeding and improved variety experiments. They can also be used for research projects, especially in applied research.

In areas close to training facilities, extension activities could be carried out by students and supervised by teachers.

It is also necessary to improve the infrastructure, to build recreation rooms for students, to maintain sport facilities for their physical health, to increase the capacities of the dormitories in order to solve the housing problem, to set up well-equipped infirmaries, and to equip schools with audio-visual educational materials and laboratory supplies.

As the state needs more and more high-level personnel, it would be advisable to launch training sessions for agricultural engineers at the CFTA in Doyaba, which will work together with extension services.

V. AGRICULTURAL EXTENSION ORGANIZATIONS

A. National Office of Rural Development (ONDR)

1. Organization

The ONDR (Office national de développement rural) (created under Order No. 26 on July 23, 1965) for implementing development programs is a semi-public organization. The ONDR is under the authority of the State Ministry of Agriculture and Rural Development. In addition to implementing development programs, it supports the Ministry of Agriculture with management and equipment tasks, in the framework of the national development plans. (See Figure 6.)

The National Director of the ONDR is Mr. Gibrail Mikail, an agronomist, whose office is in N'Djamena. He is assisted by a secretariat, a Sub-Directorate for Administrative and Financial Affairs, and an Office of Evaluation and Programs. (During the last board meeting it was suggested that the directorate be converted to a general directorate.)

There are two sub-directorates responsible to the National Directorate. The distinction between the two is based on geographical factors. The Sub-Directorate for the Sudanian zone, located in Moundou, includes the five southern prefectures. Each county is divided into three ONDR technical districts, each of which is again divided into at least three rural development sectors. Altogether there are 99 sub-sectors which are under these sectors.

The Sub-Directorate for the Sahelian area zone, temporarily located in N'Djamena, does not have the same structure as the Sub-Directorate for the Sudanian zone, due to a lack of financial resources. This sub-directorate is supported by foreign assistance from the FED/FAC. Its headquarters will be moved to Abéché.

The Sub-Directorate for the Sahelian zone includes nine prefectures, seven sectors and 22 sub-sectors. If the National Directorate is converted into a general directorate, the sub-directorates will become regional directorates.

Note at the bottom of the ONDR organizational chart the extension unit responsible for basic agricultural extension at the village level.

2. Activities

The ONDR maintains the same priorities for its extension programs in both the Sahelian and Sudanian zones. Emphasis is placed on food and cotton crops, livestock breeding and training, although they are given less importance in the Sudanian zone than in the Sahelian zone.

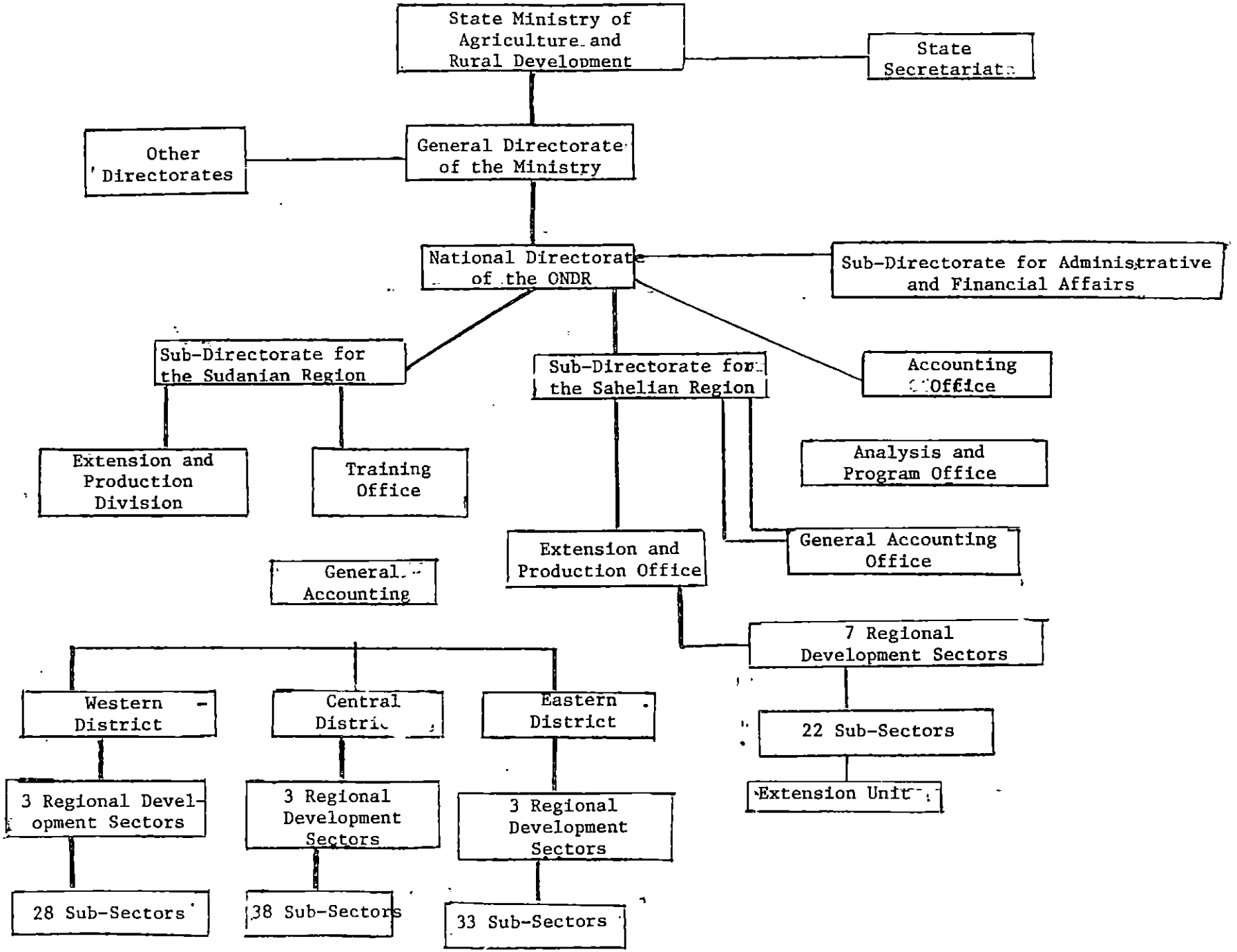

Figure 6 : Organizational Chart of the National Office for Rural Development (ONDR)

a. Sudanian zone

(1) Crops

The ONDR has targeted the improvement of agricultural techniques, such as early sowing, crop density, weeding, seed processing, stockpiling, and the use of selected seeds. The crops principally affected by the program are sorghum, millet, cotton, groundnuts and rice. In recent years maize has been the subject of increasing attention by the ONDR, because of the large area planted with maize.

(2) Livestock

The introduction of animal traction by the ONDR has necessitated instructing farmers in the training of draft animals, plowing, and disease prevention.

(3) Production systems

Much of the extension effort is directed toward the cotton crop, in an attempt to increase cotton productivity through input introduction.

(4) Other activities

The ONDR in this area also handles the training and follow-up supervision of farmers, in addition to the training of rural craftsmen such as blacksmiths.

b. Sahelian zone

(1) Agriculture

Efforts are focused on improving agricultural techniques, such as early sowing, crop density and weeding, seed and stock protection and the use of selected seed. The crops affected are millet, sorghum, berbéré and groundnuts.

(2) Livestock

Initiatives include animal traction and disease prevention among plough oxen.

(3) Other activities

These activities include training farmers at the village level.

3. Human resources

The human resources available to the ONDR can be evaluated on three levels: the National Directorate, the Sudanian zone, and the Sahelian zone.

a. National Directorate (N'Djamena)

There are 48 agents who work full-time at the Directorate office in N'Djamena. Forty-three of the agents are Chadian nationals and three are expatriates.

The National Directorate defines ONDR's general policy by outlining programs and setting goals. It is also in charge of ONDR relations with governmental and outside agencies. In addition, it coordinates and controls the activities of the sub-directorates. The Directorate's equipment and facilities include offices (destroyed during the war) and light vehicles.

b. Sudanian zone

Most of the ONDR's personnel and material resources are located in this area. There are 1,308 full-time agents, distributed among the various sectors as follows: at the office of the sub-directorate in Moundou, 104 nationals and eight expatriates; at the district and sector levels, 99 nationals and six expatriates; at the sub-sector level, 136 nationals; and on the village level (basic work), 955 nationals.

The staff is broken down as follows:

- Deputy director and his assistants;
- Department heads;
- Heads of units;
- Special operations leaders;
- District heads;
- Sector heads;
- Sub-sector heads; and
- Basic workers.

The staff is responsible for: coordinating and controlling activities, determining production goals and extension themes in order to adapt them to local conditions, following up and controlling the implementation of activities for the extension of production, drawing up reports and technical briefs, training and supervising farmers, training rural craftsmen (blacksmiths), distributing supplies (inputs) and controlling stocks, following up on repayments by cotton growers, and measuring and following up production.

The equipment and facilities available for the staff include offices, garages, warehouses, trucks and light vehicles.

c. Sahelian zone

There are no expatriates working in the Sahelian zone. 219 nationals work there full-time, with the following locational breakdown: 14 at N'Djamena, 30 at the sector level, 20 at the sub-sector level, and 155 at the village level.

The staff is small, since many agents fled during the war to larger cities or to the south of the country.

The reduction of activities in this part of the country has meant a reduction in supervisory tasks. They involve:

- o Training (extension) of farmers;
- o Collection of data on the agricultural situation;
- o Follow-up and control of program implementation in the field; and
- o Assessment of and reports on agricultural performance.

As a result of the war, however, there is a lack of personnel, vehicles, office space and warehouses, both in the field and at the main office.

d. Breakdown of administrators and extension agents by area of specialization

(1) National Directorate Office

The following personnel work at the main office: two agronomists, three agro-economists, five generalists and 34 administrators.

(2) Sub-directorate for the Sudanian zone

At this level, personnel include three agronomists and 31 generalists. At the sector level, there are 23 staff members, 125 at the sub-sector level, 955 in the village. There are 14 additional staff members. In addition, there are 780 administrators in the main office, 76 in the sectors and 11 in the sub-sectors.

(3) Sub-directorate for the Sahelian zone

The personnel at this sub-directorate consists of: two agronomists and three generalists at the main office, 13 generalists at the sector level, 20 at the sub-sector level, and 155 at the village level. There are nine administrators in the main office and 17 at the sector level.

e. Educational levels of national personnel

All staff members are male. The levels of education completed by staff members are as follows:

- Three with the baccalauréat (BAC) plus five years or more of higher education;
- Two with the BAC plus four years;
- Nine with the BAC plus two or more years;
- 63 with the BEPC plus two years;
- 145 with the BEPC (BEA); and
- 1,103 at a level lower than BEPC.

The ONDR does not train agents itself, but recruits its staff members from among students or trainees sent abroad by the government. Agents are appointed by the ONDR after they have completed their studies or training abroad.

In order to implement rural development programs in the Sudanian and Sahelian zones, a total of 5,619 basic workers should be recruited. Recruitment of supervisory personnel at a higher level has not yet been considered on a large scale.

The following numbers of additional personnel should be trained to meet the country's needs: eight people with the BAC plus five years of additional education, 13 with the BAC plus three years, 25 with the BEPC plus three years and 50 with the BEPC.

4. ONDR estimated budget (three year average)

a. Sudanian zone

In addition to the subsidies allocated by the state and Coton-Tchad, the Sudanian zone receives foreign assistance from the FED and FAC.

The investment and operations budget for the last three years averaged FCFA 210 million per year for investment and FCFA 600 million per year for operating expenses. Approximately FCFA 3 billion per year is also allocated to cotton production.

b. National Directorate

Following the war, the National Directorate did not resume its activities until September 1982. It does not receive any external funds, but operates on funds allocated to the Sudanian zone.

c. Sahelian zone

This area has not been allocated a budget since 1979.

5. Extension results

Technical newsletters are rarely published by the national office, but technical reports and monthly briefs about agricultural activities are numerous. There are also memoranda and technical bulletins.

Meetings between agents and farmers are organized by zone rather than by type of crop produced.

Radio programs dealing with seasonal extension subjects are broadcast on all three national channels.

There are few demonstration fields for food crops, but many exist for cotton crops.

6. Coordination between research and extension

Each year the ONDR receives selected seeds for diffusion from the agricultural research stations in Déli and Dougui. For the most part, however, coordination between the research facilities and the ONDR is rare, especially concerning the elaboration of research programs for food crops.

By contrast, there is close collaboration between the IRCT and the ONDR in the area of cotton crops. These two agencies consult with each another to plan varietal experiments on demonstration fields and the pre-extension of pesticides.

7. Problems identified by personnel

a. Budget

The operations and investment budget are extremely important to the smooth operation of the office. An inadequate operating budget can lead to unpaid salaries and, therefore poor performance by workers, and to a lack of office supplies and fuel for vehicles, which could halt work.

The investment budget comes into play only where extension agents' work is involved. In this case, since agents must travel continually, a lack of fuel or vehicles will stop work entirely.

b. Personnel

The quality of personnel is very important to good work performance.

A study has been made of the senior technical personnel. Because the senior staff is responsible for devising action plans and for assessing their results, the success of the extension program depends on their qualifications.

Since the supervisory work of lower-level field employees is essential to the smooth operation of all activities, these employees must be adequately qualified and have high moral standards.

Any innovation brought about by an extension program can only be successful if it is accepted by the farmers. Their refusal to accept new techniques obstructs the extension agents' work.

c. Means of production

The lack of means of production might jeopardize the implementation of an entire program. For the farmers in Guelendeng, and for farmers in general, the two most serious problems affecting production are:

- o The lack of or delay in the supply of means of production; and
- o The continually increasing fees they must pay due to a drop in subsidies provided by the government and international organizations.

8. Conclusions and recommendations

Although the lack of infrastructure (offices and warehouses in poor condition as a result of the war) and of a framework for extension (lack of personnel) in the Sahelian zone hinders the recovery of agricultural activities, the ONDR generally has sufficient supervisory personnel and infrastructure to accomplish its mission of agricultural extension. Nevertheless, the lack of a training policy and the lack of coordination between research and extension to improve extension programs for farmers must be examined. Recommendations are:

- o To implement a retraining and instruction program for ONDR workers and agents to improve their skills and to make them more successful in performing their work;
- o To develop a system for training and directing farmers;
- o To develop communication between research organizations and the national office. In order to facilitate this arrangement, someone from the ONDR should be put in charge of coordinating research-extension relations;

- o To free supervisors from their duties in administering stocks and directing marketing and to let them concentrate on extension; and

- o To help the ONDR to improve existing extension structures and to create new ones in areas lacking such structures, in order to give producers better supervision.

B. Directorate for Livestock

1. Activities and budget

The sponsoring ministry for the Directorate for Livestock is the Ministry of Livestock and Rural Waters.

Its activities deal with animal health and cattle production, health protection groups and the control of glossina.

The area is divided geographically into districts, veterinary sectors and veterinary posts. Ecologically, it is divided into the Sahelian and Sudanian zones.

In 1981 the budget for the Directorate was FCFA 195,033,000.

2. Human resources

In the main office there are two range managers, one animal scientist, seven veterinarians, 11 administrators, 21 other workers (orderlies, interpreters, carpenters, bricklayers and mechanics), and 39 drivers for the main office and the other areas.

In the Sudanian zone there are two veterinarians and three animal scientists. In the Sahelian zone there are six veterinarians and seven animal scientists.

The educational level of the personnel is as follows: 17 employees have the BAC plus five years or more of additional education, 12 have the BAC plus three or more years, 54 have the BEPC plus four or more years, and 261 have the BEPC plus three years or more. A total of 400 staff members should be trained in the next ten years.

The problems, as identified by personnel, are the inadequacy of the investment budget and a lack of senior technical personnel (there is one veterinarian for every 250,000 head of cattle). The senior technical personnel are often overworked and there is are not enough lower-level extension agents to supervise the cattle breeders.

3. Extension results and the coordination between research and extension

Farmers' meetings (health protection groups) represent an important result of the extension program. In the Sudanian zone, vaccination and parasite control campaigns are underway, along with the distribution of feed supplements to cattle.

As for the coordination of research and extension programs, extension agents are responsible for applying research results in the field (for example, disease detection and diagnoses). Preventive health care measures were taken through an immunization campaign (the vaccines were provided by the research institute). Researchers help extension agents to track down diseases by analyzing the various samples submitted by cattle breeders. Vaccines are then manufactured to protect the livestock.

4. Activities

a. Animal health

The activities are the following:

- Establishment of diagnoses and treatment of diseases;
- Conduct of vaccination campaigns according to animal planning; and
- Reports on epizooties.

b. Cattle production

In this area, activities include:

- Livestock processing, control of livestock trade; and
- Statistics and follow-up, pertinent to slaughtering and meat production.

c. Health protection groups

These health protection groups are associations of farmers belonging to the same villages or cantons, owning cattle (traction oxen at present) and sharing the supplies made available to them by the Directorate for Livestock. There are 182 groups, supervised by 41 cattle breeding technicians.

5. Summary of problems and recommendations

The main problems cited by the personnel are:

- Interruption of access to research because of the research laboratory closing during the war;

- o Inadequacy of liaison resources and intervention equipment;
- o Inaccessibility of certain areas for extension work; and
- o Insufficiency of technical personnel and investment budget.

Recommendations for improving the situation include the training of an adequate number of extension agents and providing enough equipment for field work.

6. Constraints

The results of the survey on constraints highlight the following points:

- o Physical factors (rainfall, drought);
- o Factors relating to food (forage);
- o Water supply;
- o Animal health (disease);
- o Social/traditional factors;
- o Economic factors; and
- o Other factors (civil war).

The current level of national animal production is 75,675,910 kg of meat, 1,314,796 skins, 4,000,000 chickens, 1,200,000 liters of milk and 1,000,000 eggs.

Possible long-term yields are 94,594,887 kg of meat, 1,643,495 skins, 5,000,000 chickens, 1,500,000 liters of milk and 1,250,000 eggs.

7. Conclusion

This study could constitute a valuable working tool. Unfortunately, insufficient time was allowed for the preparation of the study. Field trips to the provinces are necessary to complete certain information and to interview producers.

The following are development projects that could improve the farmers' lives and work, and that could be undertaken within one year:

- o Extension activity to improve the breed of roosters;
- o Revival and creation of village poultry breeding centers;
- o Creation of a hatching center to produce chicks for distrubution;

- o Reopening of the Iffenate cheese factory;
- o Creation of new health protection groups in the Sudanian zone;
- o Replenishment of livestock herds in the Sahelian zone;
- o Well-drilling and creation of artificial ponds;
- o Revival and creation of training centers for cattle breeders;
- o Development of efforts to save calves; and
- o Improvement of the milk collection circuit in rural N'Djamena.

C. Water and Fisheries Division and Directorate for Waters and Forests

This type of extension falls under the Water and Fisheries Division of the Directorate for Water and Forests, which is under the supervision of the Ministry of Tourism, Small-Scale Industry, Water, Forests and Hunting. It has had no operating budget since 1979.

1. Activities

The principle activities are:

- o Expanding the use of meshing nets made with synthetic material, of stable boats made with nailed planks, and of outboard motors;
- o Disseminating modern methods of improving fish processing (drying, salting, smoking), preservation, marketing (cooperative administration) and coordination of commercial networks; and
- o Encouraging farmers to develop fish breeding in order to provide greater protein intake. This action affects the Lake Chad area and the wet areas in the south of the country, namely Lake Chad, the Chari and Logone rivers, including their flood plains, the Salamat basin, and the Lèrè and Fitri Lakes.

2. Human resources

The staff of the Water and Fisheries Division is composed of one forestry engineer, who is the head of the Division (BAC plus four years), three engineers for forest works, including two heads of services (BAC plus two years), and one technical assistant for forestry works (BEPC plus three years) responsible for practical work.

These civil servants live in N'Djamena and travel to the fishing areas. The 30 forestry agents specializing in fisheries are divided among the principal districts involved in fish production. They work under the direction of five Chief Forestry Inspectors and their assistants (Lake, Chari-Baguirmi, Mayo-Kebbi, Logone and Moyen-Chari). The Chief Inspectors are forestry engineers, and the agents have the BEP. There are no women working in the department. Three staff members are being trained abroad: a senior engineer (BAC plus four years), a construction engineer (BAC plus two years) in Ivory Coast, and one technical assistant (BEPC plus three years) in Cameroon.

In the next ten years the Water and Fisheries Division will need 40 more staff members, ten senior exectives and 30 extension agents.

3. Extension results

Extension actions have involved all fishing areas, and the above-mentioned campaign for spreading modern methods has been successful. The ability of many fishermen to read and write facilitates the extension agents' work.

Before the events of 1979, ORSTOM which specialized in hydro-biological research, disseminated the results of their research (for example, statistics, fish migration, ecosystem disruption). This organization also trained lower-level personnel and took part in meetings and seminars. The two institutions had an excellent working relationship. Unfortunately, there is no longer have a research and documentation unit.

As far as fish breeding is concerned, we are still in the experimental stages. A few ponds have been created around N'Djamena and in Bongor, a city 250 km from the capital.

The results are encouraging. This operation was designed to supply protein intake in addition to that provided by fish caught in rivers, lakes and ponds. It should be extended to all sites.

In the area of forestry, the Acacia Albida operation has been favorably received by farmers. Unfortunately, the implementation of this project had to be suspended due to the war.

4. Problems and recommendations

All work materials and equipment (vehicles, furniture, fishing gear, documentation) were destroyed during the war, making it impossible for the Water and Fisheries Division to operate in the field at present. The Division is counting on newly-initiated projects to enable it to resume its activities.

The Water and Forests Department, especially the Water and Fisheries Division, should be equipped with the proper infrastructure to improve the extension system for fishing methods, fish breeding and forestry within the next ten years (forestry research unit, hydro-biological research unit, training center for extension agents,

vehicles, audio-visual equipment, detailed documentation, the possible financing of fishing activities).

Recommendations for improving the extension system include: reorganizing the office, improving working conditions, training supervisory personnel and creating research units.

5. Production targets

On a short-term basis, production could double if new technologies were used; nonetheless, production would be closely linked with climatic conditions.

Short-term production targets are the association of the agro-sylvo-pastoral techniques which are still traditional, and the experiments with Acacia Albida, which were interrupted by the war and have not yet produced any results.

Long-term production could triple if all constraints were eliminated. As for long-term production planning, the following data on the production of gum arabic in the Ouaddi, Biltine, Batha and Lac-Kanem regions is illustrative. The Agro-sylvo-pastoral system production from 1968-1975 was 3,291 tons, with a gradual drop in tonnage. From 1970-1971, gum arabic production in the Tourba region (Chari-Baguirmi) through the EDF project was very low, at about 31,204 tons. In 1976-1977, the Chad CARE Project for the extension of Acacia Albida produced 350,000 plants, of which 175,000 are still living. This project, suspended during the war, was very favorably received by the farmers, who look forward to its reactivation.

Recommendations for improving the extension system include: reorganizing the office, improving working conditions, training supervisory personnel, and creating research units.

6. Constraints in agro-forestry

Physical constraints are basically due to the climate, leading to desert encroachment and soil erosion. Socio- additional causes are the following:

- o The land tenure system, in which forests are state-owned, and there is little interest in preserving natural resources;
- o Cultural customs;
- o The reluctance of farmers to try new techniques;
- o Agricultural nomadism which leads to desert encroachment; and
- o Population growth (pressure on plant and animal resources).

There are three economic constraints: First, wood is a source of revenue for some farmers, so there is excessive felling; second, the marketing network is in complete disorder, and third, there is no commercial policy. Alternative energy sources are lacking as well. Overall constraints are an inadequate forestry policy and a lack of understanding of the philosophy of environmental conservation.

a. Research for overcoming the constraints

The following research projects are necessary to overcome constraints in the agroforestry sector:

- Sociological study of urban and rural populations;
- Study of commercial marketing channels, of possible energy substitutes so as to preserve the wood resources and control the desert encroachment process (organic gas, solar powered ovens);
- Study of local forestry and forage species which are hardy, fast growing and bring high yields;
- Production increase and control over natural pastures;
- Study of species which will enrich and restore the soil and result in production increases;
- Research on pasture development to alleviate livestock pressure on forests;
- Extension of the use of improved stoves;
- Continuing training and information for farmers;
- Collaboration between the Departments of Water and Forestry, Cattle Breeding and Agriculture, to achieve an integrated rural development effort;
- Acacia Albida operation, launched in 1976-77; although suspended due to the war, the project had been favorably received by all concerned populations; and
- The need for long and short-term research and extension personnel:

  --Short-term personnel needed are adminstrative/scientific (5 percent), services (20 percent), extension (30 percent) technical administrative (5 percent), local or village labor (men-30 percent, women-20 percent); and

  --Long-term personnel needed are administrative/scientific (10 percent) services (50 percent), extension (60 percent), technical administrative (10 percent), local or village labor (men-40 percent, women-20 percent).

b. List of constraints

The constraints hindering agroforestry efforts are the following:

- o Physical constraints: climate (rainfall deficiency and drought) and constant soil erosion;
- o Social and traditional factors: farmers are not motivated to protect forestry resources and plant trees; they are only interested in the forest as it relates to their own needs (heating and household wood, forage). Furthermore, conflicting land use interests (farmers and cattle breeders) and the recent war have severly damaged the environment; and
- o Economic constraints: the sale of gum arabic and forestry products provide the farmers with significant revenue. This prompts them to use more plant material, depleting resources which cannot be renewed in the near future.

7. Constraints in the fisheries sector

The most serious constraint to production yields is the drought which has prevailed in Chad for several years and has had disastrous consequences for fishing activities, including drops in river and lake levels, some of which even dried up totally; this situation was worsened by the diversion of the Logone and Lake Chad waters by neighboring countries. However there are still a few areas rich in fish where most fishing activity is concentrated.

Inadequate rainfall and intensive water pumping for agricultural purposes has resulted in a reduction of the surface of flooded valleys and, therefore, lower fishing production. Fishermen have been trained by the Fisheries and Fish Breeding Department, and now have a reasonably good technical level. Fish are increasingly rare on the market, which results in higher prices. Access to fishing spots is relatively difficult due to the poor condition of the roads and trails; there is also no adequate means of transportation for the rapid transport of fish to consumer centers. Illegal exportation of fish to Nigeria is increasingly common. Since 1979 the Water and Fishery Division has lacked funds to carry out its duties, namely the development of fishing and fish breeding activities. Projects have been designed and submitted to financing agencies without any concrete results. No subsidies are available to fishermen.

The war has deeply disrupted fishing activities; fishermen are concentrating efforts in some areas, neglecting other areas abounding in fish because they are insecure. There are frequent tribal disputes about fishing rights.

There are no port facilities and no hydrocultural basins. A few fish breeding ponds have been set up around N'Djamena and in Bongor, 250 km from the capital.

In high water level periods, fresh fish production was about 90,000,000 to 110,000 tons. It is currently only 60,000 tons due to the drought.

a. Research to overcome the constraints

In the short term, the following research projects are necessary:

- Research on the possibilities for increasing production, supplying the market with fresh fish, effectively implementing the fishing regulations, training technical and research personnel, and creating reserves for fish reproduction;
- Biological and migrational studies on species with economic potential;
- Socioeconomic and statistical studies;
- Intensification of the extension system;
- Training and refresher courses for senior personnel and extension agents;
- Documentary research; and
- Search for the necessary financing sources for implementing projects on fishing activities.

Research and actions needed to reach the long-term production goals are:

- Creation of a hydrological research unit;
- Training of senior technical and research personnel;
- Financing and follow-up of projects;
- Protection of the river banks in order to regulate the rivers;
- Improvement of roads between fish production areas and retail markets; and
- Documentation and information exchange.

b. Needs

The market price of fish is rather high and can cover production prices for the next few years. Unfortunately, it is very difficult to obtain investment funds for this sector.

Fishing input is available when desired. Water and Forestry Division Agents are well trained in fishing matters and the efficient supervision of fishermen. They are always available.

Access to the markets is made difficult by the scarcity of roads and vehicles and by their poor condition. The extension process nevertheless has penetrated the fishing sector well, and it is easy to acquire information of all sorts.

The extension of modern resources and methods for improved processing, conservation and marketing of fish products has been favorably received by the fishermen, who for example, would only need a small subsidy in order to deliver various forms of fish in quantity and quality to consumers (fresh fish, salted dried fish, improved smoked fish, etc.).

In terms of human resources, the following percentage increases above the current levels are needed:

- o In the short term: research, administrative, scientific (45 percent), services (35 percent) local or village labor (50 percent--45 percent men and 5 percent women); and
- o In the long term: research, administrative, scientific (80 percent), services (60 percent), local or village labor (80 percent--70 percent men and 10 percent women).

Lower-level personnel responsible for extension is composed of forestry agents trained on the job and called Fishing Supervisors. Their number should be increased so as to reach 80 percent of the staff needed to develop fisheries within ten years. A part of the existing technical personnel can specialize in research until new researchers are trained. No woman has yet undertaken a career in Water and Forestry. Department officers should attend to this problem, as it has been noted that women are better at laboratory and plant nursery work than men.

c. Comments

Since 1979 infrastructures have been destroyed and personnel has been scattered throughout the country without any working equipment. This is why 1976-1977 and 1978 are used as reference years. Even using these early references, there was not enough time to collect the needed information, some of which required field trips.

D. Conclusion

In the fishing and fish breeding sector, the inertia of the Water and Fishery Division, due to the total lack of resources, has prevented the technicians from carrying out any field work. Many programs which had been planned could not be implemented, such as: the collection of statistical data, the grouping of fishermen into pre-cooperative units, the diffusion of improved methods for processing, preserving

and marketing fish, the training of extension agents and the supervision of the fishermen. The current, urgent need for animal protein for human consumption demands that fishing activities be developed now to improve the national standard of living. The fishery projects submitted to the various agencies for financing must be approved before improvements in the standard of living can be realized. The projects should aim at the following actions:

- Encouraging farmers to plant trees and protect natural resources;
- Researching alternative economical energy sources to substitute for wood which is increasingly used in Chadian households;
- Developing natural regeneration and planting of legumes for cattle feed and soil fertilisation; and
- Developing and controlling natural pasturelands.

For fishery, as well as for agroforestry, there is an urgent need to train new technical and research staff. Information exchange about research results should be coordinated on national and regional levels. Communication lines should be established between the Water and Forestry Department, the Ministry of Animal Husbandry and the Department of Agriculture, in the hope of avoiding the frequent land use conflicts common in Chad.

The following projects have been submitted to financing agencies but have not yet been approved for funding:

- Fishery strengthening project;
- Fishery development project (cooperatives);
- Project to improve fishing products in the Chari-Baguirmi;
- Fish breeding ponds creation project;
- Sylvo-pastoral development project (Chari-Baguirmi)[a];
- Integrated development project for the Logone region (Acacia albida)[a];
- Project to create green belts around large urban centers[a];
- Natural gum plants development project[a]; and
- Development project for the wildlife reserve at Lere-Binder.

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[a]These projects have been suspended due to the war.

E. The State of Inter-Institutional Relations

These relationships have already been described in the preceeding chapters on the research, extension and training sectors.

In general, the relationships are weak and undeveloped. However, for maximum benefit to the farmers, these sectors must be linked in some way.

This linkage should take the form of a scientific and technical committee to be called the Agricultural Development Committee. This committee would then be able to define a coherent development policy which emphasizes agricultural research designed to solve problems which have been identified by the farmers themselves.

Results from extension research efforts must be accorded more importance and brought to bear upon future agricultural research which could eventually improve the farmers' standard of living. Unfortunately, this kind of relationship has not yet existed between ONDR and DRA.

VI. CONSTRAINTS ON AGRICULTURAL PRODUCTIVITY

A. Sudanian zone

The years considered in the survey are 1980-1982.

1. Sorghum

The surface area currently sown borders on 493,000 ha with respective yields of 650 kg per ha, 700 kg per ha and 749 kg per ha.

a. Constraints

The constraints to the outputs of these three years are, in order of importance:

- o The quality of the seeds (varieties);
- o The pernicious effect of the weeds, especially striga;
- o The reduction of the stock of agricultural equipment because of the war (with a lack of equipment replacement and replacement parts) reducing the surface area ploughed;
- o Rainfall and in particular its distribution; and
- o Diseases and parasites;

As part of a development program project for rainfed crops outlined for this zone, the additional surface area to be cultivated in the next few years is estimated at 32,860 ha with an annual yield of 700 kg per ha for the next five years and 1,500 kg ha in the long run.

The actions to undertake to realize this increase in yield are:

- o The strengthening of the managerial staff (22 percent);
- o The improvement of growing techniques;
- o The use of improved seeds; and
- o The growing of sorghum in rotation with cotton which will receive 100 kg/ha of NPKSB; sorghum will then make the most of the after-effects of this fertilizer.

In the longer term, the direct application of 50 kg per ha of urea on sorghum or on sorghum after cotton which will receive 100 kg per ha NPKSB + 50 kg of urea.

b. Urgent matters

Concerning the degree of urgency in achieving results in both the short- and long-terms, the surveys give the following results:

In the short-term, the agricultural inputs must be available, the producers should have access to the extension sources and the extension themes must be viable.

In the long term, the following topics will be important--market prices, investment credits, available inputs, access to extension and the viability of extension themes.

2. Millet (1980-1982)

The present surface area for millet is: 168,000 ha with yields of 740 kg per ha, 750 kg per ha, and 640 kg per ha in 1980-1982.

a. Constraints

The constraints to the agricultural productivity of the producters of this crop are the following:

- o Seeds (quality of varities);
- o Rainfall (quantity);
- o Rainfall (distribution);
- o Weeds;
- o Diseases (anthrax);
- o Insects (borers); and
- o Reduction of the stock of agricultural equipment

There is no plan of action for improving the productivity of millet.

b. Urgent matters

The short-term priorities are market prices, access to extension and the liabiltiy of extension themes.

3. Groundnuts (1980-1982)

The surface area presently cultivated spans 100,000 ha. The yields of the past three years have been respectively, 869 kg per ha, 730 kg per ha, 777 kg per ha.

a. Constraints

The constraints on the production of groundnuts are as follows:

- o Varieties;
- o Prices fixed by companies (Coton-Tchad);
- o The marketing network;
- o The reduction of present stock of farm equipment (animal traction);
- o Deficient and unevenly distributed rainfall; and
- o Weeds.

The possible short-term yields are 1,000 kg per ha. The possible long-term yields are 2,000 kg per ha.

The additional surface area to be cultivated covers 43,500 ha.

b. Action to undertake

Actions are to be undertaken on two levels. In the short term, they are the following:

- o Regionalization of crops;
- o Strengthening of training through higher quality and numbers;
- o Improvement of growing techniques;
- o Improved seeds;
- o Processing of seeds and stocks; and
- o Groundnut rotation, using 100 kg of NPKSB or of superphosphate given the current lack of a chemical mixture better suited to groundnuts.

In the long term, the following actions must be added to the actions cited above:

- o Herbicide treatment; and
- o Groundnuts in rotation with cotton with a supply of 100 kg per ha of NPKSB or of superphosphate.

c. Urgent matters

The most urgent priorities for the short term are the following: market price, agricultural inputs, access to extension services, and the viability of extension topics.

In the long term, attention must be directed to: market prices, land tenure security, access to investment credits, agricultural inputs, and extension.

The percentage of the staff to be recruited is 22 percent.

4. Cotton

The reference years are 1980-1982. The yields are respectively, 514 kg per ha, 533 kg per ha and 741 kg per ha. The surface area presently under cultivation spans 12,000 ha. The short-term yields could be 1,000 kg per ha, those in the long term 1,400 kg per ha. The additional surface to be cultivated spans 30,000 ha.

a. Constraints

The principal constraints in this area are:

- o Poorly adapted soil that is eroded in certain regions and diminishes the surface area to be farmed;
- o Reduction in the use of animal traction;
- o Fixed prices by Coton Tchad;
- o Insects;
- o Agricultural credit (tax) which increases when the percentage of subsidies decreases; and
- o Rainfall (quantity and distribution).

b. Actions to undertake

Actions shoud be undertaken on two levels. In the short term, the priorities are the following:

- o Regionalization of crops;
- o Strengthening of supervisory personnel through higher quality and numbers: one supervisor for 100 ha;
- o Increased use of animal traction;
- o Improvement of growing techniques; the supply of 100 kg per ha of NPKSB; and
- o Phytosanitary treatment.

In the long term, the priority areas are market prices, confidence in land security, access to investment credits, agricultural inputs, and extension.

The percentage of personnel to be recruited is 22 percent.

5. Rainfed rice

The reference years are 1980-1982. The yields were respectively 1,028 kg per ha and 561 kg per ha. The surface area under cultivation spans 40,000 ha. The short-term yields could reach 2,000 kg per ha; those in the long-term 2,500 kg per ha. The additional surface area to be cultivated spans 5,000 ha.

a. Constraints

The constraints are as follows:

- Rainfall;
- Varieties;
- Prices;
- Marketing network;
- Difficulties with parasites and weeds; and
- Predators (granivorous birds).

b. Action to undertake

The actions to undertake in the short term are the following:

- Inventory of sites;
- Improvement of growing techniques;
- Supply of fertilizer at 100 kg per ha;
- Improved and processed seeds;
- Processing of stocks; and
- Increasing the number of supervisors.

In the long term, priority actions include the supply of 100 kg per ha of NPKSB plus 50 kg of urea, and the supply of herbicides.

c. Urgent matters

There are priorities on two levels. In the short-term, priorities are market prices, inputs, extension topics, and investment credits. In the long term, priorities include prices, investment credits, inputs, access to the market, and extension.

The percentage of personnel to be recruited is 13 percent.

6. Lowland rice

The reference years are 1981 and 1982. The yields were 1,000 and 1,200 kg per ha. This project has just begun, and is at the stage of canvassing sites to effect the program. The surface area currently under cultivation covers 2,600 ha.

a. Constraints

The major constraints to the cultivation of this crop are as follows:

- o Sites (soils);
- o Predators (granivorous birds);
- o Market prices;
- o Marketing;
- o Rainfall; and
- o Weeds.

b. Urgent matters

The highest priorities are the following: price, inputs, and the viability of extension themes.

B. Sahelian Zone

1. Millet

The reference years are 1981-1983. Yields for these three years were 450 kg per ha, 350 kg per ha, and 300 kg per ha. Short-term yields could have reached 600 kg per ha. There is no program for the development of long-term yields. The area under cultivation is 300,000 ha, and additional surface is 100,000 ha.

a. Constraints

Major constraints to the production of lowland rice are as follows:

- o Climate;
- o Rainfall (quantity, distribution);
- o Weeds;
- o Insects;
- o Varieties/species;
- o Labor;
- o Animal traction; and
- o Land organization.

b. Actions to undertake

The actions that should be undertaken include:

- o Weeding and early sowing;
- o Protection of seeds;
- o The conservation of stocks with complementary actions such as support research to test species comportment and cultivated varieties and to perfect the most adaptable techniques; and
- o Studies that will improve knowledge of the zone of action.

c. Urgent matters

The highest priorities are land security, access to extension, access to markets, viability of extension topics, and availability of labor.

The percentage of personnel to be recruited is 25 percent.

2. Sorghum

The reference years are 1981-1983. The yields for these years were 500 kg per ha, 350 kg per ha and 300 kg per ha. They could climb up to 750 kg per ha in the short term. No program is envisioned in the long term.

a. Constraints

The constraints mentioned for this area are:

- o Rainfall (quantity and distribution);
- o Insects;
- o Varieties;
- o Granivorous birds;
- o Animal traction;
- o Land organization;
- o Prices; and
- o Agricultural labor.

b. Short-term actions

The short-term actions affect the improvement of growing systems, seed protection, and the conservation of stocks.

c. Urgent matters

The highest priorities are access to extension; the viability of extension topics, confidence in land security; and access to the marketplace.

The percentage of personnel to be recruited is the same as for millet.

3. Flood recession and rainfed rice

a. Constraints

This crop came into being with the recession of Lake Tchad in April and May with the development of the cycle during the rainy season. The water problem is unimportant, the only problems are:

- o Weeds;
- o Granivorous birds;
- o Varieties;
- o Marketing; and
- o Zonal planning.

b. Yields

The reference years are 1980-1981 and 1982. The yields averaged four tons per ha. There is no program dealing with the short-term yield. The additional surface to be cultivated spans 120 ha.

4. Groundnuts

The reference years are 1980-1982. The recorded yields were respectively 550 kg per ha, 500 kg per ha, and 400 kg per ha. The short-term yields could reach 680 kg per ha. There is no program envisioned on long-term yields. The surface area currently under cultivation is 19,000 ha. The additional surface area that could be cultivated is 300 ha.

a. Constraints

The constraints in this area are:

- Climate;
- Rainfall (quantity and distribution);
- Soil;
- Varieties;
- Insects and weeds; and
- Animal traction.

b. Short-term actions

The actions to undertake in the short term are early sowing, density and weeding, improved seeds, adapted growing techniques, and support research to test the comportment of varieties and cultivated species.

c. Urgent matters

The areas of highest priority are market prices, land tenure security, extension, inputs, and access to markets.

The percentage of personnel to be recruited is the same as for millet, sorghum, and groundnuts.

5. Cotton

a. Constraints

The constraints mentioned in this area are:

- Climate;
- Rainfall (quantity and distribution);
- Soil;
- Animal traction; and
- Marketing.

The reference years are 1976, 1977, and 1978. The observed yields were respectively 425 kg per ha, 593 kg per ha, and 300 kg per ha. The surface area currently under cultivation spans 3,000 ha.

b. Actions

No short-term or long-term program is envisioned.

VII. CONCLUSION

On a quantitative scale as much as on the level of distribution, rainfall remains the primary constraint to agricultural production, especially in the Sahelian zone.

Other factors are the damage inflicted on the crops by pests, the price of agricultural products, and the varieties.

The improvement of conditions favoring agricultural productivity will find its solution in:

- The development of irrigated crops (alongside rivers and temporary water flows), the complement of dryland crops;
- Making quality seeds and the means with which to fight crop predators available to farmers;
- The study of prices and marketing channels; and
- The institution of agricultural credit.

The following is a list of projects to improve farm production. Projects are divided into three subsections: those to be administered by the Department of Agriculture, the Department of Animal Husbandry and Rural Water Infrastructure, and the Department of Water and Forests.

A. Department of Agriculture

The current policy of this department is oriented towards self-sufficiency in food production. It is also trying to revitalize activities at agricultural production units which were discontinued because of the war. Among others, the following must be revived.

- The Office of Development of the Plains Area of Sategui-Deressia (OMVSD);
- The Lake Chad Development Society (SODELAC);
- The National Office of Rural Development;
- The irrigated rice fields of Bongor; Biliam Oursi, Doba, etc.;
- The reopening of the College of Ba-Illi and the reorganization of the Doyaba Center; and
- The re-undertaking of agronomic research activities on food crops.

The Development Office of Sategui-Deressia is a rice production and supervision organization concerned with every aspect of rice production, marketing and usage.

SODELAC, a company concerned with the regional development of Lake Chad, emphasized agricultural development.

As cotton is currently considered to be the principal source of revenue in Chad, it often eclipses the official policy of self-sufficiency in food production. For this reason, cotton production constitutes an important part of the agricultural policy of the Third Republic.

A study is now underway of the restructuring and revitalization of the Office of Rural Management (ONDR). While awaiting study results, it is imperative to begin improving workers' qualifications and increasing their numbers while upgrading their working conditions.

For agronomic research on food crops, the following actions are prescribed:

- o Varietal improvement. Chadian agricultural efforts are deeply affected by severe climatic conditions and their effects. Yet better strains of seeds, resistant to drought and local diseases are not generally known by the farmers. The availability and distribution of such seeds should be the priority for the Plant Improvement Section of the Division of Agronomic Research;

- o Agronomic testing should accompany plant improvement; and

- o Plant protection policies should be improved and intensified.

In conclusion, short-term agricultural development activities should be focussed on food crop production through:

- o The revitalization of existing foodcrop production units;

- o The resumption of agronomic research activities;

- o The training of qualified persons for management, research and training; and

- o Serious study of teaching agricultural researcher statutes.

B. Animal Husbandry Department

Like the Department of Agriculture, activities and projects of the Animal Husbandry Sector should further national policy goals of self-sufficiency in food production. In this regard, the timely initiation of the following projects is imperative:

- o Extension programs for better breeds of roosters in rural environments;

- o Revitalization and creation of village poultry centers;
- o Incubation center for hatching chicks to be used in extension efforts;
- o Making the dairy farm at Iffenat operational again;
- o Creation of new Health Protection Groups (GDS) in the Soudanian zone;
- o Digging of wells and construction of artificial ponds;
- o Reactivation and creation of training centers for breeders;
- o Emergency calf care programs;
- o Management of the milk collection circuit in rural N'Djamena; and
- o Rebuilding of cattle herds in the Sahelian zone.

C. Water and Forests Department

Again, in accordance with national policy goals, the Water and Forests Department recommends that the following projects be given first priority:

- o Reinforcement of fishing services;
- o Development of fisheries (cooperative groups);
- o Development of fish products in the Chari-Bagurmi region;
- o Creation of ponds for fish breeding;
- o Sylvo-pastoral management in the Chari-Baguirmi region;
- o Integrated development in the Logone region;
- o Creation of green belts around urban centers;
- o Management of gum producing plants; and
- o Management of the animal preserve at Lire-Binder.

ANNEX 1

Projects Underway

ANNEX 1

Projects Underway

A. General Agronomics (IRCT)

1. On-site experimentation

On-site experimentation projects are the study of lysimetric tanks, outlines hydrous lixiviation, the nitrogen action curve, and the agronomy X entomology test.

The goal of this test in 1983 is to study the impact of heavy fertilization and a number of insecticide treatments on the yields of cotton plants.

Other testing will include a supplementary test of the technical system of crops, an estimate of the production of dry substances, a test of the fight against striga in Sorghum, a subtractive test SI 1968, a PK 1976 test and a technical system of crops 1980.

2. Regional FAC experimentation

Projects underway include a study of the cropping systems, a test on the regeneration of soil in Bitanda (canton of Bédedjia), fertilization tests and analytic study of soils in cotton zones.

3. Improvement of varieties

Projects underway are research on seed reproduction (700), observance in the collection of varieties introduced and of proper selection, the study of the rate of allogamy, the creation of interspecific hybrids, the study of lineages (fiber technology), the improvement of varieties, the study of the fineness of fibres (dates of sowing and fertilization), support research (FAC), and experimentation on glandless varieties.

4. Entomology

Entomology projects are the study of insect predators of the cotton plant, insecticides testing, phytosanitary multi-local experimentation (FAC), and the study of the association of insecticides and natural insecticides with the predators of the cotton plant.

5. Phytopathology

Phytopathology projects concentrate on the study of the bacteria/cotton plant interactions; creation of resistant varieties.

B. Food Project FAC Campaign 83/84 (Support research)

1. Rice (IRCT)

a. Improvement of varieties

Projects underway in this area are comparison testing of varieties, test collections, and collecting for observation.

b. Cropping techniques: mineral fertilizer

Projects underway in this area are the study of plant response to increasing doses of nitrogen, factoriel NPKSB 19.12.19 X Urea 46 percent, and the fractional distillation of the nitrogen supply.

2. Maize (IRCT)

a. Improvement of varieties

Projects underway in this area concentrate on comparison tests of varieties.

b. Cropping techniques

Fractional distillation of the supply of nitrogen, factoriel NPKSB 19.12.19 X Urea 46 percent, sowing date testing, and test of seedbed density.

3. Sorghum (IRCT)

Observation collection of local varieties introduced by the IRAT is underway.

4. Cowpeas (IRCT)

a. Improvement of varieties

Projects underway in this area are the comparison testing of varieties, and an observation collection.

b. Cropping techniques

Projects underway are testing of the sowing date of varieties sensitive and insensitive to the photoperiod, and testing of phytosanitary protection (Cipermethrine highcis and profenofos).

5. Tests in rural environment (IRCT)

Projects underway are the mineral fertilization of rice and corn, and the phytosanitary protection of cowpeas.

6. Integrated development of South Tchad

This project underway at the DRA is funded by FAC.

7. Integrated development of South Tchad with two components

This project underway at the DRA is funded by FED and includes the improvement of plants and experimentation, and seed reproduction.

8. Project No. 677-0014: Research of Agricultural Production, Seed Reproduction and Grain Marketing

This project underway at DRA is funded by USAID.

9. Project CHD/75/005: Center of Elite Seed Production-and of the Adaptation of Varieties of Food Crops in the Sahel

This project underway at DRA is funded by UNDP-FAO.

10. Improvement of Millet, Sorghum, Corn, and Cowpeas

This project underway at the DRA is funded by FED.

ANNEX 2

Proposed Projects

ANNEX 2

Proposed Projects

A. Agricultural Research on Food Crops

1. Revitalization of agronomic research efforts on food crops

a. Justification

Before the outbreak of war in 1979, there were two agronomic research institutions in Chad:

- The Department of Agronomic Research (DRA); and
- The Institute for Cotton and Textile Research (IRCT).

Since IRCT was concerned primarily with cotton research, it is up to DRA to revive research efforts on food crops.

As a national institution, DRA was deeply affected by the war which completely halted its activities, thus depriving Chad and its people of a vital component of their economy.

IRCT, which is partly financed through foreign assistance, was able to continue basic operations.

The reactivation of the Department of Agronomic Research of the State Ministry of Agriculture and Rural Development is imperative to the revitalization of Chadian food crop cultivation.

b. Project description

At first the project will concentrate on helping the Department of Agriculture rebuild selected areas so that activities can begin again.

Then, as small improvements get underway, it will cooperate in the reestablishment of support structures (or experimental centers) supplying them with the necessary equipment, office furniture and other resources needed to begin operations. This implies that:

- Offices and private dwellings must be rebuilt;
- Seed laboratories at Deli and Dongue, as well as pertinent offices, must be reequipped;
- Researchers and managers in agronomic research must be trained;
- Viable plant material must be supplied;

- o Offices must be made available; and
- o Testing must take place at various locations.

The project comprises a first phase of six months' duration focussing on rebuilding of offices and dwellings and re-equipment of laboratories, and a second phase of three years' duration focussing on research and training.

c. Resources needed

About 15 persons must be trained. Of these, about five should be trained for research work, and ten for work as technicians. Material needs have yet to be evaluated.

The estimated cost of this project is about FCFA 900 million.

d. Results expected

The realization of project goals should help to: reduce climatic effects on food crop production, resolve problems caused by the inability to be self-sufficient in food production, provide substantial income to producers, and improve the national trade balance.

2. The improvement of flood-recession sorghum crops (berebere)

a. Justification

Berebere is a sort of sorghum (flood recession variety) which is widely cultivated by the people of Chad and the Cameroon, especially in the Sahelian zone where the lack of sufficient water is the principal limiting factor. The cultivation of berebere has diminished over the last few years because of the drought. Fortunately, it is cultivated during the dry season after floodwaters recede (between September and February).

b. Project description

Project efforts will be concentrated on:

- o An examination of local ecotypes;
- o Experimentation at various locations and at agricultural stations on these ecotypes;
- o Introduction, if need be, of other species;
- o Improvement of growing techniques;
- o Production of improved seeds; and
- o Extension of "elites".

This is a three year renewable project.

c. Resources needed

In addition to human resources, material resources are needed in the form of small farm equipment, basic inputs and general operational needs. Animals are also needed for harnessed teams.

The estimated cost of this project is FCFA 60 million for three years (including equipment).

d. Results expected

The realization of project goals should help to make viable plant material available to farmers, make the settlement of nomadic populations possible, and satisfy the population's food needs.

3. Research and development of the cultivation of desert groundnuts

a. Justification

Research and development of the cultivation of oil groundnuts has developed somewhat due to the oil mill at Moundon while the development of desert groundnuts has been left up to the producer.

Yet, the demand for desert groundnuts has grown steadily over the past few years with the development of the hotel industry in Chad. These nuts are always offered as snacks on hotel tables, in bars and in homes. Furthermore, their cost is always rising on the international market.

They constitute an important source of revenue which has not been fully explored.

b. Project description

There is a wide range of ecotypes of desert groundnuts which are relatively unknown by Chadian researchers. Project efforts will the past few years with the development of the hotel industry in Chad. These nuts are always offered as snacks on hotel tables, in bars and in homes. Furthermore, their cost is always rising on the international market.

They constitute an important source of revenue which has not been fully explored.

c. Project description

There is a wide range of ecotypes of desert groundnuts which are relatively unknown by Chadian researchers. Project efforts will require small farm equipment, basic inputs, vehicles, and basic operating needs. Animals are also needed for harnessed teams.

The estimated cost for this project is FCFA 100,000,000.

d. Results expected

The realization of project goals should result in an improvement in food availability and a general rise in the standard of living for farmers.

4. Control of pests which threaten food crops

a. Justification

Severe climatic fluctuations in Chad often lay food crops open to the attacks of birds, locusts and other pests.

The measures taken by OCLAVAC and OICMA to control these attacks are commendable but insufficient as they do not offer a lasting solution. Often, these actions are effected too late resulting in irreversable harm to the season's harvest.

The Plant Protection Services of the State Ministry of Agriculture and Rural Development are no longer operational due to lake of resources and funds.

The project aims to equip these services with basic resources so that they can conduct preventative activities and assist in case of attack until a more comprehensive program can be implemented.

b. Project description

Project efforts will be concentrated on:

- The training of action teams to control pests;
- The creation of observation posts to observe pest activities;
- The furnishing of equipment to these teams and posts;
- The training of phytosanitary agents; and
- The creation of a phytosanitary laboratory.

Chad will be divided into five areas, each one with a phytosanitary action team and observation post. The sites for these units will be chosen by experienced technicians.

The observation posts will be responsible for inventory and identification of pests, as they conduct field studies from their designated posts on-site. The action teams will only be called upon if crops are under attack by pests.

The phytosanitary laboratory will be accessible to all units.

This is a five year project.

c. Resources needed

In terms of human resources, six researchers (of which three are entomologists), then high level technicians, 20 agricultural agents, and general labor. Material needs include all-terrain vehicles, laboratory equipment and basic operating needs.

The cost of this project has not yet been estimated.

d. Results expected

The realization of project goals should result in less crop loss due to pests, better plant health, better satisfaction of food needs, and a general rise in the farmers' standard of living.

B. Fisheries

1. Scientific research on fisheries

a. Justification

After the drought is over, Chadian fishing resources must be evaluated. Fisheries in the Chari Delta and on Lake Chad should be observed and fish populations should be determined.

b. Description

Through this research, the biological cycle of fish which may sell well could be studied. Expatriated personnel (ichtyologist and technicians) will train nationals to replace them; four scholarships, two for management training and two for assistants' training will be granted to train personnel for follow-up research.

This is a three year project.

c. Resources needed

One qualified ichtyologist, two qualified technicians and two technical aides will be needed. Temporary personnel will be contracted as needed. As to material needs, two all-terrain vehicles, two boats equipped with outboard motors and two mopeds will be needed. In addition, two standard and one programmable calculators along with nets and equipment, local operating needs (for maintenance and support).

This is a three year project.

Estimated budget for this project is FCFA 144,000,000.

d. Results expected

The realization of project goals should help to avoid over

exploitation of the reproduction zone, to estimate fishing potential and increase production which could lead to self-sufficiency in food.

C. Forestry

1. Research on Natural Plant Formations in the Sahelian Zone

a. Justification

Production of firewood, lumber, and other forest products must increase. Beter sylvo-agro-pastoral management is also needed.

b. Description

Certain naturally occuring species have economic potential but are not controlled. A research center will be established at Sarh, in the mid-Chari region. Research projects will be oriented toward seed treatment, the management of parks and seed gardens, and techniques for nursery and planting. Five training and five assistants scholarships will be granted so that research projects can be followed through.

This is a four year project.

The estimated cost of this project is FCFA 400,000.

c. Resource needs

Five construction engineers, one refrigeration technician, five assistants, and about four other persons performing various duties will be needed. Material needs include: three buildings to be repaired, one enclosed warehouse, managed seed gardens, one plant nursery, six light vehicles, six two-wheeled vehicles, laboratory equipment, general forestry equipment, three cisterns. Basic operational and maintenance needs also must be met.

d. Results expected

The realization of project goals should help to: furnish firewood, lumber and general purpose wood (with controlled usage), control desert encroachment, and initiate a program of self-sufficiency in food through the agroforestry system.

2. Integrated control of desert encroachment in the Lugon Region

Sub-project 1: Control of desert encroachment in the Moundon region.

a. Justification

The following conditions make control of desert encroachment necessary: lower crop yields in the Moundon region along with the leaching of soils; desert encroachment problems brought on by regional overpopulation, over grazing, and systematic clearing of trees for research and firewood.

To resolve these problems, integrated actions involving the agricultural, animal husbandry and forestry sectors must be undertaken.

b. Description

Through this project:

- Growing techniques to improve and conserve soil fertility will be introduced into the region;
- The Agricultural Association's animal husbandry programs supply manure for use as fertilizer;
- Planting of acacia albida in the fields and reforestation around villages; and
- Drilling village wells.

The estimated total cost of this project is $US 1,928,098, from the following sources:

Chadian government	$US	80,599
PAM/CARE		121,500
UNICEF		121,765
UNSO		1,604,274
Total		1,928,098

This is a five year project.

c. Results expected

The realization of project goals should result in an improvement in the standard of living for all concerned and the arresting of desert encroachment in the region.

Sub-project 2: Restoration of soil fertility and soil utilization in the Benoye region.

a. Justification

Soils have been leached by continual cotton cultivation, and depleted by overpopulation and overgrazing. At the same time desert encroachment progresses along with soil erosion. Food crop and cotton yields have lowered.

b. Description

Project efforts will be concentrated on:

- The employment of appropriate growing techniques and methods and fertilized crops; and

- The study of erosion control and the arresting of desert encroachment.

This is a four year renewable project.

Estimated cost of this project is a total of FCFA 228,912,543 from the following sources:

Chadian government:	FCFA 21,288,000
Donor organization:	207,624,543
Total	FCFA 228,912,543

c. Results expected

The realization of project goals should lead to the reestablishment of regional soil fertility, control of erosion and desert encroachment through the settling of nomadic farmers, the improvement in crop yields and the standard of living. These factors combined should contribute to the attainment of food self-sufficiency.

D. Agriultural Training

1. Rehabilitation of CETA of Ba-Illi

Sub-project 1: Repair of buildings at the School of Agricultural techniques (CETA) of Ba-Illi

a. Justification

The buildings should be repaired so that school activities can begin again, management personnel from among the farmers can be trained.

b. Description

The buildings at CETA at Ba-Illi were built during 1947 and 1948 and include a student section (classrooms, meeting rooms, laboratories, dormatories, etc.) a section for general services (garage, workship, dispensary, accommodations), and a teaching farm.

These buildings were already considerably deteriorated before the events of February 1979 during which time they were ransacked and pillaged.

As the only national school for training mid-level agricultural managers, it is imperative that CETA be reopened in the near future.

This is a one year project.

Estimated cost of this project is FCFA 107,622,250.

c. Results expected

The realization of project goals will result in the training of mid-level managers for rural developement projects. These agents could follow up on former projects (SODELAC, OMVSD, SONASUT), assist in the extension of their results, and, above all, serve as the highly qualified management team called for by Project SAHEL to lead agricultural development efforts in the Sahelian Zone.

Sub-project 2: Re-equipment of CETA.

a. Justification

Although Chad is in a particularly difficult financial situation, CETA's infrastructure must be reestablished and its facilities re-equipped now. CETA's immediate re-opening and utilization are especially important to the Department of Agriculture.

The Chadian government is asking friendly contries and international organizations to help Chad reestablish CETA.

b. Description

The project will concentrate its efforts on the re-equipment of CETA as follows:

- o Vehicles and experimental farms for student practice;
- o Boarding house (dining hall, dormitory);
- o Offices;
- o Lodging;
- o Rooms (classrooms, meetingrooms, gamerooms);

- o Laboratory; and
- o Library.

This is a six month project.

Estimated cost of this project is FCFA 97,083,550.

c. Results expected

The realization of project goals will mean that CETA at Ba-Illi will be refurbished with the materials it needs. This will enable it to begin activities again as of June 1984, and the training of agricultural managers who will supervise rural populations, can continue uninterrupted.

2. Renovation of the training center for agricultural technicians at DOYABA (Sarh)

a. Justification

Presently there are not enough qualified agricultural managers in Chad, nor are there enough trainers to teach new trainers.

The Center at DOYABA was designed to train high-level technicians--agricultural engineers which are indispensable to the technical management of agricultural development.

When CETA was forced to close, the Center was used to train technical agents and agricultural works supervisors (conducteurs des travaux agricoles).

b. Description

Infrastructure, in place since 1976, is badly in need of repair and maintenance, particularly the buildings. In addition, the following must be built:

- o Two classrooms with a capacity of 30 students each;
- o Living accommodations for two professors;
- o A store; and
- o Basic operating equipment.

Repair and construction of buildings and equipment should take about one year.

Estimated cost of this project is FCFA 129,240,780.

c. Results expected

About 60 agricultural engineers will be trained within the first phase of three years. The caliber of management will have improved. Needed human resources will have been supplied to diverse agricultural development projects, particularly, mid-level managers.

1984-08

ASSESSMENT OF AGRICULTURAL RESEARCH RESOURCES IN THE SAHEL VOLUME III

OAU

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