

ASSESSMENT OF AGRICULTURAL
RESEARCH RESOURCES
IN THE SAHEL

VOLUME III
NATIONAL REPORT: NIGER

by

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RESEARCH RESOURCES
IN THE SAHEL

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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 Volta²

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¹Each national report is printed separately.

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

LIST OF ACRONYMS AND ABBREVIATIONS

A	Others
ABN	Authorities of the Niger River Basin
ACDI	Agency for International Development
ADRAO	Association for the Development of Rice Farming in West Africa
AGRHYMET	Regional Training and Application Center for Agrometeorology and Operational Hydrology
AGRO	Agronomie
ASECNA	Agency for the Security of Aerial Navigation
BAC	Baccalauréat
BEPC	Certificate Verifying Completion of 1st Cycle Primary Education (5th grade)
CAA	African Groundnut Council
CBLT	Commission of the Lake Chad Basin
CCCE	Central Fund for Economic Cooperation
CDFT	French Company for the Development of Textile Fibers
CEAO	West African Economic Community
CEDEAO	Economic Community of Western African States
CFJA	Training Centers for Young Farmers
CFTI	Training School for Information Techniques
CILSS	Inter-State Committee for the Fight Against Drought in the Sahel
CIPEA	International Center for the Promotion of Animal Husbandry in Africa
CM	Reproduction Center
CNCA	National Agricultural Lending Fund
CNRA	National Center for Agronomic Research
CNRST	National Council of Scientific and Technical Research
CNSD	The Development Society
COTEAR	Provisional Advisory Commissions
COTEDP	Departmental Technical Committee
CPR	Rural Promotion Centers
CPT	Technical Training Centers
CRDI	Center for International Research and Development
CREDE	Center for Research and International Development
CRSP	Collaborative Research Support Program
CTFT	Technical Center of Tropical Forestry
D	Director
DECOR	The Department of Research on Rural Economy
DRA	The Department of Agricultural Research

DRE	The Department of Ecological Research
DRF	The Department of Forestry Research
DRVZ	The Department of Veterinary Research and Animal Husbandry
DUES	Nigerian Diploma
ECE	School of Livestock Management
ELSM	School of Literature and Humanities
ENA	National School of Administration
ENA	Normal School of Education
ENSP	National School of Public Health
ESA	Superior School of Agronomy
ESAE	Superior School of Agronomy and Animal Husbandry
ESEM	School of Supervisors in Animal Husbandry and Markets
ESS	School of Health Sciences
FAAT	Arab Fund for Technical Assistance
FAC	Assistance on Cooperation Fund
FAO	Food and Agricultural Organization of the United Nations
FED	European Development Funds
FNI	National Investment Fund
GERDAT	Study and Research Group for the Development of Tropical Agronomy
GMP	Cooperative Production Group
GMV	Cooperative Village Markets
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDA	International Development Association
IEMVT	Institute of Livestock and Veterinary Medicine in Tropical Countries
IFDC	International Fertilizer Development Corporation
IITA	International Institute for Tropical Agriculture
ILCA	(See CIPEA)
INRAN	Niger National Institute of Agronomic Research
INSAH	Institute of the Sahel
IPDR	Practical Institute of Rural Development
IRAT	Institute of Tropical Agronomic Research
IRFA	French Institute of Fruit Research Overseas
IRHO	Oil and Oil Seeds Research Institute
IRRI	International Rice Research Institute
IRSH	The Research Institute of Social Sciences
MDP/ESR	Minister of University Education and Research
MDR	Department of Rural Development
MES/R	Department of Superior Education and Research
MHE	Department of Hydraulics and Environment
OAU	Organization of African Unity

OMM	World Meteorological Association
ON/HA	National Office of Hydro-Agricultural Developments
ONERSOL	National Office of Solar Energy
OPVN	Niger Food Products National Marketing Board
ORSTOM	Overseas Office of Scientific and Technical Research
PCMS	President of the Supreme Military Council
PPS	The Organization of Sahelian Pasture Production
Project NCE	Project Niger, Center-East
PTS	Auxiliary Technical Personnel
PVSP	Planning and Utilization of Soils and Forests
SAFGRAD	Semi-Arid Food Grains Research and Development
SNCP	The Niger Society for the Collection of Hides and Leathers
SONERAN	Niger National Society for the Development of Animal Resources
UMOA	West African Monetary Association
UNCC	Nigerian Credit and Co-operation Union
UNDP	United Nations Development Program

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INTRODUCTION

A. Background

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

¹Volume 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.

²World 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 Niger 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 development organizations (such as the Club du Sahel, the various UN agencies, and the World Bank) and other written information available to the team. The DEVRES/INSAH staff collaboratively designed the proposed regional projects and activities to carry out the strategy elements.

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

II. GENERAL INFORMATION ON NIGER

A. Geography and Ecology

1. Geography

a. Area

Niger has a total area of 1,267,000 km²; it is located between 12° and 23° latitude north and between 0° and 16° longitude east.

b. Boundaries

It is bounded to the west by Upper-Volta and Mali; to the north by Algeria and Lybia; to the east by Chad; and to the south by Nigeria and Benin.

c. Main regions

Niger is divided into seven departments. (See Figures 1 and 2.) These are:

- o Department of Agadez;
- o Department of Diffa;
- o Department of Dosso;
- o Department of Maradi;
- o Department of Niamey;
- o Department of Tahoua; and
- o Department of Zinder.

d. Rivers

The most important rivers are the Niger and the Komadougou-Yobé. The Niger, 4,200 km long, runs for 500 km in the western part of the country. Interestingly, its waters rise to their highest levels during the dry season (January and February).

The Komadougou-Yobé is a torrential river which originates in Nigeria and forms a boundary between Nigeria and Niger for nearly 150 km before flowing into Lake Chad.

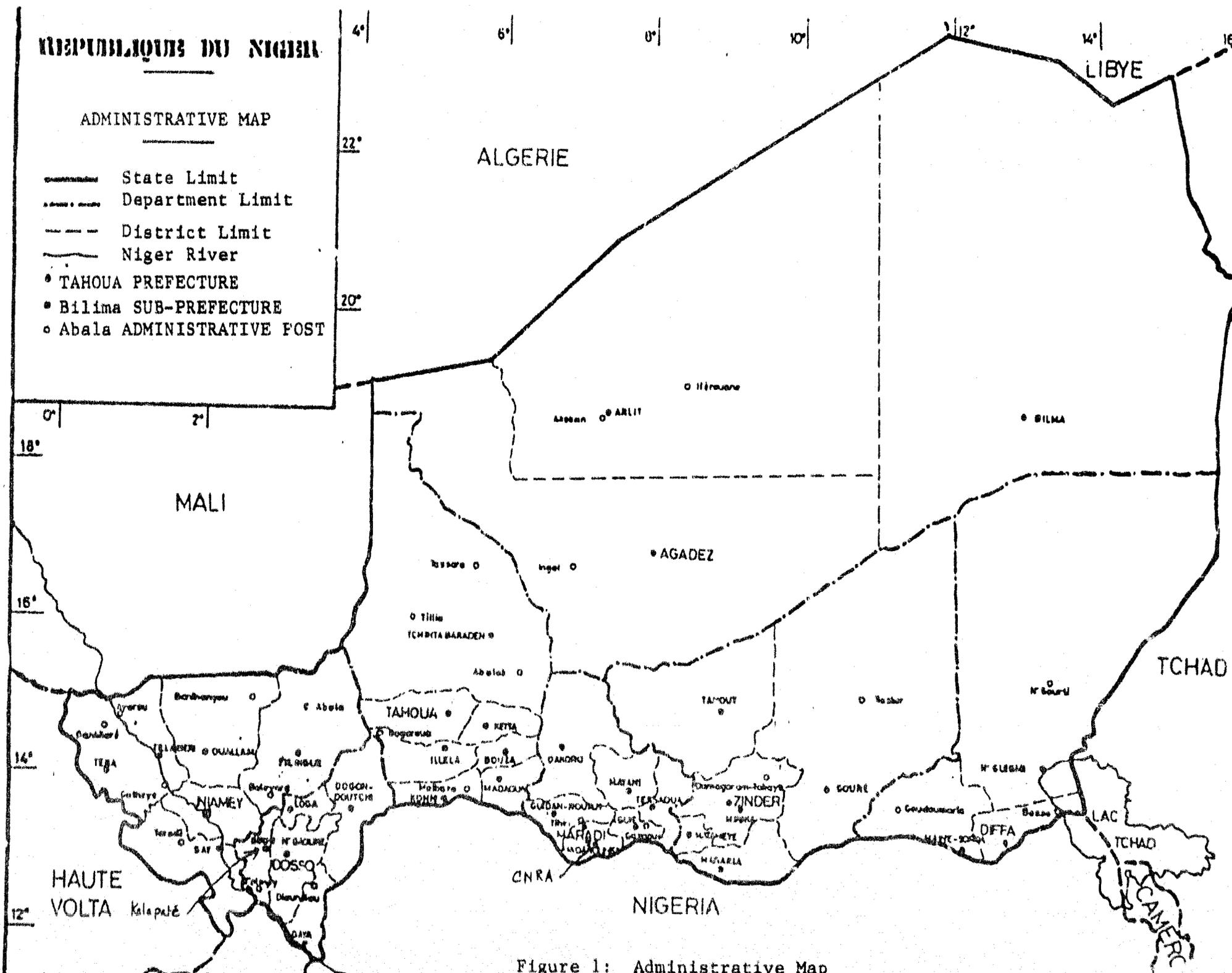
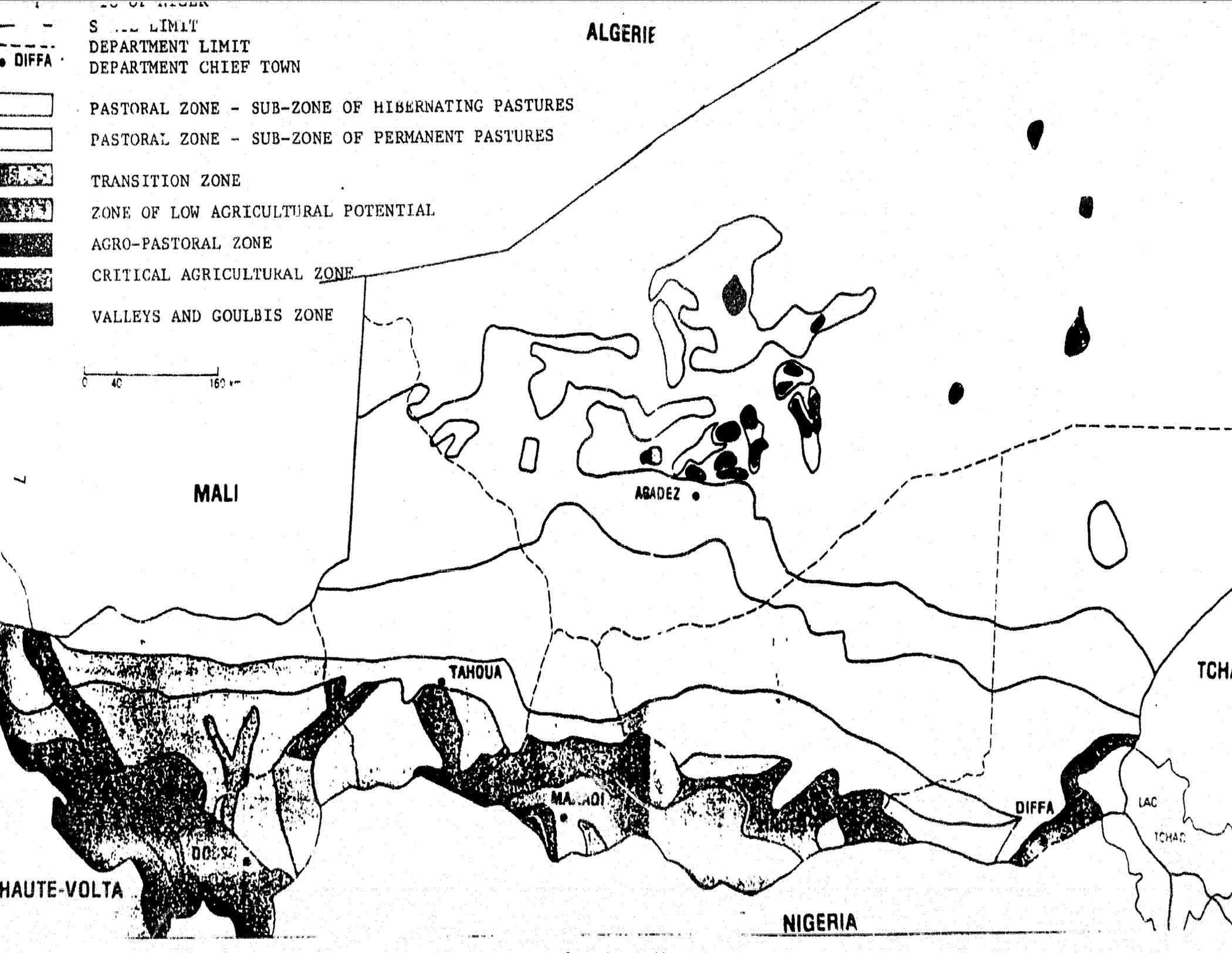


Figure 1: Administrative Map



e. Cities

The most important cities are the following (1983 estimates, Five-Year Plan 1979-1983 p. 63): Niamey, the capital, with 399,100 inhabitants, Zinder with 82,800 inhabitants, Maradi with 65,000 inhabitants, Tahoua with 41,900 inhabitants, Dosso with 14,000 inhabitants, Diffa with 5,573 inhabitants, and Agadez with 30,800 inhabitants.

These cities are the chief towns of the seven departments, Niger's main administrative division.

f. Ecological zones in relation to agriculture

Niger's agricultural area covers a strip approximately 200 km wide in the southern part of the country. Rainfall varies between 800 mm and 300 mm isoyhets. (See Figure 3.)

The soil quality and population density are used as criteria to differentiate six distinctive zones.

(1) Pastoral zone

From the boundary of Mali to Lake Chad, the pastoral zone extends in an irregular strip some 50 to 100 km wide which touches all departments except that of Dosso. The zone is marked by climatic conditions that are unfavourable to rain crop cultivation. An extensive traditional stock breeding activity is carried out in the zone which specializes in the production of young animals (modification of herd management).

(2) Transition zone

Bordering the pastoral zone in the south, this zone runs from east to west along the full length of Niger bending slightly towards the south in the western part of the department of Diffa. The zone touches all departments except those of Agadez and Dosso. It covers vast areas, particularly in the departments of Niamey and Zinder. It is astride the northern limits of farming areas and, because of its pedologic and climatic characteristics, is essentially pastoral land.

(3) Zone of low agricultural productivity

In the south it borders the transitional pastoral zone in the department of Niamey as well as in some places in the departments of Zinder and Diffa. It also covers the table-lands of Dosso, Loga and the western part of the department of Tahoua. Climatic conditions are harsh and water is scarce or not easily accessible. There are a few scattered pastures which are not in use (Dosso, Tahoua).

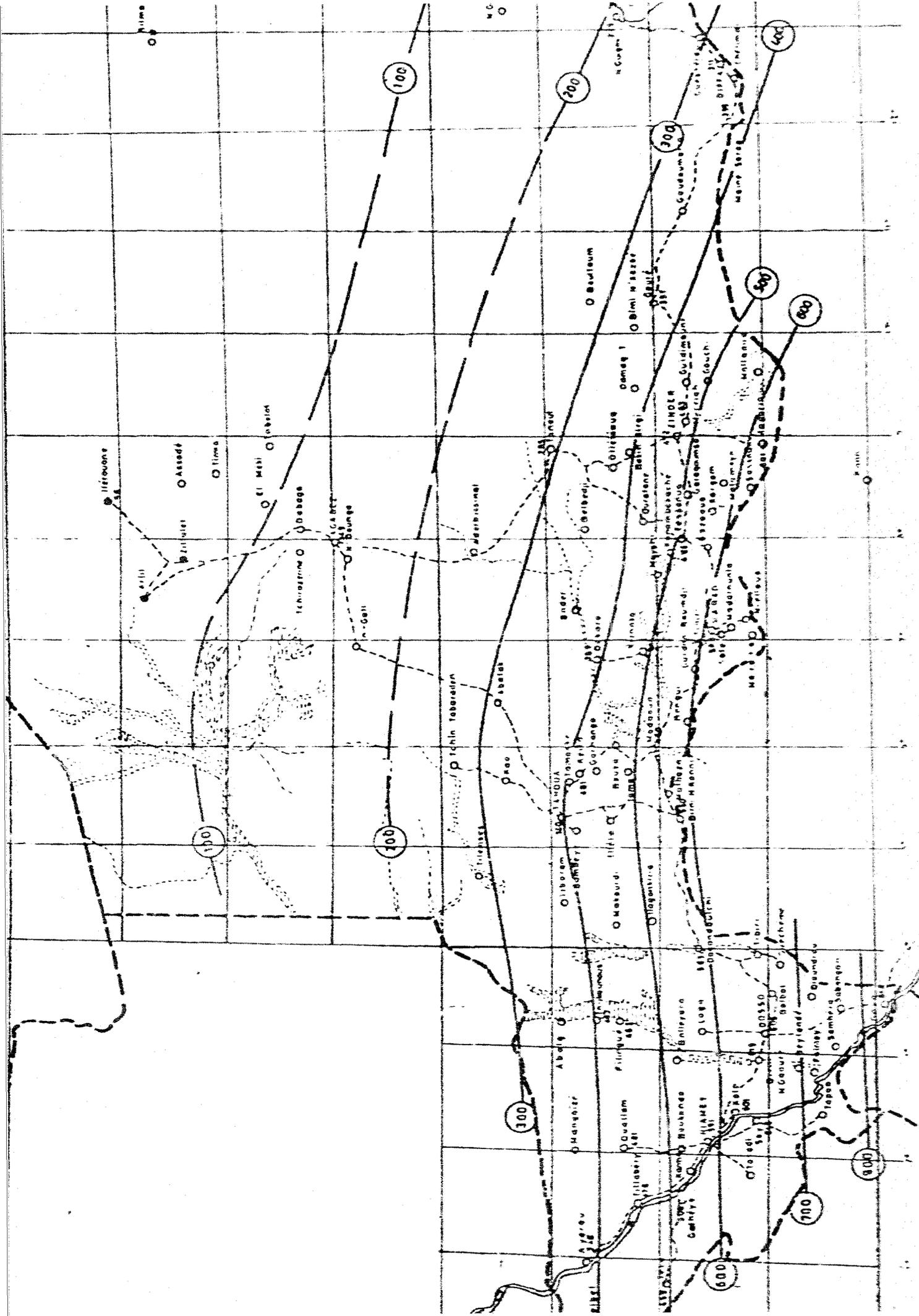


Figure 3: Annual Isohyets (1948-1977)

(4) Agro-pastoral zone

The agro-pastoral zone covers the south of the Niamey and Dosso departments as well as an east-west strip located between the transitional and the critical agricultural zone from Maïné-Sorca to Birni N'Konni; it also includes a pocket to the south of Tahoua (zone of valleys' end) as well as an extension to the northeast of Dallol Maouri. This zone covers an essential part of overall lands available for Nigerien agriculture. Rainfall is average to favorable; dune soils are of average productivity, the crop system is itinerant with lengthy fallows and there exist important livestock. Possibilities for an agriculture-livestock association exist; it is possible to improve the quality of the soils as well as crop yields and to consider the feeding and finishing of stock for slaughter or for export. The degree of occupancy of these soils is very uneven but there are receptive zones and, therefore, possibilities of future organized or spontaneous migrations of people (region of Say, the southeast of the department of Tahoua). The practice of itinerant crops (the cultivated area in proportion to assets is very important) increases the risk of soil erosion.

(5) Critical agricultural zone

This zone exists in rather important pockets in the departments of Niamey, Dosso and Tahoua (Dallol Bosso, North Dallol Maouri, Maggia) and in a 50 to 100 km strip which skirts the Nigerien border along the departments of Maradi and Zinder. The zone is heavily populated (over-exploitation of naturally productive soils that are appropriate for agriculture) resulting in severe erosion, soil sterility, a general exodus and the disappearance of fallow land.

(6) Valleys and Goulbis zone

The zone is densely populated, soils are productive and there are hydro-agricultural developments. Agriculture is extensive and the main crops are cereals such as rice, wheat, corn and sorghum plus vegetables. It includes:

- o The valley of the Niger river in the departments of Niamey and Dosso;
- o The Tarka valley and the Konni plain in the department of Tahoua;
- o The valley of the Goulbis N'Maradi in the department of Maradi;
- o The shores of the Kanadougou River and of Lake Chad in the department of Diffa; and
- o The gardens and soils in the department of Agadez.

g. Topography

Niger is a vast plateau with an average altitude of 300 m. The land is dominated in the center by the Air Massif (2,000 m) whose northern half is part of the vast Sahara desert while the southern part is composed of harder ground, with rocky or clayey or lateritic soils.

2. Communications

a. Roads

In 1978, the entire road system represented approximately 19,000 km divided between primary and secondary roads.

Primary roads which include all classified roads cover 7,657 km, of which 3,607 km are essentially paved or dirt roads, 1,520 km are fairly suitable for vehicles, 2,350 km are developed trails or primitive trails.

The secondary road system, never measured, has an estimated length of 11,000 km.

Niger does not have a railway network.

b. Airports

Niamey is the international airport. As for domestic lines, there are airports at Tahoua, Agadez, Zinder, Maradi and a private airport at Arlit owned by SOMAIR. In addition, there are 15 public and privately-owned secondary aerodromes.

Airlines servicing Niger are: Air-Niger, Air-Afrique, Nigeria Airways, Air-Algérie, UTA, Air-Maradi, among others.

c. Telephone and telecommunications

(1) Postal telecommunications

Telephone services are available as permanent fixtures in all urban centers located on the main axis and the cross-over of route RNI Tillabéry-N'Guigui. The north and the south of the country are linked by radio.

In 1978, the capacity of the various central telephones was estimated at 5,300 lines (Niamey 4,000—Zinder 400—Agadez 200—Dosso 100—Tahoua 200). Secondary localities (wards) are equipped with centrals that serve 25 to 50 subscribers. There is a central telex at Niamey that has a capacity of 200 lines.

Radio and telex communications exist between the following capitals: Bamako, Abidjan, Dakar, Cotonou, Lagos, Alger, Paris, Washington, and others. There is also satellite liaison between Niamey, Algiers, Paris, and others.

(2) Aeronautic and meteorologic telecommunications

Aeronautic and meteorologic telecommunications are under the authority of the Agency for the Security of Air Traffic (ASECNA--Navigation Aérienne).

Aeronautic telecommunications exist at the airports at Niamey, Agadez, Maradi, Tahoua, Zinder. A fixed network of aeronautic telecommunications guarantees radioteletype liaison between Niamey and Algiers, Cotonou, Dakar, Abidjan, N'Djaména, Ouagadougou, Kano.

With regard to meteorologic telecommunications, the main center at Niamey is linked with stations at Agadez, Konni, Bilma, N'Guigmi, Tahoua, Tillabéry, and Zinder. For foreign telecommunications, it is linked with centers at Algiers, Dakar, Kano, Cotonou and Ouagadougou.

(3) Radio broadcasting and television

There are seven radiobroadcasting studios, of which three are located at Niamey and one is in each of the following cities: Zinder, Agadez, Maradi and Tahoua (1978).

Television, which was inaugurated in 1979 and whose main production center, located at Niamey, has approximately 1,200 km of wireless beams, a domestic linkage system via satellite at Niamey, Agadez and Diffa, two international stations (Karma, Goudel), and two video reporting vehicles equipped with wireless beams.

3. Climate

a. Types

In spite of general uniformity, there are four types of climate in Niger:

(1) North-Sudanian climate

This climate is found in the southern belt of the country. Its northern limit passes to the north of Niamey through Birni N'Konni, Tessaoua, Zinder and bends toward the south. Rains exceed 500 mm. Winter lasts 3 1/2 months.

(2) South-Sahelian climate

This climate forms a rather narrow belt whose northern limit runs approximately through the line extending from the 16° parallel in the west to N'Guigui in the east. Winter is shorter (with 500 to 200 mm of rain).

(3) North-Sahelian climate

The northern limit of this climate follows the 19° parallel, embodying the Air Massif. Though rather light, rains fall regularly each year but with considerable difference from one year to another (less than 200 mm of rain). Vegetation changes totally in this climate and non-irrigated farming becomes impossible.

(4) Saharian climate

This climate is prevalent in the northern part of the country and is characterized by the fact that a full year or more may elapse between two rains.

b. Temperatures

Average annual temperatures at the largest cities are indicated in Table 1.

Niger is a warm country but with great differences in temperatures between the warmest and the coldest months (from an absolute minimum of -3° to an absolute maximum of 46° at Bilma). The differences increase as one travels towards the north.

c. Rainfall

Niger has only one rainy season with maximum intensity always occurring in August. (See Figures 3, 4, 5 and Table 2.) Rainfall diminishes regularly from south to north and west to east as is indicated in Table 3.

d. Winds

There are three types of wind in Niger:

- o The harmattan: eastern wind, warm and dry, blows from November to June except in January-February when boreal trade-winds force it back into higher altitudes;
- o The continental boreal trade wind: comes from the North or north-east through the Sahara. Dry and cool, it blows at ground level in January and February; and

Table 1: Average Annual Temperature

<u>City</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Variation</u>
Niamey	37 ^o 5	21 ^o	16 ^o 5
Agadez	37 ^o 8	19 ^o 3	18 ^o 5
Bilma	36 ^o 4	16 ^o	20 ^o 4

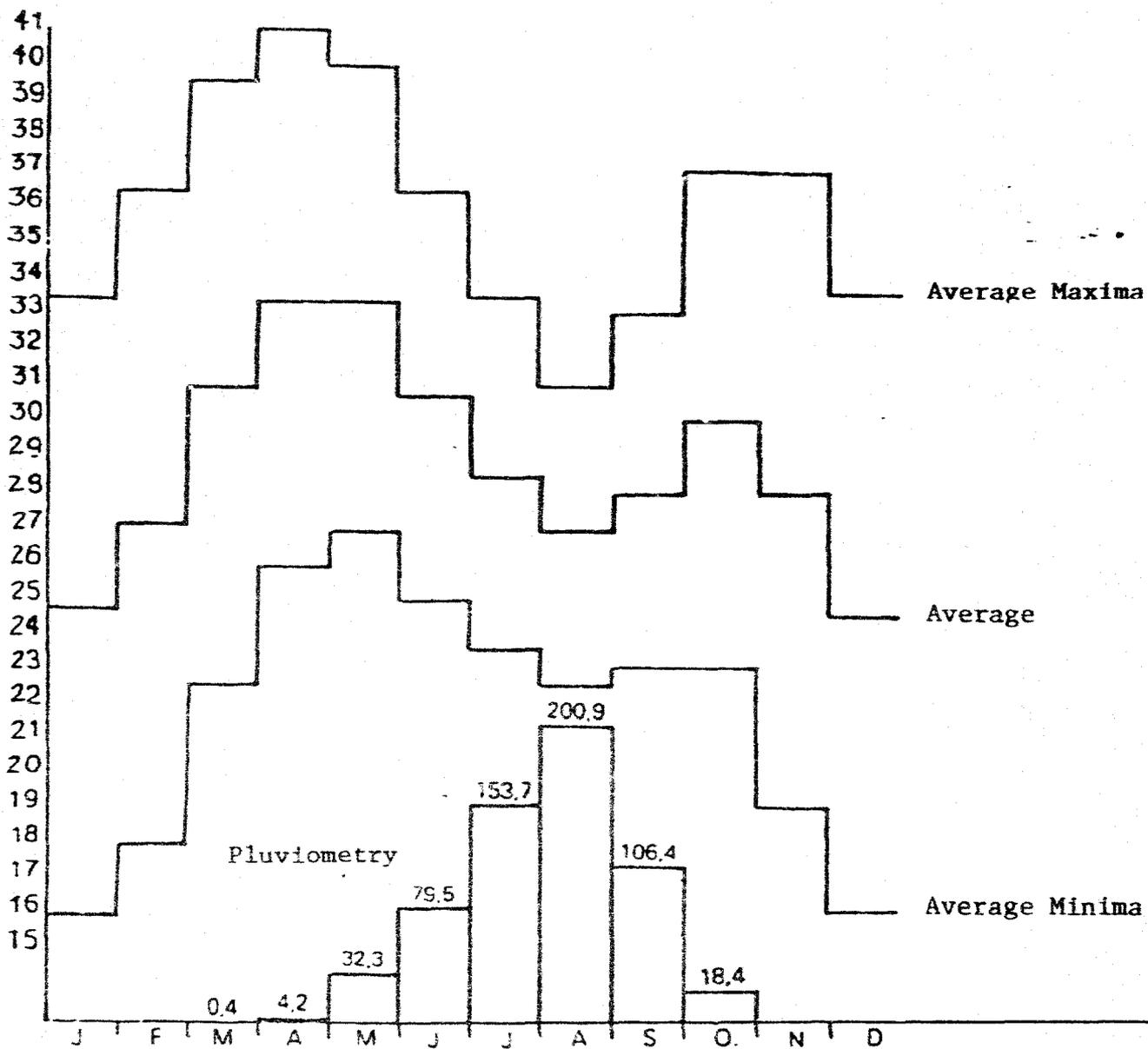


Figure 4: Average Monthly Temperature and Pluviometry^a at Niamey

^aCompiled for the period 1931-1960.

Source: National Meteorology Directorate

— Average Niamey (city), Birni N'Konni, Maradi — South-Saharan Zone
 — Average Tillabery, Tahoua, Zinder, Maïné-Soroa — North-Saharan Zone
 — Agadez (no data for 1942) — Saharan Zone

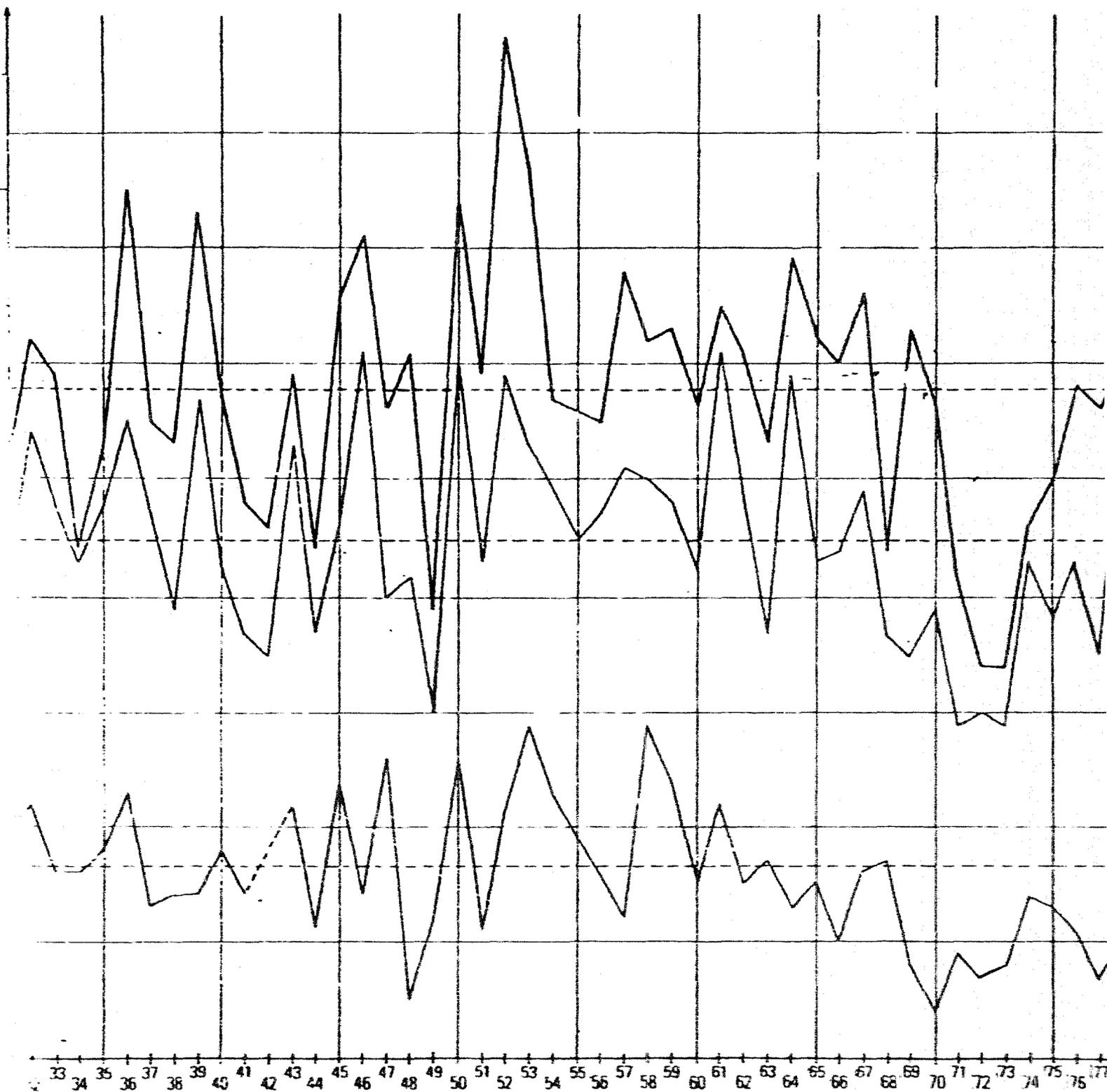


Figure 5: Annual Pluviometry^a Changes by Climatic Zone (1931 to 1979)

^aThe dotted lines indicate averages for the full period 1931-1979.

Source: Meteorology Directorate/Statistics Directorate.

Table 2: Annual Pluviometry (1968-1979)

	Average 31-60	Average 68-79	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
AGADES	164.1	98.5	165.1	81.8	39.7	92.6	73.9	76.3	136.4	130.9	106.8	70.7	100.5	107.6
BILMA	20.6	12.3	26.7	14.3	6.8	2.0	19.8	0.5	16.0	0.1	34.9	4.5	15.1	6.7
BIRNI N'KONNI	597.4	484.7	523.0	589.0	557.1	388.1	328.4	289.4	428.2	487.9	546.6	542.0	642.4	494.2
GAYA	859.7	807.3	828.3	970.8	960.4	722.4	694.5	476.1	847.3	945.4	729.6	853.4	874.1	686.4
MAINE SOROA	409.9	346.5	343.7	229.9	492.2	307.3	251.6	261.5	397.1	358.5	331.2	376.0	506.0	303.5
MARADI	642.3	477.7	362.2	640.6	585.1	398.7	288.5	350.0	490.6	350.9	529.6	607.8	515.5	613.0
N'GUIGMI	235.9	165.1	105.4	93.4	237.7	125.3	68.5	85.1	222.8	169.6	80.9	331.4	236.5	225.4
NIAMEY (AERO)	595.8	532.2	555.1	609.6	476.9	467.5	342.8	395.0	500.0	689.5	629.4	556.3	665.9	642.9
TAHOUA	407.2	364.7	407.6	317.0	421.7	267.1	267.1	244.9	421.2	421.1	391.7	360.3	566.1	291.4
TILLABERY	509.5	384.8	348.0	404.5	293.0	250.0	368.3	336.6	407.9	274.3	532.5	407.8	614.5	485.5
ZINDER	549.1	406.6	375.7	436.0	354.7	352.5	302.8	297.5	480.3	470.7	474.7	256.9	607.1	470.7

Table 3: Rainfall Distribution

<u>From South to North</u>	<u>Rainfall</u> (mm)
Gaya	850
Niamey	600
Agadez	150
Bilma	20
<u>From West to East</u>	
Birni-N'Konni	550
Zinder	200
Tillabéry	450
Tahoua	400
N'Guigmi	200
Tanout	200

- o The mousson: comes from the south-west (Atlantic), heavy with water, forces back the harmattan to higher altitude from June to September.

e. Seasons

Three main seasons, whose duration varies with latitude, divide the year as follows:

- o The cold and dry season: from November to February with frequent sandstorms in the north that bring a dry mist which reduces visibility. Few clouds;
- o The warm and dry season: from March to June, high temperatures, cloudy sky, burning wind from the east; and
- o The winter or rainy season: from June to October; its duration diminishes as one travels toward the North.

4. Demographic information

a. Population

(1) General statistics

According to the 1977 census, there are 5,098,427 inhabitants, with a projected estimate of 6,006,000 inhabitants in 1983. The rate of annual growth is 2.77 percent which projects to a population of 7,000,000 to 7,500,000 inhabitants in 1990. Population density in 1977 was 4.4 inhabitants per km²; 84.7 percent of population is rural (1983). For more detailed information, see Tables 4-12, and see Figure 6. The population breakdown by departments (1977) can be found in Table 13.

(2) Ethnic groups

There are seven large ethnic groups.

(a) Hausa

The Hausa make up the largest group (over 2,837,590 of the population). This group populates the whole region between Dosso and Zinder in the soudanian and sahelian zones. The language spoken is Hausa.

The sub-groups are: to the west, the Kourfey (Filingué, Dosso, Doutchi), the Maouri (Doutchi, Dosso), the Kabaoua and Tienga (Gaya); to the center, the Konnaoua, Azna, Aderaoua Gobéraoua, and Katsénaoua Daouraoua (Tahoua, Maradi); and to the east, the Kanaoua, Tezeraoua, and Anna (Maradi, Zinder).

Table 4: Resident Population by Department and by District, 1977

	Men	Women	Total	Density (per km ²)
Aqadez	63,764	67,893	124,657	0.2
Agadez	46,883	45,042	91,925	1
Arlit	13,451	11,875	25,326	0.1
Bilma	3,430	3,976	7,406	0.03
Diffa	81,479	85,262	166,741	1
Diffa	28,028	30,000	58,028	8
Mainé-Soroa	37,501	39,188	76,689	5
N'Guigmi	15,950	16,074	32,024	0.3
Dosso	335,047	357,764	692,811	22
Birni-N'Gaoure (Boboye)	65,729	73,524	139,253	31
Dogondoutchi	107,812	111,781	219,593	20
Dosso	78,193	86,278	164,471	21
Gaya	53,710	55,453	109,163	27
Loga	29,603	30,848	60,451	16
Maradi	470,189	474,099	944,288	24
Aguè	61,493	63,614	125,107	48
Dakoro	88,242	84,108	172,350	11
Guidan Roumji	69,951	71,661	141,612	31
Madaoufa	68,625	70,959	139,584	40
Mayahi	85,662	85,669	171,331	27
Tessaoua	73,602	74,850	148,452	28
Ville de Maradi	22,614	23,238	45,852	2,635
Niamey	580,695	591,006	1,171,701	13
Filingue	102,453	105,781	208,234	9
Niamey	73,513	74,670	148,183	20
Ouallam	71,631	72,203	143,834	7
Say	46,486	48,576	95,062	6
Tera	104,071	107,883	211,954	17
Tillabéri	68,358	71,362	140,220	18
Ville de Niamey	114,383	110,631	225,014	609
Tahoua	488,714	505,767	994,481	9
Birni-N'Konni	67,428	87,775	155,203	38
Bouza	65,640	72,482	138,122	40
Illiéla	65,229	66,544	131,773	20
Keita	63,096	64,387	127,483	26
Madaoua	71,360	73,801	145,161	33
Tahoua	65,918	69,186	135,104	15
Tchin-Tabaraden	42,612	54,178	96,790	1
Ville de Tahoua	15,831	15,434	31,265	2,868
Zinder	494,644	509,104	1,003,748	7
Goure	56,001	58,288	114,289	1
Magaria	136,423	137,518	273,941	34
Matamey	54,769	53,562	108,331	54
Miria	144,820	148,931	293,751	24
Tanout	73,159	75,841	149,000	4
Ville de Zinder	39,172	38,984	78,156	258
NIGER	<u>2,514,532</u>	<u>2,583,895</u>	<u>5,098,427</u>	

Source: Central Census Bureau - General population census (November 20, 1977).

Table 5: Population of Urban Centers^a

		Men	Women	Total
Agadez	4 centers			
Commune d'Agadez		17,848	17,120	34,968
In-Gall		10,224	10,251	20,475
Arlit		1,574	1,906	3,380
Bilma		5,245	4,149	9,394
		805	914	1,719
Diffa	3 centers			
Diffa		7,758	7,921	15,679
Mainé-Soroa		2,013	1,945	3,958
N'Guigmi		1,975	1,907	3,882
		3,770	4,069	7,839
Dosso	5 centers			
Birni-N'Gaouré		16,924	18,366	35,290
Commune de Dogondoutchi		2,211	2,355	4,566
Commune de Dosso		6,992	5,139	10,231
Gaya		4,302	5,315	9,917
Loga		3,856	4,251	8,107
		1,163	1,306	2,469
Maradi	9 centers			
Aguie		44,325	45,957	90,282
Gazawa		1,608	1,592	3,200
Dakoro		1,674	1,300	3,574
Guidan-Roumji		3,853	3,948	7,801
Tibiri		1,436	1,576	3,012
Madarounfa		4,008	4,219	8,227
Mayahi		1,550	1,718	3,266
Commune de Tessaoua		1,641	1,614	3,255
Ville de Maradi		5,941	6,152	12,093
		22,614	23,238	45,852
Niamey	7 centers			
Commune de Filingué		131,071	128,201	259,272
Quallam		3,347	3,561	6,908
Say		1,744	1,968	3,712
Téra		2,375	2,524	4,899
Ayorou		2,948	3,407	6,355
Tillabéri		2,920	3,370	6,290
Ville de Niamey		3,054	2,740	5,794
		114,683	110,631	225,314
Tahoua	8 centers			
Commune de Birni-N'Konni		36,799	37,842	74,641
Malbaza usine		7,357	7,070	14,227
Bouza		1,389	1,522	2,911
Illéla		1,343	1,791	3,634
Keita		2,719	3,002	5,721
Madaoua		1,779	1,750	3,529
Tchin-Tabaraden		4,180	4,469	8,649
Ville de Tahoua		1,701	2,004	3,705
		15,831	15,434	31,265
Zinder	6 centers			
Gouré		45,793	46,034	91,827
Magaria		2,922	3,080	6,002
Matamey		3,520	3,748	7,368
Miria		2,991	3,268	6,259
Tanout		4,313	4,123	8,436
Ville de Zinder		2,475	2,851	5,326
		29,472	28,964	58,436
IGER	42 centers			
		300,518	301,441	601,959

^aConsidered urban: chief towns of departments and districts, localities governed by the population of at least 2,500

Table 6: Urban Centers by Population Bracket

<u>Number of Centers</u>	<u>Number of Inhabitants</u>	<u>Total Inhabitants</u>
1	more than 100,000	225,314
1	50,000 - 99,999	58,346
3	20,000 - 49,999	97,592
3	10,000 - 19,999	37,551
17	5,000 - 9,999	124,393
16	2,000 - 4,999	56,954
<u>1</u>	less than 2,000	<u>1,719</u>
<u>42</u>		<u>601,959</u>

Table 7: Urban Population by Department

<u>Department</u>	<u>Population of Department Population :</u>	<u>Percentage of Total Population</u>
Agadez	28.1	5.8
Diffa	9.4	2.6
Dosso	5.1	5.9
Maradi	9.6	15.0
Niamey	22.1	43.1
Tahoua	7.5	12.4
Zinder	9.1	15.2
Niger	<u>11.8</u>	<u>100.0</u>

Table 8: Resident Population by Five-Year Age Group and Sex

	<u>Men</u>	<u>Women</u>	<u>Total</u>
0 - 4 years of age	494,996	489,040	984,036
5 - 9 years of age	432,007	385,520	817,527
10 - 14 years of age	273,775	219,303	493,078
15 - 19 years of age	204,065	303,541	507,606
20 - 24 years of age	174,789	271,857	446,646
25 - 29 years of age	180,610	236,014	416,624
30 - 34 years of age	169,751	198,398	368,149
35 - 39 years of age	129,052	103,299	232,351
40 - 44 years of age	128,655	112,987	241,642
45 - 49 years of age	68,125	44,388	112,513
50 - 54 years of age	82,133	70,793	152,926
55 - 59 years of age	37,610	21,058	58,668
60 - 64 years of age	55,764	49,417	105,181
65 years of age and over	78,048	70,478	148,526
Undeclared	4,612	8,342	12,954
Total	<u>2,513,992</u>	<u>2,584,435</u>	<u>5,098,427</u>

Source: Central Census Bureau - General population census, 1977.

Table 9: Resident Population According to Marital Status and Sex

	<u>Men</u>	<u>Percent</u>	<u>Women</u>	<u>Percent</u>	<u>Total</u>	<u>Percent</u>
Single	493,770	54.4	1,134,920	43.9	2,628,690	51.6
Married	961,162	38.2	1,248,859	48.3	2,210,021	43.3
Widowed	14,738	0.6	127,619	5.0	142,357	2.8
Divorced	41,582	1.7	68,125	2.6	109,707	2.2
Undeclared	2,740	0.1	4,912	0.2	7,652	0.1
Total	<u>2,513,992</u>	<u>100.0</u>	<u>2,584,435</u>	<u>100.0</u>	<u>5,098,427</u>	<u>100.0</u>

Source: Central Census Bureau - General population census (November 20, 1977).

Table 10: Resident Population According to Schooling and Sex

	<u>Men</u>	<u>Percent</u>	<u>Women</u>	<u>Percent</u>	<u>Total</u>	<u>Percent</u>
Uneducated	2,144,985	85.3	2,463,717	95.3	4,608,702	90.4
Literate ¹	365,959	14.6	118,867	4.6	484,826	9.5
Undeclared	3,048	0.1	1,851	0.1	4,899	0.1
Total	<u>2,513,992</u>	<u>100.0</u>	<u>2,584,435</u>	<u>100.0</u>	<u>5,098,427</u>	<u>100.0</u>

¹ Persons who can read a national language or any other language.

Source: Central Census Bureau - General population census (November 20, 1977).

Table 11: Literacy Rate Per Department

<u>Department</u>	<u>Literacy Rate</u>
Agadez	11.8
Diffa	11.6
Dosso	6.8
Maradi	7.8
Niamey	11.3
Tahoua	7.8
Zinder	12.0
Niger	9.5

Table 12: Resident Population by Department, by Sex and by Wide Age Group

	<u>Agadez</u>	<u>Diffa</u>	<u>Dosso</u>	<u>Maradi</u>	<u>Niamey</u>	<u>Tahoua</u>	<u>Zinder</u>	<u>Niger</u>
Men ¹	64,363	85,043	336,400	465,124	586,564	484,400	492,098	2,513,992
Less than 15 years of age	29,642	32,583	167,700	239,481	290,143	240,948	200,281	1,200,778
15 to 59 years of age	31,003	44,976	150,600	202,110	268,070	220,087	257,944	1,174,790
60 years of age and over	3,264	7,340	18,000	23,129	27,168	21,696	33,215	133,812
Women ¹	60,294	81,698	356,411	479,164	585,137	510,081	511,650	2,584,435
Less than 15 years of age	24,704	28,035	157,213	215,442	260,831	219,033	188,605	1,093,863
15 to 59 years of age	31,024	48,802	183,256	245,844	292,979	268,029	292,401	1,362,335
60 years of age and over	3,946	4,716	15,288	16,464	28,797	21,610	29,074	119,895
Total ¹	124,657	166,741	692,811	944,288	1,171,701	994,481	1,003,748	5,098,427
Less than 15 years of age	54,346	60,618	324,913	454,923	550,974	459,981	388,886	2,294,641
15 to 59 years of age	62,027	93,778	333,856	447,954	561,049	488,116	550,345	2,537,125
60 years of age and over	7,210	12,056	33,288	39,593	55,965	43,306	62,289	253,707

¹Including persons of undeclared age.

Source: Central Census Bureau - General population census (November 20, 1977).

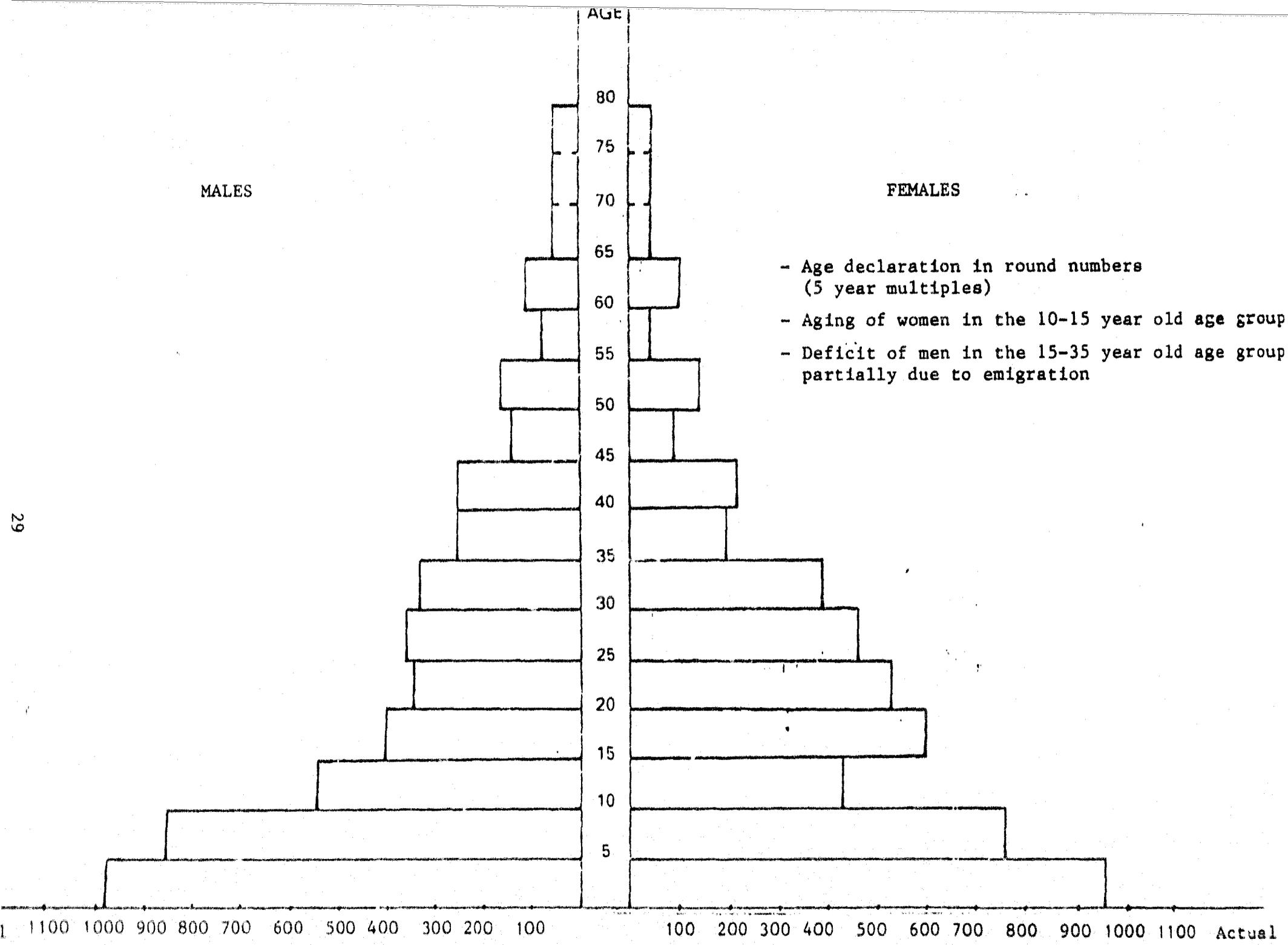


Figure 6: Age Pyramid

(per 10,000 population)

Table 13: Population Distribution by Department (1977)

<u>Department</u>	<u>Population</u>	<u>Inhabitants/km²</u>
Agadez	124,657 (2.4%)	0.2
Diffa	166,741 (3.3%)	1.2
Dosso	692,811 (13.6%)	22.3
Maradi	944,288 (18.5%)	24.5
Niamey	1,771,701 (23.0%)	13
Tahoua	994,481 (19.5%)	9.4
Zinder	1,003,748 (19.7%)	6.9

They are excellent farmers, traders and contractors and clever craftsmen.

(b) Sonrai--Djerma

The Sonrai settled in the wards of Tillabéry, Niamey and Dosso, are farmers.

The Djerma occupy the left bank of the Niger, the regions of Filingué, Dosso and Ouallam. Formerly good warriors, they now farm but do not have much cattle.

The Kourtey, Ouogo (in the islands and the valley of the Niger river in the region of Tillabéry, Sorkol), the Gourmantché (right bank of the river) (6,698) and the Dendis (Gaya region) can be added to this group.

(c) Kanouri

The Kanouri occupy the extreme east of Niger, and number 219,540 persons including:

- o The Manga (east of the department of Zinder and north of Goure);
- o The Dagra (in the mountain regions of Koutous and Damergou);
- o The Mobeur (on the banks of the Komadougou-Yobé) and the Dietko;
- o The Kenembou and their cousins Koubouri, Sougourti, Toumari (shores of Lake Chad in the vicinity of N'Guigmi); and
- o The Boudouma (fishermen and breeders on the islands and the shores of Lake Chad).

(d) Peulhs and Rimaïbé

They are found scattered among other populations in the sahelian and even the sudanian zone.

(e) Touareg

Including the assimilated Bella or Bouzen, this group numbers 405,711 persons including the Touareg Toulliminden (Tera, Tillabéry, Tahoua regions), and the Touareg de l'Air throughout the center of the country, mainly around Agadez.

(f) Toubou

This group occupies the eastern part of the country and numbers 405,711 persons including the Teda in the north (breeders), the Daza in the south (breeders), and the Aza (craftsmen and hunters).

(g) Arabs

The Arabs are represented by the Deremchak (region of Tahoua) and the Choa (regions of Agadez and N'Guigmi). The 24,652 Arabs are breeders.

(h) Others

Other groups include 28,880 persons according to the general census of 1977.

(3) Religions

Islam is the main religion in Niger (90 percent). The remainder of the population practice other religions (Animism, Christianity).

(4) Languages

French is the official language. Other national languages are: Hausa (56 percent), Djerma (22 percent), Kanouri, Toubou, Peulh, Tamajaq, Arabic, and Gourmantche. The first two (Hausa and Djerma) dominate.

b. Work distribution

Table 14 give information on population distribution for 1981, 1982, and 1983.

(1) Urban population

In 1977, the population of urban centers represented 11.8 percent of the total population as compared to 7.3 percent in 1983.

The urban population is mainly composed of workers in industry, commerce and government and of a certain population of seasonal workers who operate small retail businesses or work as temporary employees.

(2) Rural population

In 1983, the rural population (including nomads) was estimated at 5,219,000 inhabitants.

Table 14: Changes in the Population Size of Niger
(in thousands of inhabitants)

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>Average Annual Rate of Increase</u>
	-----000-----			
Sedentary Rural Population	4,221	4,319	4,417	2,3%
Nomadic Population	779	790	802	1.4%
Urban Population	687	736	788	7,3%
(of Niamey)	<u>(330)</u>	<u>(363)</u>	<u>(399)</u>	<u>(10,0%)</u>
Total Population	<u>5,687</u>	<u>5,845</u>	<u>6,007</u>	<u>2.77%</u>

Source: Study on training needs in the Republic of Niger (p. I/14).

The rural population works in four sectors of activity: agriculture, livestock, handicrafts and small retail business, and fishing. These activities are pursued by men and women.

- o Agriculture: Dry crop farming dominates in family fields (gandou) or individual fields (gamana). Irrigated or flood recession crops are cultivated on the banks of running water such as the Niger river or in the lowlands (rice, sorghum, cotton, vegetables) such as Lake Chad, and other vast pools;
- o Livestock: Animal husbandry is practiced by the nomadic population (Peulhs and Touareg). It is practiced mainly in pastoral, agro-pastoral and transitional zones. In such zones, most of the livestock is transhumant. From the pastoral zone to the south of the country, there are occasional pockets of pastures (along water bodies) where an agriculture-livestock association occurs, along with settlement by the herders;
- o Handicrafts: Handicrafts are rich and varied: weaving, dyeing, leather-work, pottery, wrought iron, jewellery, esparto work (mostly rugs), wicker-work and embroidery (leather and fabrics). There is a handicraft center in the Niger National Museum at Niamey;
- o Small retail businesses: Small displays (retail sale of various food articles and products) are operated by both men (cigarettes, cola, soap, sugar, etc.) and women (oils, groundnuts, crop pickings, cooked food, etc.). Barter is also practiced (cereals exchanged for dairy products, etc.); and
- o Fishing: Fishing is practiced along the Niger river, in lakes (Chad and Madarounfa) and the Komadougou river.

(3) Migration

(a) Exterior

There are two kinds of exterior migration: an exodus of moderate to long duration and a seasonal exodus. In both cases, such emigrations concern young people (most of them single) who come from regions where farm lands are insufficient or who wish to improve their lot or are just looking for adventure. The seasonal exodus concerns mostly young workers wanting to supplement their income to compensate for food shortages resulting from a poor crop season and to help them bridge the period until the next season; such migrations proceed towards bordering countries (Nigeria, Ivory Coast, Benin, and Togo). These last years, the government attempted to check this movement by diversifying rural activities (developments around water bodies, job creation in the mining sector, etc.).

On the other hand, before and during drought years (1972-74), there was a steady arrival of people migrating mainly from disaster zones in bordering countries, particularly Mali.

(b) Interior

Along with demographic growth (important concentration in the southern zone of the country where 75 percent of the population occupies 12 percent of the national territory with a density of 27 inhabitants per km²), there is a migration towards the north in search of farm lands. To contain this movement, a policy was instituted to intensify production systems. On the other hand, after harvesting, many rural inhabitants migrate to urban areas in search of work to occupy the slack season (Niamey, Maradi, Arlit, Zinder, Dosso).

c. Education

In 1960, the government faced a very strong social demand for education and a dramatic shortage of management personnel. (See Table 15).

The 1961-1963 provisional plan marked the first attempt, considerable at the time, to redress the state of primary education.

During the following periods and up to the present, education and vocational training have been the primary occupation of the government, requiring exceptional sacrifices.

In 1978, the government allocated to education 27 percent of its working budget and 25.7 percent of the general budget.

(1) Present situation

The present educational system comprises three levels.

(a) Primary education

In October, 1982 there were 253,062 pupils. The duration of primary school is six years (CI, CP, CE1, CE2, CMI, CM2) with an introductory age of six or seven. A certificate attesting to the completion of the cycle of the first degree is issued, permitting access to the sixth grade in general education schools.

**Table 15: Changes in the School Attendance Rate -
Elementary School Education
(Years: 1960-61 to 1978-79)**

School Year	Population as of January 1st of the School Year	School-age Population	Population Attending School	Rate of School Attendance
1960-61	3,240,000	648,000	26,609	4.1
1961-62	3,320,000	664,000	34,448	5.2
1962-63	3,410,000	682,000	43,556	6.7
1963-64	3,500,000	700,000	50,348	7.2
1964-65	3,590,000	718,000	55,146	7.7
1965-66	3,690,000	738,000	61,984	8.6
1966-67	3,790,000	758,000	70,657	9.3
1967-68	3,890,000	778,000	77,261	9.9
1968-69	4,000,000	800,000	81,954	10.2
1969-70	4,110,000	822,000	84,247	10.3
1970-71	4,220,000	844,000	88,594	10.5
1971-72	4,330,000	866,000	94,500	10.9
1972-73	4,450,000	890,000	100,892	11.3
1973-74	4,570,000	914,000	110,437	12.1
1974-75	4,700,000	940,000	120,984	12.9
1975-76	4,830,000	966,000	142,182	14.7
1976-77	4,960,000	992,000	159,515	16.1
1977-78	5,098,400	1,019,700	176,397	17.3
1978-79	5,239,600	1,047,900	187,151	17.9

Source: 1978 Statistics Year Book, Planning Department, p. 53.

(b) Secondary education

Secondary education comprises two cycles:

- o Secondary education, first cycle—four years of study, culminating in a first cycle certificate which permits passage to the second cycle (BEPC- Brevet d'écudes du premier cycle); and
- o Secondary education, second cycle—three years of study (second, first, and final), culminating in the Baccalureat in general and technical education. (See Table 16.)

(c) Higher education

Higher education is available at the University of Niamey and in other institutions of higher learning such as the National School of Administration (ENA -Ecole normale d'administration). (See Table 17.)

(d) Remarks

School year 1979-1982 there were 1,359 students graduated of which 900 studied abroad (66 percent). It must be noted that there were no students enrolled in 1977, was blank and this could have repercussions on the number of students in school year 1979-1980.

The number of students in training in Niger in 1982 was: School of Education, 64 percent; School of Humanities, 12.5 percent; EAMAC, 5.4 percent; Superior School of Agronomy, 4.0 percent; School of Health Sciences and School of Literature and Humanities, 6.5 percent; and Regional Training and Application Centre for Agro-Meteorology and Operational Hydrology, 1.1 percent.

The vast majority of those who studied abroad attended institutions in West Africa (Ivory Coast, Senegal, Togo) and in Europe (mainly in France).

(2) Institutions

(a) Rural development sector

In the rural development sector, the following institutions are active.

- o Superior School of Agronomy and Animal Husbandry--Niamey;
- o Practical Institute of Rural Development--Kolo;
- o School of Animal Husbandry Management--Niamey;

Table 16: Situation of Primary and Secondary School Education

	Primary School		Secondary School 1st Cycle		Secondary School 2nd Cycle	
	1978/79	1982/83	1978/79	1982/83	1978/79	1982/83
1. Students	189,059	253,065	19,491	38,370	3,060	5,520
2. Number of Classes	4,483	6,028	503	861	106	169
3. Students per Class	42	41	39	44	28	32
4. School Attendance Rate	18.2	20.9	--	--	--	--
5. Success Rate (first cycle certificate)	32.9	35.2	81	73.3	--	--
6. Educational Personnel	4,630	6,024	668	1,181	--	182
(Inspectors and Counselors)	(12)	(30)				
(Teachers)	(4,630)	(5,959)				

Table 17: Higher Education Situation
(Five-Year Plan Period, 1979-1983)

(Number of Students Graduating)

Period Place of Study	1979	1980	1981	1982	Total
Niger	72	53	166	168	459
Abroad	194	262	252	292	900
Total	266	315	418	460	1,359

- o Training Institutions for Rural Craftsmen (Center of Rural Handicraft and Farm Machinery Development), Workshop for Construction and Repair of Farm Material, Construction Unit for Farm Material, the three respectively located at Dosso, Tahoua and Zinder;
- o Training Centers for Young Farmers;
- o Rural Promotion Centers and Technical Training Centers in relation to projects of rural development; and
- o Training Center for Literary Education.

Non-formal education centers on two essential aspects: extension, in the broad sense of the term, and training in relation to projects such as those of the National Office of Hydro-Agricultural Projects and the training projects of the Practical Institute of Rural Development/School of Animal Husbandry Personnel. This type of education addresses training and technical refresher courses for auxiliaries engaged in short-term extension.

(b) Formal technical education

In the technical sector, the following institutions are active in training production agents:

- o Center for Professional Training and Improvement—Niamey;
- o Kalmaharo Technical Centre—Niamey; and
- o National School of Certified Nurses and Social Assistants—Zinder.

The following institutions are active in the training of production managers:

- o Air Mining School—Agadez;
- o College of Technical Teaching—Niamey;
- o Dan Kassawa Technical High School—Maradi;
- o National Center of Postal and Telecommunication Education;
- o Training School for Information Techniques;
- o National School of Public Health;
- o Training Center for Literacy Teachers;

- o National Institute for Youth, Sports and Culture--Niamey;
and
- o National School of Administration--Niamey.

(c) Non-formal professional training

Non-formal training is conducted at the Training Center for Road Transport Techniques--Niamey, the Trade Center for Waterworks and Electricity, the National Museum Educational Center--Niamey, and the Intra-Enterprise Training Center for the improvement of managerial staff.

(d) Teacher training

Teacher training is conducted at teacher training colleges in short and long courses (Tillabéry, Dosso, Zinder), and also at the National School of Education.

(e) University education

The training institutions at the university level are : the College of Agronomy, the College of Sciences, the College of Health Sciences, the College of Literature and Humanities, the College of Economic and Juridical Sciences, and the Institute of Research and Mathematic Studley.

B. Brief Description of the Government Structure

1. General description

a. Principal dates

Important dates in the country's history are:

- o 1956 Outline law adopted;
- o September 1958, Referendum on the Franco-African Community;
- o December 18, 1958, Proclamation of the Republic;
- o August 3, 1960, Proclamation of Independence;
- o November 8, 1960, the constitution is approved;
- o November 5, 1964, administrative reform creating 7 departments divided into wards, administrative posts and communes in place of the 16 former circles;
- o April 15, 1974, take-over of Government by the National Armed Forces, suspension of the constitution and of the Assembly and interdiction of all political organizations.

Creation of the Supreme Military Council. The President of the Supreme Military Council is the Head of State and President of the Cabinet.

- o February 9, 1980 approval of the Five-Year plan 1979-1983;
- o March 18, 1980, first meeting of the National Commission responsible for implementing the Niger Development Society; and
- o August 3, 1983, creation of the National Development Council.

b. Institutions

There are ministerial and regional institutions. Ministerial departments entrusted with sectorial responsibilities are structured into national directions and services and they exercise authority over the offices and societies of mixed economy.

The National Development Council, a consultative body, is presided over by the Prime Minister.

At the regional (département) level, the Prefect represents the superior authority of the Government; he chairs the Departmental Technical Committee.

The sub-prefects (arrondissement level) fulfill the same functions as that of the Prefect and they are responsible for the ward's provisional advisory commissions.

The heads of provinces, cantons, groups, and villages have authority within their areas of responsibility.

Ministerial departments are represented at the regional level by a departmental direction and at the local level by ward services which respectively form regional and local development teams under the prefects and sub-prefects.

c. Ministerial departments

The twenty-one ministerial departments are the following:

- o Prime Minister;
- o Minister of National Defense;
- o Minister of State for Finance;
- o Minister of State for Planning, Commerce and Transport;
- o Minister of Information;

- o Minister of National Education;
- o Minister of Postal and Telecommunication Services;
- o Minister of Water Resources and Environment;
- o Minister of Foreign Affairs and Cooperation;
- o Minister of Public Office and Labor;
- o Minister of Mines and Industry;
- o Delegate Minister of Finance;
- o Minister of Rural Development;
- o Minister of Superior Education and Research;
- o Minister of Public Works and Town Planning;
- o Delegate Minister of Interior;
- o Minister of Public Health and Social Affairs;
- o Minister of Justice;
- o Secretary of State for Planning;
- o Secretary of State for National Education; and
- o Secretary of State for Commerce and Transport.

d. General budget

The budget for Niger is broken down in Tables 18 and 19.

2. Government policies which impact upon agriculture and agricultural research

Most of them are part of the Five-Year Plan 1979-1983 and fall into one of three levels.

a. General policies

General agricultural policies are the pursuit of food self-sufficiency, the establishment of a development society and the pursuit of economic independence. (Five-Year Plan 1979-1983, p. 82.)

Table 18: Operating Budget, 1978
(millions of CFA francs)

<u>Revenue</u>		<u>Expenditures</u>	
Direct Taxation	10,980	National Debt	2,310
Indirect Taxation	20,440	Wages	10,640
(Customs, Stamps, etc.)	--	Equipment	8,120
Others	<u>10,140</u>	Contributions-Subsidies	<u>6,020</u>
TOTAL	<u>41,560</u>	TOTAL	<u>27,090</u>

Estimates for 1979 = 56,747 millions of CFA francs
 1980 = 72,145 millions of CFA francs
 1981 = 80,700 millions of CFA francs
 1982 = 93,900 millions of CFA francs

Table 19: Detailed National Budget for 1981 and 1982
(millions of CFA francs)

Receipts	1981	1982
Various Contributions	31,394	30,777
Customs Duties	28,800	31,992
Registration	3,940	2,648
Revenue from Public Property	1,768	2,451
Miscellaneous Receipts	7,054	4,576
Receipts Outstanding	<u>8,439</u>	<u>1,276</u>
TOTAL BUDGET ^a	<u>81,395</u>	<u>73,720</u>
Expenditures	1981	1982
Public Debt	9,395	19,185
Authorities and Service Means	32,464	35,467
Transfer to National Service Fund	26,000	8,280
Other Public Interventions	<u>12,344</u>	<u>12,105</u>
TOTAL EXPENDITURES ^b	<u>80,203</u>	<u>75,037</u>

^a Carry over not included. Provisional for 1982.

^b Expenditures for terminated management not included. Provisional figures for 1982.

Sources: Balance sheet respecting the execution of the five-year plan, 1979-1983; provisional document of the Interim Funding Program, pp. 13 and 20.

b. Policies affecting the agricultural sector

Policies affecting this sector are the development of traditional dry crops, of irrigated crops, and of livestock for the production of meat and milk to meet national and export requirements. Also, the government is promoting modernization of the pastoral zone (better managed pastures) and the agro-pastoral zone for a better balance between agriculture and livestock and in the forestry sector, improvement in wood production and the protection and restoration of soils. The maximum development of fishery potentials is also an important policy.

c. Policies affecting agricultural research

Policies concerned with agricultural research are the study of the physical and human environment of rural production, the updating of varieties adapted to ecological zones and improving farming techniques related to the environmental economic conditions, the maintenance and development of the health coverage of livestock, the improvement of livestock nutritional levels, genetic selection of the herd, and the rational conservation and development of natural resources and establishment of an agro-sylvo-pastoral development plan.

3. International organizations

Niger belongs to the following international organizations:

- o United Nations and its agencies;
- o Agreement Council;
- o West African Economic Community;
- o Economic Community of Western African States;
- o West Africa Monetary Association;
- o Liptako-Gourma Group;
- o Authorities of the Niger River Basin;
- o Commission of the Lake Chad Basin;
- o Pro-African Unity Organization;
- o Organization of the Islamic Conference;
- o Movement of the Non-Aligned;
- o Permanent Inter-State Committee for Drought Control in the Sahel;

- o Association for the development of rice farming in Western Africa;
- o African Groundnut Council; and
- o Agreement of non-aggression and assistance in defense matters.

C. Economic Indicators

1. General indices

Table 20 indicates the GDP at current prices in 1979 1980, 1981, and 1982.

The GDP per person was FCFA 82,194 in 1979 and FCFA 111,280 in 1982. The growth rate of GDP at constant prices was 13.6 percent in 1979, 4.9 percent in 1980, 1.1 percent in 1981 and 0.7 percent in 1982; giving, therefore, an annual average growth rate of 4.6 percent.

The rural sector (agriculture, livestock, forest and fisheries) represents over 47 percent of GDP.

2. International trade

The trade balance over a five-year period is shown in Table 21.

Uranium and cattle together represented over 23 percent of exports in 1979 and approximately 90 percent in 1983.

The import/export ratio shows a deficit in Niger export trade.

The principal customers and suppliers for exports are France, other countries of the European Economic Community, and Nigeria; and for imports they are France and other countries of the European Economic Community. The main products for export are uranium, coal, and meat; for imports, petroleum, food products, and industrial products.

3. Finance and currency

The FCFA is 1/50 of the French franc.

The exchange rate with the American dollar during the last 12 months is shown in Table 22.

a. National debt

The national debt was US \$32 million in 1970 and US\$ 399 million in 1980. Debt servicing was US\$ 1 million in 1970, and US \$16 million in 1980.

Table 20: Changes in the Gross Domestic Product in Current Prices
(billions of CEA francs)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<u>Rural Sector</u>				
Agriculture	105.4	120.8	152.0	169.0
Livestock	72.2	85.2	100.3	115.3
Forest and Fisheries	20.0	23.0	26.4	29.8
<u>Mines and Quarries</u>	61.6	65.6	54.3	51.1
<u>Industry, Handicraft, Energy</u>				
Manufacturing Industry	5.7	6.3	7.5	8.5
Water and Electricity	0.69	1.6	5.1	8.4
Handicraft	17.1	20.0	23.4	26.3
<u>Buildings and Public Works</u>	29.7	37.2	34.0	30.3
<u>Commerce, Transportation, Services</u>				
Commerce	46.1	52.7	66.2	71.0
Transportation	17.4	21.5	20.9	22.2
Services	16.4	26.9	33.0	39.0
Import Duties	20.0	29.1	28.3	28.0
<u>Public Administration</u>	<u>30.4</u>	<u>38.6</u>	<u>45.4</u>	<u>51.5</u>
TOTAL PIB	<u>442.6</u>	<u>528.5</u>	<u>595.8</u>	<u>650.4</u>

Source: Planning Ministry--provisional data, April 1983.

Table 21: Trade Balance, 1979-1983
(billions of CFA francs)

	1979	1980	1981	1982	1983
Imports	140.1	171.7	172.4	173.3	151.0
Exports, FOB	103.1	124.9	126.3	119.0	133.6

Source: Provisional Document of the Interior Funding Program, Planning Ministry, p. 427.

Table 22: U.S. Dollar Rate of Exchange
(in FCFA)

<u>Month</u>	<u>Rate of Exchange</u>
September 1982	353
October 1982	307
November 1982	360
December 1982	342
January 1983	339
February 1983	344
March 1983	351
April 1983	366
May 1983	378
June 1983	383
July 1983	389
August 1983	402

b. Banking institutions

The most important banking institutions are:

- o Central Bank of West African States;
- o Arab-Libyan-Nigerien Bank for Foreign Trade and Development (BALINEX) 50% Niger, 50% Libya;
- o Development Bank of the Republic of Niger (37 percent state-owned);
- o International Bank for Nigerien Trade and Industry (French capital);
- o Niger International Bank--Branch of the West African International Bank (French capital);
- o Lending Bank for Land Collectives (Property of Collectives);
- o National Agricultural Lending Bank;
- o Nigerien Lending Bank (45% state-owned);
- o City Bank (American); and
- o Dar Al Maal Islami Niger (Arab).

c. Inflation rate

From 1960 to 1970, the average inflation rate was 2.1 percent. From 1970 to 1977, it was 10.8 percent.

4. Economic plan

The present plan is for the period 1979-1983. The general priorities are to free the economy from adverse natural forces and to establish a development-oriented society that will achieve its economic independence step by step.

Priorities for the agricultural sector are more food self-sufficiency, higher productivity in livestock, and the conservation of natural resources.

Priorities for agricultural research are to develop an improved genetic stock of food crops adapted to specific zones which will be resistant to drought and disease, and to develop farm practices adapted to each crop and zone.

Other important policies are to develop efficient programs to fight crop diseases and pests; to study the situation of water in the environment and to develop systems for the livestock zone.

5. Foreign assistance

Assistance from international agencies is indicated in Table 23. Bilateral aid is indicated in Table 24.

D. Rural Sector

1. Agricultural land

Arable lands constituted 15,000,000 ha in 1979. The area cultivated is indicated in Table 25.

The area used for animal production in 1979 was 9,700,000 ha in permanent pastures.

Irrigated areas occupied 6,000 ha in 1976, 22,000 ha in 1979, and approximately 24,000 ha in 1981.

Areas cultivated are categorized by crop in Table 26 for the year 1980.

The area of classified forest was 212,000 ha according to the Five-Year Plan, 1979-1983.

2. Land tenure

The land is the property of the State. It belongs only to the one who cultivates it. The traditional land tenure system is still in force.

3. Principal products of the rural sector

a. Principal crops

The eight major crops, in order of importance, are millet, sorghum, cowpeas, groundnuts, rice, corn and fonio. Details on yields of the crops are given in Table 27.

b. Principal livestock products

The principal livestock products are beef, milk, mutton, goat meat, poultry, horse meat, pork, camel meat, eggs and hides. Details of this production are given in Table 28.

c. Fisheries

The total volume in 1981 was 1,500 tons. The total volume in 1979 was 8,900 tons. Reasons for the decline were that the production line was not yet mastered by non-national fishermen, and that fishermen are not organized at the national level (cooperatives).

Table 23: Assistance from International Agencies
(millions of U.S.\$)

	<u>1980</u>	<u>1981</u>	<u>1982</u>
IFC	--	--	2.6
IDA	36.7	--	--
AFDB	0.8	--	14.6
UNDP	2.0	3.0	--
EC	4.5	--	10.0
Others	<u>4.0</u>	<u>--</u>	<u>--</u>
TOTAL	<u>48.0</u>	<u>3.0</u>	<u>27.2</u>

Table 24: Bilateral Aid
(millions of U.S.\$)

	<u>1980</u>	<u>1981</u>
France	50.8	63.0
West Germany	21.5	36.8
Belgium	10.1	12.1
United States	9.0	10.0
Japan	6.3	1.4
Others	<u>9.6</u>	<u>11.3</u>
Total	<u><u>107.3</u></u>	<u><u>134.6</u></u>
OPEC Countries	1.7	

Source: UNDP

Table 25: Cultivated Areas, 1979-1981

	<u>1979</u> (ha)	-	<u>1981</u> (ha)
Agadez	1,000	+ 82,000	200
		date palm trees	
Diffa	65,000		61,000
Dosso	700,000		630,000
Maradi	800,000		770,000
Niamey	1,000,000		840,000
Tahoua	500,000		540,000
Zinder	800,000		720,000
	<hr/>		<hr/>
Total	<u>3,866,000</u>		<u>3,561,200</u>

Table 26: Area Per Important Crop Category, 1980

<u>Crops</u>	<u>Ha</u>
Millet	3,100,000
Sorghum	770,000
Cowpeas	1,100,000
Groundnuts	170,000
Rice	20,000
Others	25,000

Table 27: Distribution of the Principal Crops by Region

Products	Total (ha)	Area (1981) by region (percent)							Total Production (1981) (T)	Value for the Producer (1981) (CFA F)	Average Yield (kg/ha)	Price for the Producer	
		Diffa	Dosso	Maradi	Niamey	Tahoua	Zinder	Agadez				1981	1982
Millet	3,100,000	1	18	22	24	13	22	-	1,370,000	95,900,000	360 to 450	70	80
Sorghum	982,000	8	5	21	11	29	26	-	273,000	16,380,000	300 to 500	60	70
Cowpeas	1,140,000	1	16	23	19	11	30	-	280,000	25,200,000	240 to 320	90	85
Rice (paddy)	23,000	2	4	-	92.6	0.1	0.3	-	38,000	-	1,200 to 1,900	70	85
Maize	12,000	10.4	20.3	22	15.5	3.3	12.4	15.8	9,000	-	600 to 775	-	-
Vegetables	5,000	41	0.5	0.4	29	0.2	28	-	134,000	-	25,000	-	-
Fonio	3,400	-	100	-	-	-	-	-	2,600	-	700 to 800	-	-
Peanuts	170,000	0.3	9	43	0.7	3.9	42.1	-	100,000	5,000,000,000	-	50	90

Table 28: Principal Products from Stock Breeding

<u>Products</u>	<u>Total Volume (1981) (T)</u>	<u>Total Value (1981) (CFA F)</u>	<u>Consumer Price CFA F (per kg) (per l)</u>		<u>Number of heads</u>	<u>Rate of Growth (1970-1980) (percentage)</u>	<u>Average Carcass Weight (kg)</u>	<u>Annual Per Capita Consumptio (kg) (l)</u>
Beef	39,000	31.2	800		3,300,000	17	107	7
Milk (camel, cow, small ruminants)	374,000	31	75		-	-	-	10.5
Mutton and Goat Meat	36,500	31	850		10,306,000	12 (sheep) 33 (goat)	14 (sheep) 11 (goat)	6.45 -
Poultry	1,300	8	-	-	-	-	-	-
Pork, horse meat and camel meat	4,150	-	-	-	-	-	-	-
Eggs	7,560	3.2	-	-	-	-	-	-
Hides (cattle, sheep, goat)	3,250 ^a	1,261	-	-	-	-	-	-
Fish	1,500	-	-	-	-	-	-	-

^aSpecies unknown.

4. Principal production systems

In harvesting, traditional systems are still used with tools such as knives, sickles (for millet, sorghum, rice) and digging hoes for groundnuts. Cotton is harvested by hand. Crops are kept in banco or straw granaries (millet, sorghum, androsogon and wood).

As for animal products, there is extensive production transhumance in the northern zone, feeding lots for finishing in the agricultural zone, and semi-intensive production on ranges.

5. Marketing systems

Marketing systems for the principle products are described below:

- o Millet and sorghum. Primary marketing in the case of cooperatives which sell to the Niger Food Products National Marketing Board. There is also an unofficial parallel circuit;
- o Cowpeas. SONARA is the society recognized to market this crop;
- o Vegetables. Most of the production is sold by the producers in urban centres;
- o Groundnuts. SONARA holds the monopoly on sales of groundnuts;
- o Rice. This crop is sold by the Niger Rice Society which buys it from rice cooperatives;
- o Corn. Corn is sold by the Niger Food Products National Marketing Board on the official market;
- o Beef. Since the severe drought, export of live cattle is prohibited so as to replenish the herds. The marketing circuit is in line with the food objective of self-sufficiency (SONARA delivers cattle to urban slaughter houses). There is a small parallel market in rural areas;
- o Mutton and goat meat. Idem;
- o Hides. The Niger Society for the Collection of Hides and Leathers collects and markets them;
- o Eggs and poultry. Village production is sold in the markets of large villages and urban centers. There is also a modern poultry network of poultry farms; and

- o Fish. River and lake fishermen entrust their catch to women for sale in markets.

6. Factors of production

In 1976, the year of the last census, Niger used 1,000 tons U.F. of chemical fertilizer. The amount used in 1981 was 3,500 tons U.F. For the price of chemical fertilizer at farmer's level in 1983, see Table 29, and for a distribution of animal traction implements, see Table 30. In 1980, there were 130-150 tractors in Niger. As for traction animals, there were 2,805 pairs of oxen in 1979, 811 in 1981; and 800 pairs of asses in 1974, and 135 in 1980.

7. Soils

The major problems related to soils and the regions involved are the following:

- o Agadez. Soils poor in organic matter (southern and south western plains);
- o Diffa. Soils generally poor except in the south (Maïné-Soroa and Diffa and shores of Lake Chad) and sandy (the eastern part of the Kadzell plains);
- o Dosso. Soils of ferruginous and skeletal table lands: Dosso (Dogon-Doutchi-Sabongari). They are sensitive to changes in rainfall and underground waters;
- o Maradi. Leached ferruginous soils containing typical iron (Department of Maradi, series of Maradi, Wakassou, Dadoria, etc.) of low productivity, loss of organic matter content and over-worked;
- o Niamey. Unsuitable jasper-like soils in the center, they are tropical ferruginous lightly or unleached on table lands of low productivity (they constitute the major part of the department's tillable lands) and finally, dune lands located mainly in the north and the west;
- o Tahoua. Low availability of arable land (a major problem for the department) because the scarcity of land is already a problem in the Kéita and Bouza wards (absence of fallows, high erosion and deforestation); and
- o Zinder. Soils generally poor and unstable. Fallow land is particularly important in the transitional zone whose orientation is pastoral rather than agricultural.

Table 29: Price of Chemical Fertilizers

Last census year (1976):	1,000 tons U.F.
Amount used in 1981:	3,500 tons U.F.
Price at farmer's level 1983:	
Simple superphosphate	35 F/kg
Triple superphosphate	45 F/kg
15-15-15	45 F/kg
Urea	50 F/kg
Calcium nitrate	35 F/kg
TA natural phosphate	28 F/kg

Table 30: Draught Animal Equipment

	<u>Animal Traction Tools 1977</u>	<u>Animal Traction Equipment Put in Place 1981</u>
Plows	4,500	5,987
Hoes	7,200	1,388
Seeders	900	1,907
Carts	3,300	4,978
Others	4,300	10,289
<hr/>		
	<u>1979</u>	<u>1981</u>
Pairs of Oxen	2,805	811
Donkeys	180	135
<hr/>		
Tractors (1980)	130 to 150	

8. Principal rural development agencies

The main organizations involved in rural development in Niger are as follows: the Ministry of Rural Development (MDR--Ministère du développement rural), the Nigerien Credit and Co-operation Union (UNCC--Union nigérienne de crédit et de coopération), the Niger National Society for the Development of Animal Resources (SONERAN--Société nationale d'exploitation des ressources animales du Niger), and the National Development Society (CNSD--Commission nationale de mise en place de la société du développement).

Figure 7 gives a detailed division of the various sections of the MDR. The UNCC is comprised of two main services--production and cooperatives. The production service includes handicrafts, farm machinery and development projects. The cooperative service includes the development of new cooperatives, a training section and a marketing section.

In 1979, the National Commission responsible for implementing the Development Society was given a double mandate--to define a framework appropriate to development and to create the necessary institutions to be founded on village-level participation. The basic development unit was called "the development cell" and was organized at the village level. Two main mass organizations constitute the framework of CNSD--the Samariya National Movement and the Cooperative Movement. Thus, agencies of the CNSD were set up at various levels:

- o Village/tribe/district level: tribal village development councils;
- o Canton/group level: local development councils;
- o Ward level: regional development councils;
- o Department level: regional development councils; and
- o National level (August 3, 1983)--CNSD.

Other development institutions are the National Farm Credit Bank, the Forest and Fauna Authority, the Fisheries and Fish-breeding Authority, the CSPPN, SONARA (groundnuts and cowpeas) and SONERAN (animal resources).

9. Food production and consumption

The principal food items produced in Niger in 1979, 1980, 1981 and 1982 are given in Table 31. The value of the principal food imports and exports are given in Table 32.

The yearly average of 1978, 1979 and 1980 daily food consumption per person was 407 grams of carbohydrates, 67 grams of proteins, 36 grams of fats and a total of 2,217 calories.

UNCC)
ONAHA)
IPDR)
ECE)

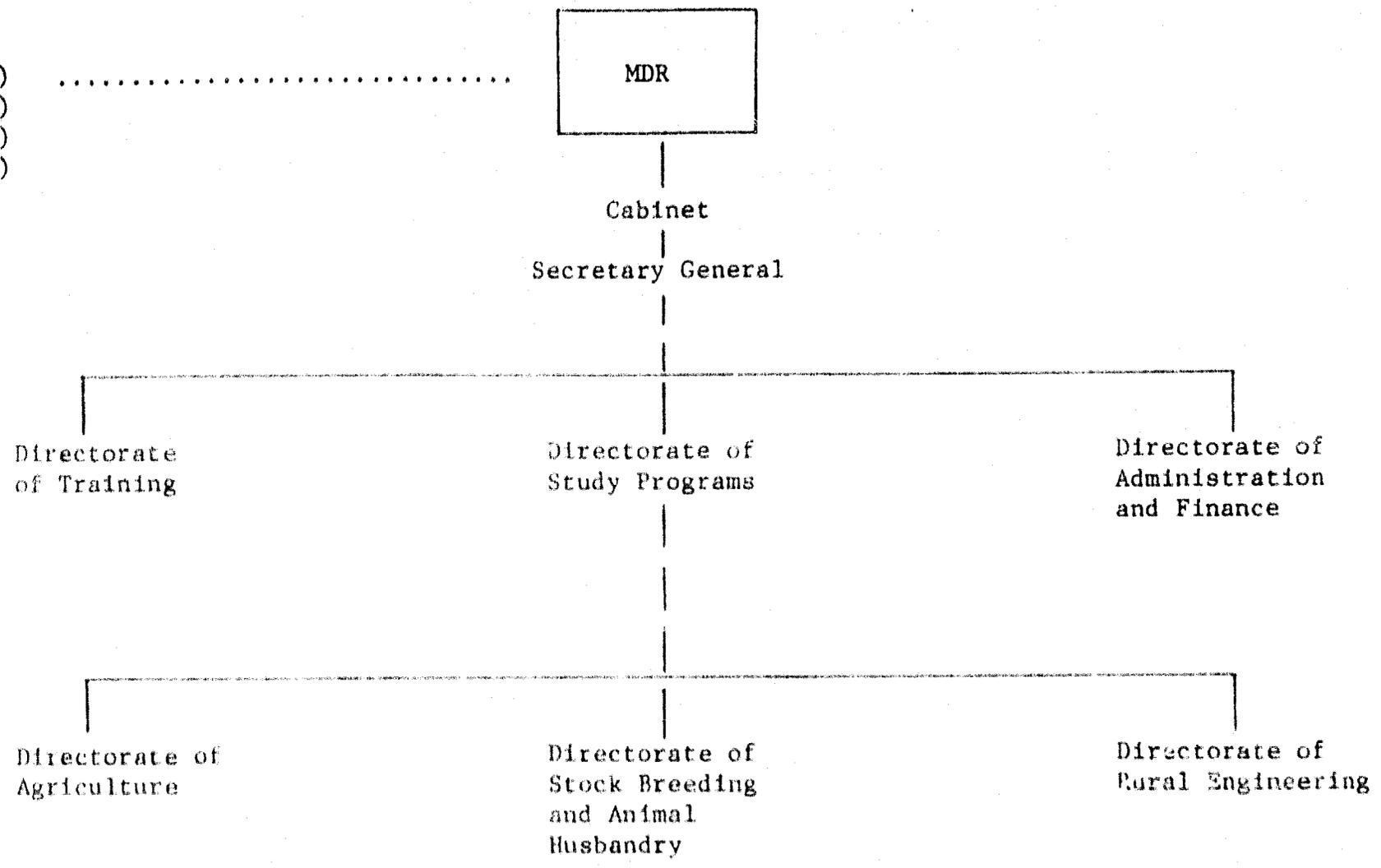


Figure 7: Organizational Chart of MRD

Table 31: Principal Food Products of Niger
(in metric tons)

<u>Food Products</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Cereals (millet, sorghum, rice, corn, fonio)	1,630,000	1,800,000	1,440,000	1,700,000
Consumable Legumes (particularly cowpeas)	310,000	270,000	280,000	290,000
Groundnuts (in the shell)	80,000	100,000	100,000	90,000
Root Crops	250,000	250,000	255,000	NA ^a
Vegetables	135,000	130,000	135,000	NA
Fruit	35,000	40,000	40,000	NA
Sugar Cane	190,000	190,000	190,000	NA
Meat	84,000	89,000	93,000	NA
Fish	3,000	1,000	1,000	NA

^aNA = Not available

Table 32: Principal Imported and Exported Food Products
(in U.S.\$)

<u>Imports</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Agricultural Products	3,568,000	4,550,000	5,365,000
Fish	<u>11,000</u>	<u>11,000</u>	<u>11,000</u>
Total	\$ 3,579,000	\$ 4,561,000	\$ 5,376,000
<u>Exports</u>			
Agricultural Products	6,164,000	6,672,000	6,273,000
Fish	<u>118,000</u>	<u>120,000</u>	<u>120,000</u>
Total	<u>\$ 6,282,000</u>	<u>\$ 6,792,000</u>	<u>\$ 6,393,000</u>

10. Credit for farmers

The official farm credit system is available under the National Farm Credit Bank. The kind of credit that is allowed to co-operatives is of medium-term on farm machinery or equipment (mainly animal traction) repayable in four annual installments.

There is another channel: farmers contract for short-term loans from usurious traders who are generally reimbursed in kind at harvest time. This practice is ruinous for farmers and the State is presently fighting it.

11. General orientation of rural development in Niger

a. Basic facts

Niger, an underdeveloped country, has a predominantly agro-pastoral economy with a 90 percent rural population. The rural contribution to the national economy is crucial (55 percent of GDP). Rural development strategy, then, is extremely important. The irregularity of rainfall, the presence of predators, and the impoverishment of farms all contribute to make the food problem the major preoccupation in Niger; long-term solutions can only be found through the means of expanding agricultural production, which is the backbone of any policy aimed at development.

Yet, agro-pastoral activity in Niger remains one of uncertain subsistence. In fact, the food situation is essentially marked by:

- o A strong population growth generating a rapid increase in an urban population (from 517,000 inhabitants in 1977 to 735,000 in 1982) whose needs differ more and more from those of the rural population which grew from 3.8 million inhabitants in 1977 to 5 million in 1982;
- o Very irregular farm crops which cause an imbalance between availabilities and needs. The overall food situation in Niger, computed on the basis of millet, sorghum and rice consumption, shows three shortage years with a deficit level of 44,900 to 6,800 tons for the period 1977-1978 to 1981-1982;
- o Inherent impeding factors are an ecosystem which is dominated by climatic hazards; the poor soils and the dangerous degradation of plant cover in particular, and the environment, in general; the maladjustment of the cultivation system and the evolution of human and animal food requirements; and
- o The weakness of supply, marketing and distribution structures.

These structural, marketing and distribution weaknesses are characterized by:

- o A wide fluctuation in cereal production from year to year and a marked tendency within the country to speculate on cereal prices, which hinders the flow of products to local markets (weakness of official purchases);
- o The import situation for rice and flour which places Niger in a dependency situation. In fact, imports of rice increased from 11,700 tons in 1977 to 44,729 tons in 1981, those of flour from 8,466 tons in 1977 to 49,481 tons in 1981;
- o The complexity of the international market, particularly its wide price fluctuations and the high cost of cereals sold to Niger;
- o The location of Niger which entails high transport costs and unreliable supply delivery (congested harbors, overworked Cotonou-Parakou railway line); and
- o The weakness of the means of the Niger Food Products Marketing Board which is not conducive to the procurement of adequate supplies (very high management costs and non-existence of working capital).

b. Potential

(1) Arable land

However, in spite of the weight of these various constraints, there is potential for improving the food situation.

With respect to plant production, the number of farms available is substantial. The total of useful agricultural area is estimated at approximately 30 million ha or 23.7 percent of the total surface of the national territory. The arable surface covers approximately 15 million ha of which 250,000 can be developed. These available lands hide enormous problems which restrict expansion in many regions, in particular, the sizeable investments required to cultivate them. The determining factor is the capacity of various lands to ensure a regular and sustained production. Soils are generally of two categories.

(a) Dune soils

Dune soils represent approximately 80 percent of available lands; their texture is sandy and they are suitable for millet, groundnuts and cowpeas. The yields on such soils average 400 kg for millet, 500 to 600 kg for groundnuts, 200 kg for cowpeas, and 200 to 300 kg for sorghum.

Intense cultural practices (choice seed, fertilizers, pesticides, animal traction cultivation) may possibly double yields of millet and groundnuts while that of cowpeas may be multiplied by three or four.

(b) Hydromorphic soils

These soils can be found in the Maggia and Goulbi valleys. They are of clay structure, productive, and suitable for sorghum, cotton, corn, wheat, tobacco and, eventually, rice. Sorghum yields reach 600 kg per ha under traditional cultural methods. On irrigated land, very interesting volumes of market gardening crops may be produced (onions, tomatoes, various vegetables, etc.).

In the valleys of the Niger and Komadougou rivers, soils are less productive than those previously mentioned but they offer a great potential for sorghum, wheat and cotton crops as well as for market gardening.

In the basins, the soils are highly suitable for rice, corn, sorghum, sugar cane and market gardening but they are not fully exploited.

Finally, around ponds and permanent water bodies, soils are clayey and suitable for market gardening because of the availability of water.

In addition to the Niger and Komadougou rivers, the country also has underground waters that have not been fully utilized.

(2) Animal production

With regard to animal production, resources were gravely reduced by drought these last few years but efforts to replenish the herds have resulted in better rates:

- o 80 percent for beef, or 3,354,000 heads;
- o 104 percent for sheep, or 2,973,000 heads;
- o 112 percent for goats, or 7,043,000 heads;
- o 133 percent for camels, or 391,000 heads;
- o 127 percent for horses, or 254,000 heads; and
- o 124 percent for asses, or 473,000 heads.

(3) Pastoral areas

Pastoral areas which are estimated at close to 62 million ha or 49 percent of national territory offer great development potential for the above livestock. However, two limiting factors require priority attention:

- o The water whose distribution network in pasture zones must be developed to allow rational and complete development;
- and

- o Organizing the herders who are the fundamental element in the Nigerian policy of livestock development.

Fauna is either terrestrial or aquatic. The first is still threatened with extinction as is our forest heritage and possibly because of the latter.

(4) Infrastructure

Finally, with regard to marketing, stocking and distribution structures, the extension of the cooperative network, thanks to the introduction of structures and the eventual transfer of certain functions to cooperatives, raises hopes of increased mobilization of agricultural products and an acceptable distribution of such products, particularly so with the development of numerous rural trails and secondary roads.

Considering this potential and out of concern for the constraints upon agriculture, a food strategy based on food self-sufficiency was established. The means required to implement such a strategy for the rural sector with regard to the investments realized during the three-year program (1976-78) and the five-year plan (1979-83) as the latter reached completion, may be summed up as follows:

In 1976-78, investments realized in the agricultural sector were 33.6 percent of all investments made during that period, or FCFA 26.7 billion.

From 1976 to 1981, many projects were prepared and implemented, including projects of national scope, many departmental or regional projects, and the development of more than 300 ha on the perimeter.

c. Objectives

The operational objectives contemplated by the combined projects are: an increase in rainy season crops by promoting modern techniques along with the use of fertilizers, registered seed and animal harnessed farming; an increase in cultivated areas through total control of the water required for alternate cereal crops for import, mainly rice, but also sorghum and wheat; and environmental protection and the revival of lands threatened with unproductivity. A managerial program has already been established.

In view of the preceding analysis, it appears that food security rests fundamentally on the following orientations:

- o Increasing plant and animal production through increase of farm areas for millet and rice, through an increase in yields, through improvement in animal and plant health and through the agriculture-livestock association;

- o Diversifying the crops;
- o Organizing and training farmers and breeders;
- o Establishing a policy to protect the environment and restore soils; and
- o Implementing all support measures liable to promote agriculture (trails, roads, health centers, schools, etc.).

Such orientations will be based on the three main following points: attaining village self-sufficiency, development of all potential, and the implementation of a realistic storage and marketing policy.

III. AGRICULTURAL RESEARCH INSTITUTIONS

A. Present State

Central or regional management undertakes studies and research actions (applied and/or general) before deciding on any development program. Studies are meant to inform and to help make decisions at both the public and private levels. In short, studies help decision-making without suppressing it; they open the door to all options, and to all human actions.

Although studies are important to optimizing investment decisions or to preparing administrative reform, they remain, nevertheless, marginally utilized. In fact, there is a contradiction between the Administration's enthusiasm for costly studies and their disinterest in the conclusions of such studies.

This situation, which is characterized by poor utilization of human and financial resources, was the consequence of inertia on the part of bureaucratic management structures which should promote and manage research studies; in this case, it is the National Council of Scientific and Technical Research (CNRST) that was created by law no. 68-23 on April 17, 1968 and whose mandate required the following duties:

- o The definition of a national scientific policy;
- o The issuance of notices about research programs to be initiated within the framework of the country's economic and social development and their mode of financing;
- o The coordination of the activities of the specialized committees with those of research organizations operating in Niger;
- o Public interest in scientific and technical research; and
- o The allotment of available subsidies between various public and private research organizations.

Unfortunately, the National Council of Scientific and Technical Research has suffered from the lack of arbitration between various branches of research as well as from the absence of concrete options pertaining to research and study programs.

Although CNRST was never active, its dissolution in 1974 only strengthened the disappearance and isolation of existing research institutes such as the Institute of Breeding and Veterinary Medicine in Tropical Countries with regard to livestock (IEMVT), the Institute of Tropical Agronomic Research, for Agriculture (IRA^T), the Technical Center of Tropical Forestry, for water resources and forests (CTFT),

the Research Institute of Social Sciences (IRSH), and the National Office of Solar Energy (ONERSOL).

Except for the last two research institutes, they all were taken over by the General Agreement of February 20, 1961, passed between France and Niger. Since 1975, upon the creation of the Niger National Institute of Agronomic Research (INRAN), all institutes managed by the Agreement of 1961 were taken over.

The former situation of research and studies in Niger was therefore marked by the presence of the National Research Council around which revolved a number of research institutes lacking coordination and precise programs.

B. Perspectives

Following the stagnation that had characterized scientific and technical research in Niger (lack of coordination at the institutional level, lack of means), the recent creation of a Department of Superior Education and Research in March 1979 is a first step toward adaptation of problem-solving methods related to the role of scientific and technical research in development and toward coordinating research-development activities.

However, to insure greater efficiency on the part of this Department, it is important to create a parallel scientific and technical research advisory organization composed of a certain number of specialized sections/commissions to advise government authorities responsible for research.

1. Niger National Institute of Agronomic Research (INRAN)

a. Founding

The Niger National Institute of Agronomic Research was founded on January 7, 1975 by Ordinance No. 75-1, thus substituting for the following foreign organizations:

- o Institute of Tropical Agronomic Research of Food Crops;
- o Institute of Livestock and Veterinary Medicine in Tropical Countries;
- o French Institute of Fruit Research Overseas;
- o Oils and Oilseeds Research Institute (IRMO);
- o Technical Center of Tropical Forestry; and
- o French Association for the Development of Textile Fibers (CDFT).

These organizations, under the General Agreement approved February 20, 1961 by Niger and France, until that date were responsible for agronomic research in Niger.

This decision was made for the following reasons:

- o Strained cooperation between the organization and the national services for lack of a liaison organization;
- o Inadaptability of research programs to the development of Niger;
- o Inadequate diffusion of research results; and
- o Training deficiencies among national research management personnel.

b. Sponsoring ministry

The Niger National Institute of Agronomic Research is an administrative establishment of the state endowed with moral responsibility and financial autonomy which operates under the authority of the Department of Rural Development (MDR). It now answers to the Delegate Minister to the Presidency who was made responsible for higher education and research in March 1979 (Decree no. 79-44/Presidency of the Supreme Military Council, Minister for Rural Development, Minister for Superior Education and Research of March 29, 1979), and who became the Minister of Superior Education and Research (Decree no. 136/Presidency of the Supreme Military Council) on September 10, 1979.

c. Mission and objectives

The role of the Institute of Agronomic Research is to provide technical and scientific assistance towards the solution of rural development problems and to organize development research in various agronomic areas:

- o Ecology;
- o Agriculture;
- o Animal husbandry;
- o Forestry;
- o Rural economy; and
- o Training and teaching.

As such, the Institute is responsible for:

- o Preparing agronomic research programs of national interest in the short, medium and long term. These programs are discussed with other interested services;
- o Creating and managing experimental stations and centers as well as laboratories for agronomic research;
- o Ensuring the scientific and technical training management responsible for rural development; and
- o Coordinating all applied research activities in agronomy in Niger.

The National Institute of Agronomic Research was created out of the need for a permanent scientific base of investigation and application which is indispensable to rural development.

The activities of the Institute are thus oriented towards two objectives:

- o First, the development of basic knowledge (physical condition of the environment, various parameters of production, etc.), plant and animal production; and
- o Second, the integration of research results in the development process, thus fulfilling the research-development objective: research contributing to establishing an observation point for evaluating various factors and their effects resulting in a wide diffusion of technical themes, and assuring the application and evolution of operations.

d. Structure

The structure of the National Institute is shown in Figure 8. Services in addition to those connected with the General Direction are:

- o An Administrative and Financial Service (SAF);
- o A Division of Programs and Studies (DEP);
- o A Statistic Division (DS);
- o A Teaching and Training Division (DEF);
- o A Documentary Center; and
- o A Research-Extension Liaison Unit (CRV).

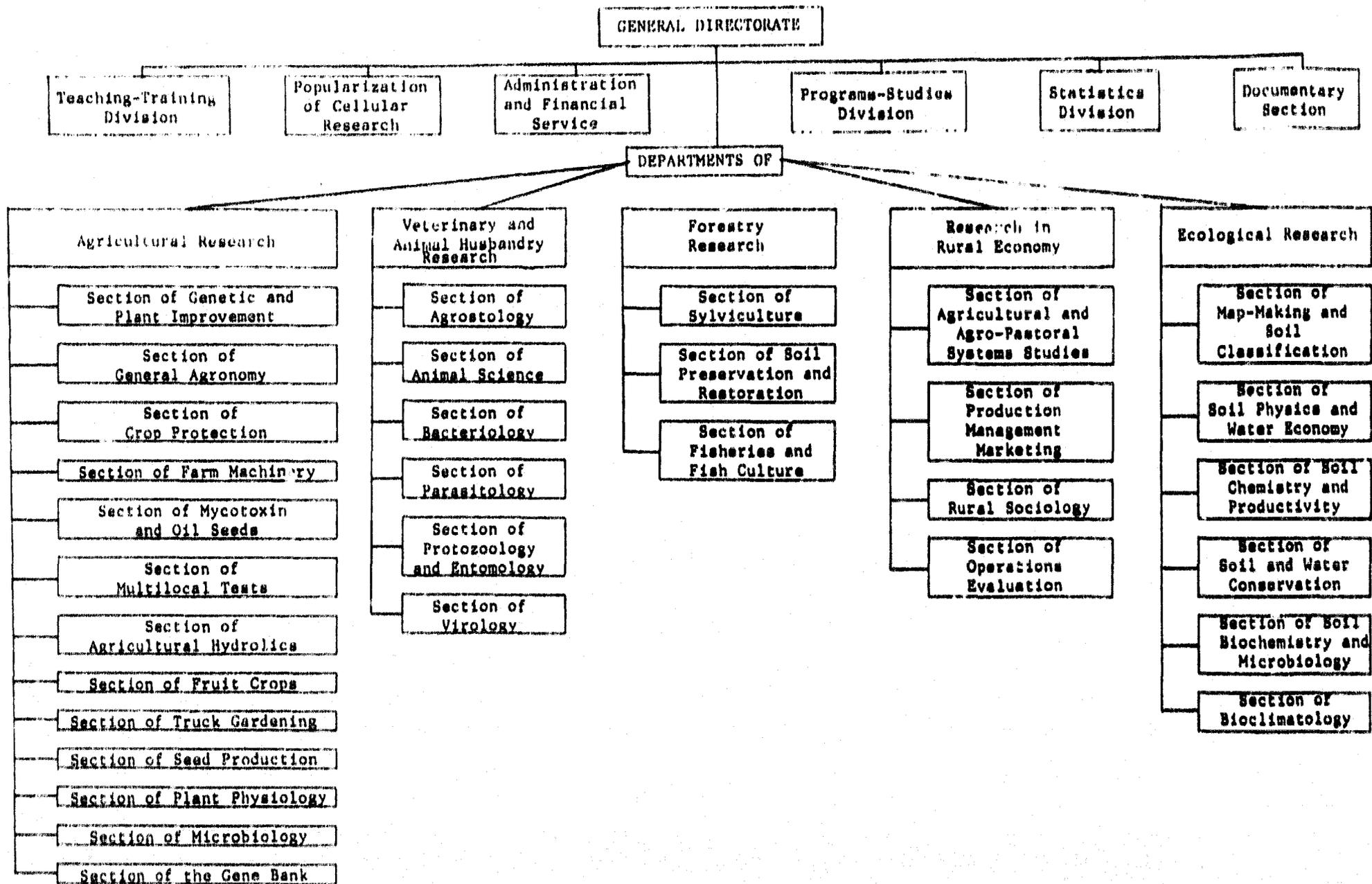


Figure 8: Organizational Chart of INRAN

DRA	DRF	DRE	DRVZ
1. Centers: CNAA-TARMA	1. Stations	Stations	Stations
2. Stations: Tarna-Kolo-Bonkougou	N'dounga	Tarna	Tarna
3. Substations: Bengou-Quallom-Bonkougou	Niamey aviation	N'dounga	Kolo
	2. Support Points	Chical	Kirkissove
	Lossa	Bengou	Ekrafane
	Karma		Bengou
	Saga		
	Goudel		
	Ekrafane		
	Bengou		
	Sakdira		

Stations not yet
functioning

Figure 8: Organizational Chart of INRAN (cont.)

The Niger National Institute of Agronomic Research is composed of five research departments which are:

- o Agricultural Research (DRA);
- o Veterinary and Animal Husbandry Research (DRVZ);
- o Forestry Research (DRF);
- o Ecologic Research (DRE); and
- o Rural Economy Research (DECOR).

e. Research centers and stations

The National Institute owns one center and six stations--Tarna, Agadez, Tillabéry, Kolo, Bengou, Kirkissoye, Ekrafane--some laboratories and many support offices, all of which are discussed below by sector.

(1) Tarna Center

Tarna Center includes five main laboratories, all air-conditioned. They are:

- o Genetics and plant improvement: in rather good condition, but poorly equipped;
- o Physiopathology: condition and equipment satisfactory;
- o Entomology: condition and equipment satisfactory;
- o Plant quarantine: satisfactory condition--not equipped;
- o General agronomy laboratory: satisfactory condition but poorly equipped.

The center has no greenhouse but has a newly installed refrigeration unit for seed preservation.

There is an administrative complex comprising six administrative plus 16 other offices for research workers and technicians, all in good condition and sufficiently equipped. There is a garage for vehicle maintenance and repair which is very poorly equipped and also some storage rooms.

The Center has a library which houses 2,500 books, six scientific reviews, and 60 annual acquisitions.

Periodicals that are more frequently consulted are Tropical Agronomy, Science Journal, and Oil Seeds.

A general description of research facilities is given below:

- o Tarna facilities. 270 ha of which 250 are dune soils (isohyets 400 mm), and 20 are valley soils. Irrigation is possible on 20 ha. Experiments on millet, sorghum, cowpeas, groundnuts, corn, market gardening crops. Production of Mo and M1 millet seed, sorghum, cowpeas, groundnuts and onions;
- o Kawara facilities. Valley soils of the Maggia (400-500 mm). Experiments on millet, sorghum and corn;
- o Magaria facilities. Sandy soils (500-600 mm). Experiments on millet, cowpeas and groundnuts; and
- o Diffa facilities. Sandy soils (200-300 mm). Experiments on millet and cowpeas.

(2) Kolo Station

The station has a laboratory which is in good condition but poorly equipped, which is presently used by administrative staff as an office, and three offices for management and research workers, which are in good condition and well equipped.

There are also two storage rooms for seed and fertilizers, both in good condition.

For a library, there is one designated area located in the office of the person in charge of the station. It contains 40 books and 265 scientific reviews and journals (of mixed issue dates). Periodicals that are more frequently consulted are Tropical Agronomy and Africa-Agriculture.

A description of the facilities is given below:

- o Kolo facilities. 86 ha of which 40 are for small ruminant grazing and 36 are irrigable. On dune lands: experimentation on and production of millet, sorghum and cowpea seed. On valley lands: experimentation on and production of sorghum, corn, rice and wheat seed and marketing crops;
- o Facilities of Kala Paté. (isohyets 550 mm) 11 ha on dune soil; experimentation on and production of millet, cowpea, and sorghum seed;
- o Bangou facilities. 45 ha, suitable for irrigation, sand-clay soils (isohyets 800 mm). Experimentation on and production of millet, sorghum, cowpea, groundnut and corn seed and fodder plants; and
- o Ouallam facilities. 51 ha, dune soils (isohyets 300 mm). Experimentation on and production of millet and cowpea seed.

(3) Tillabery Station

This station has a laboratory oriented towards the analysis of sugar cane (determination of sugar content, etc.) in bad condition, and poorly equipped, the laboratory is unused. There are also two administrative offices in good condition, although poorly equipped, as well as a storage room, also in good condition for seed and material.

For a library, there is a sparsely furnished area which is part of the station supervisor's office. It has not obtained scientific journals for several years.

The following is a general description of the facilities:

- o Tillabéry (350 mm): 40 ha terraced soil bordering the river to be used primarily in sugar cane experimentation and production, and secondly in experimentation on millet, sorghum, and corn and in production of onions and plant gardening; and
- o Lossa (350 mm): 24 ha, terraced soil bordering the river. Experimentation on sorghum, corn, cowpeas, wheat, and marketing crops.

(4) Station de Gabagoura

There is a single building housing research and extension workers.

The following is a general description of the facilities:

- o Gabagoura: 14 ha, terraced soil, suitable for irrigation; farming possible in 40 ha. Experimentation is on the production of fruit crops and goyava, mango, citrus, and other fruits; and
- o Bonkougou: 7.5 ha, suitable for irrigation, sandy soil--fossil valley, experimentation is on date palms, citrus fruit and mangos. Plant production for extension.

(5) Station d'Agades

The Station has a laboratory for biological advancement.

f. Veterinary Research and Animal Husbandry Section

The Department of Veterinary and Animal Husbandry Research is one of the four main departments of the Niger National Institute of Agronomic Research. It comprises the following research sections: agrostology, animal husbandry, bacteriology, and parasitology.

In addition to these four functional research sections, two others are presently idle for lack of specialized personnel; they are the sections of virology and entomoprotozoology.

Outside of relations with national development services and projects, the Department of Veterinary and Animal Husbandry is involved in outside relations with:

- o The Organization of Sahelian Pasture Production (PPS);
- o The Regional Project of Forage Crop and Improvement in the Sudano-Sahelian Zone (IEMVT) whose office is in Ouagadougou (France); and
- o The Institute of Breeding and Tropical Veterinary Medicine (CRED and ICRISAT).

(1) Agrostology section

The grass science section is one of four sections which constitute the Department of Animal Husbandry and Veterinary Research.

It is composed of stations in Ekrafane, Bengou and Kirkissoye.

- o Kirkissoye station: This station covers one and one-half ha; it comprises a combination of shelter-fold to trough-fed animals with its basis of forage crops. Presently, such forage crops are maintained for collection purposes; the station has a traditional dryer, a store and a cabin for the caretaker;
- o Bengou station: This station in Dallol Maouri, in the sub-division of Gaya, has not been in operation since 1980 following the break-down of the pump. This station is also concerned with forage crops and their improvement for pasture feeding and for this purpose a combination shelter/fold was constructed; and
- o Ekrafane station: Since 1977 the Niger National Institute of Agronomic Research has undertaken a rational experiment program on Sahelian pastures within the Ekrafane Ranch through an agreement signed between the National Institute and the Niger National Society for the Development of Animal Resources. This agreement is for a duration of 15 years. Existing

infrastructures enable the agrostology section to pursue research activities which were initiated by the Niger National Institute of Agronomic Research. Seven hundred ha were enclosed with barbed wire by the Institute. They contain three pastures, two of 250 ha and one of 200, for periodical cultivation.

There is also a cabin and a store for the personnel of the Institute.

Presently, all work has been suspended since 1980 for lack of human as well as financial means.

(2) Animal husbandry section

This section is composed of sub-sections in Niamey, Kolo, Bangou, and Tarna. However, only the Niamey and Kolo sub-sections presently pursue research work.

Such work is in conjunction with the objectives that were initially set.

The section suffers from a lack of infrastructure and equipment, although there were several improvements this year.

- o Sub-section of Niamey. In this section there is a cattle shed constructed of traditional materials in Kirkissoye for use in the cattle finishing program. It covers 100 ha of irrigated forage crops in Kirkissoye and is operated by the agrostology section. There is a storage room for cattle feed (concentrates) and seed. The weighing equipment consists of one spring balance scale;
- o Sub-section of Kolo. This section covers 40 ha that were fully fenced-in by the Institute including: six cages in wire netting for ewes, one cage in wire netting for rams, one well and two drinking-troughs of 0.9 m³ each, fed by pipes from the SONAL watertower. Kolo also has one mobile cattle scale with a 200 kg capacity, one spring balance scale, one building used for an office, and material to clean cages and distribute feed to animals;
- o Sub-section of Bangou. Potentially, there is a stable for 30 bulls; and
- o Sub-section of Tarna (Maradi). Infrastructures in place at the Tarna sub-section are limited to a herd of 135 heads of cattle divided as follows: 35 adult females, 41 young females, one sire, 28 young males, and 32 adult steers. Livestock is kept in an enclosure of approximately 350 m² of which one-third is covered by a metallic shed. Besides beef cattle, the sub-section also includes: one weigh-bridge for cattle, one weigh-bridge for feed, one weigh-bridge

for milk, two silage pits, one electric mill, and one lot of medicine.

(3) Bacteriology section

The bacteriology section is one of the components of the Department of Veterinary and Animal Husbandry Research of the National Institute. This section is located within the central laboratory of the Breeding and Animal Industries Service. This section has four rooms supplied with straw mattresses.

This section does not have its own budget as do other sections; rather, it draws its money from the operating budget of the National Institute.

The section also suffers from lack of infrastructure and equipment. When the five-year plan was in preparation, the construction of a veterinary laboratory was proposed. Unfortunately, the high cost of construction forced the abandonment of this project in favor of less costly investments.

Presently, the section still occupies the buildings of the Breeding Service.

(4) Parasitology section

Located in the breeding laboratory, this section has three rooms at its disposal. It is one of four sections which constitute the Niger National Institute of Agronomic Research. This section suffers from the same problems as the bacteriology section as it also draws money from the operating budget of the National Institute.

(5) Forestry and fisheries section

The Department of Forestry Research (DRF) is located in the head office of the National Institute and has four offices; one is for the secretariat, one for the person in charge, and two for five research workers.

This department also has a greenhouse, which is in very poor condition, as well as a tree nursery located near the offices in need of an extended fence.

At the station level, the department has only one office for the supervisor of the research workers and cabins for the caretakers.

g. Soil laboratory/ecological research

The soil laboratory of the National Institute is located in Gamkalley, in the industrial zone of Niamey, on an area of close to four ha of which 1,307 m² are occupied by buildings. The principal buildings are described below:

- o Laboratories: There are eight laboratories totalling 350 m², all air-conditioned, for mineral analysis of soils and plants; the laboratories and equipment are in good condition;
- o Greenhouse/shelter: There is only one which covers 30 m², which is not air-conditioned, and is used for crops in vegetation pots. It is in good condition, although poorly equipped;
- o Administration/offices: The 13 offices are used by research management, technicians and research workers; their condition is good and they are well equipped; and
- o Workshop: The only workshop is used for the preparation of samples.

Other research buildings include a hall for photo-interpretation (in good condition and well equipped), a drafting hall (in good condition and well equipped), and a hall for graphic reproduction (in good condition but poorly equipped).

Other resources include:

- o The principle laboratory equipment: one atomic absorption spectrograph, one gaseous phase chromatograph, one amino-acid analyzer, and one analytical scale. Also some precision scales, centrifuges, color meters, and distillery. There is also a laboratory permeameter (I CW), some Ph meters, conductimeters, and one octoplan microscope equipped with a camera;
- o Equipment for cartography and pedologic inspection: theodolite, topo-wire, clinimeters, altimeters, complete prospection kits, augers, mirror stereoscopes, map variograph, sketchmasters, luminous tables, drawing tables, photocopiers, ozalid sorters, stencil duplicators, etc;
- o Data processing machines: Zenith mini-computer, model Z-205-1 with a 64 k capacity, with small floppy discs of 5 and one-quarter inches; it is installed at the laboratory level under the project CRSP/TROPSOIL;
- o Library and publications: There is one library holding 119 books with an acquisition rate of 30 per year plus subscription to six scientific reviews. It is located at the laboratory level. Outside sources of information which are easily

accessible are: the documentation center of the National Institute, the documentation center of the United Nations Development Program, and the documentation center of the Niger river authority.

The soil laboratory has published about ten reports of pedological studies and annual reports of activities.

The three scientific periodicals that are most often consulted are: ORSTOM essays--pedological series, Soil Science of America Journal, and Pedology (Belgium).

h. Rural economy section

In the future the Department will play an important role in assisting other research departments of the National Institute, various services and rural development projects in the fields of agro-economy and rural sociology.

This department, presently being organized, is the youngest research department of the National Institute. Depending on the availability of financial and human resources, three research sections are planned:

- o Section on agricultural and agro-pastoral systems;
- o Section on production, management and marketing; and
- o Section on rural sociology.

Presently, only the first section is operational. Its activities extend to the northwest and to the center of the country. Five offices, in good condition, constitute the assets of this department. Three of these are air-conditioned for research workers' uses, one is for the secretariat, and the last one is used for examining documents.

A list of research programs and operations follows beginning with programs for the development of arid crops.

(1) Cereals--development of millet crops

The major research directions are:

- o Betterment of local populations;
- o Introduction and evaluation of foreign crops;
- o Creation of new varieties with wide genetic bases;
- o Inventory of principal harmful insects;
- o Study of the biology and activities of the corn borer;

- o Updating the comprehensive fight against the borer;
- o Inventory of principal diseases;
- o Fight against mildew, blight and seed-bed diseases;
- o Improvement of cultural techniques;
- o Multilocal experiments in the rural environment;
- o Analysis of grain quality (proteins, palatability); and
- o Production of MO seed.

(2) Cereals—development of sorghum crops

Research is directed toward:

- o Betterment of local populations;
- o Introduction and improvement of exotic material;
- o Creation of varieties well suited for dune and valley soils;
- o Inventory of principal harmful insects;
- o Study of the biology and activities of the stem borer and the cecidomy;
- o Comprehensive fight against cecidomy;
- o Inventory of diseases;
- o Fight against seed-bed diseases;
- o Multilocal experiment in rural environments;
- o Analysis of grain quality (proteins, palatability); and
- o Production of MO seed.

(3) Leguminous plants--improvement of cowpea crops

The major research directions are:

- o Organization, evaluation, and instruction for local farmers;
- o Introduction of high-yield, insect-tolerant strains;
- o Creation of early varieties, producing high quality grain in acceptable yields;

- o Inventory of principal harmful insects;
- o Study of the biology and activities of Thrips, Maruca, bugs and weevils;
- o Comprehensive fight against these four principal insects;
- o Improvement of traditional methods of grain conservation;
- o Inventory of principal diseases;
- o Fight against seed-bed diseases;
- o Study and fight against cowpea striga;
- o Updating comprehensive cultural techniques adapted to associate farming;
- o Multilocal experiments in rural environments;
- o Analysis of grain quality; and
- o Seed production.

(4) Revival of groundnut farming

The major research directions are:

- o Search for short cycle varieties of high potential that can be used in different ecological zones;
- o Inventory of insects;
- o Comprehensive fight against thrips;
- o Inventory of diseases;
- o Fight against seed-bed diseases; and
- o Fight against aflatoxin.

(5) Other crops (corn--sesame)

Research on other crops, particularly corn and sesame, is distributed as follows:

- o Gathering and evaluation of local sesame cultivars;
- o Introduction and adaptation tests of exotic varieties on corn;
- o Inventory of principal harmful insects; and
- o Agronomic tests.

Research activities and directions of irrigated crops are divided into several groups. The major research directions in the development of rice are the following:

- o Gathering, evaluation and improvement of local rice cultivars under traditional methods;
- o Introduction and adaptation tests of species for irrigated rice, floating, and deep immersion cultivation;
- o Biometric study of rice;
- o Control of viral and bacterial diseases of irrigated rice;
- o Study of growing methods and improvement of techniques (use of manure);
- o Experiments in rural environment; and
- o Production of M0 and M1 seed for hydro-agricultural developments.

The major research initiatives in the development of fruit and date-palm tree crops are the following:

- o Introduction and adaptation tests of fruit species;
- o Study of climatic effects and pomology on citrus, mangos and guavas;
- o Organization and evaluation of local date-palm trees;
- o Investigation into the habits of fruit growers in the Dallol area;
- o Study on the withering of citrus and mangroves;
- o Control of the cocheneal and the acariosis of the date-palm tree;
- o Tests on the association of the palm tree/citrus/mangrove;
- o Agronomic tests and study of irrigation techniques; and
- o Production of seedlings for extension.

For market gardening crops (gombo, onion, green pepper, tomato) the research directions are the following:

- o Gathering-evaluation-improvement of local crops;
- o Introduction-evaluation of foreign crops;
- o Creation of new varieties;
- o Protection against insects harmful to sub-market gardening crops of date-palm trees in the Agadez region;
- o Control of nematodes of market gardening crops in the Agadez region;
- o Study of cultural methods (density, date of sowing, use of manure); and
- o Seed production.

For other crops (sorghum, millet, wheat, sugar cane, cowpea, groundnuts), the projects are as follows:

- o Testing of local varieties which were introduced or recently created for irrigated crops in cold and warm seasons;
- o Maintenance and collection of sugar cane varieties; and
- o Study of irrigation techniques.

A list of animal production programs is given below.

Projects directed towards the maintenance of sanitary cover are the following:

- o Research on brucellosis in Niger;
- o Research on tuberculosis;
- o Livestock parasites;
- o Sheep and dromadary helminth disease;
- o Poultry parasites (Department of Niamey);
- o Calf parasites (Department of Niamey);
- o Pathology of small ruminants (throughout Niger); and
- o Study on the profitability of anti-parasite treatments.

Projects directed towards the improvement of nutritional levels in the pastoral zone include the following:

- o Creation of two research stations;
- o Improvement of livestock breeding methods;
- o Finishing of cattle;
- o Sahelian pastoral study;
- o Animal selection;
- o Nutritional study;
- o Comparative study of zebus, azawaks and bororos;
- o Interbreeding of zebus, azawaks and bororos;
- o Research on the peulh ouden sheep in Kolo; and
- o Study of the milk yield potential of the djelli cattle breed.

Research projects on environmental knowledge include:

- o Study of productivity in livestock;
 - o Forage crops and improvement of fallow land;
 - o Study of the characteristics and potential of certain sheep and cattle breeds (djelli or goudali sokoto);
 - o Research on the improvement of hide quality;
 - o Creation of an agricultural research center; and
 - o Creation of a complex of veterinary research laboratories.
- i. Forestry and fish production

A list of research programs for forest and fish production is given below. To fulfill its mission, the department is divided into divisions which execute its research programs.

- (1) Introduction of the eucalyptus into the Soudano-Sahelian zone

The program's objective is to obtain more fast-growing species of trees used for firewood and lumber, and thus eliminate

the shortage. To accomplish this, several projects were contemplated, notably:

- o Elimination of some species;
- o Elimination of commodities;
- o Improvement of nursery techniques;
- o Adaptation of eucalyptus to various types of soils;
- o Planting for conservation;
- o Cost study; and
- o Study of the influence of irrigation on the productivity of eucalyptus.

(2) Study of exotic species other than eucalyptus in the Sudano-Sahelian zone

This program is intended to help us improve our knowledge of the conditions of utilization for the species that were introduced. To realize this objective a project is proposed to understand how species can be used more effectively, particularly neem, dalbergia, cashew, cassia and prosopis.

(3) Study of local autochthonal species such as combretaceous and leguminous plants

The purpose of this study is to find local forest species that could replace exotic ones.

Through this program, several projects are proposed to study and genetically improve local fruit species such as néré and karité.

(4) Regeneration of natural reforestation

It must be determined the speed with which plants regenerate and what must be done to accelerate the regeneration of combretaceous, leguminous plants, etc.

A number of projects are foreseen to fulfill this program. They are a tree regeneration project in the Sahelian zone, and regeneration of natural reforestation in the Sudano-Sahelian zone.

(5) Soil protection and restoration

This program attempts to define erosion risks on various types of soils and then to determine the influence of cultivation methods and anti-erosion devices.

To fulfill this objective, the following projects were foreseen. They are:

- o Study of the R factor of the Wischmeier equation;
- o Study of the eolian erosion (mechanism and means to fight); and
- o Study of cases (Tara station).

(6) Treatment of wood poles;

To give long-term protection to wood poles against termites, mushrooms and wood boring insects, four projects were undertaken:

- o Study of the boucherie process;
- o Study of the autoclave process;
- o Comparative study of various types of products; and
- o Resistance test on treated poles;

With regard to fisheries, research has not been undertaken, but a number of programs do exist in that field. Specifically, the Department of Forest Research has two programs on fisheries:

- o Comparative study of the adaptability of Niger fish species to fish culture; and
- o Comparative study of the various types of feed in the breeding of tilapia nilotica.

j. Soils

(1) Inventory and description of soil resources

This is a long-term program which began in 1978. Its objective is to map the lands so that they may be used and developed rationally.

The program is divided into various projects:

- o Pedological map (1/200,000 or 1/100,000) of the agricultural zone and oases;
- o Map of agricultural zone soil area (from 1/1,000,000 aerial photos);
- o Map of soil potentiality for pasture (1/200,000);
- o Establishing a key to indicate the growth potential of various soils in the agricultural zone; and

- o Detailed pedological studies (precise maps, produced on request).

(2) Study of the chemical characteristics, fertilization and regeneration of soils in the agricultural zone

This long-term program, begun in 1978, aims to determine deficiencies in the various soils of the agricultural zone, and to estimate the amount of fertilizer required for the main food and industrial crops, the agronomic use of natural phosphates and the rehabilitation of weakened dune soils. The program includes four projects:

- o Study of the agronomic use of the Tahpua natural phosphates;
- o Study of natural phosphates that are partially acidulous;
- o Study of dune soil regeneration through the use of organic matter; and
- o Comparative study of various sources of fertilizers and where they should be applied.

(3) Management and conservation of soils

This long-term program, begun in 1979, aims to upgrade farming techniques and soil practices which can be implemented at the farm level to conserve the land's physical and chemical productivity. This program also concerns the optimal use of rain water for crops and comprises three projects:

- o The effect of plowing on water retention in the soil;
- o Determination of the hydric and hydro-dynamic characteristics of sandy dune soils; and
- o Study of the evolution of soils under irrigation.

k. Production systems

The overall objectives of the projects on agricultural production systems are the typology of farmers' agricultural farms, the characterization of agricultural production systems and the establishment of comprehensive production systems (agro-technical, social and economic) and their extension to the farmer.

One such project is the study and analysis of production systems.

The aim of the project is the characterization of farm land, the determination of socio-economic parameters, and characteristics of the farm land (work time, various constraints).

A second project concerns the production costs and market prices and aims to foresee all aspects of production, particularly direct costs to the producer of principal agricultural products.

Projects include:

- o Agricultural production experimental units (rain crops); and
- o Study and analysis of agricultural production systems in the valley of the Niger river (irrigated crops, rain crops).

(1) Global objectives

- o Foresee all production parameters, in particular, the cost to the producer of principal agricultural products;
- o Characteristics of management of agricultural farms;
- o Study of the various market outlets for farm products; and
- o Study of market prices for farm products.

Projects include:

Study of production costs and market prices. The following research possibilities are also under consideration:

- o Study of the social environment of rural production;
- o Study of the land tenure; and
- o Structure and dynamics of cooperatives.

(2) Human resources, training policy

Presently, the Niger National Institute of Agronomic Research is composed of 22 Nigerian research workers, 26 expatriated research workers, 52 technicians, six administrators, and 399 permanent auxiliaries.

The training of high-level management is partly assured through research projects, agreements passed with outside financing to train Nigeriens who can replace expatriated research workers.

Considering that the Niger National Institute is a relatively new institution (created in 1975), the education policy is based on the recruitment and education of research workers to strengthen its effectiveness. Training of new research workers and technicians will take place gradually to avoid interrupting research activities already in progress.

(3) Financial resources

Financial resources are available from (average for the last three years):

o State subsidy (operations)	FCFA 400,000,000
o National Investment Fund (FNI)	FCFA 150,000,000
o Money lenders (including agreements)	FCFA 260,000,000
	<u>Total FCFA 810,000,000</u>

(4) Scientific and technical information resources

The Niger National Institute has a documentary center at Niamey which houses approximately 4,000 books and publications, and a library at the Tarna National Center of Agronomic Research containing about 2,500 works. The available documentary funds of the Niger National Institute cover all field activities (plant, animal and forest production, environment).

2. National Office of Solar Energy (ONERSCL)

ONERSOL, under the authority of the Department of Superior Education and Research (MES/R) is a scientific organization of an industrial and commercial nature, whose mission involves two aspects. First, it carries out research activities, using the results to create and test machine prototypes which function on solar energy. Presently, the work focuses on the production of solar collectors, motors, kilns, and dryers as well as on solar air-conditioning experiments. Second, the Office must popularize solar power usage through mass production and marketing of its innovations.

The Office carries out its activities through two sections, a research and a production section.

It has a laboratory complex at Niamey at the head office and a manufacturing workshop located both in the industrial zone and also at Niamey.

The National Office of Solar Energy conducts only one research program on the solar drying of onions and other agricultural products which it carries out in cooperation with the Niger National Institute.

At the present time, the Office is composed of seven administrators, four research workers, four technicians, and 14 auxiliaries.

The national budget is FCFA 287,000,000, and the contribution of money lenders is FCFA 28,000,000. The total budget is FCFA 315,000,000.

3. The Research Institute of Social Sciences (IRSH)

The IRSH is part of the University which is under the direction of the Minister of University Education and Research.

Its mission and objectives focus on the conservation of cultural patrimony. It is made up of the following research stations:

a. Niamey station

The Niamey station contains an air-conditioned laboratory of 80 m², in good condition, used for research and administrative services. There are 11 offices with equipment that is in good condition also used by the administrative and research staff. Another building, in poor condition but well-equipped, serves as a documentation center.

b. Maradi station

This station has only one building which is in good condition and which serves as an administrative office.

c. Agadez Station

This station has only one building which is in good condition and is well equipped. It is presently used as an office.

d. IRSH activities

The activities of this station involve research in human and social sciences (geography, history, archeology, sociology, languages, etc.). In general, there are no research programs as such in this institution because existing programs (particularly in sociology) which concern the rural sector generally blend with thesis subjects of various research workers. Research-development works and other studies are pursued on request from projects of rural development or by other organizations.

Human resources of the institution include: seven research workers (two sociologists, one archeologist, one historian, one geographer, one linguist and one specialist in the Arab language). Only two of the staff do research work full-time while the other five divide their time between management and research. Three research workers are available or otherwise occupied while two other technicians are responsible for the equipment, and 31 persons constitute the service personnel (investigators, typists, chauffeurs, orderlies).

Financial resources are very limited and regress each year. These resources come from the national budget which guarantees an average yearly grant of some FCFA 65 million to operate. There was no investment budget the last three years. UNESCO has invested an average of FCFA 8 million per year for the last three years.

Scientific and technical information resources include a library containing approximately 14,000 books, new annual acquisitions (difficult to appraise since they depend on available credit), and 14 scientific reviews and journals.

4. Sahelian Center under the Institute of Livestock and Tropical Veterinary Medicine (ICRISAT)

Before the birth of this institute in 1982, coupled with the creation of its center based at Sadoré (45 km to the south of Niamey), cooperation between the Niger National Institute and the Hyderabad (India) Institute of Livestock and Tropical Veterinary Medicine existed through joint programs on millet since 1977 at the Tarna National Center of Agronomic Research.

As a research institute of international status, ICRISAT is under the authority of the Department of Higher Education and Research (with regard to research programs of national scope) as it signed an agreement with the Niger National Institute in matters of scientific and technical research.

The mission of the Sahelian Center at Sadoré, which covers 500 ha, is to set up a gene bank for cereal and leguminous plants of West Africa.

Its programs are national (executed by the Niger National Institute), regional, and international.

National programs aim to: improve millet, improve groundnuts, and study production systems (socio-economic).

Human resources include 13 management agents (one part-time), nine expatriated research workers and 37 technicians.

IV. INVENTORY AND ANALYSIS OF THE PRINCIPAL PROBLEMS

A. Plant Production

1. General problems

Infrastructural problems in plant production are the following:

- o No infrastructure at Gabagoura (laboratory, equipment);
- o Inadequacy of laboratories at Kolo; the sole laboratory is used by researchers as an office;
- o Inadequacy of research infrastructure at the Tarna Centre (greenhouse, insectarium, growing chamber, storage, equipment);
- o Inadequacy and obsolescence of existing infrastructures at Bengou, Agadez, Tillabéry, Sadia, Magatia, Kolo, Kalapaté, Ouallam, Kawara and Bondoudou (laboratories and equipment);
- o Lack of fencing in some of stations makes it difficult to provide protection from animals (Tarna, Magaria, Kolo, Kalapaté);
- o Defective irrigation system at Tarna, Bengou, Sadia and Tillabéry; and
- o Nonexistence of experimental stations in some regions: Tahoua, light rainfall zone (499 mm); Say, heavy rainfall zone (600 mm); Konni (developed zone—irrigated crops); Dakow, north of Nardi (300-400 mm).

The consequences are the following:

- o Capacity to accept research programs is weak at the stations at Agadez, Tillabery, Magaria, Kalapaté and Kawara;
- o No food analysis can be done on plants, plant organisms and soils in the laboratories at Gabagoura and Kolo. Selection and agronomic analyses can not be done at Tarna;
- o The study of insects and diseases must be done under natural conditions with all the complication and danger entailed for surrounding populations without protection;
- o For lack of protection, some tests are threatened by the proximity of animals;
- o The state of irrigation systems in some stations restricts research activities on irrigated crops; and

- o Experiments are valuable only in the zone that experiences moderate rainfall because of the lack of active stations in marginal zones of heavy or low levels of rainfall. This situation makes the diffusion of technical subjects extremely slow or nonexistent in such zones.

2. Human problems and their consequences

Human problems, besides the lack of research workers and technicians, are:

- o Poor allocation of assignments for human resources personnel: of the 19 research workers in the agricultural research department, 63% work on plant selection, 37% on crop protection (entomology, pathology). There is no phytotechnician and only one phytopathologist who is obliged to work on all crops and in malherbology;
- o Lack of Nigerien research workers--47% of researchers are expatriated workers who, for the most part, are under short-term contracts;
- o The research technicians are often extension agents of the Department of Rural Development;
- o Research workers lack contact with the outside world. They do not often participate in stages, seminars, conferences, meetings or study tours;
- o The same situation applies to research technicians;
- o The career of the research worker is not directed; and
- o The research worker is not given adequate incentives.

The consequences are:

- o Multidisciplinary teams for each crop are incomplete and reduced to one person;
- o The continuity of research programs always poses problems when expatriated research workers leave at the end of their contract;
- o The volume and quality of the information collected in the field and in the laboratory suffer; and
- o The research worker eventually does routine work.

The financial problems are:

- o Inadequacy of the operating budget. It only covers wages and other operational costs; the operating budget is almost insignificant. Research activities are financed largely through the National Investment Fund and outside assistance;
- o Irregularity and delays in the allotment of credit;
- o Disparity inherent in the allotment policy of financial resources: some research programs lack reliable financial backing while a large portion of research costs are absorbed by the production of choice seed; and
- o Lack of sufficient investment budget.

The consequences are:

- o Programming and planning research activities are impossible;
- o Agricultural operations may be delayed for lack of funds;
- o Many research programs suffer from intermittent financing;
- o Acquisition of new agricultural and laboratory material is endangered;
- o Equipment maintenance of existing infrastructures is difficult; and
- o Extension of the research field is limited due to the difficulty of constructing new work facilities and the problem of controlling (by research workers as well as management) the activities within the existing structures.

3. Assessment of problems by agricultural research personnel

a. Operating budget

Problems in this area were considered to be minor to serious, including:

- o Inadequacy;
- o Delay in credit allotments;
- o Hindrance of research activities; and
- o Reduction of the work volume.

b. Currencies

The fluctuation in foreign currency prevents stockage of spare parts.

c. Personnel qualifications:

At the auxiliary technical personnel level, problems were minor to serious, including:

- o Lack of quality;
- o Neglect of continuing education;
- o Necessity of post-education through study tours, and participation in seminars, meetings, conferences, etc., to avoid falling into a routine;
- o Necessity to reach the highest level of basic education; and
- o Necessity to lessen management and bureaucracy.

At the high-level technical personnel level, problems were minor to serious and included:

- o Inadequate number of staff;
- o Necessity of increased specialization, participation in meetings, and seminars;
- o Need for post-study and short-term instruction;
- o Need for continuing education (although basic education is sufficient); and
- o Lack of encouragement for high-level technicians.

Maintenance personnel constitute either no problem or minor problems such as:

- o Measures of qualification for the maintenance of certain materials and equipment is lacking; and
- o Motivation and encouragement are necessary.

Constancy of financial support is a problem which is generally minor but sometimes serious. Working capacity is affected and in turn the volume of work and the work efficiency. Programming is altered so that it takes longer to reach research objectives. There is also a need for increased financial security.

Facilities constitute little or no problem. The number of laboratories is sufficient at Tarna but not at other stations (Kolo, Agadez, Bengou, Tillabery). Another problem is the lack of offices.

Equipment constitutes a severe problem as indicated below:

- o Inadequate laboratory equipment;
- o Lack of agricultural and irrigation equipment;
- o Lack of workrooms and equipment (mechanical tools, etc.);
- o Lack of protection against animals; and
- o Lack of stock of supplies necessary to assure renewal.

Maintenance poses problems, sometimes severe and sometimes minor, of which the principle one is the maintenance and repair of machinery.

Other problems in plant production are:

- o Lack of means for travel;
- o Little contact with other research workers;
- o No regeneration of personnel; no recruiting of personnel at either management or employee levels;
- o Inadequate documentation;
- o Lack of agreement among research workers (with regard to research);
- o Poor circulation of information between research workers and stations;
- o Administrative delays;
- o Liaison of research-extension: extension activities must follow recommendations indicated by research and allow research workers to adequately define the research objectives;
- o Lack of status for research workers--their careers are not directed; and
- o Few benefits for research workers. They must have good working conditions.

B. Animal Production

With regard to veterinary and animal husbandry research, certain problems can be identified:

- o Lack of financial means;
- o Lack of training and post graduate studies for management personnel responsible for design and execution;
- o Lack of status for the research worker;
- o Lack of cooperation with other research institutions;
- o Weak cooperation with extension services;
- o Lack of research material and equipment; and
- o Low wages for management personnel.

Resources are practically nonexistent and for veterinary research workers are inadequate. The structure is relatively new and lacks management leaders. Supplies and equipment are also inadequate.

With respect to animal production, animal health remains a priority and improvement programs must be established.

C. Forest and Fish Production

1. General problems

The Department of Forestry Research suffers from a serious lack of management personnel at both high and medium levels. It also lacks a budget sufficient to properly direct its research activities and appropriate buildings to house its staff. To execute its program for genetic improvement of various species, the department needs to rebuild its greenhouse. The scope of this program also requires the nursery's expansion.

2. Assessment of the problems by the forestry and fishery research personnel

All the problems now encountered by the Department of Forestry Research are severe:

- o Acknowledged inadequacy of personnel at all levels;
- o Lack of financial means;

- o Confinement of programs conducted on exotic species to the western part of Niger (in the department of Niamey); this is a direct consequence of the lack of research workers in that field; and
- o Lack of research on fish due to lack of qualified personnel and finances, in spite of research on real potential in this sector.

D. Soil Problems

i. General problems

Only the laboratories of the Niger National Institute are presently in operation for soil analyses throughout the country. The capacities of these laboratories will soon be insufficient and many soil samples will not be analyzed.

The soil laboratories of the Niger National Institute are adequately equipped but, even at this level, there is a severe maintenance and repair problem. If the maintenance problem is not solved, much of the equipment, some of it valuable, will fall into disuse for need of repair. Simultaneously, the capacity of laboratories will be greatly reduced.

The number of high-level technical personnel is insufficient to conduct various soil research projects; in addition, such personnel are often not sufficiently specialized. Except for expatriated personnel, there are few advantages leading to lack of motivation. The intermediate and subordinate personnel are also very insufficient; qualifications are weak, particularly for the laboratory personnel. No school in the sub-region conducts specific training programs. At the level of the Niger National Institute, there is no particular status for research personnel.

Research projects are very limited for lack of personnel, therefore the quality of work suffers; trained personnel resign or ask to be transferred to other institutions where working conditions are better.

Financing is a severe problem. At the level of national institutions (Niger National Institute, University) research budgets are very small. Most of the soil research programs are financed by assistance (United Nations Development Program) on a short- or medium-term basis. Budget management is centralized at the management level of the institution. As a result, there is a lack of financing continuity in which volume varies with project phases, as well as administrative restrictions imposed on research workers.

A more rational operating budget will have to be accorded to each section. Research budgets must be managed directly by the persons responsible for carrying out the programs.

According to development and logistic means, some stations under the Niger National Institute must be created in the agro-ecological zones where presently there are none. Existing stations will have to be strengthened by the addition of soil laboratories (simple routine analyses) and in virgin soils which can be used for experimental fertilization and soil management.

2. Assessment of problems by the ecological research personnel

The insufficient operating budget is considered a severe problem for personnel at all levels. Government grants are small and operations are assured largely by a project of the United Nations Development Program/Food and Agriculture Organization (UNDP/FAO). Currency does not appear to be a severe problem for the personnel.

The question of personnel qualification is considered a severe problem by some, a minor problem by others. However, all persons questioned agree that inadequacy of upper-level and subordinate technical personnel is a severe problem. As a result, the few existing staff cannot take advantage of specialized training. Persons questioned emphasized the problem of the lack of status perceived by research personnel and the absence of motivation.

The reliability of financial support is a serious or minor consideration. The staff's concern is mainly based on the fact that the financial support given by the UNDP/FAO will terminate in 1984. Laboratory, office and equipment facilities are not a serious problem except for the failure of air-conditioning in several laboratories. On the other hand, the quality of maintenance service posed a severe problem for some, particularly due to the lack of specialized repair persons and available spare parts.

The lack of perceived personnel status is mentioned by all as a severe problem and is seen as the cause of several other problems.

E. Production System

In this sector, personnel interviewed brought out the following problems:

- o Lack of coordination and effective cooperation between the various institutions interested in the sector to establish an eventual complementarity, and a more rational utilization of both human and material resources;
- o Narrowness of topics studied in certain research institutions, catering more to individual thesis subjects;
- o Inadequacy of human means (research workers and TS);

- o Lack of further training and specialization for certain research workers (very little contact with the outside and a need for appropriate education);
- o Inadequacy of financial and material support;
- o Unreliability of financial support for work already in progress;
- o Lack of status for the research worker (problems related to promotion and working conditions);
- o Extreme inadequacy and lack of facilities in this sector; and
- o Unreliability of financial support, particularly for programs already in progress, causing serious disturbances in initial programs.

F. Analysis of Specific Problems

1. Plant production

a. Dry crops

(1) Cereals

(a) Millet

Millet is a species with very wide genetic variability in Niger within particular ecological zones and from one zone to another. The cultivars are the result of a long, massive and natural selection but in spite of their hardiness, there are problems which reduce their productivity. These are:

- o A high rate of Chibra (wild millet);
- o Susceptibility to climatic hazards (drought, storm damages);
- o Susceptibility to insects (ear borer and stem borer);
- o Susceptibility to Striga, smut and mildew; and
- o Poor quality of some cultivars.

The Niger National Institute has produced high-yielding, early varieties whose diffusion is relatively good in medium rainfall zones but slow in the north and south of the country; yet it remains under the desired level. Reasons are multifold, from the extra care of farmers to the inadaptability in determined production systems susceptible to storm damage and the poor quality of cultivars. Sometimes the precocity of those varieties resulted from an unfavorable diffusion factor because they ripen before local varieties and become easy prey

for birds and harmful insects (dysdercus). However, it must be noted that the level of good quality seed production does not meet the needs of some regions.

In addition to these serious problems, the ecological changes that occurred during the 1970s, such as the decline in soil productivity, resulted in a new outbreak of parasitism, particularly insects (ear borer, stem borer, dysdercus, forficulae, meloids) and Striga. Corrective measures recommended up until the present time against insects require phytosanitary products that farmers cannot afford, while treatments carried out by the National Service for the Protection of Plants are insignificant.

On the other hand, present cultural techniques, although tested in the past, no longer meet increasing needs at the family and national levels. In past years the food balance could only be achieved by increasing cultivated surfaces in marginal growing zones, but this can not continue indefinitely, considering the hazards and availability of manpower. Primary and intermediary mechanization, and chemical and organic fertilization, are absolutely necessary and must be adapted into the agrosystems.

Finally, these last years have seen an increase in the consumption of imported cereals (wheat, rice) in urban centers, brought upon by a weak or unattractive local supply, but also because of the ease of cooking offered by the imported kind. In view of urban development, direct utilization of agro-industrial products will continue on a long-term basis.

(b) Sorghum

Our analysis of millet also applies to sorghum but with some differences. Dune soil varieties presently studied by the Niger National Institute are sufficiently hardy to thrive in sandy soils.

Local valley varieties are generally very tall, photosensitive, sometimes produce poor quality grain, and are sensitive to ecidomy. The varieties produced by the Niger National Institute, however, because of their extreme precocity, are sensitive to diseases (smut which impedes the growth of grain).

Sorghum research, in spite of its long history, did not reach all the zones where sorghum was cultivated and the whole range of research (entomology, pathology, agronomy) could not be undertaken.

Little information has been given by the Extension Service about real constraints to the development of the crop in various agro-systems.

(2) Leguminous plants

(a) Cowpeas

The first research option on the cowpea was an attempt to increase grain production through intensification of cultivation. This theory presupposed the existence of pure crops, optimal cultivation techniques, and efficient protection. The assumption was that in this area, results would be positive even if the problem of grain quality (TN 88.63 variety) hindered propagation.

This option, however, forces the majority of the farmers who practice association to minimize risks to make their agricultural work profitable; the same is true for farmers who grow cowpeas for forage. This should lead to a revision of the research objectives while maintaining the first option, in that it is a matter of the farmer's future, and because radical change is not probable as there remain too many unknown factors concerning this crop. In fact, is it possible to increase the productivity of the cowpea in associated crops without hindering that of cereals? Can we increase the cowpea's productivity through this means of cultivation?

The important genetic variability of cowpeas permits valuable research work by changing selection criteria, and by allowing for choice in production techniques. According to the options, vulnerable photosensitive varieties can be set aside for forage crops, medium cycle late varieties for mixed production, and associated crops and early varieties for the production of grain.

Outside of the mode of cultivation, insects are the main problem in the production of cowpea seed, particularly those that attack the blossom and the grain. Furthermore, in the past two years, diseases (and in particular *Macrophomina phaseolina*, the bacterial cancer) are becoming a plague whose recurrence is favored by stress conditions (sandy winds, drought) thereby weakening the plants.

There are other drawbacks in cowpea cultivation (such as growth inhibitors or swelling) which result in low consumption in spite of its high nutritive value.

The extraction of proteins and the use of cowpea flour in cattle feed are the factors that make cowpeas an agro-industrial crop.

(b) Groundnuts

Formerly a cash crop, today the groundnut is considered a food crop in that it is transformed by artisans into oil and oilcakes. Production has decreased alarmingly to the point where, from an export situation, Niger has now become deficient in the necessary fats. The yield which was 859 kg/ha in 1966-67 was down to 440 kg/ha in 1981.

In addition to the necessity for the farmer to be self-sufficient in cereals, one of the main reasons for the drop in production and yields is that groundnuts have become a risky crop. The principal constraints to its production follow.

A shortage of rainfall early in the season delays the sowing date since priority is given to cereals. A shortage at the end of the season does not permit existing varieties to mature. However, a reduction of isohyets in the South has been witnessed along with the shortening of the rainy season and the volume of rain water.

As to plant material, the varieties presently used in the north (55-437) and the south (28-206) are well-adapted but still sensitive to climatic variations and parasitism (plant louse, rust). On the other hand, varieties such as the 55-437 cannot stand heavy rainfalls.

Parasitism is now the most threatening problem. There are presently three severe infestations whose importance and regularity are very difficult to define: rosette which is transmitted by the plant louse, rust and abortion of flowers and gynosphores whose causes have not yet been determined, and defoliators and stock weevils.

As for agricultural techniques, pure cultivation is still not widespread despite extension efforts. Groundnuts are usually grown in association with millet. Techniques in that area need to be defined. In addition, groundnut growing is difficult because it requires relatively intensive labor in the face of the low wages.

(c) Other crops (corn, fonio, voandzou, sesame)

These are all secondary crops, most of them cultivated by women, and there are no development efforts for these crops, although they should deserve attention because of their nutritional and financial interest for the family unit and for less fortunate farmers of agro-industrial crops (the sesame being used as oil-seed).

Only corn and sesame have been the subject of experiments on species and agricultural practices.

In the framework of crop diversification to improve the standard of living of rural populations, a certain effort must be made with regard to research. Necessary human resources, however, must first be delivered to achieve this goal.

b. Irrigated crops (rice)

Rice is the main irrigated cereal in Niger. The increase of food resources for the benefit of the population must take place through integrated development of this crop. It is grown in ponds, lowlands, etc. (traditional rice growing), as well as in hydro-agricultural areas (irrigated rice growing).

(1) Traditional rice growing

Varieties used are of the *brevigulata* and *glaberima* types found in certain harvest areas. Areas covered by this rice are not well-known although they are relatively important (14,860 ha in 1982). Traditional rice growing accounts for most of national production but was never the subject of any development and research efforts. Only a few experiments have been conducted, and have pinpointed various constraints:

- o Low yields (1, 2T/ha) depending on the advent and speed of river swelling;
- o Fertility and fertilization of paddy-fields; and
- o Attacks by rice-eating fish.

Research should focus on the task of specifying the problems inherent to rice growing, a crop which continues to play an important role in the country's food strategy.

(2) Irrigated rice growing

This type of rice crop using controlled water was unknown to Nigerian producers. Introduced in 1979, it covers an area of 3,275 ha (1982). An annual increase of 1,000 ha per year is expected in the coming years which would give irrigated rice a priority position in food equilibrium. Consequently, particular attention must be given to this type of rice growing because it requires considerable investment that must be profitable since it enters into a new type of production system associating dry crops and bi-annual irrigated crops.

The IRRI varieties (hybrid of Japonica and Indica) are very productive (8 T/ha) but these high yields are obtained to the detriment of adaptability factors, and the very restricted genetic base of these varieties may prove very dangerous. Proof of this condition was seen in recent years by the proliferation of bacterial and viral diseases. Additionally, the varieties that were introduced until the present time are not well adapted to out-of-season cold winds. In many areas yields are diminishing because, in addition to high maintenance costs, there is competition between dry crops and rice growing during rainy seasons. Other reasons are:

- o Soil deterioration, possibly because of an evolution in irrigated areas or an outdated usage of fertilizers on soils lacking sufficient organic matter;
- o Poorly followed growing techniques: cultivation calendar not adhered to, poor preparation of soil; and

- o Use of poor quality seed for lack of a national circuit for seed production.

Research on rice began in 1961 with IRAT and was taken over in 1975 by INRAN, but presently suffers from a lack of personnel and infrastructure. Only one person does the seed selection while rice growing perimeters are under the management of cooperatives. Only the Sadia perimeter belongs to INRAN--it covers 40 ha and may be used for selection as well as production of choice seed. This is the only perimeter which lacks an adequate irrigation system.

c. Fruit crops and date-palms

The fruit deficit in Niger is very serious. Consumption by inhabitants is only an average of 3 kg while the world average is about 27 kg (80 kg in Europe). Much of that consumption can be attributed to produce imports from Third World countries. It is necessary to increase the amount of fruit in the diet, to cut imports and cover future needs, and to improve the farmer's income through the diversification of traditional cultures.

The initial research on fruit crops has permitted promotion of the best stock and the varieties most suited to the ecological conditions of Niger as well as the cultural techniques (use of manure, density) to be implemented. However, in the last few years there has been an unexplained withering of citrus and mangroves and, further, fruit research remained confined to Gabagoura and Bonkougou; it does not extend throughout the country. As is the case in many research programs, the process has remained unsteady because of the unreliability of expatriated personnel combined with unsatisfactory means available. Many unknown factors remain in fruit production: irrigation techniques, use of manure in other ecological zones, study on withering, etc.

Another important consideration is that existing work structures are poorly distributed throughout the country. There is a need for one in the Bengou station as well as in the Tarna station before other sites are explored.

With regard to the date-palm tree, the main food and financial source of the Agadez oasis, the introduction of a biological protection program was introduced to fight the white cocheneal and acariosis of the Air date-palm tree groves. But these diseases also affect other date-palm groves (Bilma Djado), for which no program has yet been introduced. Nevertheless, the production of dates in the department of Agadez is experiencing a catastrophic decrease, partly due to the effects of the drought. Varieties are producing much less than expected and parasitism, which is now present everywhere, is manifested in the withering of plants affected by cocheneal, acariosis, and other diseases.

Again, the program suffers from the lack of human resources to participate in all fields of research, and particularly from the lack of financial means and adequate material to cover all oases.

d. Irrigated multiple cropping

In its strategy to attain food self-sufficiency, Niger has looked to the development of irrigated crops. Among these are corn, sorghum, wheat, market gardening and leguminous plants (which occupy an important place, particularly on the banks of the Niger river), and in the valleys of the Komadougou, of Goulbri and of the Maggia as well as around permanent and semi-permanent water bodies. A few research programs were conducted at Lossa on cereals and leguminous plants, and at Tarna on market gardening and wheat. However, those programs were limited in terms of time and space.

In the valley of the Goulbri Maradi, research work conducted in the hydro-agricultural station and in the Tarna station has resulted in the update of varieties of onions and cultivation techniques.

Along the banks of the river, the program is still in the development stage as regards the Komadougou and Maggia Valleys, where little has been accomplished with the exception of several studies on the effects of multi-local crop testing.

Research on irrigated polycultures needs its own personnel including a phytotechnician, an entomologist, a pathologist and a specialist in irrigation, plus technicians who will work in existing facilities. The research must also have two main working structures, one at Tarna and the other at Lossa, which reinforces the need for rehabilitation of the hydro-agricultural station at Tarna and the establishment of new infrastructures at Lossa, or the renovation of those existing at Tillabéry.

2. Animal production

In general, efforts and research have always focused on cattle, particularly from the standpoint of health. Therefore, special attention must be given to the breeding of small animals, such as small ruminants and poultry. Animal husbandry research (genetic improvement of breeds) was neglected as well for lack of research stations.

3. Forest and fish production

In forest production the specific problems concern diseases in the nursery and withering problems of planted trees. Quality seed supplies are often short. The lack of finances seriously hinders the work of the Department of Forestry Research, as does the lack of high-level managers specialized in various aspects of forestry. With regard to fish, production is low and depends on existing potential in the river and areas where water is collected.

The main problems are the lack of technical knowledge, the lack of organization, and the lack of research work in several fields.

Studies should be conducted on aquatic areas (physico-chemical, morpho-metric characteristics of water bodies during various hydrological seasons, dynamics of the fish population), the treatment and marketing of fish, smoke-cure technique, salt-cure fish, intensive fish study, and piscicultural statistics.

4. Soil problems

a. Inventory of soil resources

An inventory is presently being conducted throughout Niger by the Section of Cartography and Soil Classification. Problems center around personnel, which is insufficient in number and availability at all levels, particularly intermediary and auxiliary prospecting personnel who are practically nonexistent. Infrastructures are satisfactory as is equipment, except for reprography (edition of maps, reports). Logistic means (ground vehicles) are highly inadequate considering the size of the country and the condition of its roads. The operating budget is inadequate at the level of INRAN.

The main consequences of the above problems are the following: the inventory is done at a rate which cannot keep up with potential capacities of the section; certain projects are dormant for lack of personnel; requests from field services for soil maps and classification are met with considerable delay.

b. Chemistry and soil fertilization

Research in this field is conducted mainly by the chemistry and fertility section of INRAN and IFDC. Here again personnel is insufficient and auxiliary personnel is not specialized, particularly at the laboratory level. Laboratory infrastructures are good. There is no greenhouse, but equipment is satisfactory. Logistic means are insufficient. The operating budget is very low at the level of INRAN. This institute does not have a station in all of the agro-ecological zones in Niger.

The consequences of these problems are that research on fertilization is done at a very limited number of sites; tests are very few and are relevant to only a few soil types; only millet fertilization has been done until now, while other important crops remain to be studied.

c. Management and conservation of soils

Research in this field has been conducted up until now by the section of soil physics and water economy of the INRAN and the project CRSP TROPSTOIL by the Texas A & M University. Personnel is clearly insufficient and poorly qualified at all levels. Laboratories

are available and equipment is in good condition, but maintenance of this equipment is a serious problem. Logistic means are highly insufficient.

The consequence of these problems is that despite the importance of resolving the problem of soil management through better use of water, and the fight against eolian erosions, research projects are few and are still in the development stage.

5. Production system

The study of production systems through "experimental units of agricultural production" was initiated in 1980. The specific problems faced by research workers are a result of the facts that the country is not divided into well-defined homogenous ecological zones, there is no multidisciplinary research team at the department level and there is an absence of close collaboration with other institutions.

V. OUTLINE OF SOLUTIONS AND POSSIBILITIES FOR ACTION

Niger, a Sahelian country whose economy is based primarily on the production of the rural population, requires a strategy modernization in its aim to achieve food self-sufficiency.

To this end, considering the diversity of the ecological zones and research areas of the country, the analysis of constraints focuses on the level of human and financial resources, and infrastructures and equipment.

This analysis provides an outline of the following solutions:

A. Various Levels

1. Plant production

a. The reinforcement of work structures

This entails the following actions:

- o Reinforcement and rehabilitation of infrastructures already in place in stations and experimental facilities;
- o Provision of laboratory equipment;
- o Construction of new laboratories of entomology and pathology at Kolo and of physiology at Tarna;
- o Construction of new work structures at Tarna (insect incubators, greenhouses, growth chambers, storage facilities);
- o Continuation of fencing of experimental plots to provide protection from animals;
- o Resumption of irrigation systems in order to make the sites destined for research on irrigated crops operational;
- o Creation of new work structures, in the zones of low rainfall (Tahoua and Dakoro), in the zones of high rainfall (Say), and in the Konni development;
- o Action to make the Tarna plant quarantine center functional by the introduction of complementary infrastructures and adequate equipment (this quarantine center has a regional orientation); and
- o Creation of a gene bank (for species that are grown in Niger and elsewhere) at Tarna for national and regional needs.

b. Regionalization of research in Niger

(1) Creation of regional research stations

These stations will work on food crops and on precise objectives resulting from constraints in regional production.

The stations to be created include:

- o Regional agronomic research station (Niger Center West at Tarna), which would serve the departments of Maradi, Zinder and Diffa;
- o Two facilities in the medium rainfall zone--Tarna and Magaria;
- o Two facilities in the low rainfall zone--Diffa and Dakoro;
- o Three facilities in the valley zones--Tarna (Goulbi Maradi) Diffa (Komadougou) and Kawara (Magaria);
- o Regional agronomic research station--West Niger at Kolo that would serve the departments of Niamey, Dosso and Tahoua;
- o Two facilities in the high rainfall zone--Bengou and Say;
- o Two facilities in the medium rainfall zone--Kolo and Kalapaté;
- o One facility in the low rainfall zone--Ouallam;
- o Two facilities on river banks: Tillabéry and Lossa;
- o One irrigated crops facility at Konni; and
- o One rice growing facility at Sadia.

(2) Formation of a research support system within each department

Such supporting units should work in cooperation with INRAN and be integrated into the rural development departmental teams. These units will be created as the Department of Rural Development is reorganized. Each unit should have the task of ensuring the research-extension liaison, particularly in collecting information (on-site) concerning constraints encountered by producers, while conducting multi-site experiments in rural environments to test and adapt updated techniques and technologies. The unit's research workers should participate in the work of the Regional Development Council. Some research activities may be taken over by collectives or by the ONG.

c. Reinforcement of programs with human and financial resources

Research programs should be reinforced in the following ways:

- o Installation of complete multidisciplinary teams for all crops;
- o Introduction of a national policy for the assignment of human and financial resources, realizing the importance of research in the long-term development process;
- o Encouragement of research workers to train and teach themselves through sustained and regular acquisition of documentation, participation in seminars and conferences, contact with other research workers, and through team work. In short, the objective is to create a research atmosphere within the institute;
- o Action to make research attractive by providing research workers with adequate working conditions and a clear definition of their career path; and
- o Establishment of an adequate policy of financial resources devoted to research programs so that a good evaluation of research results will be possible in the future and will thereby render the program's activities more effective.

2. Animal production

Animal production programs should be reinforced through the following:

- o Creation of two research stations on animal husbandry with the goal of undertaking work on the selection of Nigerien livestock species: cattle, sheep, goats, and poultry;
- o Reinforcement of veterinary research programs in order to assure the health of livestock (brucellosis, tuberculosis, helminthiasis, poultry parasitism, etc.), and creation of a laboratory of veterinary research;
- o Improvement of the nutritional level of animals in the pastoral zone as well as in the agricultural zone;
- o Study of the productivity of traditional breeding;
- o Creation of veterinary research units within each department to coordinate research activities within the departmental structures; and

- o Reinforcement of the human resource capacity at all levels of the Department of Veterinary and Animal Husbandry Research according to the national plan.

3. Forest and fish production

The following solutions should be implemented:

- o For each program of forestry research there must be a research worker who is competent in that field;
- o Material means must be adequate;
- o The greenhouse must be restored to working order;
- o The Directorate of Forests and Fauna and that of Fisheries and Fish Production of the Department of Water Resources and Environment must take greater interest in the activities of the Department of Forest Research by suggesting research subjects and providing the department with enough qualified forestry specialists;
- o Stations and support stations must be sufficiently equipped and buildings should be rebuilt or reinforced;
- o The lack of money must not be a constraint to testing, which is mostly long term;
- o The development and modernization of fishing gear must be a priority for the Directorate of Fisheries and Fish Production;
- o Organization of fishing and fish distribution must be controlled; and
- o Fish production must be developed, as it is indispensable to increasing fish potential for the population concerned.

4. Soil problems

The problems are almost the same as for all the sub-sections discussed above. Solutions to these problems can be found through a strong policy of management training and equipment improvement.

a. Training policy for high-level management

At least ten high-level technical personnel should be trained on a short- or medium-term basis. In the case of auxiliary technical personnel, training could be supplied by the Practical Institute of Rural Development at Kolo; the individuals' qualifications could be complemented by internships in training institutes or laboratories.

To increase motivation of personnel and instill an interest in research careers, it is urgent to write a statute to define clearly the evolution of research careers at all levels; status must be based on education and experience but also on the creativity, the productivity and the efficiency of all personnel.

Experienced expatriate personnel should assist in the areas of pedological cartography, soil chemistry and fertility, soil physics, soil conservation and management, microbiology and biochemistry (compost, nitrogen fixation).

b. Equipment

The laboratory's analysis capacity must be improved by the acquisition of new analysis equipment for all sections. At the same time, a maintenance service should be implemented at the country or sub-regional level. A complete stock of spare parts should be available for every machine. The cartography and classification section of INRAN must be equipped with material to edit pedological maps and evaluate reports. The reproduction unit will be open to all other sectors.

5. Production systems

The solutions envisioned are:

- o Structuring of the department, by creating a team of multidisciplinary research workers (agro-economist, agronomist, extension agent, sociologist, etc.);
- o Preparation of new programs for pastoral and forestry production systems;
- o Study, while waiting for the zoning of the country, on production systems, with an emphasis on rainfed crops and on those that coexist with rainfed and irrigated crops (valleys zone); and
- o Establishment of effective collaboration between various institutions.

B. List of Program Suggestions

1. Plant production

For plant production, the following projects have been proposed:

- o Development of rainfed cereal crops (long-term);
- o Development of rice production (long-term);

- o Development of irrigated multiple cropping (wheat, maize market gardening); and
- o Development of leguminous plant crops (long-term).

2. Animal production

For animal production, the following projects have been proposed:

- o Improvement of animal health (pathology of ruminants--long-term);
- o Creation of two stations for animal husbandry research work (short-term); and
- o Construction of a laboratory for veterinary and animal husbandry research work (short-term).

3. Forest and fish production

The two projects proposed for this sector are:

- o Study and improvement of local species (long-term); and
- o Conservation of water and soils (long-term).

4. Soil problems

Study of the mineral deficiencies in the major agricultural zone soils and the fertilization of principal crops (long term) has been proposed.

5. Agro-sylvo-pastoral systems of production

Two studies have been proposed for this sector:

- o Study and analysis of production systems (long-term); and
- o Study of production costs.

6. Regional projects

At the regional level, the following projects have been proposed:

- o Maradi center for the introduction and quarantine of plants (Niger); and
- o Pedological cartography of agricultural zone soils.

7. Other comments

Directions and objectives for the development of agricultural research in Niger may be summed up as follows:

- o Better knowledge of the physical and human environment of rural production (climate, soil, water, and rural economy);
- o Updating of the varieties that are adapted to ecological zones and improving cultivation techniques tied to particular economic conditions; and
- o Development of forestry research (forest, fauna, and fish).

These directions must contribute to the preparation of long-term economic and social development plans in Niger. In view of this, international assistance is needed to prepare an overall plan, a sort of "instrument panel", which will provide the framework necessary to specify constraints, define actions, and coordinate work among various efforts.

C. Description of Current Research and Different Institutions

1. Knowledge of the environment

Research on soils in Niger is conducted by several institutions.

a. INRAN

INRAN conducts research through its department of ecological research and contains a laboratory which includes five research sections:

- o Cartography and classification of soils;
- o Soil physics and water economy;
- o Soil chemistry and fertility;
- o Soil and water conservation;
- o Soil microbiology; and
- o Agro-climatology.

Due to a lack of personnel, only the first three sections are operational.

(1) Personnel and finance

The institute includes nine research workers of which four are expatriates, three technicians, 18 laboratory and prospecting agents, 22 service agents (secretaries, orderlies, chauffeurs,

store attendants, maintenance staff, and guards). The department's operating budget comes from INRAN and from a project of UNFP/FAO.

(2) Infrastructure

The Department of Ecological Research has a laboratory complex at Niamey at its disposal. Various sections conduct tests at all INRAN stations, at training centers for rural development projects and in rural environments.

(3) Collaboration

The sections of the Department of Ecological Research (DRE) cooperate with the International Fertility Development Center (IFDC), ICRISAT, and Texas A & M University (project Tropsoil).

b. ICRISAT

The IFDC Texas A & M University have posted research workers at the ICRISAT center at Niamey who conduct tests on the fertility and physics of soils. They also use the facilities of the INRAN soil laboratory.

c. University of Niamey-National School of Agronomy

At the ESA two teachers are conducting soil research projects while preparing their theses.

In the forestry sector, research work constitutes one of the most important steps toward the success of the environmental protection policy, particularly with regard to the rational conservation and development of natural formations. The long-term objectives of research must be aimed at:

- o The study of natural formations;
- o The pursuit of intensive techniques for lumber and firewood production, irrigated or dry, to meet the needs of the population;
- o The regeneration or development of natural formations within the framework of control of desertification;
- o The study of erosion mechanisms and the formation of dunes; and
- o The updating of development plan of the agro-sylvo-pastoral lands.

Forestry research has only one research worker, three national forestry agents, and one technical assistant for all projects. Research activities in the fishing culture sector are at a standstill for lack of resources.

The human aspects of production, research on economy and sociology in general, and on agricultural, agro-pastoral, and silvo-pastoral production systems in particular, are fields that have hardly been developed.

The national institutions conducting research work pertaining to the above are:

- o The Niger National Research Institute of Agronomy (INRAN) through its research department on rural economy;
- o The Research Institute of Human Sciences (IRSH), through its rural sociology service (in the form of thesis subjects, or of studies requested by development services);
- o The National School of Agronomy (ESA) through its social science service (subjects of theses of teachers research workers; and
- o The ICRISAT through its program on economy.

d. INRAN Department of Rural Economy

Of the national institutions and their services conducting agricultural research, only the INRAN Department of Rural Economy has actual research programs on production systems. These studies are conceived and programmed in the same fashion as INRAN's own studies. ICRISAT also has a research program of this sort.

In addition to this research, other research workers from foreign institutions have conducted socioeconomic studies in various regions of Niger.

(1) Research areas

Presently, considering the limited financial and human resources, the activities of the department are concentrated on the study of agricultural production systems in various agro-ecological zones of the country. This study must be coordinated with other research concerns in agronomy in order to finalize and popularize agricultural production systems that are technically feasible, socially acceptable and economically profitable.

Within the framework of these research programs, the department must further reinforce its relations with

- o The other research departments of INRAN;
- o The projects of rural development (follow-up and evaluation units as well as applied research);
- o The Research Institute of Social Sciences, for sociological aspects;
- o Extension services;
- o The ICRISAT (program on economy); and
- o The National School of Agronomy (service of social sciences).

(2) Departmental resources

Human resources include four research workers (one agronomist and three agro-economists, of which two are expatriates), auxiliary technical personnel (four mid-level managers), and three service personnel. The financial basis is not well defined because, since its inception, the program has never had a precise and consistent budget. Finances come from the National Investment Fund, government grants, and the Project of Support to Agricultural Research (USAID). As for material resources, there are no office supplies. Survey material is good but insufficient, and there is one all-terrain vehicle which is insufficient.

2. Plant production

a. Research

In this sector, research work covers four food crops: millet, sorghum, cowpeas and groundnuts; multidisciplinary programs have been formulated to improve these crops.

The objective is to enable farmers in a relatively short time, to learn to utilize the necessary techniques to improve their land and standards of living through the following plan:

- o Improvement of varieties, which consists of finding high-yield species which are stable and adapted to the unreliable rainfall conditions, are resistant to insects and major diseases, and are acceptable organoleptically;

- o Protection of crops (from seed-bed to harvest) against insects, diseases and plant parasites by taking inventory and making a biological study of the main predators, through research on the best phytosanitary products and crop techniques to reduce the sizeable damage caused by various pests:
- o Improvement of cultivation techniques through a search for the best method of soil preparation and maintenance, improvement of soil fertility, and intermediary mechanization to help reduce working time; and
- o Production of the best varieties of MO foundation seeds, and their introduction into the national circuit of seed production and extension.

Similar to research conducted on the most important food crops, the Department of Agricultural Research also conducts studies on market gardening--onions and tomatoes--and fruit crops--mangoes, citrus, and date-palm trees. It is also involved with secondary crops--rice, maize, wheat, sugarcane--by organizing collections for species testing.

All these research projects are part of a network of experiments in which 17 stations and support stations, as well as eight laboratories, are involved: phytopathology selection, entomology, agronomy, Tarna and Kolo, rice biometry, aflatoxin, mycotoxin, and sugar cane.

b. Work allocation

Multidisciplinary teams conduct research for principal crops that require a selector (entomologist, pathologist, agrologist). There is also a network for agronomic and varietal experiments in pre-extension centers to train farmers for extension and for rural environments (multi-site testing).

(1) Participation in regional programs

The Department of Agricultural Research participates in the following regional programs:

- o CILSS: project for integrated pest control;
- o The Sahel Institute: project for improving millet, sorghum cowpeas and maize;
- o (Semi-Arid Food Grain Research and Development SAFGRAD): joint project 31/OUA/CSTR on millet, sorghum, cowpeas and maize;
- o WARDA: coordinated rice testing; and
- o The African Groundnut Council: program of aflatoxin control.

(2) Relationships

The Department of Agricultural research maintains close relationships with:

- o Other research departments of INRAN, particularly by the Department of Ecologic Research (DRE - Département des recherches ecologiques);
- o Extension services: agriculture, operation of rural development, (National Office of Hydroagricultural Installations), (ONAHA - Office national des aménagements hydroagricoles), National Cereal Project;
- o National research institutions, such as the National Solar Energy Office (ONERSOL - Office national de l'énergie solaire) for its onion-drying program;
- o International research institutions, such as International Institute for Tropical Agriculture the (IITA), ICRISAT, IRRI, GERDAT - Study and Research Group for the Development of Tropical Agronomy (Groupement d'Etudes et de recherches pour le développement de l'agronomie tropicale); the International Rice research Institute;
- o Training institutions such as IPDR of Kolo, Superior School of Agronomy at Niamey; and
- o Other organizations, including FAO, Arabian Fund for Technical Assistance the (FAAT), USAID, European Development Fund EDF), Aid and Cooperation Fund—Central Fund for Economic Cooperation (FAC-CCCE)—Fonds d'aide et de coopération—Caisse centrale de coopération économique), American universities, volunteers from the Netherlands, and the Peace Corps.

c. Resources of the Department of Research in Agronomy (DRA)

(1) Human resources

There currently are 19 research workers, nine of whom are expatriates. Twelve are in plant improvement (of whom four are expatriates), four are in entomology (of whom three are expatriates), one is in crop loss analysis (expatriate), one is in pest control (expatriate), and one is in phytopathology.

There are 22 technicians, of whom seven are of B category, 12 are of C category, and three are of D category.

There are 104 auxiliaries in the CNRA at Tarna, 60 at Kolo, 18 at Bonkougou, 14 at Gabagoura, 28 at Tillabéry, 21 at Ouallam, 19 at Bengou, eight at Agadez and nine at Lossa on rice crop lands.

(2) Financial resources

The breakdown per research program and per station is not complete. Nevertheless, financial assistance essentially comes from:

- o A government grant;
- o The National Investment Fund;
- o The project in support of agricultural research (USAID);
- o CILSS (project for integrated pest control);
- o CEAO (project center for plant quarantine);
- o The Sahel Institute (project of millet, sorghum, cowpeas and maize improvement);
- o FAO (training of technicians in seed technology);
- o WARDA (studies on rice);
- o The ONAHA (joint program on river banks financed by the CCCE); and
- o The Department of Agriculture (production of seed and resumption of groundnut growing).

(3) Material resources

(a) Agricultural material

The Tarna, Kolo, Tillabéry and Bengou stations are equipped with tractors with dis sprayer attachments and other farm machinery. Most of the stations and sub-stations have animal harnessing units. However, manual farming with the daba or the hoe is also very common.

(b) Laboratory material

Of the eight laboratories of the Department of Research in Agronomy, four are rather well equipped, three are poorly equipped and one is not equipped at all.

3. Animal production

Veterinary and animal husbandry research is a catalyst to increasing and assisting technical introductions into agro-pastoral environments and to developing innovations applicable to livestock breeding. If such research work is part of the Development Service and succeeds in meeting the needs expressed by the breeders, it must then be applied to research on a long-term basis, particularly in:

- o The maintenance and development of health and sanitary protection of livestock;
- o The development of the nutritional level of animals in each zone; and
- o The improvement of herds through genetic selection.

VI. AGRICULTURAL TRAINING INSTITUTIONS

Four institutions of agricultural training were identified in Niger. They are the National School of Agronomy (university level), The Practical Institute of Rural Development at Kolo, The School for Breeding Managers, and the AGRHYMET Regional Center For Training and Application of Agricultural Meteorology and Hydrology (AGRHYMET).

A. The National School of Agronomy (ESA)

This school is one of eight institutions of training and research within Niamey University. It is under the authority of the Department of University Education and Research.

1. Mission of the school

a. Objectives

The school's principal objectives are:

- o Education of design engineers (Agrologists of A1 category); and
- o Education of teachers and research workers: further training and adaptation of teachers and research workers to the scientific, technical, economic and social evolution.

b. Level of education

As with schools of agronomy, education is divided into three cycles:

- o A first cycle of two years, known as the preparatory cycle: for those who have passed the baccalauréat, preparation is at the Faculté de science. After two years the student receives a university diploma in scientific studies (DUES - Diplôme universitaire d'études scientifiques) with a major in agronomy;
- o A second cycle of two years, known as the cycle of general education in agronomy: this phase is at the National School of Agronomy;
- o A third cycle, of at least one year, is known as the cycle of specialization. Recruiting is done through two channels:
 - After passing the baccalauréat: preparation for the university diploma in scientific studies, major agronomy (DUES-AGRO)--admission based on qualifications; and

- After professional competition: experience gained through a special two-year preparation cycle (AGRO B1, AGRO B2).

Most students come from rural environments and some from urban environments. They are of various nationalities (Nigerien, Voltaic, etc.) and hold scholarships from the state or foreign organizations (FAC, ACDI, FED).

2. Resources of the school

a. Financial and human resources

Financial resources come from a government grant to the university. The school has received a yearly average of 13 million as investments and 23 million for operations. As to human resources, there are currently 64 persons, 35 of whom are teachers, including 23 Nigeriens. According to the recruiting program (1983-1987) 27 teachers are needed. Presently, 11 nationals are in training and eight nationals need complementary training towards a doctorate degree.

b. Infrastructure

The school has six classrooms with a total capacity of 124 students (all students combined: Agro B1, Agro B2, Agro III, and Agro IV), a laboratory of 400 m² in good condition for tutorial work, directional work and research, 11.5 irrigated ha, one sheep fold, one hen house, and one library containing 2,500 books (26 scientific reviews and journals) and 250 acquisitions per year. Access to the library is free of charge for students, who may borrow documents and references of their choice. There is also a slide projector for educational purposes.

Agricultural facilities cover an area of 25.25 ha, of which five are for crops, 8.75 for pasture and 11.5 are irrigated.

3. Results achieved by the National School of Agronomy

Until 1982, the school had trained 49 agrologists and 25 engineers in agricultural techniques. Over the last three years the average was 15 and seven respectively.

The agents who were trained occupy 90 percent of the stations in national organizations of development, while the remaining 10 percent opted for education and research.

It must be noted that more than 50 percent of the agrologists presently working are graduates of the National School of Agronomy. There are engineers studying breeding techniques, as well as water and forest engineers.

B. Practical Institute of Rural Development (IPDR) at Kolo

1. Mission and objectives

The Kolo institute is a public establishment which offers mid-level professional training oriented towards administration. Its main office is at Kolo and it operates under the authority of the Ministry of Rural Development.

The budget of the institute comes from government grants and assistance from certain countries and international organizations.

The institute aims to organize studies and programs of professional training and cycles of advanced training for individuals already working. Training programs are organized into two cycles--the technical agent cycle, and the technician cycle.

a. Technical agent cycle

Access to this cycle is through two types of recruiting:

- o Direct recruiting of young people holding a baccalaureat or an equivalent diploma as recognized by the state; and
- o Professional competition for agents in D category who are already working.

b. Technician cycle

Again access is through two methods:

- o Direct recruiting of the best students in training at the institute who have successfully completed the technical agent cycle; and
- o Professional competition for technical agents and for those already working.

The following specializations exist in all cycles: agriculture/INRAN/ONAHA, water and forests, rural engineering, initiation/cooperation. Upon completion of their training, students receive the following diplomas:

- o A technical agent diploma in rural development with specialization; and
- o A technician diploma in rural development with specialization.

2. Disciplines and capacities

The subjects studied are: mathematics, physics, chemistry, biology, agronomy, soil science, sociology, rural economy, forestry, rural engineering, and topography.

Upon completion of their training, the students are called upon to work in various services, offices and projects of the Department of Rural Development, the Department of Water Resources and Environment, and INRAN.

The school's capacity is approximately 130 students per graduating class of technical agents and 70 students per graduating class of technicians in rural development.

3. Human resources

With regard to human resources, the Kolo institute has 61 full-time training staff, 20 of whom are nationals and 23 are expatriates; 16 part-time nationals, two of whom are expatriates; 18 managers and 51 support staff (orderlies, chauffeurs, mechanics, cooks, handymen, etc.). The institute also has an important program for teacher training; presently 15 teachers are in training, eight at the engineering degree level, four at the M.Sc. level and three at the B.Sc. level. Long term recruiting requirements were not met.

4. Financial resources

The budget of the institute during the past few years clearly seems to have been dominated by high investment, financed largely by foreign aid and loans. The operating budget is weak (215 million FCFA), and has not been augmented to compensate for real cost increases due to the building of new infrastructures.

5. Description of facilities

With regard to facilities, the institute has:

- o 18 classrooms with a capacity of 30 students each, in good condition;
- o A chemistry laboratory, four laboratories of biology/agronomy, a laboratory for plant protection, all in good condition;
- o One insectarium of four m², in good condition;
- o One production unit for soil research and one photography laboratory; and
- o One library which is accessible to all students from which documents may be borrowed by the week or month. The library has 4,000 books, 1,000 other publications (a variety of

issues) and an annual acquisition rate of 394 books and reviews.

The institute also has a farm which allows for student experimentation; it covers 24 ha delegated solely to agriculture (dune soil or swamp) and one ha which is reserved for breeding.

C. School of Livestock Managers (ECE)

1. Structure

This school is a national institution which falls under the authority of the Department of Rural Development. It was created in 1972 for the purpose of training agents in animal production and the livestock industry.

a. Administrative structure

With regard to management, the structure is as follows:

- o An administration responsible for the supervision and control of the teaching and management activities;
- o Education departments play an instructive role within the education system, but also manage and direct personnel on topics pertaining to their job and function; and
- o General services include a service for study, a financial service, and a general secretariat.

b. Subjects taught

The departments of education are under the direction of a department head and the subjects studied are the following:

- o Department of General Education subjects are: mathematics, french expression, geography-climatology, physics-chemistry, physical education, and statistics;
- o Department of Biological Sciences subjects are: zoology, genetics, anatomy, histology, embryology, and physiology;
- o Department of Animal Health subjects are: pharmacology, general and surgical pathology, study of infectious diseases, medicine, inspection of animal foodstuffs, parasitology, microbiology, laboratory techniques, and clinics;
- o Department of production subjects are: general and specialized animal husbandry, general and special feeding techniques, ethnology, dairy ethnology, and impact of cold temperatures (solar energy); and

- o Department of agro/pastoralism subjects are: botany, agrostology, forage cropping, management of trails, pastoral and general water resources, and general agronomy.

Internal advisory organizations make decisions and offer proposals to the sponsoring authority to assure proper functioning of the establishment, while making sure that it conforms to general directives as issued by the Director of the School of Animal Husbandry.

2. Training

Training in the School of Livestock Management combines the technical agent cycle with that of the technicians.

The duration of the technical agent cycle is two years. Students possessing the BEPC, or an equivalent certificate recognized by the state, are directed to the School of Animal Husbandry by a national orientation commission. Those students who hold a third level certificate are admitted directly.

Agents of the D category who worked in animal breeding and livestock industries and who meet the existing prerequisites are admitted through professional competition.

3. General organization of studies

a. Technical agent cycle

At the end of the first year, all students are evaluated. Students whose general average is above or equal to 10/20 during the first half of the program are promoted to the second term. Students whose average is less than 10/20 but higher or equal to 7/20 must try again to achieve a passing average at the beginning of the second term. Students whose general average is less than 7/20 may not continue their studies.

At the of the second term, students who have a general average higher or equal to 10/20 graduate to the second year. Those whose general average is lower than 10/20 but at least equal to 8/20 are authorized to repeat the term. Those whose general average is lower than 8/20 are expelled from the school except in cases of illness or accident (confirmed by a doctor and by the board of examination) which has interrupted work for more than a month of the school year; in such a case, the student may repeat the term.

The students must do an internship of at least two months during the second year of study during which time they prepare detailed reports. Internship grades and general improvement enter in to the final evaluation and grade average.

At the conclusion of the second year, an overall evaluation is made of each student's accumulated knowledge.

Students who have obtained an average of 10/20 or higher at the completion of the first and second term exams (as required by provisions previously mentioned) receive the diploma of technical agent of rural development, with specialization in livestock raising.

b. The technician cycle

This cycle lasts four years, two of which are combined with the technical agent cycle. Recruiting is based on a quota of students who come from the technical agent cycle, who did not repeat terms, and who were selected according to their grades and classification following the year-end overall evaluation. Following professional competition, C category agents of breeding management and animal industries who can meet the conditions set forth will graduate to the third year technician's cycle in rural development, while those in B category will graduate to the fourth year of the cycle of technicians in rural development through the same route and conditions of those in C category.

Students who graduate to the fourth year of the course follow a theoretical and practical program from October to March and a specialization term from April to May. At the conclusion of the specialization term, each student must prepare a dissertation that he will defend before an examining committee. The fourth year curriculum includes the following options: management of services, animal production, modification and animal industries, and animal health. Students receive the technician diploma in rural development with specialization in livestock, which is the B1 category of the civil service.

At the end of the second term, students whose grade point average is lower than 10/20 or equal to 8/20 receive a technician certificate in rural development with specialization in livestock, which qualifies them for the B2 category of the civil service.

4. Financial resources

The budgets of the School of Livestock Managers come under title I and title II.

a. Title I

The operating budget, including receipts and expenditures, amounts to FCFA 45,915,000. It is used for the living expenses of students, salaries for auxiliary personnel, supplies and equipment, allocations for study grants and various other expenses.

b. Title II

The budget from project Education IDA No. 11051 NIR amounts to FCFA 11,341,000,000 of which FCFA 1,307,170,000 covers expenses related to the construction of the ECE school at Kolo while

the balance (FCFA 33,830,000) will be used to purchase furniture and supplies for the school.

5. Library

The library of the ECE presently has 1,000 books and scientific reviews.

6. Human resources

Currently there are six management personnel, one of whom is an expatriate, nine teaching personnel, four of whom are expatriates, and two assistant-teachers, both nationals.

7. Class size at the ECE

In 1983-84, there were 53 certificate holders enrolled in first year, 68 students in second year, 21 students in third year, and ten students in fourth year.

D. Regional Center for Training and Application Agricultural Meteorology and Hydrology (AGRHYMET)

1. Structure

AGRHYMET is a regional training institution for member countries of the Permanent Inter-state Committee for Drought Control in the Sahel (CILSS)-Cômité Inter-état pour la lutte contre la sécheresse au Sahel of which the coordinating department is the Department of Rural Development of the Republic of Niger. It should be noted that the institution also has students from Bénin, Burundi, Congo, Ivory Coast, Guinea, and Togo.

Resources come from UNDP, CILSS, and donor countries: USA, Netherlands, France FRO, Belgium, and Switzerland. In regard to the nature of activities, the center provides training for:

- o Upper level technicians in agrometeorology (Class III);
- o Agrometeorological engineers (Class II);
- o Upper level technicians of hydrology;
- o Engineers of hydrological applications; and
- o High level technicians of standard meteorological, electronic, and informational instrumentation.

The center also offers a short course of study (two to eight weeks) to provide specialized training in the fields of agrometeorology standard meteorological devices, electronic and informational instrumentation.

AGRHYMET also sponsors activities involving analysis of techniques for improving compilation of meteorological, agronomic and hydrological data to optimize agricultural efforts.

2. Training

AGRHYMET trains engineers in the field of agrometeorology. Subjects taught include meteorology, agrometeorology and hydrology. Graduates of the institute are employed by the government at the meteorological services level.

To gain admission, applicants must possess the baccalaureat category C or D for entrance into the upper level technician program, and the DUES, DEC or DUT for the engineering program.

There are three full-time teaching personnel under the jurisdiction of the CILSS, and eight expatriates. During the school year, AGRHYMET employs about 20 advisors and part-time professors.

There are two members of the permanent teaching staff under the jurisdiction of CILSS for the next ten years. The institute does not have a recruitment program.

The center's average budget totals FCFA 75,000,000 annually in investments and operations. It is difficult to estimate the amount of the budget spent each year on education costs.

3. Infrastructure

The center has at its disposal:

- o Two classrooms in good condition, covering 120 m², which hold about 80 students each;
- o Three classrooms in good condition, covering 108 m², which hold about 80 students each;
- o Four laboratories in good condition, covering 60 m², 72m² and 77 m² respectively, for equipment and electronic instruments;
- o Two hydrology laboratories in good condition, 50 m² and 35 m²;
- o One hydrology workshop in good condition, 88 m²;
- o One hydrology hangar, in good condition, 40 m²; and

The building itself is in good condition, and is used as an office, workshop, store, and lab for agrometeorology.

The library has 2,027 books and 113 scientific reviews and journals. Among the audio-visual apparatus, there is one overhead, one slide projector and one 18 mm film projector. Students have access to the library, which is free of charge.

There is also a farm for the students' practical courses: 25.05 ha, of which 13.55 ha is for crops and 11.50 ha is for pasture.

E. Problems Identified by the Personnel

1. ESA

- o Delay in the release of funds, and the inadequacy of these funds; and
- o Absence of qualified support personnel.
- o Inadequacy of certain infrastructures (laboratories) and the lack of equipment;
- o Lack of qualified teaching personnel to instruct in the fifth year of specialization; and
- o Lack of reference documentation for laboratory work.

2. IPDR

The operating budget is generally considered to be a serious problem. Its dependency on foreign financial aid is increasingly a cause for concern. Those departments not benefitting from foreign assistance experience operational problems.

The lack of high level technical personnel is considered to be severe in terms of its insufficient number and in terms of the number of teachers who are expatriates. Auxiliary technical personnel and support staff also note serious problems concerning the lack of laboratory personnel and the poor qualifications of secretariat personnel.

Facilities do not present a problem except for the inadequate number of classrooms (temporary problem) and laboratory equipment.

The low quality level of certain students recruited, the overburdening of teachers and classrooms, and the lack of teaching materials have also been cited as problems.

3. ECE

The principal problem cited is the inadequacy of the operating budget.

4. AGRHYMET

The operating budget is insufficient because of restrictions on certain expenditures. Inadequacy in the number of high level technical personnel and the existing obsolescent agricultural equipment are additional concerns.

5. Human resources and working conditions

At the university level, more teachers are needed to permit the institution to rely on its own personnel instead of having to call upon temporary professors to compensate for the lack of full-time professors. Nevertheless, the school is able to, whenever necessary, call upon specialists to organize seminars.

At IPDR at Kolo, permanent teachers are assigned to the institute by the governmental departments, although their wages come from the IPDR budget. They retain their status as government employees and career advancement (promotion, etc.) is realized through governmental channels. Many of the permanent teachers actually reside in the IPDR or receive a housing allowance.

At ECE, conditions are relatively good. As in research, there is concern over the lack of status for teachers and the lack of an operating budget. Since the creation of ECE, no teacher has benefitted from foreign post-graduate studies; moreover, most of them are expatriates.

At AGRHYMET, working conditions are generally good (wages and various benefits).

F. Link between Research Institutions and Educational Institutions

1. ESA

Relations between INRAN and ESA with regard to research are undeveloped. The teachers/research workers of the ESA are preoccupied with completing their education (presentation of thesis) while those of INRAN must pursue their work within the national research program in agronomy.

Nevertheless, research workers in institutes such as INRAN give courses at the ESA as temporary teachers and INRAN welcomes interns from ESA upon the latter's request.

2. IPDR

Research directors are requested to give courses at the Kolo IPDR. IPDR also sends interns to INRAN stations and laboratories. IPDR trains INRAN's technical agents and technicians.

3. ECE

ECE trains auxiliary management personnel for research institutes and, in return, research institutes provide a number of courses for ECE and supervise practicums which are conducted in research laboratories and observation posts.

4. AGRHYMET

The functional links that exist between AGRHYMET and INRAN are as follows: within the framework of student training, AGRHYMET has always conducted agricultural activities in accordance with agronomic norms as recommended by extension research. INRAN also supplies each lot with seed for the major crops. These links should be further reinforced, particularly in research concerning use of meteorologic, agronomic and hydrologic information to optimize projects in reference to the training of research workers. Nothing has yet been done.

G. Principal Recommendations

1. ESA

a. Reinforcement of the work capacity

The capacity of the the National School of Agronomy must be increased, by creating basic training facilities which meet the needs of the projects.

The necessary infrastructures include:

- o Adequate laboratories;
- o Greater area for practice and experimental lands; and
- o Adequate stock of agricultural and laboratory supplies.

To meet these needs, however, financial means would be required. It is possible, in any case, for the school to use existing facilities for some aspects of its work (IPDR, INRAN).

b. Reinforcement of human resources

More students should be encouraged to pursue teaching careers. The INRAN research workers and developers should offer more courses than are offered at present. The improvement in the quality of teachers-research workers has several implications:

- o Granting of scholarships;
- o Long and short-term course work for training: this would necessitate a regular flow of teachers to the school; and

- o Efforts to encourage graduates of the baccalaureat of series C and D to pursue courses in rural development management while providing inducements.

Revision of management training so as to give it a scientific, technical and human component as well as practical modalities. Such training requires mastery of the subject taught as well as the joining of services pertaining to the education and study program. It is also necessary to:

- o Increase the emphasis on cooperation between research workers, training personnel and users; and
- o Call upon teachers-research workers for certain studies in rural environments.

2. IPDR at Kolo

The Institute of Kolo is presently the object of reform and extension. Current problems are not particularly severe or are in the process of being resolved. However, there are recommendations:

- o Reinforcement of the operating budget by the Nigerien government;
- o The educational policy for teachers must be developed and reinforced; the personnel must experience a certain sense of status in order to assure good morale and motivation; and
- o To increase teacher training capacity, IPDR could be turned into a school solely for the training of technical agents. Another school for technician training could be established.

3. ECE

The following must be accomplished:

- o Preparation of a statute for teaching personnel;
- o Reinforcement of the operating budget; and
- o Introduction of a policy for teacher training to relieve expatriate personnel.

4. AGRHYMET

The following must be achieved:

- o Increase in teaching staff;
- o Training of design managers specialized in agrometeorology and hydrology;

- o Revitalization of the activities of the service's "operational activities";
- o Research work jointly undertaken with the research institute leading to agrometeorological and hydrologic information; and
- o Organization of short refresher courses for research personnel already working in agrometeorology.

VII. EXTENSION INSTITUTIONS

There are six agricultural extension institutions. They are:

- o Directorate of Agricultural Services;
- o Directorate of Animal Husbandry and Animal Industries Services;
- o Directorate of Forests and Fauna;
- o Directorate of Fisheries and Pisciculture;
- o Directorate of the National Office of Hydro-agricultural Installations (ONAHA); and
- o Directorate of the Nigerien Union of Credit and Cooperation (UNCC--Union nigérienne de crédits et de coopération).

All these institutions are reinforced by regional projects or act as support structures for extension institutions.

The directorates of Agriculture, Animal husbandry, UNCC, and ONAHA, and their particular projects, are under the authority of the MDR. (See Figure 10). The Directorates of Forests and Fauna, and Fisheries and Pisciculture and projects undertaken by them operate under the authority of the Ministry of Water Resources and Environment (MH/E--Ministère de l'hydraulique et de l'environnement).

A. Directorate of Agricultural Services

1. Mission and Objectives

This is the main agricultural extension organization. It is under the Department of Rural Development and is sub-divided into five central services and seven departmental services. (See Figure 9)

It is responsible for agricultural extension and aims to increase and improve the production of cultivated plant species (cereal, leguminous plants, fruit and market gardening as well as crops for diversification) in all regions which are suited for agriculture. It works in four ecological zones: the critical agricultural zone, the agro-pastoral zone, the poor productivity zone for dry crops, and the Fossil and Goulbi valleys for irrigated crops.

It also determines seed production programs and agricultural statistics and insures phytosanitary controls and the supervision of development projects in the plant production sector. Finally, it participates in the preparation of a national policy for agricultural production and food crop evaluation.

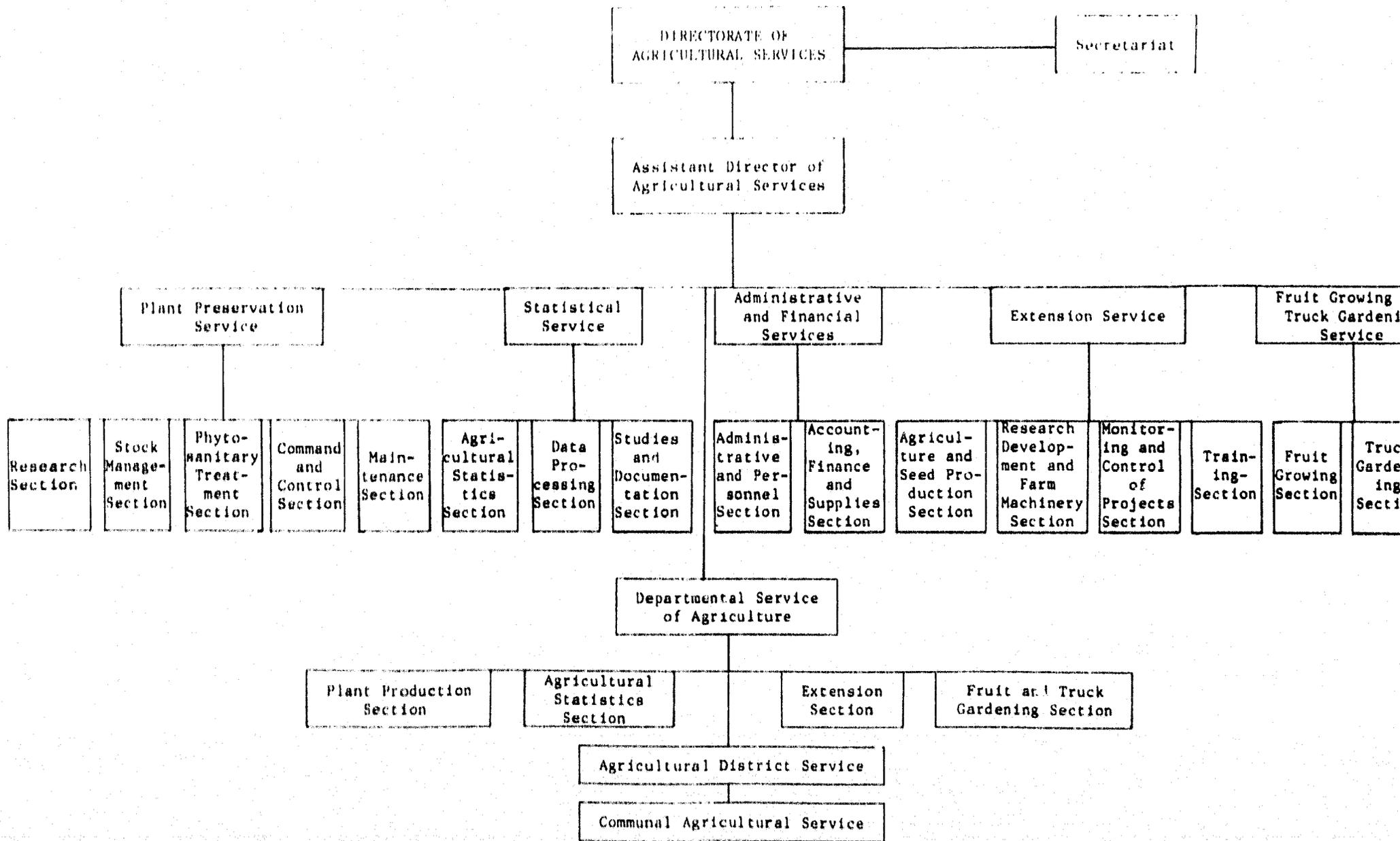


Figure 9: Organizational Chart of the Directorate of Agricultural Services

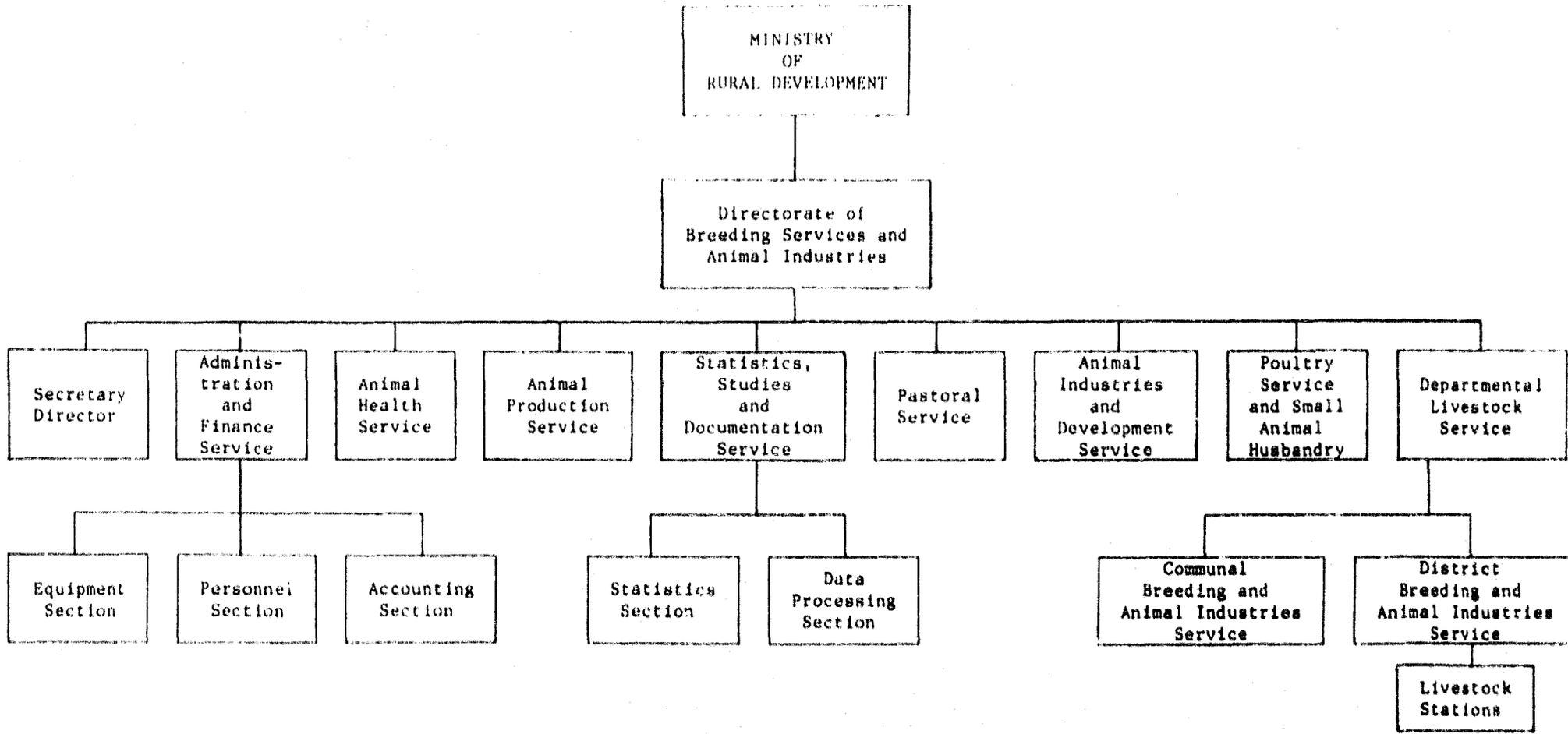


Figure 10: Organizational Chart of the Ministry of Rural Development

2. Human resources

The total personnel is as follows:

- o 401 Nigeriens and 21 expatriates in general and administrative services
- o 296 agents at department level;
- o 253 agents at ward level;
- o 203 district agents; and
- o 300 auxiliary agents.

Total personnel amounts to 1,484 persons. Of these only 30 are high-level staff, of whom 17 are agrologists (baccalaureat plus five years) and 13 are technical agricultural engineers (baccalaureat plus four years). The total also includes 163 agricultural advisers (BEPC plus four years) and 165 agricultural technical agents (BEPC plus two years).

The service has 75 supplementary personnel, 70 of which are agronomists.

There are currently 112 high-level staff in training.

3. Financial resources

Financial resources are distributed as follows: FCFA 492,000,000 for the national budget (operations), FCFA 150,000 (estimated) for FNI, FCFA 316,000,000 for the ONG budget and FCFA 97,000,000 for land collectives budgets equalling a total of FCFA 1,055,000,000, which does not include financial support for agricultural sector projects.

Credit issued from FNI is used mainly to subsidize agricultural inputs.

4. Methodology

As a general rule, the diffusion of research results relies upon existing cooperative structures.

Before initiating productivity projects and operations conceived after the drought, agricultural extension methods were based on meetings held by those service agents sent in to certain zones, particularly those producing export products or those with market potential (groundnuts, cotton, etc.).

After 1970, analysis of prior operations revealed that it was impossible to impact upon the rural sector with a disjointed management structure and very low numbers of personnel.

As a consequence of this, the rural sector was further organized under cooperatives, through which technical ideas were updated and circulated with the support of regional, integrated development projects.

Since the inception of the Development Society (1979) there is clear evidence that rural development efforts must originate from the workers themselves. Consequently, agricultural research efforts must conform to the needs expressed by the village units taking into account the specific needs of each ecological zone. Research programs are drawn up during annual meetings of high-level agricultural management and of INRAN. Technical extension flyers are edited and circulated by INRAN to the extension institutions.

B. Directorate of Animal Husbandry

1. Mission and Objectives

This service is under authority of the Ministry of Rural Development. The service pursues project activities leading to the improvement of animal production (meat and milk) to assure food self-sufficiency for the population. It is also dedicated to raising the breeders standard of living, and to developing exports to bring in foreign currency.

This policy is well founded since, after agriculture, processing industries and trade, livestock production is the fourth largest contributor to the gross domestic product, and the second largest contributor to exports, directly behind extractive industries (mines).

2. Financial resources

The general budget for animal production is as follows: FCFA 17,643,000 for operations, FCFA 419,000,000 for personnel, FCFA 49,500,000 for technical material and FCFA 64,000,000 for services.

National funds allocated to the livestock service as investments are shown in Table 33 (FNI).

3. Area of activities

a. Major activities

Major activities of the service are:

- o Health maintenance for all livestock, through a sustained program of preventive vaccination and medical treatments;
- o Complementary feed for livestock is distributed in zones which are particularly troubled due to poor condition of pastures following late and insufficient rainfall. The distribution program takes into account the needs expressed by departmental services; and

Table 33: National Investment Funds for Animal Husbandry
(CFA)

Aid to the Health Sector	35,000,000
Aid to Vaccine Production	25,000,000
National Poultry Development Program	65,000,000
Operation "A Drop of Milk"	10,000,000
Temesna Animal Husbandry Project	5,000,000
Niger East Center Animal Husbandry Project	150,000,000
Operation Cotton Seed	75,000,000
Research of Sheep and Dromedary Helminthic Diseases	8,000,000
Small Ruminant Pathology	10,000,000
Completion of the Infrastructures at the Belbedji Dakoro Proliferation Centers	<u>100,000,000</u>
Total	<u>483,000,000</u>

- o Inventory of permanent or semi-permanent water sources: sumps and traditional and modern wells found in the pastoral zone which were inadequate for proper watering of animals during the dry season. Since then, programs to better equip water sources have been organized.

b. Development of the pastoral zone

The pastoral zone, created by Law no. 61-5 of May 26, 1961, is located in the northern boundary of the agricultural area and constitutes the land on which nearly one-third of the country's livestock is bred.

Its northern fringe is located at the limit of the permanent breeding area in the west where the isohyet level is 150 mm and in the east where it is 200 to 250 mm. This zone extends to nearly 1,500 km and covers approximately 300 km. The total area is about 345,000 km² (Aïr Massif excluded). The number of Peuhl and Toureg breeders in that zone represents approximately 1 percent of the national population, or 500,000 persons.

Following the drought, a long term breeding shift has been occurring in Niger. Zones are becoming specialized for breeding purposes as follows:

The Pastoral zone will be at first, essentially a zone where animals have their young. The nature of the cattle herd has undergone tremendous change. It is a herd of cows with a just sufficient number of bulls for reproduction purposes. Young bulls and cows are taken out after two years to free the pastures; only enough young females remain to replace cows which must be slaughtered because of age or other reasons.

The pastoral area has also been transformed considerably: transhumancy continues but it is now organized into individualized lots, each of them equipped with the necessary infrastructure: water sources, reserve pasture, vaccination pens, fire protection, markets, etc. The social and economic environment has improved (health, education, supplies of crucial products).

The Intermediate zone will without a doubt witness the most spectacular changes. This zone specializes in raising young animals that come from the pastoral zone. Management with the Ekrafane ranch will have led the way for others.

At the beginning, private enterprise will practice the raising of young animals on a small-scale basis. The presence of the cooperative movement in the breeding sector and the credit now available which is well adapted to their needs, should allow some of these groups to get involved in such breeding, first as a semi-industrial endeavour and then industrially with increasingly bigger units; the intermediate zone must become the ranch zone.

Agricultural zone, considering the necessity of designating more and more land to crops, livestock breeding as it is currently practiced will slowly disappear from this zone.

Today extensive animal production is still conducted in that zone where animals roam more or less freely and graze periodically, not so much for lack of food, but because they must be kept away from crop fields until harvesting is complete.

It is expected that by the year 2000 crops will have increased to the point that pasture lands will have significantly diminished. Animal breeding will evolve into an entirely new form where animals will be used for help develop cultivated land (work, transportation, manure). Therefore animal production will very likely become intensive, and well-integrated into agricultural development. The farmer will supply forage crops and the by-products needed. The animal producer, in turn, will supply manure, meat and milk.

Finished cattle breeding will also be transformed:

It will be generalized as is the normal outcome of any type of farm breeding. Then, again with the support of cooperatives and credit, it is possible that industrial units will be created particularly around large hydro-agricultural perimeters, where agro-industrial by-products are plentiful. These units should constitute the last line in the breeding chain which can be visualized as follows:

- o Calving and collection markets in the pastoral zone;
- o Raising young animals and ranching in the intermediate zone; and
- o Farm breeding and industrial establishments (feed lots, dairy areas) in the agricultural zone.

4. Human Resources

a. General description

(1) Veterinary corps

The state corps of veterinarians is growing. There are 31 veterinarians who are beginning to fill the posts where they are most needed. To meet the country's requirements, in 1981 five veterinarians were assigned to the following institutions: The Ministry of Mines and Water Resources, The Ministry of Rural Development, Director of the National School of Agronomy, Entomology Service of the breeding laboratory of INRAN, and the Vice-President of the West African Development Bank.

French technical aid supplied four veterinarians and one agrostologist for the following services: program studies and statistics, animal production, pastoral service, livestock reconstruction, and teaching at the school of breeding assistants.

(2) Corps of assistants

This corps also increases from year to year: There were 134 breeding assistants in 1981 and their number continues to increase.

(3) Other personnel

This is made up of technical breeding agents, breeding attendants, and breeding supervisors. Their insufficient number inhibits good training for rural populations.

b. Training

(1) Design and management corps

Niger's graduates of veterinary medicine are trained in European veterinary institutions.

In 1968, the opening of the Inter-state School of Science and Veterinary Medicine at Dakar, supported by the French corps of veterinarians, permitted the training of veterinary students on African soil which was better suited to the educational training needs. Since 1968, Niger has sent students to this school, and to other countries as well (USSR, Algeria, Nigeria, Cuba, etc.).

The need for more Nigerien veterinarians has always existed but, until recently, such training was the choice of only a very few graduates.

(2) Training of engineers in livestock techniques

Since 1974, the training of A2 personnel has been carried out at the National School of Agronomy and Breeding at Niamey which is under the authority of the Ministry of National Education and Research. The school is for baccalaureat students as well as B2 personnel trained in breeding techniques who were admitted through professional competition and became technical assistants (B1 trained personnel).

Livestock assistants (B2 personnel (mid-level)) have been trained since 1972 at the School for Breeding Assistants and Technical Agents at Niamey; prior to 1970 they were trained at the Bamako (Mali) School of Assistants.

Students enter EAATEN with the BEPC and their studies last three years. Breeding assistants supervise veterinary services in the wards.

The livestock technical agents (C1 personnel) have also been trained since 1970 at EAATEN in Niamey. These agents form the nucleus of vaccination and anti-parasite projects.

The Breeding and Animal Industries Services does not expect any decrease in training during the next years but it does foresee, between

1983 and 1986, training 71 agents with baccalaureats plus five years and 13 agents with baccalaureats plus two years.

5. Extension results

Extension results may be summed up as follows:

a. Estimate of livestock numbers

The number of cattle is difficult to estimate, which is why, after 1983, a growth rate was established for each species. These rates are 1.5 percent for cattle, 3.5 percent for horses, and 2 percent for asses. Considering these growth rates, the projection for livestock growth per species from 1982 to 1985 is as specified in Table 34.

b. Health situation

(1) Vaccinations and treatments

The vaccination campaign against cattle plague originated at the breeding management meeting held from November 30 to December 5, 1981. Generally, results were satisfactory. Overall, 2,758,222 cattle were vaccinated in 1981 compared to 2,676,541 in 1980, or 79.7 percent of cattle in the departments concerned.

Vaccination against peripneumonia was administered in susceptible regions along with the anti-parasite vaccination. There were 1,808,208 immunizations in 1981 which is a rate of 45.8 percent (51.4 percent) in the department of DIFFA; for DOSSO, 102.6 percent (83.9 percent); for Niamey, 99.7 percent (108.3 percent); and for Tahoua, 69.1 percent (52 percent).

Other vaccinations in 1981 represent 439,723 doses or a decrease of 30 percent compared to 1981; this decrease is particularly noticeable in bacterial anthrax (36 percent) and symptomatic anthrax (20 percent). these diseases represent 72.9 percent of all vaccinations, pasteurellosis 25.2 percent and the rest is divided between goat peripneumonia and rabies amongst carnivorous animals.

8930 cattle were given chemical prophylaxis with Trypanidium (for trypanosomiasis) in 1981, as well as 62 sheep, 42 goats, six donkeys, and one horse.

In 1981, the Breeding Service carried out 73,444 curative or preventative treatments with chemical products which amounted to 55,391 less than the previous year. These were mostly cases of ecto and indo-parasites.

Sulfamide prevention for the small ruminants of the country's seven departments was administered; 62,803 animals were treated in 1981.

Table 34: Estimated Increase in Number of Livestock

<u>Livestock</u>	<u>Total</u> (in billions)	<u>Increase</u> (percent)
<u>Cattle:</u>		
1982	3,487	2.0
1983	3,539	1.5
1984	3,592	1.5
1985	3,646	1.5
<u>Sheep:</u>		
1982	3,315	4.0
1983	2,448	4.0
1984	3,568	3.5
1985	3,693	3.5
<u>Goats:</u>		
1982	7,295	2.5
1983	7,478	2.5
1984	7,627	2.0
1985	7,780	2.0
<u>Camels:</u>		
1982	407	2.0
1983	415	2.0
1984	421	1.6
1985	427	1.6
<u>Horses:</u>		
1982	279	1.6
1983	283	1.6
1984	287	1.5
1985	281	1.5
<u>Donkeys:</u>		
1982	492	2.0
1983	502	2.0
1984	512	2.0
1985	522	2.0

(2) Central breeding laboratory

In 1981, the central laboratory of the livestock service delivered, for the vaccination program 1,420,400 doses of vaccine for cattle plague, 935,000 doses of peri-T1, 233,700 doses against symptomatic anthrax, 385,250 doses against bacterial anthrax and 162,500 doses against pasteurellosis. This was a total of 3,136,850 doses. They also performed 91 autopsies, 153 ceptoscopic examinations, eight hemologic examinations, 55 bacteriologic examinations, 4,074 serologic examinations, and 20 virologic examinations.

(3) The livestock pharmacy (VETOPHAR)

In 1981, VETOPHAR recorded the volume of business in FCFA which is shown in Table 35.

(4) Animal husbandry

As to the castration of breeding stock in 1981: there were 1,000 bulls, 537 rams, 22,712 sheep, and seven others. These figures represent all seven departments of Niger.

There was also distribution of complementary feed: in 1981 throughout the country, 2,104,551 tons of cotton seed were distributed. An inventory was conducted in the pastoral zone of the following: permanent ponds and permanent water points; 18 drillings equipped with pumps, and 44 other drillings.

c. Marketing of animal products

Animal products largely sold through market circuits include standing livestock, meat, leather and hides. Less often milk and milk by-products are marketed in this manner.

The following points are discussed in this chapter:

(1) Marketing of standing livestock

Standing livestock is marketed essentially through traditional marketing outlets. State intervention is still very limited. 480 outlets were opened in 1981 (440 in 1980). These outlets are either collective, regroupings or terminal markets in the vicinity of towns and the border. The market control rate is 52 percent. Sales of standing livestock are summarized in Tables 36 and 37.

(2) Marketing of dry and smoke-cured meat

This form of marketing, which is nonexistent in many countries, is essentially destined for Algeria as represented in Table 37.

Table 35: Business Volume of VETOPHAR, 1981
 (in FCFA)

<u>Pharmacy</u>	<u>Business Volume</u>	<u>Operations</u>
Zinder-Diffa	9,725,257	2,265,658
Tahoua-Agadez-Maradi	12,585,771	2,530,424
Niamey-Dossa	28,862,802	2,650,057
Central Pharmacy	25,737,882	
Total	<u>76,911,212</u> =====	<u>4,918,675</u> =====

Table 36: Sales of Standing Weight Livestock
(number of heads)

<u>1981</u>	<u>Estimated Sales Interior Market</u>	<u>Development Estimate</u>	<u>Controlled Development</u>
Cattle	370,000	130,000	42,911
Sheep	790,000	105,000	16,548
Goat	2,313,000	25,000	3,733
Camels	28,000	3,000	100

Table 37: Marketing of Dried and Smoked Meats

<u>Origin</u>	<u>Destination</u>	<u>Dried Meats (kg)</u>	<u>Smoked Meats (kg)</u>
Niger	Algeria	1,448	21,430
	Nigeria	NA	NA
	Togo	NA	NA
Total (1981)		<u>1,448</u>	<u>21,430</u>

(3) Marketing of meat and national marketing

The volume consumed was estimated at 80,243 tons in 1981. It should be noted that in 1981 the Nigerien population reached 5,671,760.

(4) Marketing of fish

Unfortunately, there is no information on fish marketing for 1981.

(5) Activities of the Niger National Society for the Development of Animal Resources

This organization (SONERAN--Société nigérienne d'exploitation de ressources animales) was created in 1968 to develop facilities for meat refrigeration and to improve animal resources through the utilization of the Ekrafane ranch (5,159 cattle, 237 sheep).

Cattle numbers outside the ranch (Ayerou-Abala) have increased from 1,072 to 1,310 in 1981. The number of sheep (Mangaisé-Niamey) has also increased from 2,050 to 3,344.

SONERAN also manages the hydro-agricultural semi-industrial development at Tiaguirité for intensive cattle feeding. It covers 300 ha and houses 1,052 animals.

As to the marketing of leather and hides, 2,885 cattle hides were sold, or 17.98 tons.

It is difficult to give information about poultry marketing because data is not available for 1981, but the number of poultry (hens and guinea-fowls) can be safely estimated at 10,800,000.

As to the consumption of poultry, the consumption of eggs is estimated at 216 million annually while the average production per bird is 200 eggs. Research activities at the Baté Ranch have concerned peripneumonia. Thirty-one serums have been produced. The results are 16 positive serums, two at 1/10, two at 1/20 and one positive serum at 1/80.

A survey was conducted of hen houses to determine cause of death and decrease in number of eggs laid among hens. Typhosis was isolated and ways and means to eradicate the disease were studied.

SONERAN led an investigation into the outbreak of cow plague in the Niamey region. Identification of the virus is taking place at the veterinary research laboratory at Dakar.

SONERAN also conducted an investigation into dromedary camels, examining seven animals with Staphylococcus only, two animals with Corynebacterium pyogenes and Staphylococcus, and one animal with Nocardia and Staphylococcus.

Camel feces were also examined with the isolation of salmonella and brucellosis serology (55 negatives) and two with RB positive with one cross and SAW negative.

A study was conducted of helminth disease in sheep and dromedaries at Niamey. Eighty three field trips yielded the following results: coprologic sampling of 1,808 sheep, autopsy on 403 sheep, coprologic sampling of 467 dromedaries, and autopsy on 403 dromedaries.

At Tahoua in 43 field trips, a coprologic sampling was done of 659 sheep and 134 sheep were autopsied. A coprologic sampling was also done of 369 dromedaries, and 28 were autopsied. As to bacteriology, a serological investigation on brucellosis in Niger was conducted at Niamey, Tahoua, Maradi, and Agadez, where 2,273 cattle, 801 sheep, and 1,000 goats were tested, for a total of 4,074 animals.

The results for cattle were 147 positive or (6.55 percent), 30 doubtful (1.93 percent), and 2,096 negative (91.62 percent). For sheep there were 15 positive (1.9 percent), 13 doubtful (1.6 percent), 773 negative (96.5 percent). For goats there were 26 positive (2.6 percent), 19 doubtful (1.9 percent), and 955 negative (95.5 percent).

C. Directorate of Forests and Fauna

1. Structure

This directorate is under the authority of the Ministry of Water Resources and Environment and has an operating budget of FCFA 71,366,000 (1983). Its major activities are:

- o Village plantings (village forests);
- o Awareness;
- o Artificial plantings other than village forests; and
- o Regression.

2. Areas of activity and human awareness

The ecologic zones involved are the Sudano-sahelian and sahelian zone. Its activities concern all seven departments of the country. This directorate has 96 agents at department level, 57 at ward level, and 32 in forestry posts, for a total of 226 agents. Human resources were reduced, however, when the two directorates which constituted the Water and Forest Service were separated. The level of education for men and women varies from BEPC plus two years to BAC plus five years. There are 21 persons in management; none are women. Extension results are poor because accomplishments in forestry are always neglected by the population, which does not yet grasp the importance of the activities in this sector.

3. Relationship between extension and research

Liaison between extension programs and research is often neglected. Extension programs should be based upon research results. However, even research management, to whom such data is readily available, have been negligent in consulting them. Persuading extension personnel to consider research results in their work is also difficult.

4. Problems as seen by technical personnel

These problems are the following:

- o Delay in the delivery of credit;
- o Delay in launching the project;
- o Inadequacy of extension resources; and
- o Lack of coordination between extension services.

D. Directorate of Fisheries and Pisciculture

Under the Ministry of Water Resources and Environment, this is a newly created directorate. At the present time, its operating budget is part of that of the Directorate of Forests and Fauna.

Its major activities are:

- o Control of the points of entry and the weighing of fish;
- o Identification and development of bodies of water;
- o Pisciculture in ponds; and
- o Restocking.

All activities concentrate on the Niger river zone and in the Sudano-sahelian and sahelian zone. Human resources are few and are limited to two engineers and a few mid-level specialists in fisheries.

The education level varies from BEPC plus seven years to BAC plus six years.

There is one female typist, but no women in upper echelon positions. There is a management representative in each of the departments. This young directorate needs a comprehensive training program to better manage its activities.

E. National Office of Hydro-Agricultural Installations (ONAHA)

ONAHA (Office national des aménagements hydro-agricoles) is a public organization which was created by the government in 1979. (See Figure 11.)

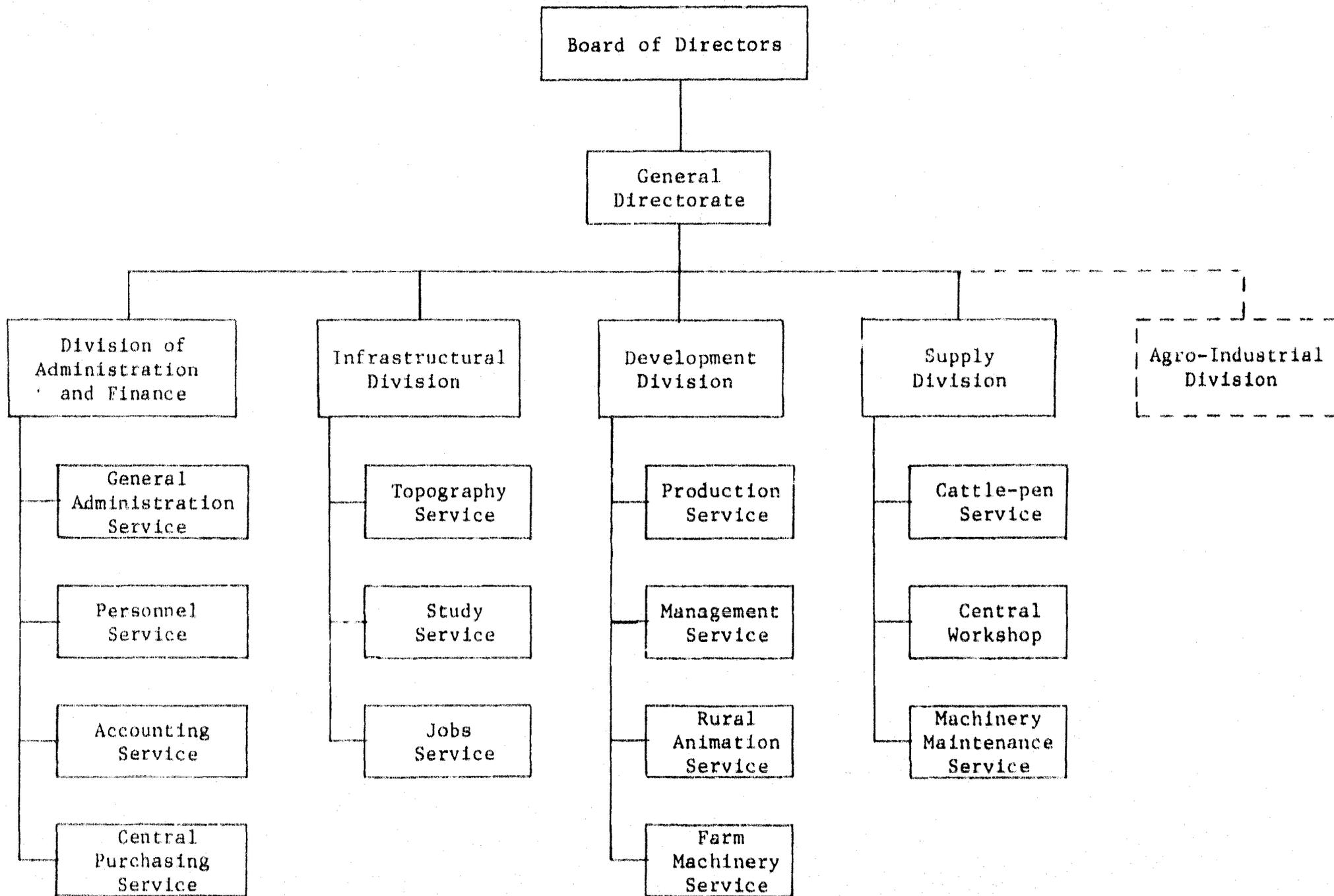


Figure 11: Organizational Chart of ONAHA

It comes under the authority of the Ministry of Rural Development and its mission is to study the execution and management of hydro-agricultural projects.

The activities of this office are not geographically limited although most of its work is presently conducted in the west and center of the country in the Sahelian ecological zone.

The extension budget of the office averages FNI 60 billion.

The office is divided into three regional departments: Niamey, Tillabéry and Tahoua. The personnel responsible for the direction and management of these departments includes five agronomists, three engineers in agricultural techniques, 12 high-level technicians, 30 rural development technicians, and 115 management assistants.

Working conditions at ONAHA are basically the same as those of other extension institutions.

Extension results may be summed up as follows: adaptation of high yield varieties of rice (valley of the Niger river), use of fertilization, introduction of animal-harnessed cultivation in the developments, farmer self-management and the creation of cooperatives.

Liaison with research programs are poor: INRAN acts primarily for seed conservation.

Working conditions are not good. Management assistants generally do not have the required qualifications and lack training. Agents, who have no incentives, are therefore not motivated. Field research did not have the projected impact. There is an urgent need to control the factors related to land development such as pedology, choice of specialization, relationship between water and soil, and seed reproduction.

The problems of sociologic obstruction must also be studied. The problem of investment and operating budgets is almost unanimously considered to be severe. The operating budget has decreased even when developed areas were increasing.

With regard to high-level technical personnel, the budget problem is not considered to be as severe. However, the lack of specialization amongst the group is a serious problem according to many persons.

With regard to technical support personnel, its lack of qualifications is considered to be serious. It is particularly faulted for its difficulty in identifying with the rural environment. Relations between this group and research are good; however, its access to research is undoubtedly a severe problem.

The farmers attitude is also considered to be a serious problem. They do not see developments as their own, rebel against innovations, and refuse to pay their dues.

The availability of inputs is considered to be a problem of varying severity. This is due to the farmers poor financial situation which prevents them from purchasing these inputs.

The lack of information about research is also a problem; INRAN's technical publications do not reach all extension agents.

The problem of prices, subsidies, etc. is often considered as minor. The paddy price is somewhat profitable. However, it is important that government subsidies are not terminated in light of what present tendencies would seem to indicate.

F. Nigerien Union for Credit and Cooperation (UNCC)

The Nigerien Union for Credit and Cooperation (UNCC--Union nigérienne de crédits et de coopération) under the authority of the Ministry of Rural Development. (See Figure 12.) It is responsible for the organization of cooperative structures throughout the country (farmers, breeders).

Cooperatives are one of the pillars of development. Along with the movement of organized youth in Samaryia, cooperatives act as the driving force between the technical extension services and research, and between National Agricultural Lending Bank (la Caisse nationale de crédit agricole) and the producers (farmers and breeders).

The human resources of the UNCC consist of:

- o 61 persons at management level, of which one is an expatriate;
- o 110 agents at department level (low-level managers);
- o 150 agents of the department level; and
- o 300 at district level.

In design management, UNCC has ten agrologists and ten at the level of BAC plus four years, 25 at the level of BAC plus two years. Presently, 30 persons are in training, of which five are at the BAC level plus four years, and 25 are at the BEPC level plus two years (including five women).

Of these 30 persons, five will join the service in the next three years.

Financial resources are a national budget of FCFA 5,000,000,000 for operations.

UNCC does not foresee any candidates for training in the next ten years.

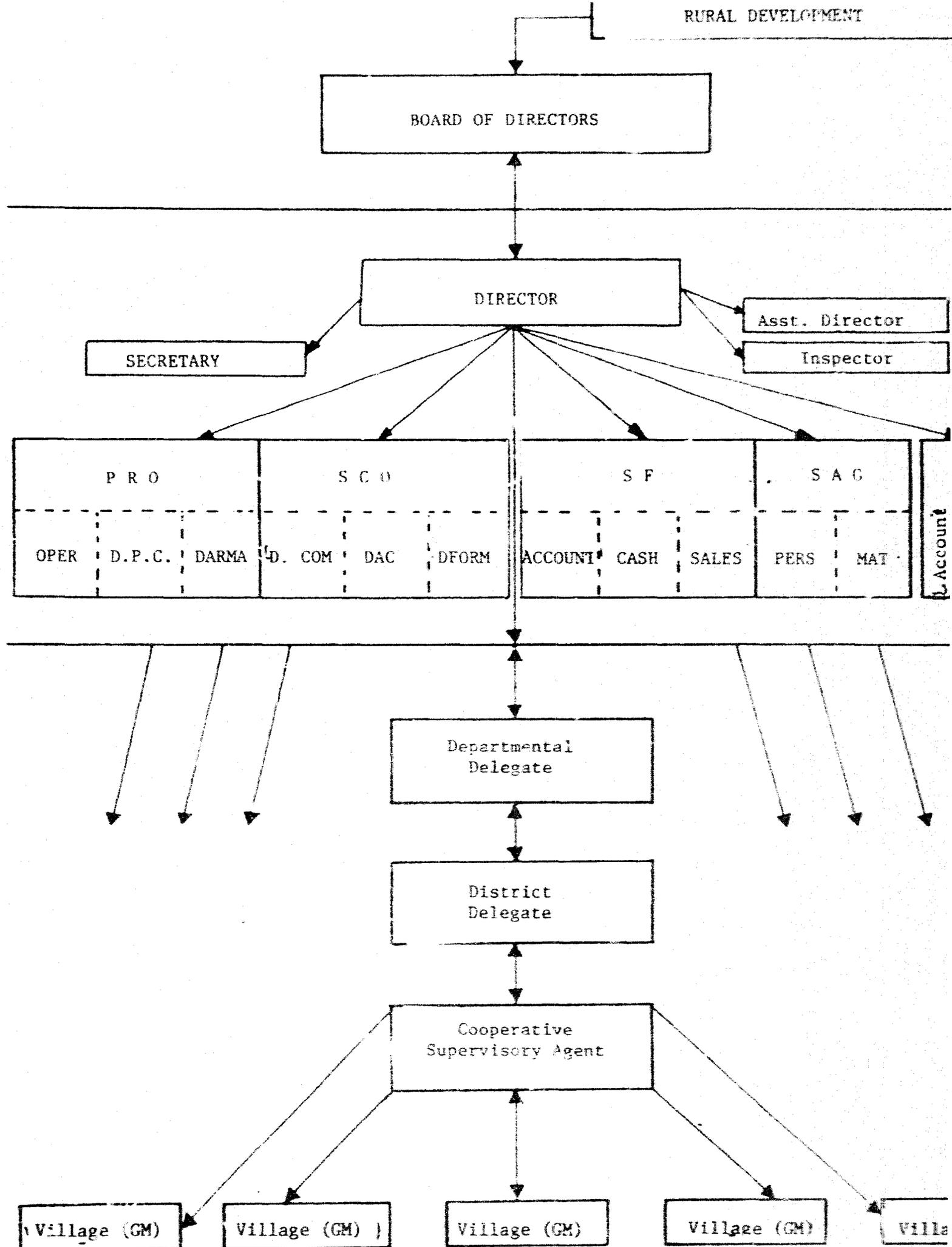


Figure 12: Organizational Chart of UNCC

G. Support Structure for Extension Institutions

For agricultural production and forestry projects, the principal support structures for extension institutions are:

- o National cereal program;
- o Badéguichiri project;
- o Tahoua project of productivity;
- o Maradi project of rural development;
- o Zinder "3M" project;
- o Diffa project of agricultural development;
- o Dosso project of rural development;
- o Niamey project of productivity;
- o Namarigoungou project;
- o Konni project; and
- o Diffa center of agricultural development.

The sponsoring ministry for all of these support structures is the Ministry of Rural Development.

The principal support structures for extension institutions in animal production are:

- o Center-East Niger project;
- o South-Tamesna project; and
- o Pasture management project.

These projects are all sponsored by the Ministry of Rural Development.

1. Agricultural extension

a. National cereal program

This is a national project which aims to contribute to the national policy of food self-sufficiency and whose principal objectives are the following:

- o Support (financial, material, infrastructures) to the system of agricultural extension;
- o Support (financial, material, infrastructures) to the UNCC to develop the cooperative structure necessary to facilitate

the supply, stocking and distribution of production factors and means; and

- o Support to agricultural research.

The program's main activity concerns the production of quality cereal seeds (millet and sorghum) through the creation of a national system of seed production (seed farm, seed multiplication centers).

b. Regional support structures for extension institutions

The objective of the productivity projects at Badéguichiri, Tahoua, Maradi, Zinder, Diffa, Dosso, and Niamey is to support the standard management structures necessary to insure continuity, to install new infrastructures and to consolidate farm self-management. In general, these are integrated or sectorial rural development projects whose main activities may be summed up as follows:

- o Training of the farmers (CPT, CPR), self-management agents, management agents (temporary and post-studies), and cooperative supervisors;
- o Extension of agricultural inputs, and of new intensification techniques adapted to the environment to increase the production of food crops and improve sales techniques;
- o Supplies of agricultural inputs for rural inhabitants;
- o Improvement of the land capital through the actions of CES, DRS;
- o Animal resources; development of domestic breeding (pasture land) and improvement of health care;
- o Reforestation;
- o Creation of infrastructures, system of wells, rural trails in the desert, and stock-rooms for inputs; and
- o Applied research in the form of support research.

To accomplish these objectives, the productivity projects rely on standard extension structures existing in their zones of activity to bring them necessary logistic support.

These projects cover the agro-pastoral zone, the critical agricultural zone and the valley zone in the "crop zone" which lies in the southern part of Niger (300 mm isohyets).

It must be noted, then, that these projects do not encompass the geographical area of each departmental zone.

Human resources responsible for management (managers and auxiliaries) are rebuilding the classical extension structures. It should be noted

that results of extension activities are obtained under the supervision of existing agricultural services and the UNCC, with supplies and contributions from different projects.

c. Projects at Namarigoungou, Konni, CDA at Diffa

These three projects concern the restoration of the Niger river valley, of hilly reserves and other river valleys. the principal activities are:

- o Development, through the development of water resources, of rice crops, cotton, sorghum and vegetable crops (green peppers, okra, hot peppers);
- o Extension of agricultural inputs and new techniques;
- o Reforestation, wind-breaks;
- o Training of farmers, agents, and managers; and
- o Related research.

The primary irrigated surface area is located along the length of the Niger river valley in the western part of the country. These efforts are also undertaken on the river banks.

Improvements are also made from hilly reserves, underwater pools, or in food crop basins (Comadougou).

2. Animal production extension

a. Niger project

This is a breeding project covering three departments in the central and eastern part of the country. The most affected ecological area is the transhumant pastoral area.

The main activities of the project, which use traditional intervention techniques, are the following:

- o Diffusion of animal husbandry inputs;
- o Immunization project (against animal diseases);
- o Breeders' training;
- o Breeders' organization gatherings at water supply points;
- o Products of primary need;
- o Establishment of watering places (grazing wells); and
- o Research activities (sociological, agrostological studies).

The project relies on available human resources from breeding activities and public health services for the management of extension activities for each breeder's area of activity.

b. South-Tamesna project

This is a breeding development project in the northwestern region of the center of the country (Tahoua department). The pastoral area is the ecological area most affected by the major activities of the project:

- o Organization of breeders in a Cooperative Production Group (GMP--Groupement mutualiste de production) or Cooperative Village Group (GVC--Groupement mutualiste villageois);
- o Establishment of a management system for pastures and watering points;
- o Control of animal health;
- o Training of breeders as first-aid workers; and
- o Supply of primary products and animal husbandry inputs.

3. Forestry and fish production extension

There are three major projects at the national level in forestry and fish production. These projects are under the sponsorship of the Ministry of Water Resources and Environment.

a. Forestry project

The operating budget of the project is estimated at about FCFA five billions for five years; this project is implemented at the national level; consequently it affects all the climatic areas of all seven departments.

In addition to the project management staff, which consists of a forestry engineer (manager), three advisers, two technical agents, and two agents below the BEPC level, there are four expatriate staff. Two persons holding the BAC plus five years and two who have the BAC plus four years are now in training. Ten more engineers are needed.

At present, extension results only indicate problems previously unsolved. Gradually, these results will be further emphasized and more substantial.

The relationship between extension and research is developing and positive results are expected.

The problems, as seen by the staff, range from minor to serious. There are several problems tied to the blockage of funding.

b. Aquaculture project

This is the only project of the Directorate of Pisciculture and Fisheries. It is funded with FCFA 110 millions by the central fund for economic cooperation. The project does not cover all of the departments, but focuses on the Tillabéry region in the dry branches of the Niger River and on the banks of Lossa. Its staff, from engineers to technical agents and forestry advisers, is very limited. In fact, there is only one expatriate fishery engineer, two national forestry advisers, and three technical agents. Project results are already positive, since the population of Niamey and the surrounding area are already consuming fish.

c. Soil and forestry use and planning project

The total budget of this project is \$13,537,000. It is under the direction of the Department of Hydraulics and Environment. The scope of its operation is national and covers all the climatic areas of the seven departments affected by the project. Personnel includes one water and forestry engineer (director), three advisors, two technicians and two persons with less than a BEPC degree. There are four expatriate positions. In training there are two persons at the BAC+5 level and two persons at the BAC+4 level. Approximately ten additional engineers are needed.

H. Relationship Between Research, Training, and Extension Institutions

1. Current status

The existing links between Nigerien agricultural research institutions are governed by the regulations establishing INRAN, which is the only national institution responsible for coordinating Niger's agronomic research activities. INRAN signs agreements with international research institutions carrying out agricultural research programs in Niger (ICRISAT, GERDAT, universities, etc.) Programs which are implemented by INRAN are reviewed during annual meetings of the extension services and INRAN. These programs are conceived based on needs expressed by extension workers. As far as training is concerned, the agricultural research institutions accept interns from training schools (ESA, IPDR, ECE, universities, etc.) and some researchers teach in these training institutions as substitute teachers.

Through the rural development project, all extension services participate in the training of farmers organized into cooperatives. These projects are the perfect vehicle for the diffusion of research results and the practical training of technical leaders in rural development.

2. Critical analysis

Generally, all national institutions of research, training or extension lack human, financial, material, and technical resources.

a. Human resources

Agricultural activities continue to increase and encompass new areas. But the number of rural management staff remains very low.

At the research level, a legal framework must be introduced to motivate young people to enter into scientific professions, because, at the present time there is little status associated with the research profession.

Training institutions lack teachers and most of the staff is made up of expatriate technical assistants and temporary teachers from other national services.

b. Financial resources

Financial resources are insufficient and operational budgets do not take into account growing needs or inflation. This low level of funding is the major concern of rural development institutions.

c. Material resources

Equipment is insufficient including: laboratory equipment, infrastructures (establishment of stations to cover the Niger ecological areas, strengthening of existing structures), and logistic means for extension agents.

d. Technical resources

Proposed techniques are tested in rural areas assisted by development agents. Their extension results from a cooperative effort between research and extension management agents. Training, at all levels, should conform to national realities. The technological extension packages should originate from the needs expressed by the farmers. The seminar on "Intervention Strategy in Rural Areas, and Agricultural Extension System" held in Zinder (November 1982) recommended that all development efforts must be defined by the beneficiary rural population. For this reason, all rural development projects are established on-site, the extension agents serving only as advisers for producers' organizations.

VIII. CONSTRAINTS

A. Crop Production

The major constraints to crop production are:

1. Millet

The constraints are linked to:

- o Uncertain conditions (precipitation unevenly distributed and of insufficient quantity);
- o Soil erosion; and
- o Subsidy and producer price policies.

Research needed to overcome the constraints should focus on the following areas:

- o Improvement of species adapted to the different ecological zones;
- o Crop preservation by developing pest control methods;
- o Studies on inter-cropping; and
- o Improvement of cultivation techniques.

The potential yields for the short and long-term, if farmers adopt the new technologies, could reach 450 to 1,500 kg/ha (with constraints) and 2,500 kg/ha for high-yield varieties (without constraints), respectively.

The realization of such yields implies the existence of the following conditions:

- o Market prices high enough to cover production costs;
- o Access to investment and production credit;
- o Agricultural inputs available at the proper time;
- o Availability of skilled manpower when needed; and
- o Viability of technical extension themes introduced.

2. Sorghum

Constraints to growing sorghum are linked to the following factors:

- o Precipitation (quantity and distribution).

- o Soil erosion;
- o Agricultural manpower;
- o Rural traditions;
- o Economic factors (prices, marketing); and
- o Weeds.

Expected yields will range between 200 and 1,500 kg/ha for the short-term (with constraints) and around 4,000 kg/ha (without constraints) in the long term.

Research areas needed to overcome the constraints are:

- o Selection of early, high-yielding, disease-resistant species;
- o Development of species adapted to conditions in the production zones;
- o Improvement of growing techniques;
- o Development of pest control methods; and
- o Studies on soil fertility improvement.

The most urgent needs in the short and long term are market prices high enough to cover production costs, access to investment credit, access to extension services, the viability of extension topics, and the availability of manpower and agricultural inputs when needed.

3. Cowpeas

The constraints to growing cowpeas can be summarized as follows:

- o Uncertain climatic conditions (precipitation);
- o Soil erosion;
- o Diseases;
- o Pests (insects);
- o Subsidy policy;
- o Rural traditions (education);
- o Economic factors (marketing); and
- o Insufficient credit.

Potential short-term yields (if better technologies are available and applied by the farmers) with the same constraints, would range between 800 and 1,000 kg/ha. In the long-term, if the constraints were eliminated or reduced, potential yields would range between 1,500 and 3,000 kg/ha.

Research efforts to overcome these constraints focus on:

- o Soil regeneration and fertilization;
- o Crop improvement through rotation (intensification of the farming systems);
- o Improvement of growing techniques;
- o Mechanization (animal power);
- o Studies of the parasites and diseases affecting the cowpea and development of control methods; and
- o Development of varieties adapted to different regions of the country.

The most urgent needs are market prices high enough to cover production costs, availability of skilled manpower, availability of agricultural inputs, access to extension services, access to credit, and viability of extension topics.

4. Groundnuts

The constraints to growing groundnuts are linked to the following factors:

- o Precipitation (quantity and distribution);
- o Weeds;
- o Agricultural labor (manpower);
- o Economic factors (prices);
- o Diseases; and
- o Rural traditions (manpower, education).

Potential yields with short term constraints will amount to approximately 1,000 kg/ha, if current available technology is applied, and about 1,500 and 2,000 kg/ha in the long term, if constraints are reduced or eliminated.

Research efforts to overcome these constraints focus on:

- o The selection and development of high yield species adapted to different crop systems (rainfed and irrigated);

- o The struggle against aphids;
- o The improvement in growing techniques;
- o Priority level undertakings and theories in order to obtain results in the short and mid-term dependent upon access to credit, availability of agricultural inputs, market prices, the availability of trained manpower, the viability of plans proposed by agricultural extension, and access to extension services.

5. Rice

The constraints which reduce yield are the following:

- o Predators (grain-eating birds);
- o Agricultural work (animal power);
- o Weeds;
- o Rural traditions (education, land tenure); and
- o Insufficient credit.

Short term potential yields, if available technologies were applied, would be between 5,000 and 7,000 kg/ha.

In the long term, if all the constraints were eliminated or reduced, yields would be 12,000 kg/ha. (These yields are probably estimated on the basis of the results of two harvests.)

Research efforts to overcome these constraints focus on:

- o Development of varieties less sensitive to changes in lightness and darkness and cold;
- o Development of crop techniques (crop calendar, fertilization, irrigation); and
- o Improvement of producers' technical skills and equipment.

The ability to attain the short and long-term results stated above depends upon the existence of the following conditions.

- o Trust in the security of land tenure over a long period;
- o Access to credit;
- o Availability of agricultural inputs;
- o Availability of trained manpower;

- o Access to extension services;
- o Access to markets; and
- o Viability of extension projects.

B. Animal Production

1. Cattle production in the pastoral and agro-pastoral areas

Constraints to cattle production are related to the following factors:

- o Physical (rainfall, sandstorms);
- o Human (brush fires);
- o Food related (natural forage);
- o Watering (accessibility);
- o Health (preventative and curative difficulties);
- o Socio-traditional (watering, herd management, use of pasture land);
- o Economic (in terms of marketing); and
- o Lack of information.

Yields available in the short term are 45,000 tons of meat and 215,000 liters of milk; and 55,000 tons of meat and 265,000 liters of milk in the long-term.

Research projects will focus on the following:

- o Modernization of pasture land management;
- o Research on types of supplementary feed;
- o Regeneration of natural pastures;
- o Socio-economic studies;
- o Intensification of forage production;
- o Intensification of beef and dairy production;
- o Breeding in agricultural stations; and
- o Animal health.

The conditions necessary to reduce short and long term constraints, assuming that the results can be used by producers, are access to

credit, availability of veterinary and animal science inputs, availability of qualified manpower, access to extension services, viability of extension themes and access to markets and information on marketing.

2. Sheep production in the pastoral and agricultural area

Sheep are raised throughout the country except in the desert area. The constraints identified are related to physical factors (rain) and feeding (availability of forage and water).

The yield will be 15,000 tons of meat in the short term and 17,000 tons of meat in the long term.

Research efforts focus on cattle feeding, nutrition, health, socioeconomic factors, the agriculture-livestock association (livestock within settled zones) and breeding.

To realize the short and long term yields stated above, the following conditions must exist:

- o Access to credit;
- o Availability of inputs;
- o Access to extension services;
- o Market prices;
- o Access to markets and information on marketing; and
- o Viability of extension themes.

3. Goat production

The concerns are exactly the same as those for sheep. The constraints are also the same.

The yield in the short term will be 28,000 tons of meat and 204,000 liters of milk (sheep and goat).

Research efforts will focus on:

- o Breeding in agricultural stations; and
- o Research on the quality of the hide of the Maradi red goat.

4. Camel production in the pastoral and transitional area

Constraints to camel raising relate to physical factors (rainfall), nutrition (availability of natural forage), health and socio-economic factors (herd management, pasture land exploitation, water, and technical skills of the herders).

Research efforts focus on nutrition, health, dairy production and transportation methods.

5. Poultry production

Poultry is raised in the agricultural and non-rural zones.

Constraints to poultry production are relative to traditional social factors (flock management, technical skills of the producers), economic (marketing) and health factors (difficulties in disease prevention).

The production in the short-term would be about 18,000 tons of meat if current technologies were applied by the producers.

Research efforts will focus on investigation of diseases and improvements in nutrition. Priority level will depend upon market prices, access to credit, availability of inputs, availability of trained manpower and the rural population's exposure to the possibilities of poultry production.

C. Forestry and Fish Production

As far as forestry is concerned, no data was available. Research projects were defined by the research institutions.

As for fish resources, constraints have not yet been identified, since the extension agency responsible for this sector was only recently established (1983), and its activities are still in the planning stages (social surveys, organization of fishing cooperatives, organization of markets, conservation techniques).

D. Conclusions and General Recommendations

Based on an overview of the socioeconomic situation and of the problems faced by the agencies responsible for modernizing the rural economy, the Niger Government has opted for a policy of nutritional security.

Since the establishment of the development agency, the social approach to the rural environment was redefined following the seminar held at Zinder in November of 1982, which recommended that the decisions regarding the rural environment be based on the desires of the beneficiary populations.

In terms of scientific research, techniques (particularly agronomic techniques), rural development and all technological innovations should correspond to the needs of the population.

Agricultural research should be a privileged tool in the struggle for food self-sufficiency, with the help of beneficiaries organized through the development agency, youth movements (Samarvia), and rural cooperatives.

Considering that only INRAN conducts concerted agronomic research activities in the principal rural development sectors in Niger, and that its activities have been expanding physically and lasting longer, it is necessary to define a tentative long term plan for economic and social development.

It is in this context, through the present analysis aimed at strengthening agricultural research institutions in the Sahel, that international assistance is needed in formulating this tentative plan.

This plan should define research needs over the long-term and specify the steps which should be taken to satisfy those needs. It must consider the strategic objectives established within the context of development plans to ensure national food self-sufficiency.

In terms of the development of research, using existing program and orientations as a guideline, the following will have to be provided:

- o Better distribution of research infrastructure (centers, stations, sub-stations, support points, foreign testing, laboratories);
- o Better collaboration with rural development operations in defining production systems adapted to different ecological zones, taking into account the desired evolution of farming;
- o Application of research results of a realistic scale on rural farms, while taking into account socioeconomic and ecological constraints;
- o Establishment of better links between research and development (reciprocal information, common definition of programs);
- o Training of scientific and technical personnel. The tentative plan should permit a more rigorous program; and
- o The development of an evaluation method based on the economic, sociological, and technical impact of research results.

The tentative plan will serve as a reference document for long-term programming of research, sector programs, infrastructure, material, training of personnel, etc.

For this reason, a proposal for research projects is annexed to this report. It was written to prioritize urgent needs, which demand immediate action despite the current worldwide economic crisis that has particularly impacted on underdeveloped countries.

ANNEX 1

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ANNEX 2

Projects and Programs

Projects and Programs

A. Development of rain-fed cereal crops

1. Justification

Millet and sorghum furnish 98 percent of cereal production and take up 99 percent of the surface area devoted to the cultivation of cereals. They form the food base of the people of Niger. Unfortunately, since 1976 yields have stagnated at a low level (400-450 kg/ha) which is significantly less than those attained during the period between 1960-67 (by at least 20 percent).

This low level yield can be explained by a combination of several factors including:

- o Climatic factors: sporadic rainfall, parasites, ecological changes; and
- o Progressive, significant lowering of soil fertility, insufficient use of fertilizers (organic and mineral), plants which are very sensitive to climatic changes, poor crop protection.

Growth in cereal productivity is a prerequisite to a favorable food balance in the long term.

2. Brief Description

The project should attempt to make stable species of acceptable yield, which are drought and parasite resistant available to the majority of Nigerien farmers. Optimal production techniques and appropriate technologies for different ecological zones should also be made available. More than anything else, a multidisciplinary research program focusing on breeding, entomology, pathology and agronomy, to which should be added plant science, seed technology, food technology and agricultural mechanics should be established.

The development project for dryland crops is a long-term project to be implemented in different ecological zones for testing within different systems before being widely distributed.

In the short term it will be necessary to consolidate the existing program, emphasizing:

- o The collection, evaluation, and refinement of local material;
- o The introduction and evaluation of exotic material;

- o The genetic study of local and imported populations in view of a program creating varieties from a wide genetic base;
- o The study of organoleptic qualities of existing material;
- o The complete inventory of the principal vermin; and
- o The study of the biology and activities of the most important vermin together with a study of the crop losses for which they are responsible.

In the medium and long-terms. The program should aim to create varieties of acceptable yield with medium and short-term growing cycles (according to the zones of adaptation), resistant to the principal insects (millet spike borer, stemborers, sorghum grains) and to striga. In addition, the varieties should have a genetic composition enabling them to tolerate drought and damage by heavy rains and should appeal to consumers. Specific middle and long-term objectives include:

- o To establish a program to control the principal pests which will not require major investments by farmers;
- o To develop profitable agricultural techniques which are socially acceptable to reduce work time and maximize its profitability; and
- o To establish a program of food technologies to study the possibility of processing food crops.

The research project, "Development of Cereal Crops," is a long term project to be carried out in five year stages.

3. Resources

The following resources are necessary to achieve project goals:

- o Training;
- o Construction (creation of stations and posts);
- o Material and equipment for library and statistical documentation, and laboratory equipment; and
- o Research expenses.

The estimated budget for the next five years is FCFA two billion. This takes into account the infrastructure to be installed in the context of regionalizing the research.

4. Expected results

Development of high yield, and stable species well-adapted to the different ecological zones of the country.

B. Development of Rice Cultivation

1. Justification

Cultivation of irrigated rice should be developed. Niger food policy seeks the attainment of an increase in the surface area devoted to the cultivation of rice of 600 ha per year from 1983 to 1990, 1,000 ha per year from 1991 to 1995 and 2,000 ha per year from 1996 to 2000. Currently 4,283 ha (estimated in 1982) are under cultivation.

Nevertheless, traditional rice cultivation will continue to provide an important part of the national production.

The yields obtained in traditional rice cultivation are mediocre. In irrigated rice cultivation, low yields are found in several rice growing areas.

2. Brief description

The project includes the following activities for traditional rice cultivation:

- o Collection, evaluation and preservation of collected material;
- o Introduction and creation of adapted new material;
- o Improvement in crop conditions, date, density, fertilization, soil preparation, etc;
- o Inventory, study and integrated control of principal pests: grain-eating birds, insects, fish, rhizophages; and
- o Foundation seed production.

In irrigated rice cultivation, measures to be taken include:

- o Introduction, evaluation and preservation of material of high yield, with a short to medium-term growth cycle, which is tolerant of cold, insects, and diseases;
- o Creation of new varieties;
- o Inventory of insects and diseases;
- o Study of varietal resistance to insects and development of a method to fight rice parasites;
- o Control of grain-eating birds;

- o Study of growing techniques with the aim of maximizing returns on investments: growing season, fertilizer, crop maintenance, working the soil, mechanization system;
- o Study of water needs for rice;
- o Study of the milling potential of seeds; and
- o Production of high quality seeds.

The research on rice is a long-term project to be carried out in five year stages.

3. Resources

The following resources will be needed by the project:

- o Human resources: agronomist/plant-technician, plant geneticist, hydraulic engineer, protection specialists, food technology specialist; and
- o Irrigation material; creation of seed station.

The estimated cost of the project is FCFA 300,000,000.

4. Expected results

Improvement of the rice production system based on developments adapted to rural conditions.

C. Development of Irrigated Mixed Cropping (for market garden crops)

1. Justification

The increase in market gardening in Niger creates a growing demand for seeds which in many cases have to be imported from Europe due to insufficient local production.

2. Brief description

The climate in Niger, with its low temperatures during five months of the year, affords good conditions for producing seeds from almost all market garden plants. Particularly for onions, excellent results can be obtained.

The aims of the project are the following:

- o The establishment of a seed production center in the south central part of the country;
- o The acquisition or control of 200 hectares;

- o The acquisition of infrastructure and necessary equipment; and
- o The installation of further equipment at Maradi.

3. Resources

The following resources are necessary to achieve project goals:

- o Training of researchers in all disciplines. Currently there are no Nigerien researchers for these crops;
- o Development of land and construction; and
- o Acquisition of material and research equipment.

The estimated budget is FCFA 200,000,000.

4. Expected Results

The project seeks to satisfy the needs of producers for selected seeds.

D. Development of Leguminous Crops

1. Justification

Cowpeas and groundnuts, often associated with cereals, take up about 25 percent of the area under cultivation. They play an important role:

- o In feeding humans (protein, oil) and animals (cattle-cake, forage);
- o In the agronomical field: because their rhizobium can fix nitrogen from the atmosphere, legumes could be useful in a program to restore the soil fertility in a country where organic and mineral enrichment are very costly;
- o In terms of extension: leguminous crops require particular attention (working the soil, sowing, phytosanitary treatment) facilitating technical dissemination; and
- o In the domestic economy, by virtue of the substantial revenues they generate for the producers.

Nevertheless, national production has not yet reached the desired level and, in the case of groundnuts, has even declined. This decline is a result of lowered productivity, itself resulting from:

- o Soil and weather conditions: persistence of drought at the beginning and end of the growing season; low soil fertility;
- o The sensitivity of plants used; ecological changes have shown the extreme sensitivity of the varieties used;
- o The increase in parasitism in insects and diseases in plants; and
- o Outdated growing techniques.

2. Brief description

The project aims to study the constraints on the cultivation of leguminous crops and to suggest suitable crops, techniques and appropriate technology to ensure a balanced diet for the rural population. It seeks as well substantial revenues for producers, the purchase of production inputs, and the establishment of self-sufficiency in cereals.

The project will have two thrusts--improvement of cowpea farming and reinvigoration of groundnut farming. Both will require the participation of a seed selector, an entomologist, a pathologist, and an agronomist who will work in collaboration with a physiologist and specialists in food technology, seed technology, genetic resource conservation, and agricultural mechanization.

The researchers will work in the INRAN stations and support centers with the rural development operations teams. They will propose varieties and techniques adapted to different ecological zones and the country's production systems.

In the short run it will consist of the following:

- o Evaluating local and imported crops;
- o Continuing the program to create different species;
- o Continuing with the inventory of harmful pests;
- o Proposing economical methods of controlling vermin;
- o Studying varietal resistance to drought and vermin (insects, disease, striga); and
- o Studying and proposing agricultural techniques adapted to different systems of production.

In the long run it will consist of the following:

- o Creating stable high yield varieties with short and medium growing cycles, broad genetic bases, and resistance to drought, insects, diseases and striga. They must also taste acceptable;
- o Creating species usable in mixed production which have acceptably high yields and are capable of serving as forage;
- o Developing an integrated method for controlling leguminous crop parasites;
- o Continue updating agricultural techniques adapted to different production systems in the main ecological zones; and
- o Establishing a food technology program to study the possibilities of cowpea processing for nutritional purposes (extracting protein for children, etc.).

The project "Development of Leguminous Crops" is a long term project to be carried out in five-year stages.

3. Resources

Resources needed include:

- o Training of researchers;
- o Material and laboratory equipment; and
- o Vehicles and operations.

The estimated budget for the first five years is FCFA 300 million.

4. Expected results

Creation of productive material specifically adapted to local conditions and in accordance with local tastes.

E. Improvement in Animal Health (ruminant pathology)

1. Justification

Ruminants play an important role in the national economy. Little is known about diseases and other limiting factor particularly for sheep and goats.

2. Brief description

The project consists of the following:

- o Study of diseases affecting cattle, sheep, and goats;

- o Etiology;
- o Diagnosis; and
- o Treatment.

The estimated project duration is five years.

3. Resources

The resources needed for the project are the following:

- o Material and laboratory equipment;
- o Logistical resources;
- o Technical assistance; and
- o Training assistance.

The estimated cost of the project is FCFA 300,000,000.

4. Expected results

The project seeks to assure ruminant health and will formulate recommendations for services and extension.

F. Creation of Two Animal Science Research Stations

1. Justification

Niger has several species of cattle and sheep about which little is known.

2. Brief description

The diversity, behavior, characteristics, and needs of each species need further study for development. In addition, nutritional studies should be carried out of the characteristics of meat and milk. To do this, it is imperative to develop two stations, one located in the river zone and the other in the area around Lake Tchad.

The estimated project duration is five years.

3. Resources

The resources needed for the project are the following:

- o Infrastructure;
- o Material and equipment;

- o Technical assistance; and
- o Training assistance.

The estimated cost of the project is FCFA 600,000,000.

4. Expected results

Overall, cattle and sheep raising will be developed, and meat and milk produce will be improved.

G. Construction of a Veterinary Research and Animal Husbandry Laboratory

1. Justification

Construction is needed in Niger of a laboratory complex responsible for carrying out animal science and veterinary studies and surveys.

2. Brief description

The project consists of the following:

- o Making an inventory of infectious and parasitic diseases;
- o Development of vaccines and other methods of protection; and
- o Analyses of various products, including food, milk, and meat.

The estimated project duration is two years.

3. Resources

The following resources will be needed for the project:

- o Civil engineering; and
- o Equipment.

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

4. Expected results

The result of the project's activities will be to assure the health of cattle in Niger.

H. Study and Improvement of Local Species

1. Justification

The country is suffering the effects of desertification.

Desertification threatens the country by preventing it from being able to fulfill its needs for wood and forage. Soil deterioration and dune movement are accelerating.

2. Brief description

This project consists of the following:

- o Study and research on the biology of local species;
- o Study and research on the methods of developing natural formations; and
- o Mastery of forestry techniques with the aim of controlling desertification, protecting and restoring the soil and using it for feeding livestock.

The estimated project duration is 20 years, including a five year start up period.

3. Resources

Resources needed are the following:

- o Infrastructure;
- o Technical assistance;
- o Training assistance; and
- o Material and equipment.

The estimated cost of the project is FCFA 800,000,000 for the first five years.

4. Expected results

Strengthening of the research capacity for forest resources in order to use these resources in control of desertification.

I. Conservation of Water and Soil

1. Justification

In Niger, the soils are constantly threatened by erosion. Indeed, farming techniques or uncomplicated anti-erosive devices which are easily implemented would considerably lessen these risks.

2. Brief description

The project consists of the following:

- o Defining erosion risks; and
- o Studying the influence of farming techniques and anti-erosive devices.

The estimated project duration is ten years.

3. Resources

Resources needed are the following:

- o Infrastructures:
- o Technical assistance;
- o Training assistance; and
- o Material and equipment.

The estimated cost of the project is FCFA 600,000,000 for the first five years.

4. Expected results

Both soil fixation and preservation of soil humidity will result from this project.

J. Study of the Mineral Deficiencies of the Main Types of Soil In the Agricultural Zone. Fertilization of Main Crops.

1. Justification

The poverty of the soil in minerals needed for plant growth constitutes one of the major factors limiting productivity in Nigerien agriculture. Few data exist on the chemical properties of the main types of soil, and the amounts of fertilizer currently recommended do not take into account the specific features of different soil types.

2. Brief description

The project will consist of determining soil deficiencies and in conducting soil fertilization tests at numerous stations and posts of INRAN, which represent various agro-ecological zones. The dynamics and the fixation of certain elements will be studied.

The estimated project duration is five years.

3. Resources

Resources needed include:

- o Human resources: three pedologists specialized in the chemistry and fertility of soils, 15 assistants (laboratory assistants, field observers), drivers, manual laborers, etc.; and
- o Equipment: measuring equipment for the stations, laboratory equipment, and all-terrain vehicles.

The estimated budget for the project is FCFA 140 million.

4. Expected results

This project will aid in determining deficiencies in mineral nutrients for the main soil types of each agro-climactic zones and the economical amounts of fertilizer for each crop. It will also make it possible to equip some station laboratories, and add to INRAN's capacity to characterize soils.

K. Study and Analysis of Production Systems

1. Justification

The nearly general failure of the system of approach to extension which has prevailed up until now (a productivity and control-oriented approach, based solely on the consideration of very technical topics advocated by research) has meant that very little improvement has taken place at farm level.

2. Brief description

In each zone considered, "sample farms" will be studied for a specified number of years, with the purpose of inventorying real constraints of every kind encountered by rural producers, and assessing the difficulty of putting the technical themes advocated by agronomical research into practice. In this way, the best possible combinations of different factors of production can be determined. Eventually, the existing production systems can be improved. Food self-sufficiency can be achieved, and the standard of living of rural populations will rise.

The estimated project duration is six or seven years.

3. Resources

Resources needed for the project include:

- o Human resources: a multi-disciplinary team of four or five researchers and a number of middle-level personnel to serve as technical agricultural agents for a "sample village;" and
- o Equipment: all-terrain vehicles, devices for processing and analysis of data, inventory and office equipment.

The estimated budget of the project is FCFA 170,000,000.

4. Expected results

The specific results expected from the project are:

- o Assessment of various agricultural production systems;
- o A new approach to the transfer of technology, which will take into account not only technical factors but also their compatibility with the socioeconomic circumstances of agricultural production;
- o Extension of improved systems of production according to the ecological zones for which they are suited; and
- o Increase in production and intensification of agriculture.

L. STUDY AND ANALYSIS OF AGRICULTURAL PRODUCTION SYSTEMS IN THE VALLEY OF THE NIGER RIVER

1. Justification

There is a shortage of information on farming production systems along the valley of the Niger river where rainfed and irrigated farming are practiced. This shortage is particularly in need of correction because of the hydro-agricultural developments in the region.

2. Brief description

Follow-up of a few "sample farms" located in the reserved developed areas to study and improve production systems (irrigated farming and rainfed farming techniques) practiced through a combination of all techniques.

The estimated project duration is five years.

3. Resources

Resources needed for the project are:

- o Human resources: same team as for general projects on agricultural production systems; and
- o Equipment: same as for the general project on agricultural production systems.

The estimated budget for the project is FCFA 30 million.

4. Expected results

Expected results are the assessment of the farms and the delineation of a few socioeconomic limitations that are characteristic of these production systems (work time, etc.).

M. Study of Production Costs

The general objectives are:

- o To understand all the parameters of production, in particular, the cost to the producer of different agricultural products;
- o Assessment of rural farm management;
- o Study of the different marketing networks of farm products; and
- o Study of the market prices of farm products.

1. Justification

There is a shortage of reliable figures on costs to the producer of the major grains and cash crops, which results in a poor understanding of the profitability of different types of farms.

2. Brief description

A certain number of sample farms in the reserved zone will be the subjects of a follow-up study. Markets will also be reserved.

The estimated project duration will be three years for each zones reserved.

3. Resources

The following resources will be needed:

- o Human resources: one agro-economist and one investigator for each "sample village", one inspector, and one analyst; and
- o Equipment: inventory equipment.

4. Expected results

- o Determination of the cost to producers of principal crops;
- o Ascertainment of the real revenue of peasant farms; and
- o Establishment of a better pricing policy for farm products.

N. Regional Center for the Introduction and Quarantine of Plants At Maradi (Niger)

1. Justification

The promotion of the exchange of plant stocks brings high risks of introducing new plant parasites. One of the most economical prevention or protection measures is the institution of an effective system for the inspection and quarantine of plants.

2. Brief description

Establishment of a station for the quarantine and introduction of plant stock under controlled conditions to avoid the introduction of or to delay the diffusion of plant parasites and diseases originating from the introduced stock.

The estimated project duration is five years.

3. Resources

Expected resource needs are infrastructure, technical and training assistance, equipment and stocks, at a total cost of FCFA 700,000,000.

4. Expected results

To prevent the outbreak of diseases and to insure better phytosanitary protection through the control of the propagation of plant parasites unknown in the sub-region.

0. Pedological Mapping to the Scale of 1:100,000 in the Agricultural Zones (national component)

1. Justification

The only comprehensive map of the soils by agricultural zone is to the scale of 1:500,000. This teaching map does not answer the needs of regional planning and the current projects in rural development.

2. Brief description

The project will consist of the pedological inventory of elaborate reconnaissance, combined with the interpretation of aerial photographs and satellite pictures and the analysis of soil samples in the laboratory.

The estimated project duration is five to ten years.

3. Resources

The needs in human resources are for five pedologists, 20 assistant pedologists (guides, technical agents), laboratory assistants, drivers, laborers, etc. The needs in equipment are for complementary inventory and laboratory equipment, reproduction equipment, and cross-country vehicles. The estimated budget is FCFA 640 million (salary of expatriate personnel not included).

4. Expected results

This project will culminate in a map of soils and a map of the aptitude of the crops to a scale of 1:100,000. It will also reinforce INRAN's capacities in soil study.