SAFGRAD

OAU/STRC/SAFGRAD
BURKINA FASO

RECONNAISSANCE SURVEY OF THE FARMING SYSTEMS OF THE MOSSI PLATEAU IN BURKINA FASO

Farming Systems Research Programme

INERA — INSTITUT D'ETUDES ET DE RECHERCHES AGRICOLES
KAMBOINSE STATION B. P. 476 OUAGADOUGOU BURKINA FASO

SAFGRAD — SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT
B. P. 1 783 OUAGADOUGOU, BURKINA FASO

Ouagadougou, December 1986

BURKINA FASO

Ministry of Higher Education
and Scientific Research.

National Center for Scientific
and Technological Research.

Institute of Agricultural
Research and Studies

Kamboinsé Station

National Farming Systems
Research Programme

ORGANIZATION OF AFRICAN UNITY

SCIENTIFIC AND TECHNICAL
RESEARCH COMMISSION

SEMI-ARID FOOD GRAIN
RESEARCH AND DEVELOPMENT
SAFGRAD

FARMING SYSTEMS RESEARCH
PROGRAMME.

RECONNAISSANCE SURVEY OF FARMING SYSTEMS IN THE MOSSI PLATEAU OF BURKINA FASO.

Ouagadougou, December 1986.

AUTHORS*

Reconnaissance Survey

by

Yves Coffi Prudencio, Ag. Economist, SAFGRAD

and

Sibiri Sawadogo, Ag. Economist, INERA

Adama Sohoro, Agronomist, INERA

Sibiri Zoundi, Animal Scientist, INERA.

Follow-Up Survey (Annex 1)

by

Tadesse Kibreab, Soil Sientist, SAFGRAD

Kassu Yilala, Animal Scientist, SAFGRAD.

---

* Also participated actively in the reconnaissance survey:

- Jean-Marie Ouedraogo, Technician, INERA.
- Clement Yaméogo, Sociologist, SNP-INERA.

ACKNOWLEDGEMENTS

The SAFGRAD Coordination Office of the Organization of African Unity's Scientific, Technical and Research Commission -OAU/STRC), gratefully acknowledges the various support given by the Government of Burkina Faso. The management guidance for the implementation of the Farming System activities which was provided by INERA (Institut d'Etudes et de Recherches Agricoles) and the cooperation rendered by Organisme Régional de Développement (ORD) at village level is also greatly acknowledged.

Many other organizations were instrumental in facilitating the implementation of the FSR project. In addidtion to the National Research Systems, technologies were made available from the International Agricultural Research Centres (IITA, ICRISAT, etc...) and regional research programmes.

The technical support for the improvement of the Burkina Faso FSR capacity has been made possible through the financial assistance provided by the International Fund for Agricultural Development and the SAFGRAD Coordination Office gratefully expresses its gratitude to IFAD.

FOREWORD.

The Kamboinsé based National Farming Systems Research team would like to seize this opportunity to thank everyone who helped the team to carry out the surveys, results of which appear in the present report. We thank the directors of the Regional Development Agencies (ORD) of the North Central region (Ouahigouya), of the West Central region (Koudougou) and of the East Central region (Koupela), and particularly the heads and agents of the "Recherche-Developpement" units of these ORDs for their help and assistance during the surveys. We are also very gratéful to the heads and agents of the provincial livestock administration services and of the Tourism and Environmental Protection services for their help and assistance during the surveys.

Special notes of gratitude and appreciation are also due to Mr. Paré Francis, Graphist and to the staff of the OAU/STRC/SAFGRAD Coordination Office, particularly to Dr. Taye Bezuneh, Director of Research, Mr. Denis Ouédraogo, Documentation and Information Officer and Mrs. Mary Ann Briggs, Administrative Assistant for their help in the presentation and production of this report.

---ooo---

C O N T E N T S

LIST OF ENCLOSED MAPS OF BURKINA FASO

LIST OF TABLES

A B B R E V I A T I O N S

CFJA: - Centre de Formation des Jeunes Agricultures
Young Farmers Training Center

FEER: - Fonds de l'Eau et de l'Equipment Rural
Water and Rural Equipment Fund

FJA: - Formation de June Agriculteur
Training of Young Farmers

GJA: - Groupement de Jeunes Agriculteurs
Young Farmers Association

GV: - Groupement Villageois
Farmer Association

GVH: - Groupement Villageois des Hommes
Men Farmer Association

GVF: - Groupement Villageois des Femmes
Women Farmer Association

INERA: - Institut d'Etudes et de Recherche Agricole

OFNACER: - Office National pour la Commercialisation des Cereales
National Food-Grain Marketing Agency

ORD: - Organisme Regional de Development
Regional Development Agency

PAE: - Projet Agro Ecologie
Agro Ecology Project

PAF: - Projet Agro Forestier
Agro Forestry Project

PSP: - Post de Santé Primaire
Primary Health Post

RSP: - Recherche sur les Systemes de Production

6S: - "Savior se servir de la Saison Seche pour subsister dans le Sahel" Non governmental Project.

I. INTRODUCTION

OAU/STRC - SAFGRAD, through IFAD's financial assistance, provided technical support to Burkina Faso in order to strengthen the national farming systems research programme (FSR) of the Institut d'Etudes et de Recherches Agricoles (INERA). Exploratory surveys were conducted in February 1986 on the Mossi Plateau of Burkina Faso. These surveys were designed and conducted by the FSR team of the Kamboinsé Station which included three technical experts from the OAU/STRC - SAFGRAD and four Burkinabé researchers. The surveys were carried out under the direction of the SAFGRAD agricultural economist.

The results and conclusions are presented in this document. One of the major objectives of the survey was to identify a limited number of villages suitable as primary research sites. The primary sites, which consist of limited geographical areas around specific villages, will be intensively studied by the FSR team in close collaboration with conventional agricultural researchers, developers and farmers in order to design technologies and development programmes adapted to the needs and actual conditions of the farmers in the area. The research sites are expected to represent,as accurately as possible, the farming systems practices of their respective regions. The mandate of the Kamboinsé Station-based FSR team covers the Central Region of the country commonly referred to as the Mossi Plateau (Fig.1). The exploratory surveys which results are reported in this document were conducted in the Ouahigouya, Koudougou and Koupela zones on the Mossi Plateau.

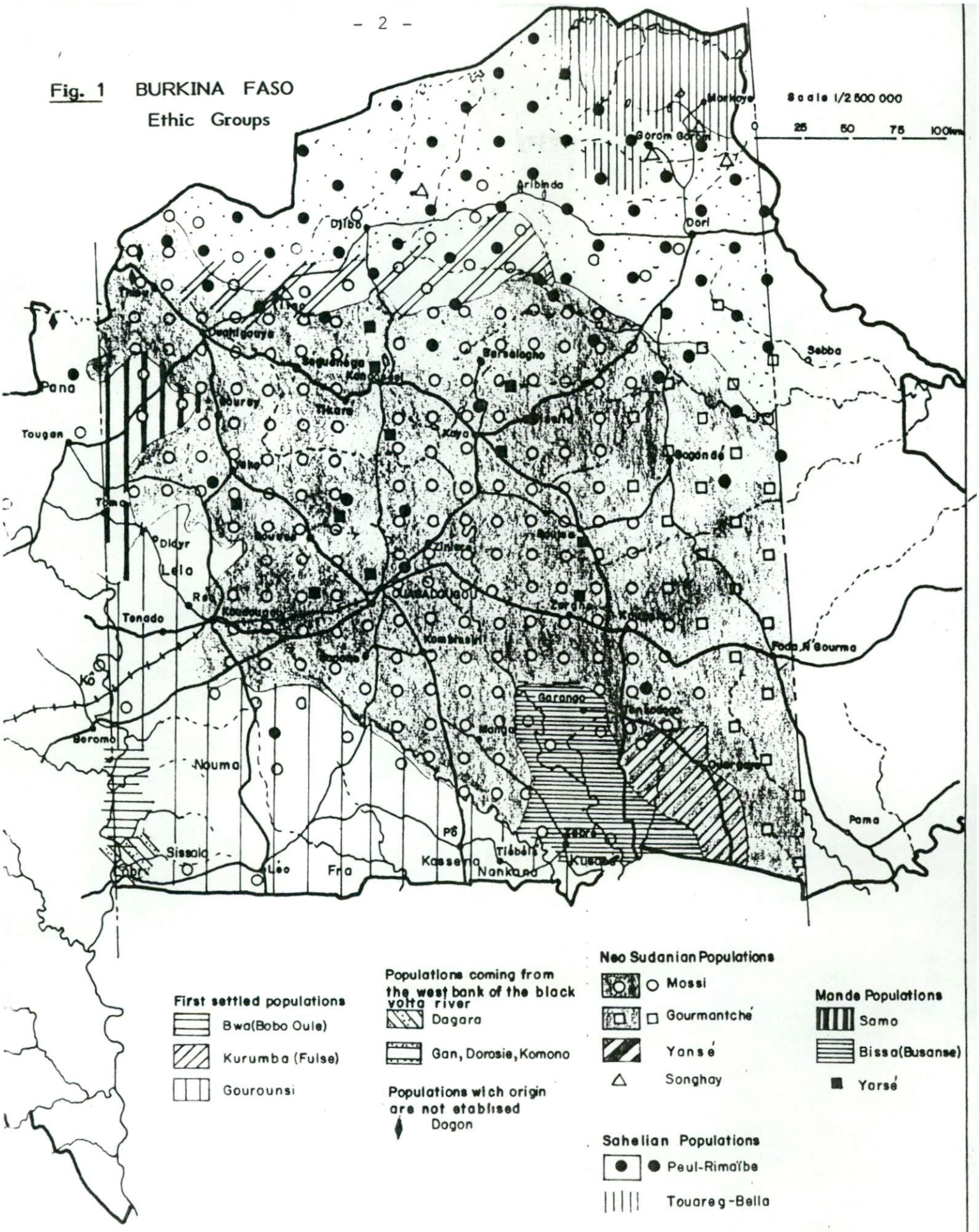
II. METHODOLOGY

1. Selection of the Mossi Plateau

The Mossi Plateau is the most densely populated region of Burkina Faso, covering an area of about 94,000 sq km in the central portion of the country (or 34% of the total area of the country). About 50% of the country's population are of the Mossi ethnic group (Fig.1).

/....

Fig. 1 BURKINA FASO
Ethic Groups



First settled populations
- Bwa(Bobo Oule)
- Kurumba (Fulse)
- Gourounsi

Populations coming from the west bank of the black volta river
- Dagara
- Gan, Dorosie, Komono

Populations wich origin are not etablised
- Dogon

Neo Sudanian Populations
- Mossi
- Gourmantché
- Yansé
- Songhay

Mande Populations
- Samo
- Bissa(Busanse)
- Yarsé

Sahelian Populations
- Peul-Rimaïbe
- Touareg-Bella

Source: Péron et Zalacain 1975

The population density on the plateau varies from 20 to 70 inhabitants per sq km. The mean density of rural population per sq km of useful agricultural area was estimated at 107 individuals in 1975/76 as indicated in Table 1. Furthermore, soils and agro-climatic conditions in this zone are less favourable to food production than in other regions of the country. Consequently, the problem of meeting the food requirements of the population is more crucial in the plateau than in the remaining portion of the country. In addition; the presence of two major agronomic research stations could facilitate the development of appropriate farming systems, since these stations have been generating technologies pertinent to the region. The Kamboinsé Station is located 12 km from Ouagadougou and Saria Station is based 40 km from Koudougou, West of the Mossi Plateau.

2. Selection of Zones

2.1 Leading Criterion

In accordance with the agricultural policy of Burkina Faso which places a particular emphasis on the integration of agriculture and livestock as well as on environmental protection, the National FSR Programme identified the main objective to be reached on the Mossi Plateau as the development of intensive and stable farming systems that will allow a rational management of available natural resources through an integration of agriculture, livestock and agro-forestry.

Given the above-mentioned characteristics of the Mossi Plateau, the problem of a rational intensification of agriculture is more acute on the plateau than anywhere else in Burkina Faso. At the same time, the problem is not equally severe from one location to another on the plateau.

/....

Table 1. RURAL RESIDENT POPULATION AND AVAILABLE LANDS

Departments (ORD)	Area (km^2)	Rural Population	Area UAL(ha)	Cultivated Area	LUI	UAL Per Resident	Rural density per km^2 of UAL
Mossi Plateau							
Centre: Ouagadougou	21 952	762 000	740 000	374 800	56	1.0	103
East Central: Koupela	11 166	402 000	325 000	165 400	43	0.8	124
North Central: Kaya	21 578	626 000	615 000	242 100	39	1.0	102
West Central: Koudougou	26 992	740 000	805 000	305 400	38	1.1	92
North: Ouahigouya	12 293	493 000	350 000	244 500	70	0.7	141
S/Total	93 981	3 023 000	2 835 000	1 532 200	54	0.9	107
Sahel							
Sahel: Dori	36 869	354 000	980 000	140 300	14	2.8	36
West and South-west							
Hauts Bassins: Bobo Dioulasso	24 782	270 000	1 530 000	180 500	17	4.3	23
Black Volta: Dedougou	33 106	633 000	930 000	304 500	29	1.5	68
South-west: Gaoua	17 488	358 000	720 000	132 700	18	2.0	50
Comoe: Banfora	18 390	186 000	760 000	86 800	12	4.1	24
S/Total	93 766	1 447 000	3 960 000	704 500	18	2.7	37
East							
East: Fada N'Gourma	49 902	403 000	1 550 000	203 100	13	3.8	26
Total General	274 040	5 227 000	8 925 000	2 380 000	27	1.7	58.5

UAL: : Useful agricultural land
LUI : Land use intensity: ratio of annual cultivated area and UAL
Sources : INSD (Economic indicators April 1977)
Planning Services
MDR, Agricultural Annual Statistics 1977 - Adaption from Reij, 1983

The task of the national FSR programme was therefore to identify the areas or zones of the plateau where the problem of agricultural intensification is the most acute and then select primary research sites in these areas or zones of the Mossi Plateau.

The leading criterion used in identifying these zones was the emigration rate,with particular emphasis on the internal emigration of farmers from overpopulated rural areas to less populated rural areas for the continuation of agricultural activities.

The basic hypothesis which led to the selection of this leading criterion is that farmers' emigration may be considered as an indicator that the local farming system of the area has already reached the threshold of its productivity and can no longer support the population. In other words, the technological level and the level of natural resources available is such that per capita production has fallen below the minimum threshold vital to sustain the populations involved. As a result, people migrate to other regions or neighbouring countries as an alternative,in order to temporarily restore the balance of the system of production to an acceptable level. The rate and direction of migration also depend on the costs and the benefits expected by moving to a particular region within the country or to neighbouring countries.

Under these conditions, intensification of agriculture with locally available technology alone could not resolve the problem. New technological innovations are needed to increase the productivity of the farming systems in order

/.....

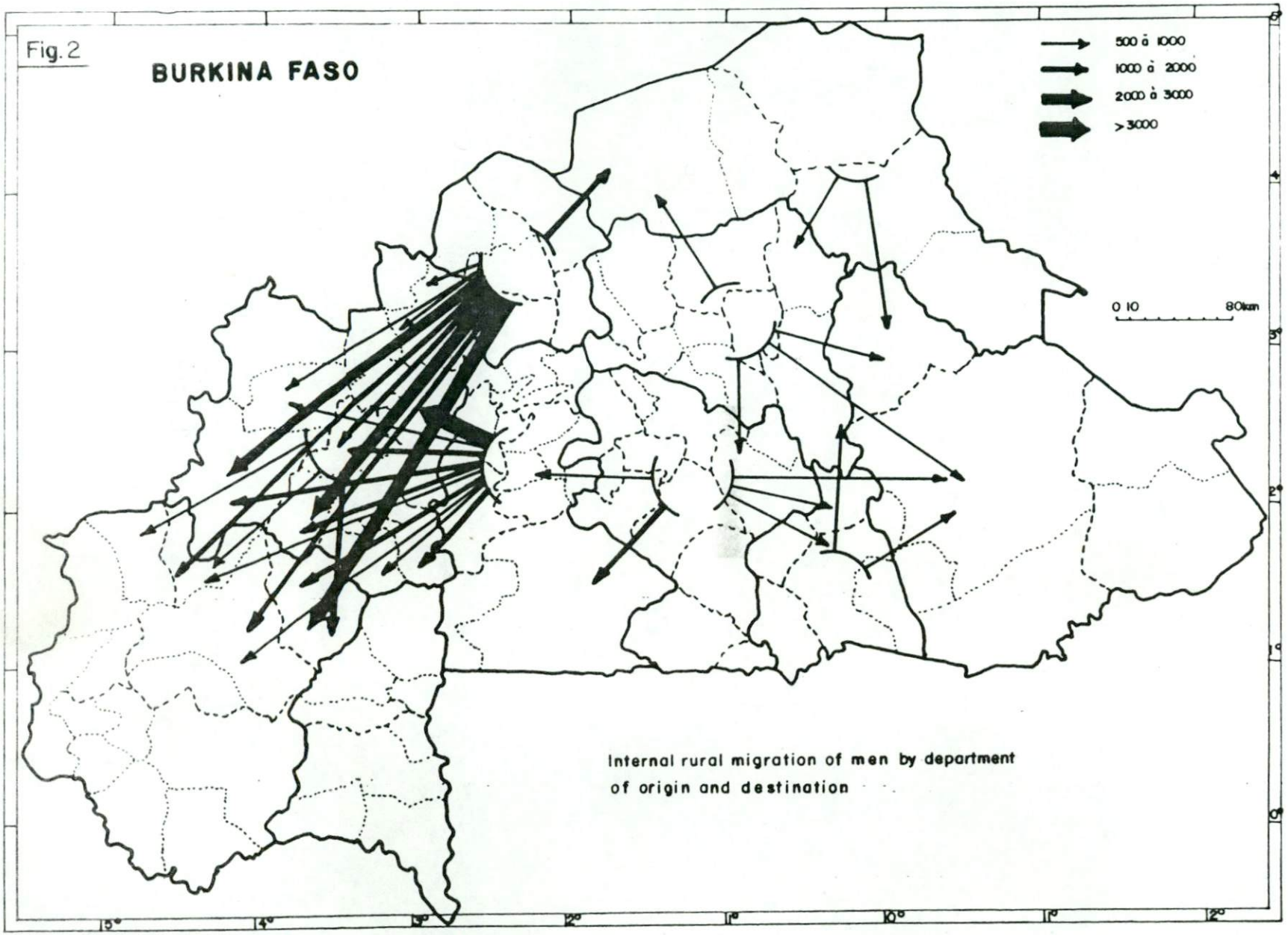
that agricultural production would keep pace with population growth. Such a situation offers a favourable framework for FSR to intervene, in order to introduce the needed technological innovations likely to stabilize the system at a high level of productivity. In addition, the existence of such a technological need in the farming system facilitates the farmers' collaboration in the development of appropriate technologies, which is a vital factor for the success of any farming systems research. Furthermore, since strong migration generally corresponds to a relatively high population density, the research results are likely to benefit a large number of farmers.

In view of the preceding arguments, it was decided that the primary research sites on the Mossi Plateau would be located in three of the large centres of rural country internal farmer migration, on the Mossi Plateau, namely, the regions of Ouahigouya, Kaya and Koudougou, and the Ouagadougou-Koupela axis, as indicated in several documents on internal migration in Burkina Faso and shown in Fig.2 published by the National Institute of Statistics and Demography.

The Ouahigouya and Koudougou zones are the largest centres of rural and country internal migration on the Plateau. The migrating farmers generally leave to settle in the less populated lands in the Western part of the country. From the Ouahigouya-Koupela axis, farmers migrate mainly eastward and southward. The least important among these four centres of internal migration is located around Kaya from which farmers mainly move to the south, the east and the north.

/.....

Fig. 2



Source INSD-1979 b

These migrations are more or less confirmed by the provisional results of the second census of population conducted from December 10 to 20, 1985. The gross migration rate in the Yatenga province where Ouahigouya is located, is estimated at some 34%, whereas the rate is reported to be 28% in the Bulkiemdé Province where Koudougou is, 15% in the Kouritenga Province where Koupela is, and only 5% in Sanmentenga Province in which Kaya is located.

2.2 Other Criteria

Climate

The Mossi Plateau is located between the 600 mm and 100 mm isohyets. The climate on the Mossi Plateau is in general sudan type with a transitional sudano-sahelian climate north of the 800 mm isohyet. Ouahigouya and Kaya are located in the sudano-sahelian zone with an average annual rainfall of between 600 and 800 mm, whereas Koudougou and Koupela are in the typically sudan climatic zone between 800 and 100 mm isohyets/year (Figs. 3 and 4). According to Virmani, Reddy and Bose (1980), the long-term average of annual rainfall is approximately 692 mm/year in Ouahigouya, 706 mm/year in Kaya, 877 mm/year in Koudougou and 826 mm/year in Koupela.

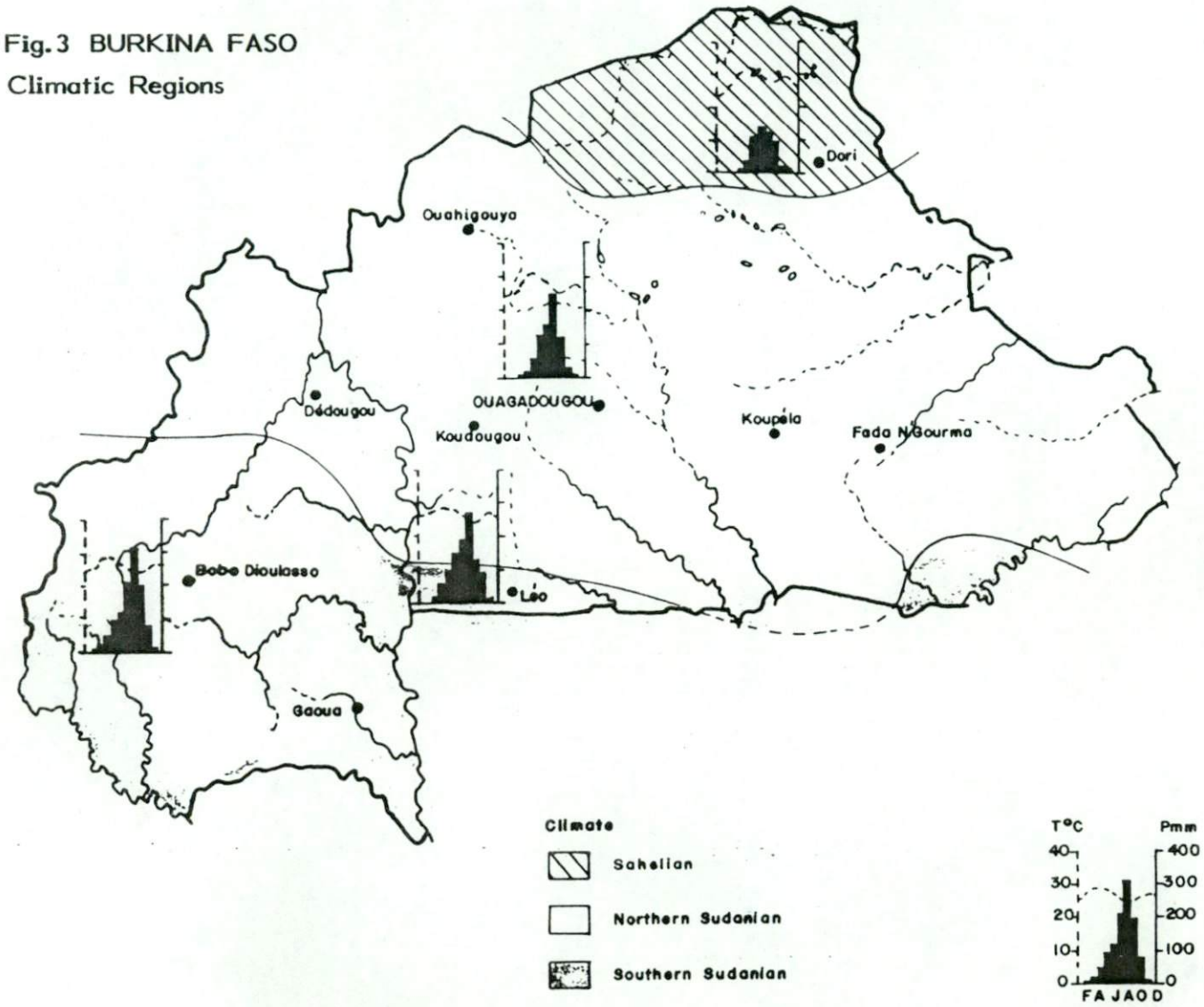
Vegetation

The Plateau is mostly covered in its central and northern parts by tree and shrub savannas. This type of vegetation characterizes the four pre-selected zones. The southern part of the plateau is characterized by tree and woody savannas as indicated in Fig.5.

/.....

Fig. 3 BURKINA FASO

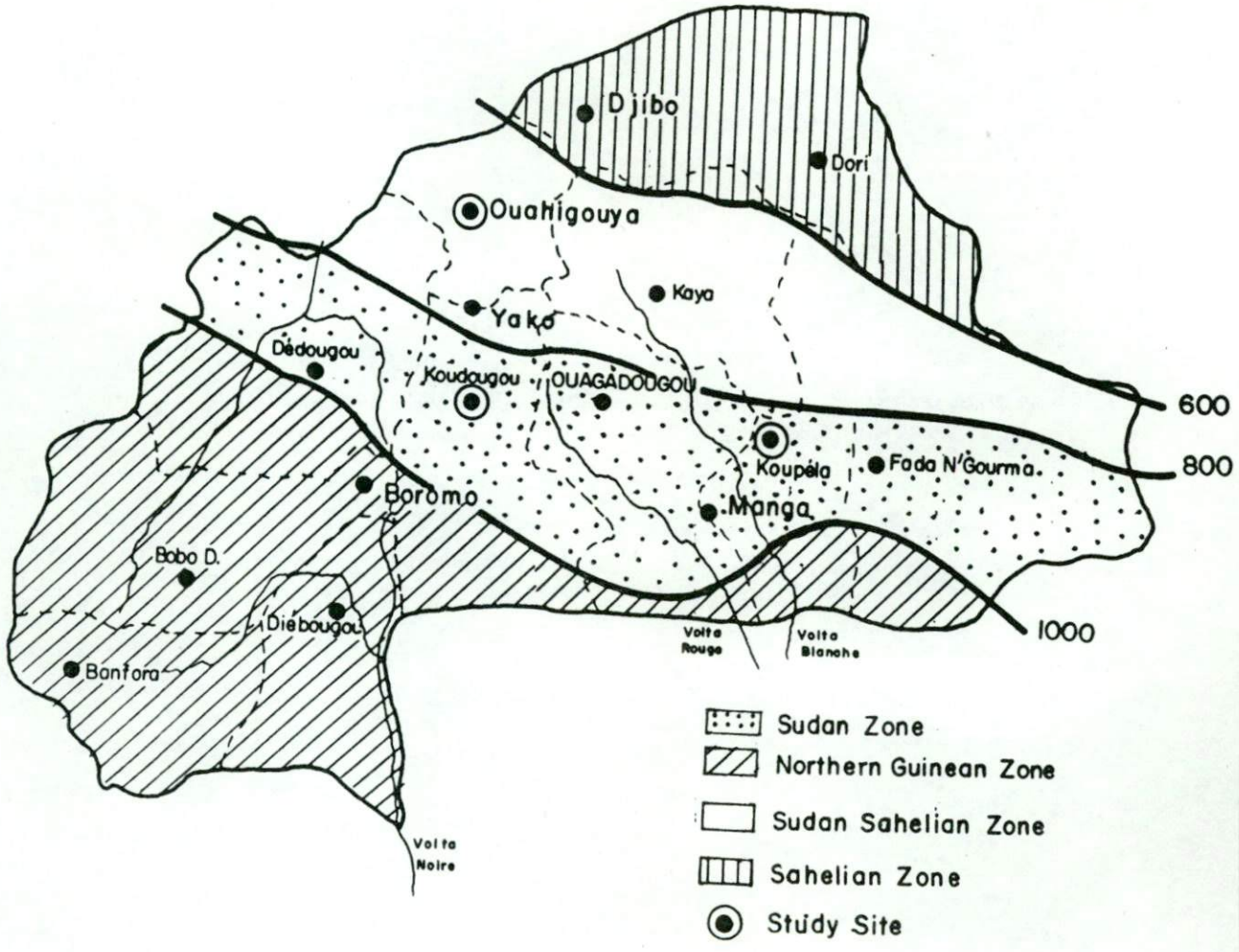
Climatic Regions



Source: Péron et Zolachain, 1975

Fig. 4

AGROCLIMATIC ZONES OF BURKINA FASO

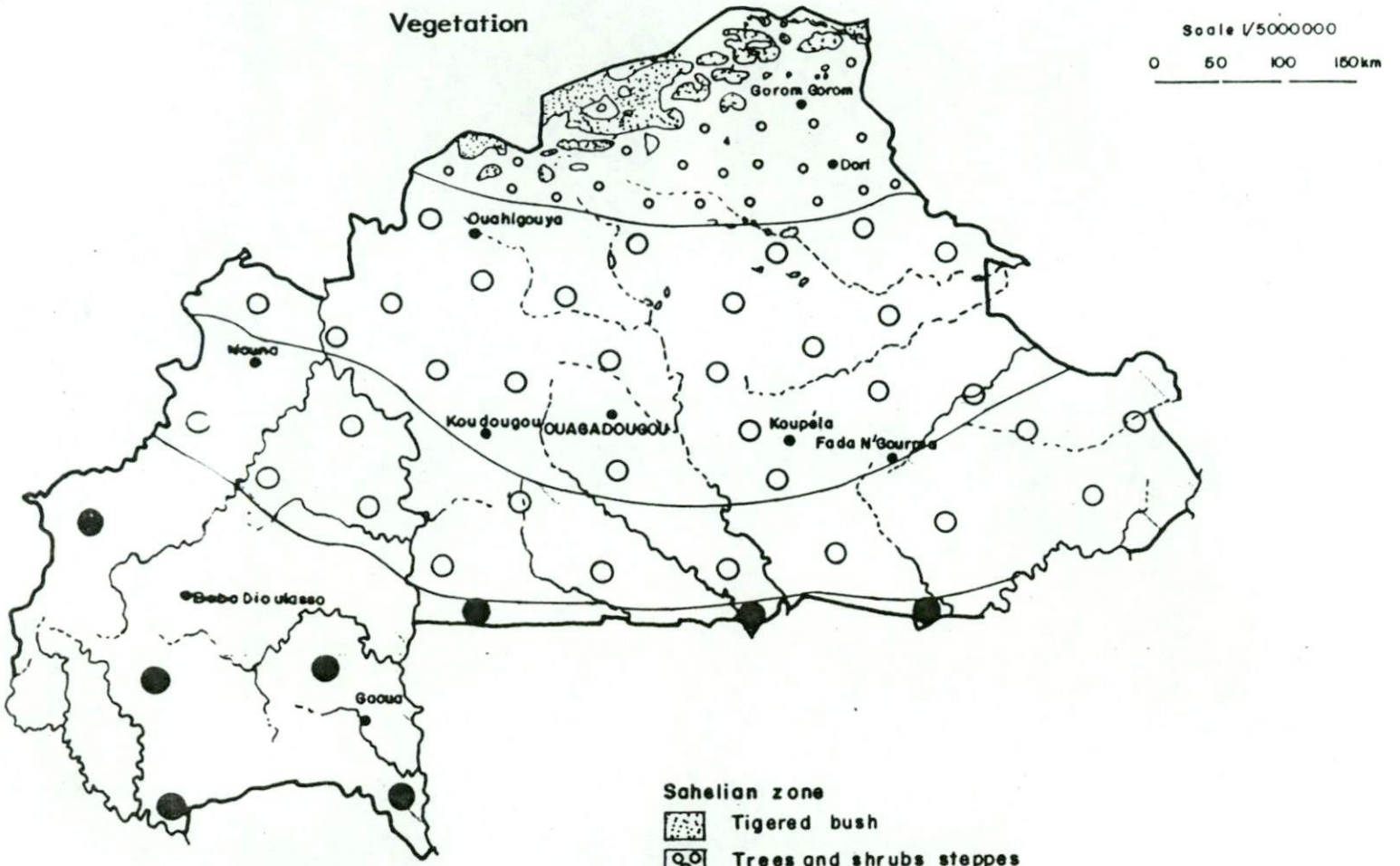


Source GERDAT, 1983
Adaptation

Fig. 5

BURKINA FASO

Vegetation



Source: Péron et Zalacain, 1975

Soils

Ouahigouya zone is characterized by hardly evolved soils on a gravel base. The same types of soils are found west of the Koudougou region, whereas the eastern region of Koudougou from which most migrants leave, is covered with slightly leached and leached tropical ferruginous soils on top of sand, sand-clay or clay-sand mixtures. These types of ferruginous soils are dominant in Koupela region whereas both of the afore-mentioned two types of soils are to be found in the Ouahigouya region with some predominance of slightly evolved soils (Peron and Zalacain, 1975). The various soil types are summarized in Fig.6.

Agriculture

Agriculture is traditional and hardly varies on the whole Mossi Plateau. In general, sorghum and millet are raised as major crops, and cowpeas, groundnuts and maize etc., as secondary crops. These characteristics are illustrated in Fig.7.

Livestock

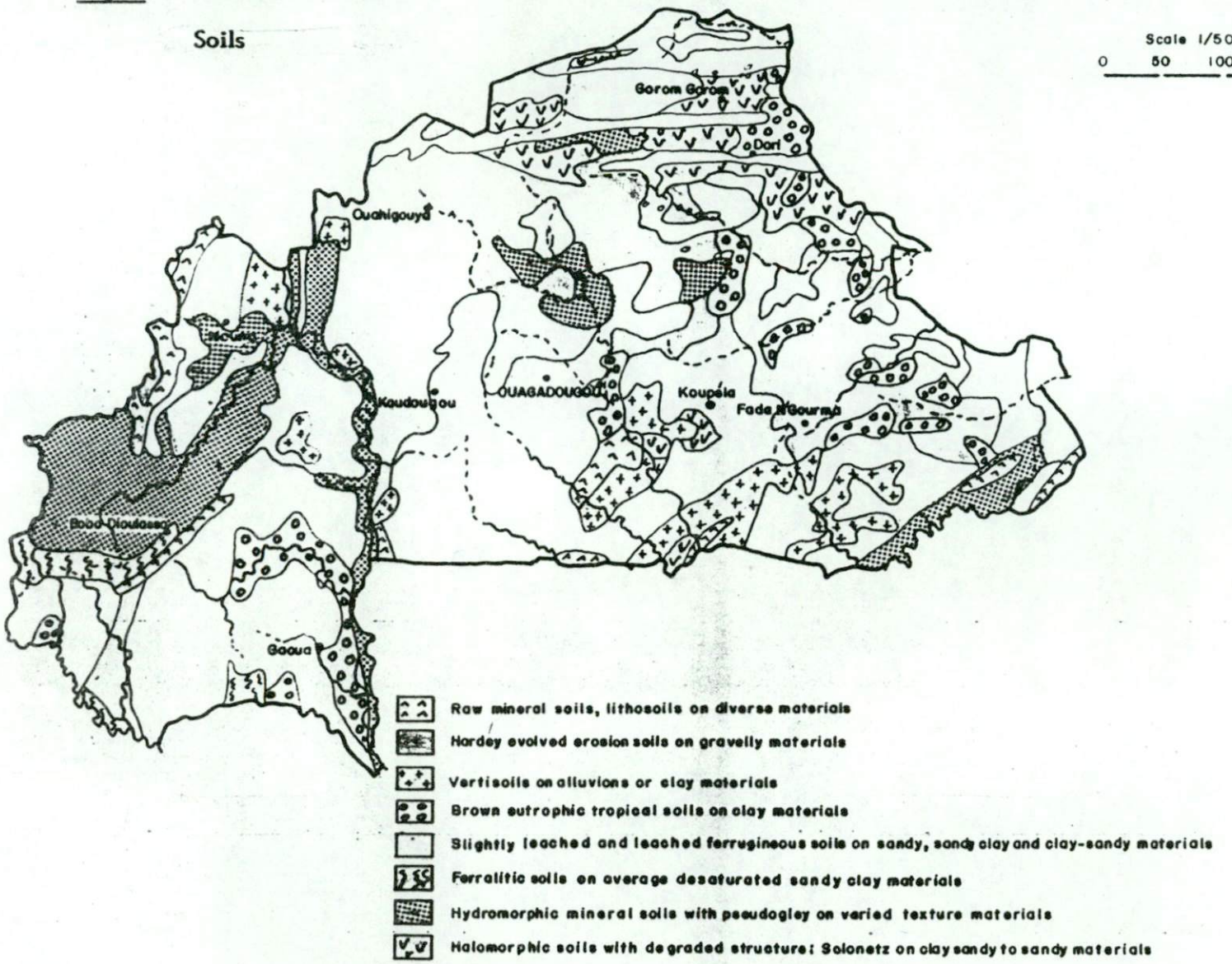
The livestock situation of the whole country is summarized in Fig.8 by Peron and Zalacain (1975).

Livestock husbandry on the Mossi Plateau is generally characterized by the sedentary husbandry of small ruminants on farm and by cattle raising through collaboration between the Mossi farmers and Fulani herdsmen, whereby the cattle belonging to the Mossi farmers are entrusted to the Fulani herdsmen. The main difference between the four zones lies in the density of the livestock population. The density is relatively higher in the Ouahigouya zone, moderate in the Kaya and Koupela zones and relatively low in the Koudougou zone.

/.....

Fig. 6 BURKINA FASO

Soils

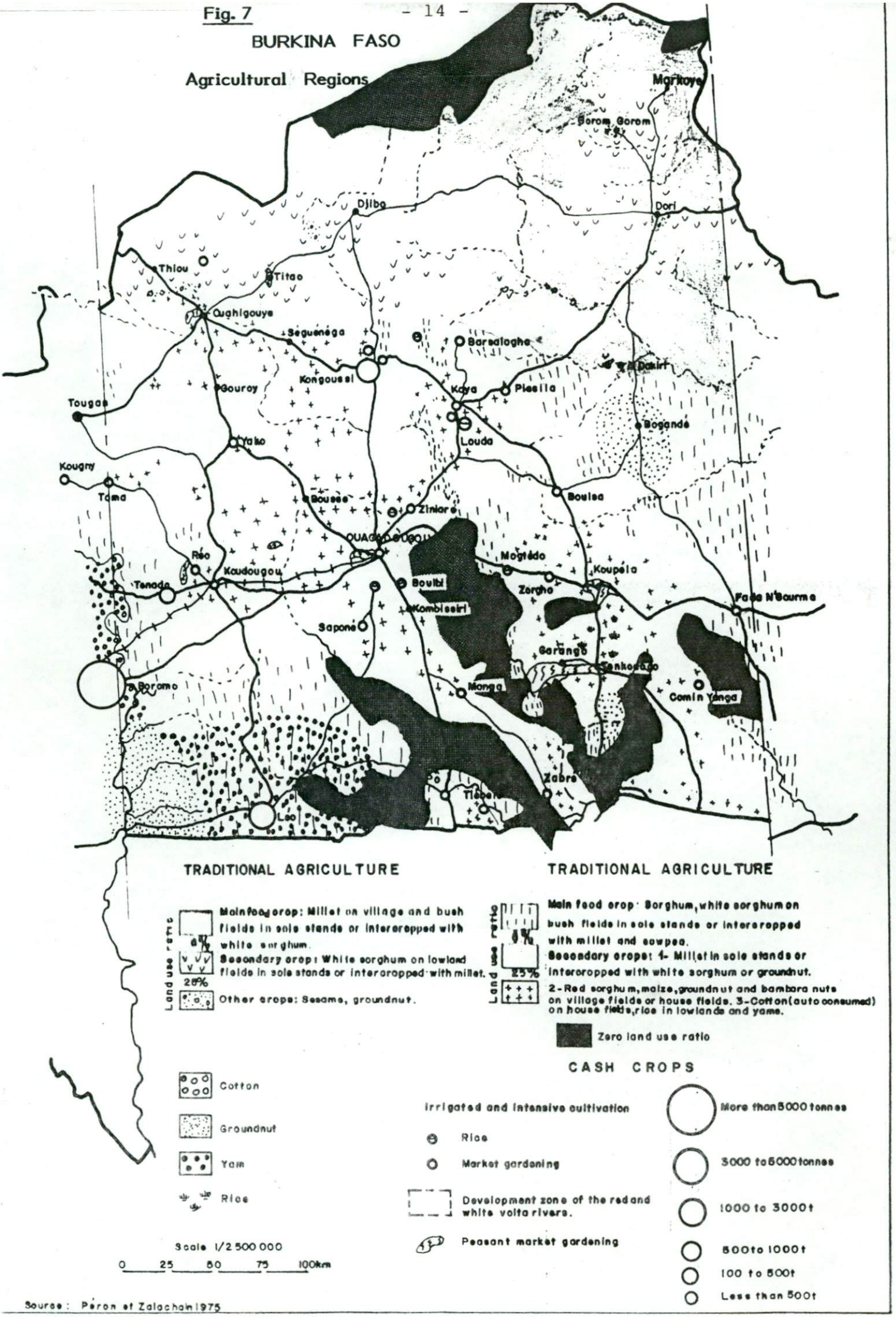


Source: Péron et Zalacháin, 1975

Fig. 7

BURKINA FASO

Agricultural Regions

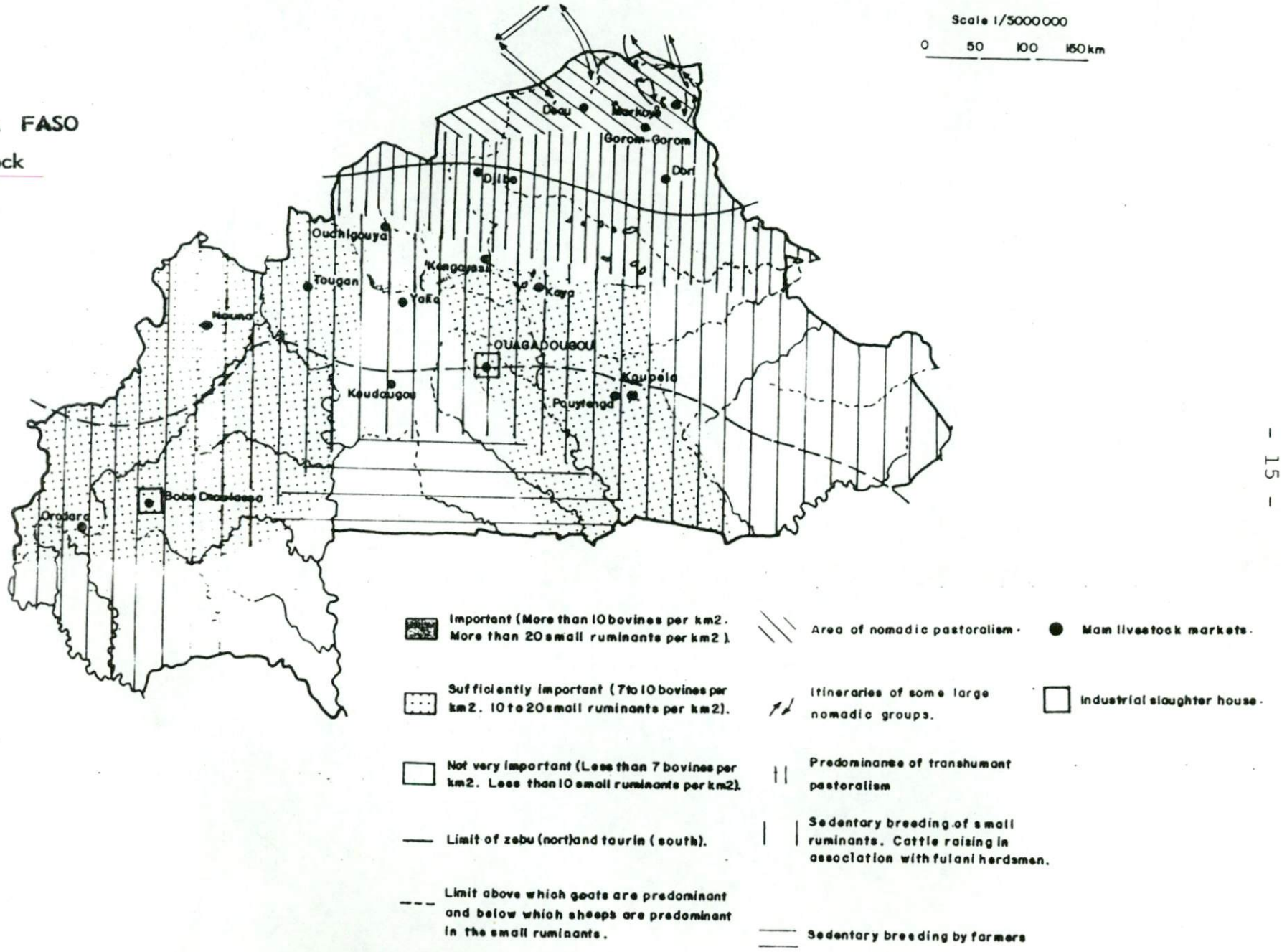


Source: Péron et Zalacain 1975

Fig. 8

BURKINA FASO

Livestock



Source: Péron et Zalacháin, 1975

Cattle raising thus appears important in the Ouahigouya zone with over 10 bovines per square kilometer and more than 20 small ruminants per square kilometer. It seems to be rather important in the Kaya and Koupela zones with 7 to 10 bovines per square kilometer and 10 to 20 small ruminants per square kilometer. It seems less important in the Koudougou zone, with less than 7 bovines per square kilometer. The northern part of the Ouahigouya zone is characterized by a predominance of transhumant pastoralism. Given that this is a rather characteristic feature of the northern part of the country and given the marginal character of the northern part of the Ouahigouya zone on the Mossi Plateau, it was decided that only the southern part of the Ouahigouya zone would be considered in the selection of primary sites.

2.3 Agricultural meso-regions and selection of zones.

Given the uniformity of the general outlines of agriculture and climate on the Mossi Plateau, the characteristics of livestock populations are the most determinant factors of the agricultural meso-regions of the plateau. As indicated in Figs. 8 and 9, there is one meso-region south of Ouahigouya, one meso-region formed by the west of the plateau where Koudougou is located and one meso-region formed by the whole eastern region (north-east, central and south-east) of the plateau where Kaya and Koupela are located (Fig.9).

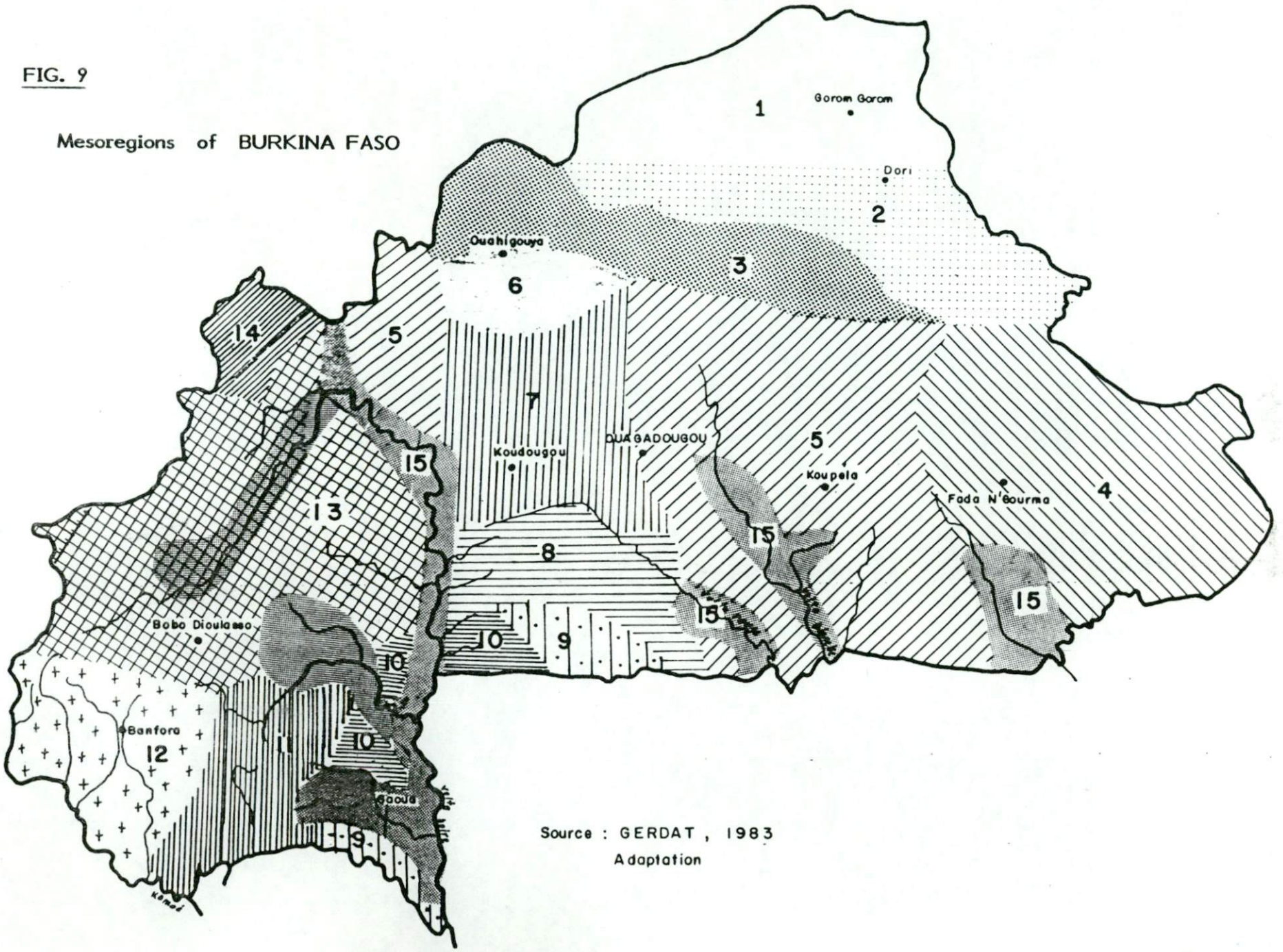
It was then decided that one primary site would be selected in each of the three meso-regions, i.e.:

- One primary site in the region immediately south of Ouahigouya;
- One primary site in the region east of Koudougou in order to have one site on ferruginous soil different from the type of soil in the Ouahigouya region; and

/.....

FIG. 9

Mesoregions of BURKINA FASO



Source : GERDAT , 1983

Adaptation

- one site either in the Kaya region or in the Koupela region.

The Koupela region was selected because it is apparently a region where the heaviest rural migration takes place and where agriculture is more diversified and includes off-season crops (market gardening), which the national agricultural policy particularly emphasizes. Furthermore, the Kaya region hosts a former FSU/SAFGRAD village which could be used as a secondary site by the FSR programme.

3. Selection of villages

The first criterion used in the selection of the villages during the exploratory surveys was that of village population. Based on the general population census made in 1975 and using the Atlas of Burkina Faso villages, a list of villages located in the modal zone of the village distribution, according to population criterion, was established for each of the selected zones (southern Ouahigouya, eastern Koudougou, Koupela). A meeting was then held in each zone with the rural development agencies such as the ORD, the livestock and the forestry services. During the meeting, the FSR team members explained the approach taken to select the zones and the pre-selected villages. A general discussion was then held in order to get the rural development agents to present their views and field knowledge on the selected villages and to propose additional criteria considered relevant for the selection of villages during exploratory surveys. The rural development agents felt that the presence of a reliable farmers' association (groupement villageois) within the village should be an additional fundamental criterion to ensure good collaboration from the farmers. Accessibility of the village during rainy season and the system of livestock production in the village were other suggested criteria.

/...

The rural development agents in each zone were allowed to propose to the FSR team a list of five villages to be visited in each zone. The list was to comply,as much as possible, with the selection criteria established.

The list of villages proposed per zone is presented in Table 2. The geographical locations of the villages are presented in Fig.10.

Table 2.

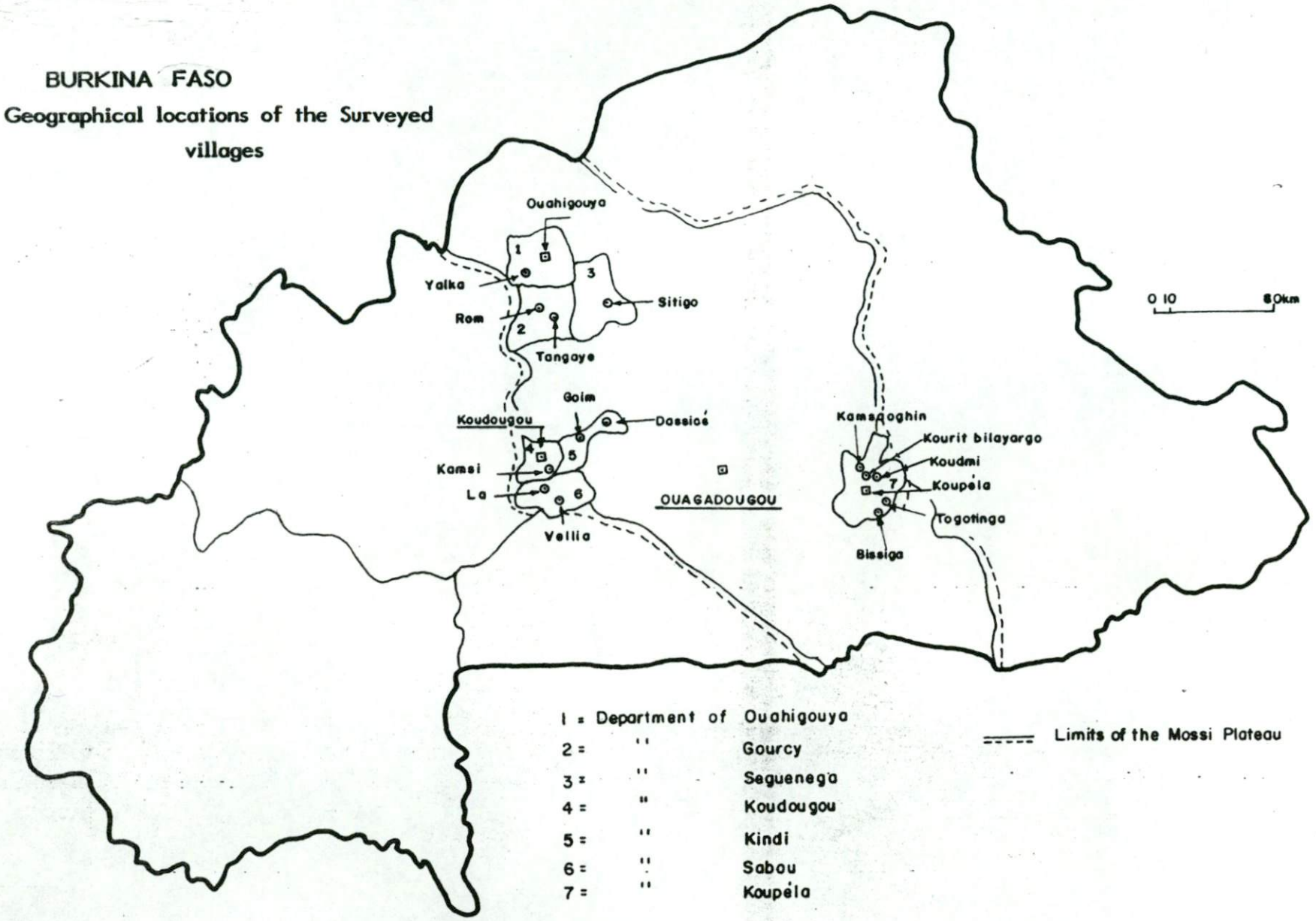
List of villages selected for exploratory surveys.

ZONE	DISTRICT	VILLAGE	Population in 1975
Southern Ouahigouya	Central Ouahigouya	Yalka	519
	Gourcy	Rom	594
	"	Tangaye	2366
	Seguenega	Sitigo	2115
Eastern Koudougou	Central Koudougou	Kamsi	1072
	Kindi	Gouim	1236
	"	Dacissé	1145
	"	Vellia	1316
Koupela	Central Koupela	Koudmi	792
	"	Kouritbilayargo	570
	"	Kamsaoghin	395
		Togotenga	417
		Bissiga	503

/.....

Fig. 10 BURKINA FASO

Geographical locations of the Surveyed villages



4. Execution of the survey

After identification of the villages, a questionnaire was drawn up to conduct the exploratory survey. The questionnaire was predominantly of qualitative nature, likely to give a comprehensive overview of the farming system existing in each village and to reveal the fundamental differences between these villages. The questionnaire was structured to document general information on socio-economics pattern, crop and livestock production, agro-forestry, availability of marketing and credit infrastructures.

The survey took place from 14 to 26 February, 1986. In each case the FSR team visited the village with the local rural development agents comprising :

- one to two officers from the research-development unit or from the plant production unit of the ORD;
- one agent from the livestock production services of the zone;
- one agent from the forestry service of the zone; and
- the head of the sub-sector and/or the village extension agent.

After explaining the objectives of the survey to the farmers (men, women and children) who were gathered in a general assembly, the farmers were organised into four more or less homogenous groups. The FSR team members and those accompanying them were grouped into four teams in order to administer the questionnaires. In order to confirm the data collected through questionnaires an additional village visit was made.

III. RESULTS OF SURVEYS

1. General Information

1.1 The southern Ouahigouya zone

The plateau has undulating features. Vegetation

/....

is essentially tree and shrub savanna. The land is occupied by scattered compounds surrounded by fields. The houses have a round or rectangular shape and are covered with straw or mud roof (rarely corrugated iron).

Only the 1985 rainfall data for Sitigo and Tangaye were recorded by the extension workers (485 mm and 696 mm respectively). The drought spells were reported to occur in September and sometimes in mid-July.

Four types of soils are generally found in the villages visited. These are :

- Zinka or Singdiga : gravelly soil
- Bissiga : sandy soil
- Bolé : clay soil
- Baongho : lowland soil

The order of importance of these types of soil for each group has been established in the Summary Table 3.

Infrastructures

The inhabitants of the villages visited are supplied with water from wells. However, two types of wells were distinguished :

- Traditional wells :
  these are the most numerous.
  They dry up during the dry season.
- Concrete-lined wells :
  there are generally 2 to 4 concrete-lined wells per village. They hardly ever dry up.

The existence of a bore-hole was revealed in Yalka and Sitigo. Small water catchment basins exist in all the villages. They are locally called "Boulli".

/....

Each village has a primary health post (PSP = Poste de Santé Primaire).
In addition to the PSP, Tangaye and Sitigo are villages with maternity hospitals.
Except Yalka, all the other villages have pharmacies.

In each village, one mosque or one church was observed. Schools are built everywhere except in Yalka (the nearest school is in Ninga, 4 km away).

Each village has its own cereal bank (except Rom). Apart from Sitigo, which has its own market, the other villages do shopping in neighbouring villages within a radius of about 4 to 15 km.

The Socio-political/economic characteristics.

Mossi are dominant everywhere except in Sitigo where Fulani/Peuhl are the most numerous. The presence of Fulani was noted in Sitigo and Rom.

The importance of the major families varies from one village to another as follows:

- Yalka : Ouedraogo, Zonon
- Sitigo : Kindo, Ouedraogo, Barry
- Rom and Tangaye : Ouedraogo, Sawadogo.

/.....

Table N° 3 General Information on the four villages in the Ouahigouya zone

Villages	Distance from Ouahigouya	Population 1985	Principal religions	Organisations	Migration	Accessibility	Fallow	Types of soil	Presence of Peuhl
Sitigo	45 km	2.317	Islam Animist	2 GVH* and 1 GE**	-	Bad	50%	Zinka Bissigou Baogho Bolé	Yes
Tangaye	52 km	2.454	Islam	10 GVH 5 GVF*** 1 Nam**	-	Bad	None	Zinka Baogho Bolé Bissigou	No
Yalka	15 km	616	Islam	1 GVH 1 GVF	-	Good enough	Some	Bolé Zinka Baogho	No
Rom	25 km	860	Islam	4 GVH 4 Nam	-	Good	Some	Zinka Bolé Baogho	Yes

*GVH = groupement villageois hommes = Men farmer association

**GE = groupement d'éleveurs = Herdsmen association

***GVF = groupement Villageois féminin = Women farmer association

*Nam = groupement du projet "6 S" = Farmer association initiated by the "6 S" project

In the Yatenga zone, the important religions are Islam, Christianity and Animism, in that order.

Crop production is the most dominant activity and animal production is of secondary importance. Other activities are blacksmithing, pottery making (ex. Yalka), weaving, tanning and small business.

The major political/administrative organizations in each village are, in order of importance:

- CDR (Committee for the Defense of the Revolution)
- Customary chiefs (village chief and land chief)
- Iron-smith chief (Yalka)
- Fallo-Naba (spokesman of the customary chief) in Sitigo
- Village farmer associations.

Socio-economic organization consists primarily of extended households. These are most numerous in Yalka and Rom whereas single-family households are most common in Sitigo and Tangaye.

Collective producer units are organized as :

- Men's village farmer associations (in all the villages)
- Women's village farmer associations (Tangaye and Yalka)
- Herdsmen's association (Sitigo)
- Nam association (Rom and Tangaye)
- Mutual aid farming associations (in all villages).

The primary manner of acquisition of land is through inheritance. Less often land is acquired by loan or gift. It is never sold or leased.

/.....

Migration

Although the rate of migration is not quantified the destinations of most migrants in the order of importance are to:

- Republic of Ivory Coast
- Region of Volta Noire River (Kouka, Solenza)
- Gourounsi region (Leo)
- Cities (Ouahigouya, Bobo Dioulasso, Ouagadougou and Banfora).

Extension Services

The frequency of supervision by extension agents was every 15 days. The "training and visit" system was applied. An extension officer lives in each of the villages with exception of Yalka where he lives in another village five kilometers away.

Research or Development projects

No other research project has been established in these villages up to now. However, they have received services of several development projects, namely, the village wood project, FEER, "6 S", PAF and PAE. All these projects are operating in Rom but not all of them are in operation in the other villages.

1.2 Eastern Koudougou Zone

The landscape is similar to that of southern Ouahigouya except that the vegetation, composed of trees, shrubs and grass, is relatively more dense.

The average rainfall ranges between 700 and 800 mm except for Kamsi where 1981 rainfall was exceptionally high. The amount of rain recorded everywhere in 1985 was the highest of the last five years. Soil types similar to those of southern Ouahigouya were observed; the general description is summarized in Table 4.

/....

Infrastructures

Water sources consist of traditional or concrete-lined wells. There are no bore-hole wells. Some water catchments with temporary water supply exist in Gouim and Kamsi. Each village has its PSP but no village pharmacy. Mosques exist in La, Kamsi and Vellia. Churches have been built everywhere except in Vellia. The educational infrastructures are the school and the centre for young farmers' training. There are schools in La, Kamsi and Vellia, whereas young farmers' training centres can be found in Gouim and Kamsi. Gouim and La each have a market which is held every three days. The other villages depend upon the markets of neighbouring villages.

Social/Political/Economic Characteristics.

These villages have been essentially settled by the Mossi. However, the presence of Fulani can be noted in La, Vellia and Dacissé.

The importance of the major families differs from one village to another. The order of importance for each village is as follows:

- Dacissé : Koala, Zongo, Ouedraogo, Diallo
- Kiemdé, :Tiendrebeogo, Koala, Nikiema
- La :Bouda, Gandema, Zongo, Kabore, Ouili, Nikiema
- Kamsi :Yameogo, Kabore, Songo
- Gouim :Zongo,Combassere, Kimou, Birba.

In order of importance,the major religions are:

- Animism, Christianity (Kamsi, Gouim and Dacissé)
- Islam, Animism, Christianity (Vellia)
- Animism, Islam, Christianity (La).

The major economic activities include agriculture and animal husbandry. But other economic activities vary from village to village as indicated as follows:

/.....

- Pottery - (Kamsi and Dacissé)
- Blacksmithing - (Kamsi, Vellia, Dacissé and La)
- Weaving - (Gouim, Vellia, La and Dacissé)
- Trade - (Vellia)
- Dyeing - (La).

The CDR and the customary chiefs (village chief, chief of the land and Kam Naba only in La) are the main political and administrative units.

The number of single-family households exceeds that of extended-family households in La, Vellia and Dacissé. In Gouim and Kamsi, the extended family households are the most numerous.

In addition to the ORD women's and men's village associations, the presence of a young farmers' association was noted in Gouim.

Migration

Migration varies from one village to another. The rate may be as high as 75% (only among youth from 15 to 30 years). Most migrants go to the Ivory Coast. Some of them also go to the Gourounsi region (Leo, Po area). Those who migrate to the cities are the very young age group.

Extension Services

The extension worker does not reside in any of the villages visited. The frequency of his visits is once a week. None of the villages has hosted a research or development project.

/.....

Table 4: General Information in Koudougou Zone

Villages	Distance to Koudougou	Population in 1975	Principal religions	Organisation	Migration	Accessibility	Fallow	Principal type of soil	Presence of Fulani
Gouim	30 km	1236	Animism Christianity	1 GV 1 GJA	75% of the young	Poor	No	Bissiga Zingdiga Baogho	No
Dacissé	67 km	1478	Animism Christianity	2 GVH 1 GVF	23%	Poor	Few	Bolé Zinka Baogho Bissigou	Yes
Kamsi	10 km	1200	Animism Christianity	1 GVH 1 GVF	+50%	Good enough	No	Bolé Bissigou Zingdiga	No
La	24 km	1119	Animism Islam	1 GVH 1 GVF	Feeble	Poor	50%	Zinka Bolé Bissigou Baogho	Yes
Vellia	29 km	1316	Islam Animism	2 GVH 2 GVF	feeble	Good	Few	Bissigou Bolga Zingdiga	Yes

1.3 Koupela zone

The landscape is similar to the one observed in the Koudougou zone. In terms of rainfall, 1985 remains the best year compared to the last five years. The drought period generally occurs in August and September. The soil type is also similar to that of the Koudougou zone.

The major occupants of the villages visited are the Mossi. The Fulani are in limited number. In the order of importance of the major families of each village are :

- Togotenga : Kananga, Oubda, Sondé
- Bissiga : Belbaogo, Belnaba, Korogo, Naré, Bandé, Diallo, Yameogo
- Koudmi : Tougouma, Diallo, Sebgo, Dwindé
- Kamsaoghin : Kabore, Naré, Sanwidi, Sana, Diallo
- Kourit : Naré, Diallo, Barry, Koudougou.

Except in Togotenga where Islam is the most important religion, Christianity and Islam and Animism are the most important religions, in that order.

Infrastructures

The major source of water is from wells. There is one bore-hole in Bissiga and two in Togotenga. Each village has built its PSP, but these posts are not yet functional. Only at Koudmi village is there a pharmacy.

As to places of worship, there is a mosque in Togotenga and a church in each of the following villages: Bissiga, Koudmi and Kamsaoghin.

Only one village shop has been built in Koudmi. Some cereal banks were found in Togotenga and Koudmi.

/....

Table 5: General Information - Koupela Zone

Villages	Distance to Koupela	Population	Principal religions	Organisation	Migration	Accessibility	Fallow	Main soil types	Presence of Fulani
Koudmi	5 km	792	Christianity	1 GVH 1 GVF	25%	Poor	Some Few	Bissigou Piiga	Yes
Kourit Bilayargo	6,5 km	578 (1975)	Christianity	1 GVH 1 GVF	15%	Poor	Some Few	Bissigou Piiga Zinka	Yes
Kamsaoghuin	30 km	349 (1975)	Christianity	1 GV Miate	50%	Poor	None	Bissigou Zinka Bolé	Yes
Togotenga	10 km	604 (1985)	Islam	1 GVH 1 GVF	15%	Good	None	Zinka Bolé	Yes
Bissiga	7 km	971 (1984)	Christianity	1 GVH 1 GVF	60%	Bad	50%	Bassiri Zinka Bolé	Yes

Social/Political/Economic Characteristics.

The major activities are agriculture and livestock husbandry. The importance of secondary activities varies from one village to another as indicated below :

- Tanning : Kourit-Bilayargo, Kamsaoghin
- Blacksmithing: Kamsaoghin
- Pottery-making: Koudmi and Kourit-Bilayargo
- Dolo (beer) trading (everywhere except Togotenga).

The political/administrative organizations are the same as in the Koudougou zone. Single-family households are in greater number than extended-family households in Kamsaoghin only.

Migration

The rate of emigration generally varies between 25% and 50%. The order of importance of the destinations of emigrants are:

- Republic of Ivory Coast;
- Cities (Koupela, Pouytenga, Ouagadougou); and
- Ghana.

Extension Service

None of the villages visited hosts an extension worker. The distance from the dwelling of the extension worker to the above-mentioned villages ranges between 5 and 15 km. The frequency of visits is about twice a month. Thus far, no research or development projects have been initiated in the area.

2. Cropping Systems

2.1 The Cropping System in the southern Ouahigouya zone.

In the southern Ouahigouya zone the major crops are pearl millet, sorghum (mainly white sorghum and

/.....

accessorily red sorghum), maize, cowpeas and groundnuts. The cropping system is dominated everywhere by pearl millet crop associated with cowpeas in the highlands of the plateau.

The second most important crop is white sorghum, grown in association with cowpeas, mainly in the lowlands or "bas-fonds". Where there is some form of fallow remaining, white sorghum is also planted in the highlands of the plateau during the first year following clearing; the intermediate areas between the highlands and the lowlands are also used for mixed crops of millet, white sorghum and cowpeas. Groundnuts are generally planted at random in small plots on light soils (highlands) in pearl millet fields. Partial millet-groundnuts rotation is practiced. Maize is generally planted on manured land around the compound. Occasionally, red sorghum also covers part of the compound fields. According to farmers, red sorghum is mainly planted on exhausted and striga-infested soils because it is reported to be more resistant to striga-infested soils.

Whenever possible, fallowing for an extended period of four years is practised in most villages. It is applied by a relatively limited number of farmers. Rotation and short fallowing would be of an advantage to farmers possessing sufficient amounts of land. Such a rotation, which is mainly effective on highland soils, is said to consist of growing white sorghum during the first year following clearing or during the first two or three years, if the soil is fertile. Continuous cropping of millet until the soil fertility declines is practised before land is fallowed.

/.....

The relative importance of pearl millet in the cropping systems has considerably increased during the last few years as a result of a decline in the rainfall and due to its erratic distribution. Concurrently, areas occupied by sorghum have considerably decreased in the highlands. Its cultivation has shifted more and more towards the lowlands. Tangaye farmers, for example, have indicated that in 1984 sorghum was more largely cultivated in the village than pearl millet. The situation was reversed in 1985.

In all villages, maize has grown in importance, because of its early maturity and consequently, its use in bridging the food gap between other crops. One particularly important dynamic aspect of the farming systems is the research and adoption by farmers of early millet, sorghum and cowpea varieties from other villages or agro-climatic zones. The different cereal and cowpea varieties grown in each of the four villages visited are summarized in Table 6. The names and cycles of the varieties are reported according to the information given by farmers.

Late varieties are generally abandoned for early ones. However , it seems that earlier varieties grown in some villages are not known,apparently in other villages. This suggests that either information on new varieties flows inadequately or very slowly between villages, or that new varieties tend to be adapted to specific sites. These assumptions, however, would need to be verified in future research work.

Furthermore, late millet and sorghum varieties are not completely abandoned in most cases. Their use tends to move into lowland areas.

In case of groundnuts, late maturing local variety (120 days) was being replaced by an early improved variety (70-90 days) introduced by the ORD.

/.....

Table 6: Crop Varieties by Order of Importance and per Village - Ouahigouya Zone

Villages	Millet		White Sorghum		Cowpea		Maize		Red Sorghum	
	Name	Cycle (days)	Name	Cycle (days)	Name	Cycle (days)	Name	Cycle (days)	Name	Cycle (days)
Rom	Kassablga	90	Fimuougou	90	-	-	-	-	Konlim-onga	70
	Sineminga	100	Kapeelga	90	-	-	-	-	-	-
Tangaye	Kakounga	70	Belko	+120	Bingraga	60	Kamandara	60	Var Loc	75
	Kawoko	90	Fimugou	85	Bingmuanga	80-90	Kamanyana	75	-	-
					Kandigi-sioumgou	75				
Sitigo	Kassablga	90	Fimuougou	85	-	-	Ziliga	60-70	-	-
	Fologo	+100	Var of Niger	70	-	-	Kamanyana	100	-	-
			Younga*	120	-	-				
Yalka	Kassablga	90	Belko	100	Bengraga	90	Kamandawa	60	-	-
			Youngo	120	Bingmouenga	120	Kamangnaga	70	-	-

Agricultural implements

Agricultural equipment consists primarily of hand tools and animal-drawn equipments. The hand tools are generally pick-axes for planting and "daba" (hoes) for weeding. The shapes of these tools may vary slightly from one village to another. Animal traction is practised with donkeys and "houe manga" in general and with oxen and plough as well as horses and "houe manga". The other devices drawn are generally weeders and carts. About half of the heads of households in each of the four villages possess animal traction equipment.

Soil fertility regeneration

Manure is applied to improve the fertility of the soil. The manure consists of a mixture of the compound refuse with animal manure (poultry, ovines, caprines, bouvines) in order to obtain a sort of compost. It is applied in bulk over maize in the compound fields and in holes on white sorghum fields and occasionally on old millet fields.

Fertilizer is moderately used in the villages. The main form of mineral fertilizer used is NPK cotton fertilizer supplied by the village extension worker, an agent of the ORD. It is particularly used on the white sorghum grown on soils with relatively high water retention capacity. Fertilizer is rarely applied on pearl millet. Fertilizer is generally mixed with the seeds and applied in holes, at planting.

Soil and Water conservation

The farmers in the region use various conservation methods including traditional erosion control practices such as fallowing, stone rows, trunk barriers and mulching. The practice of mulching

/....

has decreased as a result of scarcity of biomass. Earthen dykes have also been recently introduced in the region by development projects. These earthen dykes have been constructed in many villages with the participation of farmers.

Crop residues are also used as mulch. Occasionally, the residues are left on the ground and tramped by cattle to be incorporated in the soil. Mulching is generally applied on portions of the fields where the soil is most compact in order to improve moisture retention and also to improve soil fertility by increasing termite activities in the soil.

Crop management

Farmers equipped with animal traction apply certain soil tillage practices before sowing or planting. In general, clearing, burning and furrowing are operations carried out by men. Other crop management activities are based more on the availability of labour in the household than on the sex of the labourer. Thus, men, women and children may participate in construction of dykes, transport of manure or fertilizer, planting, thinning/transplanting, weeding and harvesting.

Dry planting is practised in three out of the four villages visited. Holes are filled with seeds and organic manure towards April or May in order to save time. Part of the field is dry-planted and the rest is planted after the first rains. Farmers feel that even if it is risky, dry planting gives rather encouraging yields. They also feel that in view of the short cycle, its practice is far from being abandoned.

/.....

Although the usefulness of dry planting is generally acknowledged, farmers in Sitigo do not practise it, since their custom prohibits planting before the rains.

Weeding of millet and sorghum fields are generally done two or three times. The number of weeding tends to increase as the soil's water-holding capacity and its level of fertility decline. The last weeding is generally a weeding/ridging operation.

Harvesting is carried out by both men and women. Crops are transported by carts whenever possible and then stored in local granaries.

The crop residues, particularly the young and tender stems, are harvested as fodder and the rest is used for mulching, for the household fuel requirements and for making potash.

Agricultural Constraints

Insufficient and erratic rainfall pattern of the last few years is considered as one important constraint. Also, the physical degradation of the soil due to severe erosion, declining fertility and crusting characteristics of the soil is another constraint. The third constraint generally, is the difficulty in obtaining agricultural equipment and other inputs. Solutions found by farmers themselves to the rainfall problem consist in seeking and adopting early varieties of all crops, cereal in particular, and the adoption of water and soil conservation techniques which also serve as solutions to the problem of soil degradation. Examples of these techniques are mulching, construction of stone rows and earthen dykes and reforestation. To solve the problem of obtaining agricultural equipment, farmers form village associations in order to request loan from the National Agricultural Credit Bank.

/.....

2.2 The Cropping System in the Eastern Koudougou Zone.

The major crops are the same as in the Ouahigouya zone with the addition of bambara nuts. However, in the Koudougou zone environmental heterogeneity is emphasized more than in the Ouahigouya zone. This results in a less uniform relative importance of each crop. Relative importance seems to be determined by the types of local soils and by the cycle of available crop varieties. All things being equal, where there is an abundance of finely-textured soil with good water retention capacity, sorghum predominates over millet. Among the three major crops (pearl millet, white sorghum and red sorghum), those with available early varieties tend to predominate, ceteris paribus.

Thus, for the five villages visited in the zone, the relative importance of various intercroppings in terms of areas cultivated, is as indicated in the following Table 7.

Table 7. Relative importance of crops and Intercropping per village visited in the Koudougou Zone.

Ranking Village :	1	2	3	4	5
Dacissé	RS/C	PM/C	WS/C	RC/WS	-
Gouim	PM/C	WS/C	RS/C	PM/WS	PM/RS
Kamsi	WS/C	RS/C	PM/C	WS/PM	RS/PM
La	PM/C	RS/C	WS/C	PM/WS/C	-
Vellia	WS/C	RS/C	PM/C	-	-

Notes: PM = Pearl Millet, WS = White Sorghum
RS = Red Sorghum, C = Cowpeas, PM/C = Pearl Millet/Cowpeas intercropping.

There is also some market gardening around the wells in two of the villages visited (Kamsi and La).

/...

Fallowing is almost non-existent in all the villages visited except Vellia, the village located farther south in the less-populated zone. Crop cultivation is generally continuous, with a white sorghum/red sorghum/pearl millet rotation. A fallow with a duration of up to ten years is usually included in this rotation in Vellia.

The dynamics of the farming system is charaterized everywhere by the research and adoption by farmers of early cereal varieties to cope with the rainfall changes. The specific changes which occur within each farming system also depend, for example, on the types of soil available and on the adaptation of the different crops and their varieties to these types of soil. Thus, in Daciseé, red sorghum has recently become the most important crop, replacing pearl millet for three reasons;

a) the decline in rainfall resulted in an intensification of farming in the lowland areas which are more humid and more favourable to sorghum;

b) red sorghum produces more grain than white sorghum or pearl millet under these conditions; and

c) farmers had access to several short-cycle varieties of red sorghum. Varieties of the different crops as registered on the basis of information supplied by farmers are presented in Table 8.

Agricultural implements

The agricultural equipments used in the five villages are essentially manual : picks for planting and dabas (hoes) for weeding. As in the Ouahigouya zone, animal traction forms of

/...

Table 8 CROP VARIETIES BY ORDER OF IMPORTANCE AND BY VILLAGE IN THE ZONE OF KOUDOUGOU

VILLAGE	Millet		White Sorghum		Red Sorghum		Cowpeas		Maize		Bambara Nut	
	Name	Cycle	Name	Cycle	Name	Cycle	Name	Cycle	Name	Cycle	Name	Cycle
Dacissé	Kapéelga	120	Wuamba (Naba Kongo)	80	Rigwongo	100	Bingréenga	70	Woebgo	75		
	Kassablga	100	Bani Zalga	100	Rakosbouga	90	Bingzaaga	100	Sapoguin	70		
			Kamdaogo	100	Djidji	80						
					Karougouya	80						
Gouim	Kassablga	90	Wuamba	80	Bologho	100	Bingzaalga	100			Sumrenga	90
	Kapéelga	100	Banirenga	85	Djidji	80	Bingraaga	70			Bobosumzalé	60
			Baninga	110			Béemrenga	60				
Kamsi	Karaalga	120	Banirenga	100	Karoulga	90	Bingraaga	90	Sablnonraogo	70	Bobosuma	80
	Kassoumnon		Fimuogo	90	Kazinzalga	100	Bingzaalga	100	Kamanpéelga	90	Sumzaalga	90
	Sogho	140	Banizalga	120							Sumdabouêga	100
La	Karaalga	120	Banirenga	90	Wisoga	100	Bingraaga	90	Kamanwilga	70	Sumdaaga	70
	Kapéelga	110	Banizalga	130	Rigwango	100	Bingzalga	100	Kamanpéelga	85	Sumdaboêga	90
	Zoumonssogo	130		90	Kiodré	120						
					Karoulga	90					Sumpéelga	80
Vellia	Kapéelga	110	Fimuogo	90	Kasizaalga	120	Nansira	70	Kamanmingou	70	Sumdaaga	105
	Kassablga	20	Kogmongho	90	Zalou	90	Bingralga	80	Kamapéelga	90	Bobosuma	105
			Péodogo	120	Kiodré	120	Bingnenga	120				

equipment are the houe manga with a donkey and the plough with a pair of oxen. The percentage of heads of households who utilise animal traction is 40% in Dacissé, 9% in Gouim, 0% in Kamsi, 14% in La and 22% in Vellia. Donkey traction prevails north of Koudougou (Dacissé and Gouim) whereas oxen traction predominates in the south (La, Vellia and Kamsi areas).

Soil fertility regeneration

Application of manure and other refuse is done in Ouahigouya. A mixture of refuse and animal manure is spread over compound fields and village fields (generally maize and sorghum). Chemical fertilizer when used, is cotton fertilizer or NPK.

Use of chemical fertilization is notable only in two of the five villages (Gouim and Kamsi) where about 30% of the farmers use it in their white sorghum and millet fields. It has recently disappeared in Dacissé along with the cotton crop because of rainfall problems. It is not used in La due to lack of availability, and is negligible in Vellia where there is more fertile land and fallow.

Where mineral fertilization is practised, fertilizers are applied in stripes along the planting rows where planting holes are arranged in a line. This technique is used only when there is sufficient time and labour for planting and weeding.

/.....

Soil and Water conservation

The soil and water conservation technique include the practise of putting land under strips of Andropogon Gayanus, which is seldom observed in the Ouahigouya zone. It seems to be a traditional soil and water conservation technique common in all five of the villages in the Koudougou zone. It is the dominant technique in Gouim and La. Another traditional technique, stone rows, is observed almost in all areas if stones are available. This is the dominant technique in Vellia. Other traditional techniques are the use of tree trunks to make small barriers and the mulching of compact soils. The tree trunk technique is still somewhat important in Gouim and La.

In addition to these traditional techniques there is the construction of earthen dykes, a practise established through the activities of FEER and other projects with the active participation of farmers. Now, earthen dykes are the anti-erosion and water conservation technique most common in Dacissé and Kamsi.

Crop management

Crops are managed and work is assigned in essentially the same manner as in the Ouahigouya zone, with the following differences:

- there is a greater participation of women in all agricultural activities in some villages;
- ploughing is less important due to the reduced availability of animal traction equipment;
- furrowing or row planting is less important for the same reason; and
- dry planting is less widely practised because of the greater presence of birds

/....

and seed-eating insects. In Kamsi, some farmers are said to treat the seeds with insecticides before dry planting and generally, millet and sorghum are weeded three times. The use of crop residues is practically the same as in the Ouahigouya zone. Residues are mostly taken away and used as fodder, fuel and mulch for hardened areas of the fields and for making potash, fences, mats, etc. The crops are stored in straw or earthen granaries (traditional silos).

Agricultural constraints

Problems in the Koudougou zone are identical to those mentioned by farmers in the Ouahigouya zone, namely, insufficient and erratic rainfall, degraded soils and difficulties with obtaining agricultural materials and inputs. Beside these, problems of crop disease are reported among the farmers of the region.

The solutions to the first two problems are the same as those utilized in the Ouahigouya zone, i.e. research and adoption of early varieties, traditional systems of soil and water conservation (grass, stone rows, mulching), reafforestation and earthen dykes. In addition to these measures, farmers in the Koudougou region mentioned sacrifices to call down the rain (recourse to animist beliefs), organic fertilization to increase chemical fertility and soil water retention capacity, prohibition of bush-fires and excessive wood cutting because they were given to understand that the presence of trees attracts rainfall.

/.....

The recommendations made were: continuing research of early high yielding varieties, generalization of dyke construction, reafforestation and construction of water reservoirs or small dams, as in the Ouahigouya zone. Furthermore, it was recommended that assistance be provided for the acquisition of traction equipment for scarification or ploughing in order to reduce soil compaction, to improve water infiltration in the soil and to reduce run-off and its erosive effects.

The solution adopted concerning the problem of agricultural material involves training village farmers' associations to obtain agricultural credit and to undertake money-generating activities such as collective fields, subscriptions, etc. Application of this solution would require the support of the relevant authorities.

As for the problem with crop, which is said to result from stemborers, farmers confess that they are desperate and helpless in alleviating the constraint.

2.3 The cropping system in the Koupela Zone.

The major crops are the same as in the Ouahigouya and Koudougou zones; pearl millet, red sorghum, white sorghum, maize, cowpeas, groundnuts and bambara nuts. To these, one should add rainfed rice, grown in two of the five villages visited (Koudmi and Kamsaoghin).

The cropping system here is generally dominated by pearl millet intercropped with white sorghum and cowpeas. A specific variety of white

/.....

sorghum called "Muanga" is generally used in this case. The second most dominant crop is red sorghum usually intercropped with cowpeas. While millet is grown in village fields as well as in bush fields, red sorghum is mostly grown close to the compounds or in village fields, in order to facilitate its organic fertilization. The other important cereal crops are white sorghum and maize. The former is generally grown in monoculture in lowlands while the latter is often intercropped in compound fields with sauce plants and sometimes with soybean (ex. Togotenga). Groundnuts and bambara nuts are planted mainly in spots in millet fields on loose and light soils. Consequently, partial rotations between millet and groundnuts or bambara nuts are observed on light soils. Red sorghum and pearl millet are also rotated on a highly variable cycle depending on striga emergence in the fields.

Fallowing is still practised in the bush fields of the villages close to the scarcely populated zones of the east and the Volta areas (ex.Koudmi and Kouritbilayargo). Elsewhere, it has practically disappeared.

The dynamics of the farming system are such that the relative importance of pearl millet has considerably increased over the past few years; it exceeds red sorghum even in the villages where the latter was the dominant crop (ex. Togotenga).

The search for early varieties appears to be a very recent concern which has not yet had a significant impact on the farming system. There is an overall dominance of long cycle varieties;

/.....

the varieties grown in one of the villages visited (Bissiga) have remained the same for several generations. However, new early varieties are present in the region. They are named after their place of origin (ex. Sankinssé: village in Northern Togo; Mogtedo: in Burkina Faso), based on their cycle of growth (ex. Pissopoe: 70 days) or after the ethnic groups which use them (ex. Bariba: ethnic group in Northern Benin).

Agricultural Implements

Like everywhere else, agricultural implements consist of hand tools (picks and dabas) and traction equipment. Once again, the houe manga with donkey traction and the plough with ox traction dominate.The highly variable rate of equipment is 9/70 in Bissiga, 34/115 in Kamsaoghin, 13/118 in Koudmi, 4/46 in Kourit-Bilayargo and 41/51 in Togotenga. Types of traction equipment range from ploughs to weeders, ridgers and carts.

Soil fertility regeneration

Organic soil fertilization is much more diversified in the Koupela zone than in the Ouahigouya and Koudougou zones. The various sources are sheep/goat/poultry/ox manure, household refuse and tanning residues. These fertilizers are gathered separately and deposited in small heaps in the fields, then mixed and spread during application, which generally occurs after the first rains or during the first weeding. Tanning residues are an unusual manure particular to Kourit-Bilayargo where tanning is a very important economic activity.

/.....

Table 9 CROP VARIETIES BY ORDER OF IMPORTANCE AND PER VILLAGE IN THE KOUPELA ZONE

VILLAGE	Pear Millet		Red Sorghum		White Sorghum		Maize		Cowpeas	
	Name	Cycle	Name	Cycle	Name	Cycle	Name	Cycle	Name	Cycle
Bissiga	Local varieties	180	Local varieties	150	Local varieties	180	Local varieties	70	Local varieties	150
Kamsaoghin	Kapéelga	180	Zeliouré	120	Belsablga	90	Milka	75	Local varieties	150
	Kassablga	180	Réogo	120	Belmignin					
			Doganinini	120	Belpédga	90				
Koudmi	Kapéelga	170	Zélioure	150			Pissopoé	70	Sankinssé	70
	Kassablga	180	Réogo	150					Bengpéelga	150
			Pissopoé	70					Rapinsiaka	150
Kouritbila-yargo	Kapéelga	180	Zélioure	130	Péologo		Bariba		Local varieties	150
	Kassablga	180	Réogo	130			Milgué		Sankinsé	70
	Kamiougou	180	Sankinssé	70						
Togotenga	Zouralga	160	Local varieties	150	Belco	180	Pissopoé	70	Mogtéda	70
	Kagnanga	180	Pissopé	70	Kankayaré	180			Local varieties	150

Note: Cycle in days.

Dry season penning of oxen in the fields is practised in two of the five villages (Togotenga and Kamsaoghin). The organic manure thus obtained is generally applied on maize and red sorghum.

Mineral fertilizer is less used now in the Koupela zone than in the other two zones. Cotton fertilizer and Burkina phosphate are hardly used in two of the five villages visited (Kamsaoghin and Togotenga). The reasons proferred by farmers include the decline in rainfall, decreased practice of row planting due to the scant use of traction equipment and the lack of money to purchase fertilizers.

Soil and water conservation

Mulching particularly compact soils is widely employed as water and soil conservation technique in the region, particularly in two of the villages visited (Koudmi and Kourit-bilayargo). Earthen dykes are common in the other villages where mulching (and sometimes grassing techniques) is also to be found. Stone rows are practically non-existent in the villages visited, due to the lack of stones and a lack of knowledge about the technique (ex. Bissiga).

Crop management

The situation is the same as in the Koudougou zone, with the participation of women in all agricultural activities, the practice of dry planting in April-May and the practice of three weedings in millet and sorghum fields.

Agricultural constraints

In four of the five villages visited farmers mentioned only the problem of rainfall. In one of the villages (Kourit-bilayargo), problems of

/.....

agricultural material and a phytopathological problem caused by leaf-hoppers were mentioned. Soil degradation is considered as a minor problem everywhere.

The solutions recommended for the problems raised are practically the same as everywhere else. However, with regard to the problem of water/rainfall management, a particularly strong recommendation was made for the construction of dams and reservoirs since it was observed that there is a great potential for their use in this zone.

3. Livestock Production Systems

3.1 Southern Ouahigouya Zone

Species raised

Small ruminants rank first (ovines/caprines), followed by poultry and finally by bovines. The average maximum numbers of ruminants in the farmers' herds are :

- ovines : 25 head
- caprines : 15 head
- bovines : 15 head

The percentage of farmers raising poultry and small ruminants is higher than that of farmers raising bovines (100% vs.10%).

Feeding systems

Small ruminants

Feeding is sedentary extensive with :

- natural pastureland as the basis for feeding
- low complementary feeding in dry season, consisting of the irregular addition of crop residues (haulms and straws);
- livestock are guarded during the rainy season and left to stray in the dry season. All year round, livestock are watered and stabled by the farmers.

/.....

Bovines

Farmers who raise cattle practise the sedentary extensive system with :

- natural pastureland as the major feeding source;
- low complementary feeding in the dry season;
- total lack of pastoral space for management policy;
- Fulani herdsmen:

  Fulani herdsmen are seldom found because water and pastureland problems have induced them to migrate southward and south westward (towards the Sourou area). Those encountered practise transhumance extensively. In the rare cases where Fulani herdsmen and farmers live together, the main inter-relation observed between the two communities was the purchase of manure by farmers from the herdsmen for market-gardening purposes.

Livestock production problems

The major problems encountered are: water, feeding and health, in that order of importance.

With regard to water, the solution found by farmers is well-digging. In addition to this, they recommend the construction of water reservoirs and the installation of hore-holes.

With regard to complementary source of feed during the dry season, crop residue is stored. Among the solutions practised by farmers, the following should be noted: rational cattle management, utilization of agro-industrial by-products (bran, oilcake and cotton seed) and deforestation control.

/.....

Health

Up to now, the solution to this problem has been veterinary care upon the farmers' request. Among the solutions recommended, the following should be mentioned : medical and sanitary prophylaxis of feed and livestock pens.

3.2 Eastern Koudougou Zone

Species raised

The species raised are ranked differently than those in the southern Ouahigouya zone. In order of importance one finds poultry, caprines, ovines and finally bovines.

The average maximum numbers per farm are :

caprines : 30 head
ovines : 20 head
bovines : 30 head.

Feeding systems

Small ruminants

The feeding system is identical to the one applied in the preceding zone (southern Ouahigouya): sedentary extensive with the same characteristics.

Bovines

Unlike the southern Ouahigouya zone, the co-existence of two systems may be observed: sedentary extensive cattle raising (dominant) and transhumant cattle raising. Cases of transhumance are observed in villages where the concentration of Mossi farmers and Fulani herdsmen are too high (cases of Vellia and La). This transhumance is conducted southward (Sissili) for water and pasture-land. This area is heavily populated with Fulani herdsmen (particularly in the Sabou sub-zone). Among the Fulani, there is a marked dominance of the transhumant system.

/.....

In the villages where farmers and Fulani breeders live together they often have multiple inter-relations, summarized as follows in order of importance :

- farmers entrust Fulani herdsmen with the care of their cattle;
- farmers' fields receive manure from Fulani cattle in exchange for standing crop residues in the fields;
- occasionally, Fulani herdsmen supply farmers with milk products as a grant, or in exchange for food grains;
- Fulani herdsmen receive food grains from farmers as a grant or in exchange for their services.

Livestock production problems

The same problems are found as in the southern Ouahigouya zone but with a different ranking in order of importance: first water, then health, and lastly, feeding. However, the solutions recommended and applied for all these breeding problems are similar to those mentioned by farmers in the southern Ouahigouya zone.

3.3 Koupela Zone

Species raised

The ranking in order of importance of the species raised is identical with the one in the eastern Koudougou zone. The average maximum numbers of ruminants per farm are :

- caprines : 20 head
- ovines : 10 head
- bovines : 20 head

A higher ratio (50%) of bovine raising farmers was recorded as compared to the southern Ouahigouya and eastern Koudougou zones.

/.....

Feeding systems

Small ruminants

The feeding system for small ruminants is the same type as those already observed in the two preceding zones, namely the sedentary extensive type.

Bovines

This system is similar to the one in the eastern Koudougou zone: sedentary extensive (dominant) transhumant extensive. The southbound transhumance for water and pastureland concerns cattle breeders whose herd consist of 25 to 30 head.

Fulani herdsmen

As in the eastern Koudougou zone the transhumant and sedentary systems co-exist. Transhumance, which is the most dominant system, is always southward-oriented for water and pastureland.

The proportion of Fulani herdsmen is, however, higher than the one in the southern Ouahigouya zone but lower compared to the proportion observed in the eastern Koudougou zone (particularly Sabou sub-zone: La and Vellia villages).

Farmer-herdsmen inter-relations may be summed up as follows:

- some farmers entrust Fulani herdsmen with the care of their bovines;
- after the harvest and threshing of millet, farmers frequently offer millet to breeders as a grant. In lieu of millet, some farmers offer poultry instead.

/.....

Livestock production problems

The same major problems as those encountered in the southern Ouahigouya and eastern Koudougou zones are to be found, ranked similar to the ones in the eastern Koudougou zone: water, health and feeding.

The solutions applied and recommended are the same as those already mentioned by farmers in the other two zones.

4. Marketing and Input Supply

4.1 Southern Ouahigouya Zone

In the four villages visited, farmers have access to at least 4 markets within a radius of less than 20 km; there is one every three days. The products sold are the same everywhere; cereals, small ruminants, poultry, cooked food (pancakes, fritters, etc.) and condiments (salt, spices). Cereal prices are falling this year compared to last year's prices. However, animal and poultry prices are increasing everywhere (Table 10).

The main customers are other farmers. Most of the time their transactions concern poultry (chicken/guinea hens) cooked food (pancakes, fritters) and sometimes animals. Cooked food is sold by women while only men sell animals.

Except for Rom where the farmers' association sell the products from the collective fields, and in Sitigo where the Naam association purchases cereals (millet/sorghum), the villages have no collective marketing organizations. None of the villages have a well-established schedule for product purchase and sale. In Rom, cereals and animals are sold according to need

/.....

Table 10: Average market producer prices for selected products

(Farmers' estimates*)

Zone	Village	Millet and white sorghum CFA/kg**		Cowpea CFA/kg**		Goat CFA per adult animal**	
		1984/85	1985/86	1984/85	1985/86	1984/85	1985/86
Ouahigouya	Yalka	118	103	-	-	2000	4250
	Sitigo	118	76	176	147	-	-
	Rom	118	59	176	59	1500	3000
Koudougou	Kamsi	118 to 147	88	206	147	-	-
	Gouim	118	74	235	162	-	-
	Dacissé	159	71	323	147	1000	3000 to 5000
	Vellia	118	59	-	-	1000 to 1500	5000
Koupela	Bissiga	114	74	-	-	1000 to 1500	2000
	Kouritbilayargo	100	60	160	140	1000	2000
	Koudmi	100	70	-	-	1500	2500
	Togotenga	100	70	-	-	2000 to 2500	3000
	Kamsaoghin	110	64	160	180	3500	5000

Note: *Crop prices were originally given for local weights: tine and assiette yoruba
the conversion rates used are 1 tine = 17 kg for millet, sorghum and cowpea
1 assiette yoruba = 2.5 kg for millet, sorghum and cowpea.

** 1984/85 was a relatively bad crop year and 1985/86 was a relatively good crop year.

whereas poultry are sold as soon as they reach the appropriate weight. In Yalka, pottery is sold in the dry season; animals mostly during the rainy season and cereals according to need. In Tangaye and Sitigo, products and animals are sold only in times of need. This information needs to be thoroughly examined. The national marketing agencies have very little influence on the farmers' commercial dealings. In Yalka, the latest visit by OFNACER (office Nationale pour la commercialisation des cereales) agents dates back three years.

The major sources of cash income vary only slightly from one village to another. Farming and livestock husbandry are common sources of cash income in all villages except Rom where emigration and weaving are the most important sources. In Yalka, pottery and blacksmithing are also important cash-generating sources.

4.2 Eastern Koudougou Zone

On the whole, the organization of the marketing network is similar to the one in the Ouahigouya zone. There are several local market places accessible to all villages with local means of transportation (bicycles, foot, etc.). The products sold and purchased are also similar to the ones in Ouahigouya, and most trade is conducted between farmers. However, the influence of traders from the city of Koudougou is notable in Gouim, Dacissé and Kamsi with regard to cereal and animal trade. Commercial dealings at Rom are highly unpredictable. In Vellia, Kamsi and Dacissé, trade is conducted in small ruminants, poultry and cereals. In Gouim and La, there was no mention of home-based trade.

Vellia and Dacissé village farmers' associations sell cereals collectively. In Vellia, the farmers'

/.....

association keeps cereals in storage and sells them back to its members, while in Dacissé, the association sells beans in addition to cereals Dacissé is the only one which collectively purchases food products through its farmers' association.

In Gouim, La, Dacissé and Kamsi, there is no set schedule for product sale. Trading takes place according to the needs of the moment. In Vellia, however, millet/sorghum sales are more intense in August/September, while purchasing is done mainly at harvest. Animals are purchased there mostly during the rainy season.

National marketing agencies do not operate in La and Kamsi. In Gouim, Dacissé and Velia, ORD and livestock services agents are involved in the marketing of cereals, products for phytosanitary treatment and livestock products.

No problem related to product sale and purchase was mentioned in Vellia and La. In Gouim, slumps in pruduct sales may occur from time to time and there are often scarcities of some products. In Kamsi, the major problems related to product sales are the remoteness of market places, the poor state of the roads, transport difficulties and periodic slumps in sales. Cereals are often unobtainable.

In Dacissé, the lack of buyers and price fluctuations are the major problems associated with product sales. The unavailability of some products is another major problem.

/.....

In all villages, farming and livestock husbandry are mentioned as the major sources of cash income. Trade as source of cash was mentioned in Gouim, Kamsi and Dacissé. Market gardening in Dacissé, fruit growing in Gouim, handicrafts and brick-making in Kamsi are also sources of cash income in those villages.

Unlike in the Ouahigouya zone, emigration was not mentioned in any case as a major source of cash income.

4.3 Koupela Zone

As in the Koudougou and Ouahigouya zones, farmers in the villages visited in the Koupela zone have access to several market places. The number of market places frequented by farmers in Bissiga, Togotenga, Kourit-Bilayargo, Kamsaoghin and Koudmi varies from one to six. Distances between the villages and market places range up to 16 km.

Trading is much more intense in this zone than in the other two zones. All women conduct trade during the dry season. They sell mostly cooked food (rice, dolo, groundnut butter, etc.) and purchase mainly local products (karite and nere nuts, cereals, etc.). Men conduct the animal trade and sometimes the cereal trade also.

As in the other two zones, food crop prices are decreasing whereas animal and poultry prices are increasing in comparison with 1985.
The village of Kouritbilayargo is unusual

/.....

in that hide-tanning is a predominant commercial activity. However, only men conduct this trade, women practise the same commercial activities as in the other villages. Trade is conducted between farmers as in the other two zones. Marketing within the farm (sale and purchase) is also very limited here. It concerns mostly grains, cooked food, kolanuts, tobacco, poultry and sometimes small ruminants. Only men are responsible for the marketing of the latter. No sexual particularity is linked to poultry marketing. The rest of the in-farm trade seems to be left to the women.

There is a cooperative for the sale of hides in Kouritbilayargo and a projected cereal bank in Koudmi. In Togotenga, Kamsaoghin and Koudmi, village farmers' associations work with the ORD to collectively purchase cereals, groundnuts, karite nuts, etc. The other villages have no collective purchasing organizations. There is no regular schedule of product sales and purchases. Cereals and animals are usually sold and purchased according to the needs of the moment. Women's commercial activities as well as the tanning activities in Kouritbilayargo take place particularly during the dry season.

The ORD in Togotenga manages a village shop and in Kamsaoghin conducts purchasing of groundnuts. In Koudmi, the ORD is involved in the supply of agricultural equipment, fertilizer and pesticides. The National tanning centre in Ouagadougou is an important commercial partner for Kouritbilayargo tanners. There is no national marketing agency working in Bissiga.

No specific difficulties in marketing were mentioned in Bissiga. Remoteness of market places and frequent slumps in sales are recorded in Togotenga as problems related to marketing. In Koudmi, the only difficulty mentioned concerning marketing is the

/.....

inaccessibility of market places during the rainy season.

In Kamsaoghin, farmers feel that buyers use inadequate weights when purchasing their products. The prices offered are often low and there are slumps in sales and transportation difficulties. In addition, they feel that the products they purchase are overpriced.

In Kouritbilayargo, the problems associated with product sale are transportation, remoteness of market places, low return on products sold, and dishonest practices by some traders. Difficulties in purchasing result mainly from the unavailability of some products (tanning products) on the market and from the fluctuation of product prices.

The major sources of cash income, except in Kouritbilayargo, are agriculture and livestock production like in the other zones. Additional sources are handicrafts in Bissiga and Koudmi as well as trade by women in Kamsaoghin. In Kouritbilayargo, tanning,dolo (local beer) and groundnuts are the major sources of cash income, in that order.

5. Extension Services

5.1 Southern Ouahigouya Zone

In all the villages of this zone, the ORD extension service is by far the best known and the most in evidence. In Rom, the extension worker is continuously present because he resides in the village. The forestry agent visits the village two to three times a month, the health service agent once a year, the animal health service agent twice a year. In Sitigo, besides the ORD extension agent residing in the village, there is a

/.....

forestry agent who comes twice a week, a human health agent who comes twice a month for maternal and infant protection, the officers from the "6 S" project who visit two to three times a month and officers of the FJA. Yalka is visited by the same agents who visit Rom and, in addition, by the Naam association.

The major services which villagers would like to have are those supplied by the already existing extension organizations. In all villages, the demand is highest for water, agricultural extension, human health, livestock and forestry services. There is no considerable difference in service requirements from one village to another.

Farmers feel that no administrative service is adequate to all their needs. However, the ORD and water service agents have made notable progress through their projects :

- a bore-hole and a shop in Yalka; two bore-holes; and
- a PSP (Primary Health Post) and food distribution in Sitigo; dykes and fertilizers in Tangaye.

Villages cannot be differentiated on the basis of the major objectives aimed at by farmers in carrying out their activities. Everywhere the major concern is to ensure an adequate food supply and then to be able to get health treatment and clothing. Accumulation of monetary wealth always ranked last, or is merely ignored.

The most common suggestion for attaining the objectives of all the villages is to have a permanent water source, preferably a water reservoir while waiting for better rainfall. In Rom and Yalka, however, training and information were among the requests.

/.....

In all villages dyke construction and row planting are innovations adopted as a result of agricultural extension. Tree planting as an innovation was mentioned in Rom, Sitigo and Yalka. All these innovations are a result of the efforts of the ORD and the environment and tourism services.

5.2 Eastern Koudougou Zone

Extension work here has the same characteristics as that in the Ouahigouya zone. The ORD and the Environment and Tourism agents visit the villages most frequently. Visits by livestock officers are far less frequent except in Vellia where they come about 3 or 4 times per month. The frequency of their visit is once a year in La, twice a year in Dacissé and once or twice per month in Kamsi.

Here too, the main services which farmers request from development agents are related to human health, agricultural extension, training and the lowering of input prices. Farmers in Gouim have also expressed the wish to have an OFNACER store. Specially, farmers in Gouim have requested extension services and agricultural supervision; those in Kamsi, want agricultural supervision and literacy training; in Dacissé they asked for refforestation, human health services and agricultural supervision; the same is true of farmers in Vellia.

Farmers' goals here are not different from those pursued by Ouahigouya farmers: food security, health and clothing. Accumulation of wealth was only mentioned in Gouim and Dacissé. Their suggested ways of attaining these objectives are: to have a permanent water source and one health officer in Gouim; to develop agriculture and livestock in Kamsi; to have a nurse in La; water, agricultural equipment, one health officer and one school in Vellia; water, health and training services in Dacissé.

/....

The major changes introduced in the farming systems and villages through extension activities are : tree planting, a primary health care centre (PSP), a cereal bank, use of animal traction and row planting in Gouim; dyke construction, tree planting, the cultivation of a collective field and creation of a village farmers' association in Kamsi; row planting, animal traction, tree planting and animal immunization in Dacissé; row planting, use of chemical fertilizers, tree planting, construction of a primary health care centre (PSP) and a school in Vellia; tree planting, digging of a well and construction of a cereal bank in La.

5.3 Koupela Zone

The extension system is the same as in the Koudougou and Ouahigouya zones. The primary services in each village are: water (bore-holes), agricultural extension (new farming techniques), human health care (a PSP) in Bissiga; ORD services (dykes, agricultural equipment, carts, water) and forestry services (seedlings) in Togotenga; human health care (a PSP), ORD services (loans for the purchase of carts and ploughs) in Kouritbilayargo; ORD services (dykes), education (a primary school), human health care (a PSP) in Kamsaoghin; ORD services and human health care in Koudmi. The major objectives pursued by farmers in conducting their agricultural activities are the same as those in Koudougou and Ouahigouya: food, health and clothing. Here also the main suggestion proposed by farmers everywhere in order to attain these objectives is the construction of permanent water sources.

/.....

The innovations resulting from the extension activities are the same as in the Koudougou and Ouahigouya zones: row planting, animal traction, tree planting, etc. Contrary to what was found in Ouahigouya, dyke construction was not mentioned anywhere as an introduced innovation. In Kamsaoghin, other innovations mentioned were animal training, crop residue collection for fodder and improved stove construction. In Koudmi, innovations include veterinary care for animals and poultry; in Togotenga, they include the control of abusive wood cutting, an increase in the schooling rate and maternal and infant care (PMI).

6. Credit and Finance

6.1 Southern Ouahigouya Zone

Information on credit and finance was difficult to obtain in all zones and villages. It was possible to determine however, that there are two major types of credit : informal credit from relatives and friends and formal credit from ORDs, NGOs (Non-governmental organizations) etc.

In Yalka, financial resources are livestock, emigration, knitting, pottery-making, informal credit and formal credit from the ORD for the acquisition of agricultural equipment. Informal credit is mainly used to buy food and ranges between 1000 and 1500 CFA at a time. In Tangaye the situation is almost the same as in Yalka, informal credit is mostly used for travelling (temporary emigration). The amount of the loan granted by traders is about 2000 CFA at a time. It is mostly used towards solving social problems (weddings, baptisms, funerals, etc.). In Sitigo, besides ORD credit and loans from relatives and friends, the Naam association has financed watering cans, wheelbarrows and carts.

/.....

The major problem related to credit results from the incapability of the borrowers to reimburse the loans. This is linked to the problem of erratic rainfall which does not make it possible for farmers to realise their agricultural production goals, thus leading to their gradual impoverishment.

Farmers were requested to offer suggestion for the improvement of credit services. In Yalka, the suggestion concerned the creation of a credit system taking into account the reimbursement capacity of each farmer. In Tangaye, it was suggested that all funds already released within the formal credit be recovered. After this step, a new credit system should be set up.

In Rom, it was suggested that a credit system be established which might guarantee loans by using the borrowers property as collateral. Loans based on livestock would be more feasible. The loan would be used for feeding young animals, reselling them and reimbursing the loan. In Sitigo, it was suggested that the number of reimbursement installments for formal credit be increased in order to reduce the amount of each installment.

When asked about the things which they would like to receive credit for, farmers named commercial activities first (Yalka, Sitigo and Rom),and then agricultural equipment and livestock.

6.2 Eastern Koudougou Zone

Financial resources and credit sources here are the same as in the Ouahigouya zone. In Kamsi, however, the village farmer association has a fund from which it may grant loans to its members The amount of each loan ranges between 2,500 and 5,000 CFA and is mainly used to purchase food products or medicine, to feed workers during farm work invitations or to solve social problems.

/.....

The same holds true for La. In Dacissé, the village farmers' association lends food products to its members. Informal credit among famers consist of loans ranging between 5,000 and 15,000 CFA.

Farmers feel that problems related to credit result from the non-reimbursement of loans already granted and from the insufficiency of the loans themselves. In La, farmers deplored the non-existence of formal credit. In Gouim, its insufficiency was mentioned. In Dacissé, three problems were advanced: unwillingless to repay the loans already granted, insufficiency of credit and farmers' mobility.

Suggestions regarding the financing and credit issue vary from one village to another. Vellia's population feel that the construction of a dam is a prerequisite to the creation of an agricultural credit system. If this condition were met, they believe that a credit system could be developed for the acquisition of agricultural material and for granting of personal loans. Farmers in Dacissé would rather recommend the launching of a network of cereal banks.

The activities which farmers in each village wish to invest their loans in are: trade, agricultural equipment and draught animals in Gouim; cereal marketing and a school in La; agricultural equipment and inputs in Kamsi; and general trade (cereal marketing in particular) in Dacissé.

6.3 Koupela Zone

Credit sources are the same as in the other two zones. In Kamsaoghin informal credit among farmers often amount to 10,000 CFA per loan and is mainly used to solve social problems. In

/.....

Bissiga, besides informal credit among farmers the village farmers' association lends amounts that vary from 2,500 to 5,000 CFA. These two types of credit are mostly used to solve social problems. In Kouritbilayargo, the ORD lent 200,000 CFA to a group of tanners while the federation of farmers' associations granted a loan of 100,000 CFA for tanning. Loans between farmers often amount to 20,000 CFA; their utilization are highly diversified. In Koudmi, loans are also granted by the ORD, the farmers' association and the farmers themselves. In Togotenga, the ORD has granted loans but farmers know neither the total amount loaned nor the amount required per installment. Loans from traders vary between 25,000 and 50,000 CFA; these go to finance health care and social problems.

In Kamsaoghin, farmers feel that the major problems related to credit are the inadequacy of local resources and their difficulty in reimbursing loans. In Bissiga, the problem raised is the absence of lenders in the village. Farmers in Kouritbilayargo are of the opinion that the amounts of the informal credit given are low and do not enable them to conduct their tanning activities.

In Koudmi, farmers are distressed by the complication of the process of obtaining a loan, the revealing of one's own secrets to the lenders and also the fact that the decision of granting the loan or not depends on the mood of the lenders. In Togotenga, lack of information about ORD loans is the main problem.

As a suggestion for improving the credit system, Bissiga farmers believe that village farmers' associations should be entrusted with funds and

/.....

their management. Kouritbilayargo farmers think that the volume of loans should be increased. Farmers from Koudmi made the same suggestion as those in Bissiga.

In Kamsaoghin, Bissiga, Togotenga and Koudmi, farmers would like to get loans in order to carry out commercial activities particularly agricultural product trade. Those from Kouritbilayargo would rather use their loans for tanning. In Koudmi, cattle breeding is perceived as a second alternative for the utilization of credit. Investment in crop production was not mentioned in any village.

7. Agro-forestry

In all three zones visited, the vegetation is a savanna type and includes a considerable number of tree and shrub species. The names vary slightly from one zone to another but they are essentially the same species commonly found over the whole Mossi Plateau (see list of trees and shrubs in Annex II and III). From one zone to another the same motivation also justify the practice of agro-forestry which essentially consists of saving a number of trees and shrubs on cultivated land or of protecting and maintaining those which naturally grow on the farm.

The main reasons for practising agro-forestry do not differ either from one zone to another. Trees and shrubs are maintained in the fields essentially because they supply food (fruits and leaves), building timber, fuel wood and shade; they also have medicinal properties regenerate the soil, are used as fodder, reduce erosion and run-off and attract rain. From all discussions it appears that the first criterion for the popularity of a plant species is based on its capacity to feed men and animals.

It does not seem that farmers are hostile a priori, to the presence of particular species in their fields.

/....

However, because of the need to reduce the density of vegetation in order to plant crops, farmers prefer some plant species to others. Their choice is based on the qualities of the species: nutritional therapeutic or merely its scarcity in the natural environment. If farmers were given the choice, they would mostly plant fruit trees in their fields. In any case, traditional fruit trees such as Karite, Nere and Lannea microcarpa are all in favour with them. In all villages farmers have individually or collectively planted trees. Besides traditional fruit trees they have also planted introduced species; neems, eucalyptus, mango trees, etc. Trees and shrub species usually found in farmers' fields are listed in Annexes II and III.

The main difficulty farmers confront in the tree planting activities is the lack of water. Natural rainfall is insufficient to ensure that the plants take well. Furthermore, there is no water sources (bore-hole, well, reservoir) for watering seedlings during the dry season. Other difficulties such as the straying of cattle, the unavailability of seedlings, termites, etc., were also mentioned, but are somewhat negligible in comparison with the problem of the lack of water.

In all zones and villages, farmers share only one wish or suggestion for developing refforestation activities; to make water available, preferably through obtaining a water reservoir. However, they consider that the realization of such a wish is out of their reach. They seem to be expecting the initiative to come from elsewhere,very often from state services. In terms of agroforestry there is practically no distinction between the zones and between the villages.

/.....

IV. SELECTION OF RESEARCH SITES

Once the surveys were completed, the FSR team held a meeting in each of the three zones with the research and development partners who had participated in the surveys in order to select the definitive FSR research site for the zone. During these meetings, the various groups which had asked specific questions gave additional information to the audience. Then each participant in the surveys spoke his mind regarding the advantages and drawbacks of each village visited, based on the established criteria. These criteria are : accessibility, the more or less typical character of the farming and breeding systems for the zone, the village population, the extent of farmer mobilization or motivation, the level of research or development project operations in the village, the level of farmer emigration, the percentage of farmers with animal traction, etc.

The audience then selected the definitive research site in each zone through a process of elimination. In the southern Ouahigouya zone, Yalka was selected to be used as the primary research site for the FSR programme.

The villages of Tangaye and Sitigo were eliminated mainly because their large populations are not representative of the area, and because their villages are almost inaccessible during the rainy season. The village of Rom was ultimately eliminated because of the intensive operation of development projects (seven) there, because of its location which makes it too close to the Koudougou zone and because of the typical location of the village on the side of an inter-urban highway: the Yako-Ouahigouya road.

In the eastern Koudougou zone, Kamsi was selected to be used as the primary research site for the FSR programme. Vellia and La were eliminated because of the low intensity

/.....

of agriculture practiced there, which is due to the great availability of uncultivated arable land where these villages are located. Gouim was mainly eliminated because of its inaccessibility during the rainy season and because of the low level of mobilization/motivation of the population. Dacissé was ultimately eliminated for the following reasons: its northern location which makes its condition like those of southern Ouahigouya, a typical farming system (dominance of red sorghum), and a low level of internal migration. As for Kamsi, the major drawback is that none of the farmers there has animal traction while those in most neighbouring villages do. Except for this problem, Kamsi is very interesting,since it has environmental conditions similar to those prevailing in the Saria station, 20 kilometers from the village. It was finally decided that tests with animal traction could be conducted in collaboration with farmers from neighbouring villages and that, furthermore, Kamsi could serve for a study of the problems associated with the introduction of animal traction in a village.

In the Koupela zone, Kamsaoghin was selected to be used as the primary research site for the FSR programme. Bissiga was eliminated because it is inaccessible during the rainy season and because its agriculture is marginal and retrograde in comparison with the other villages in the zone. Kouritbilayargo and Koudmi were eliminated for the following reasons: important commercial activities, particularly activities of an agro-industrial nature such as tanning, great availability of fallow land, non-existence of bovine breeding in the case of Kouritbilayargo. Togotenga was ultimately eliminated because it has already been used as a target village for development projects in the region, with several external interventions which gave it a non-typical character from the point of view of agriucltural equipment, organization and mobilization; in addition, it has a very low internal migration rate. The problem with Kamsaoghin was that it is hardly accessible during the rainy season but otherwise was the best choice among the villagesselected.

/.....

V. CONCLUSION

The exploratory surveys led to the selection of three primary sites for the work of the National Farming Systems Research Programme (FSR) on the Mossi Plateau. These sites are Yalka, in the southern Ouahigouya zone, Kamsi in the eastern Koudougou zone and Kamsaoghin in the Koupela zone (Fig.11).

On the whole, very few differences are evident between the various farming systems visited on the Mossi Plateau. This is further reflected by the uniformity of the problems faced by farmers in the villages visited. These problems are : drought and water problems linked to the increasingly insufficient and erratic rainfall, soil fertility degradation, equipment or acquisition of agricultural materials or higher productivity inputs, credit and financing, animal feeding, agricultural product marketing, wood fuel supply and plant cover regeneration, etc.

The FSR programme will help to solve these major problems in collaboration with component research and development services during the course of its research work on the Mossi Plateau.

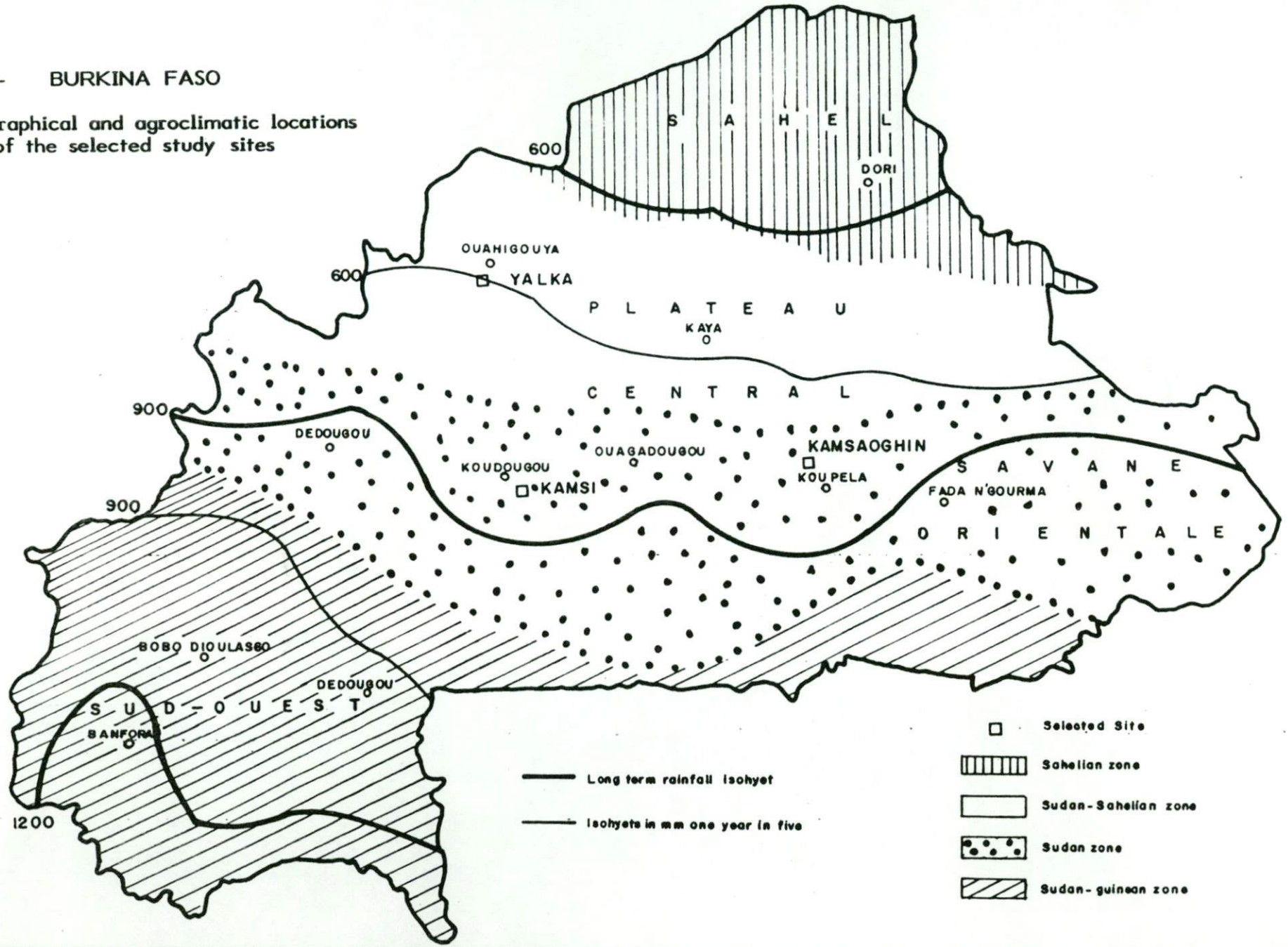
To tackle each of these problems, farmers have taken initiatives that are commendable but insufficient. These initiatives deserve being taken into account for improvement. Farmers have, moreover, clearly defined the priority areas in which they need assistance from research.

The problem of first priority is drought or lack of water. To solve the drought problem,farmers seek and adopt early varieties of cereals and legumes already existing in their environment or coming from elsewhere. The national FSR programme may largely contribute to solving this problem by studying the possibilities, constraints and consequences of adopting drought-resistant varieties,developed by component research,which are usable in Burkina Faso.

/.....

Fig. 11 BURKINA FASO

Geographical and agroclimatic locations of the selected study sites



Source: GERDAT 1983

In order to solve the drought problem and the problem of soil fertility degradation, farmers have recourse to various soil and water conservation techniques, such as mulching, stone rows, grass cover, superficial soil tillage and organic fertilization. The FSR can also contribute to solving these problems by studying the possibilities, constraints and consequences of adopting the water-saving, soil conservation and fertilization techniques most promising now in Burkina Faso.

To solve the problem of inadequate water supplies for human and animal consumption, as well as for agricultural purposes, the farmers' efforts have been to construct water reservoirs and to grade gullies. Farmers expect that development action would be taken for this purpose, in order to assist them. The FSR programme could consider the technical and economic feasibility of various forms of hydro-agricultural developments in collaboration with its partners from component research and development, so as to identify the best forms of interventions in this area. It is true that without water there is no life and that without a solution to the water problem the objective of agriculture and livestock integration recommended by the Burkinabé agricultural policy, will be unrealizable.

Degraded vegetation and the softest crop residues are, for the moment, the main sources of livestock feed. Under these conditions, transhumance and leaving domestic animals to stray, remain necessary for a minimal level of animal nutrition. The achievement of sedentary livestock husbandry highly integrated with agriculture (a national objective), will not be possible without the development of other alternative methods of animal feeding. It is with a view to solving this major concern for the state and the rural populations that the FSR will closely investigate the problems of animal feeding within sedentary systems, through

/.....

studies on fodder crops and other feed resources. The solution to this problem should also make it possible to simultaneously solve the problem of the availability of organic fertilizer on the farm.

Apart from the motivational actions taken,in order to achieve better protection of the environment, farmers have few resources and inadequate technical facilities to solve this problem. The FSR, through its agro-forestry division, will be involved in the search for adequate solution to the problems of environmental restoration and protection in rural areas, for the benefit of present and future generations.

Farmers in the central and southern areas of the Mossi Plateau are,furthermore, faced with phytosanitary problems which the FSR will investigate in close collaboration with its component research and development partners. Finally, the FSR will also have to consider the major constraints on agricultural product marketing and input supplies which are worrying farmers.

REFERENCES

GERDAT - 1983 : Contribution à la détermination des objetifs agronomiques et technologiques à long terme - Dossier par pays. Burkina Faso (Haute Volta) (Document de travail)

INSD - 1975 :"Atlas des villages du Burkina Faso (Haute Volta) Cartes de localisation des villages par district de récencement" Institut National de la Statistique et de la Démographie - Ministère du Plan et de la Coopération, Burkina Faso.

INSD - 1979 :"Récencement de 1975 - Fichier des villages" - Institut National de la Statistique et de la Démographie. Ministère du Plan et de la Coopération - Burkina Faso.

INSD - 1979-b :"Principaux Resultats du Récencement de 1975" - Institut National de la Statistique et de la Démographie - Ministère du Plan et de la Coopération Burkina Faso.

PERON, Y., Zalacain V.-1975 :"Atlas de la Haute Volta" Editions Jeune Afrique, Paris.

Reij, C.- 1983 "L'évolution de la lutte antiérosive au Burkina Faso (Haute Volta) depuis l'indépendance - vers une plus grande participation de la population" Institut for Environmental Studies, Free University, Amsterdam.

A N N E X I

Follow-up surveys of soil-water management, agronomic and livestock production practices.

Three villages: YALKA, Province of Yatenga; KAMSI, Province of Boulkiemde; and KAMSAOGHIN, Province of Kouritenga, were selected,based on global reconnaissance survey conducted in January to February 1986, as being representative of the agricultural system in the central Mossi Plateau. The three villages were revisited between March 10 - 14, respectively. In each village,prepared sets of questions were posed, with the assistance of the staff of local Rural Development Organization. The objectives of the survey were :

- to get acquainted with the bio-physical environment in which agricultural production is carried out and resource availability in the village; and
- to get an appraisal of the villagers' perception on major constraints to agricultural production so as to design and formulate agronomic and soils research interventions.

The findings of the survey, with emphasis to soils and agronomy aspects, are hereby presented:

YALKA located in the Province of Yatenga, within Tangaye region is at 230 km northwest of Ouagadougou. The topography is made up of eroded slopes near dwellings leading to lowland area. The land use consists of :

- upland area;located near village site, eroded and of poor productivity;
- lowland;which makes up for sizeable area and partially cultivated when drainage is adequate; and
- bush land; scattered around a radius of 2 to 3 km from dwelling site and grazing zone restricted to abandoned bush land.

Trees and shrubs vegetation is relatively abundant in the bush fields and lowland area furtherest from the dwelling site. The

villagers identified many of the predominant species (Annexes II and III). Multiple uses of the species were indicated, such as Cassia for fence; Neem shade for shade; Tamarind and Karite for fruit; Khaya senegalensis for traditional medicine and furniture making. Some tree species are protected from clearing. Acacia albida and Nere are noted for improving the soil fertility.

Andropogon guyanas is planted on strips along fields for soil erosion control.

The main factors hindering tree planting were cited as lack of water and damage by brousing animals.

The concern of inhabitants with insufficiency of water supply was emphasized. There are six bore wells and one fo them with a force pump in the village. There is also a pond which dries up during the dry season. Four of the wells were dug collectively by the inhabitants. Water supply in the village is adequate for domestic use and for animal watering. Provided more water were available,there was expressed interest in rice, fruit, vegetables and tree cultivation in that order. Around May, water level in the wells drops considerably. The preferred time for digging wells is indicated to be around November to December. The water table at the time ranges between 15-16 meters. Interestingly, farmers felt they have the know-how locally to construct their wells, provided they could get assistance in procuring equipments for digging and/or earth moving. One possible source identified was the Rural Development Organization (O.R.D.). There was interest in acquiring more force pumps in addition to the one they own already. Maintenance work of the pump is carried out by three technicians in the village. There was need for increasing the storage capacity of the pond. Additional sites for pond construction exist. The villagers'requirements were for tools or tractor rental to facilitate excavation work.

Millet, sorghum, groundnuts, cowpeas, sesame and bambara nuts are the major crops. Mangoes are also planted. Sheep and goats make up the predominant animals,followed by livestock and draught animals - donkey and oxen. Chicken, guinea fowl and pigeons are also raised.

/.....

The land holding per household ranges from 6 to 2 ha with an average value of 4 ha. The farmers identified two types of soils in their villages.

Manure is kept in heaps around the dwellings and it is usually broadcasted on maize fields and occasionally on sorghum and millet fields. Some apply the manure near seed pockets. Transport of it is either by cart or in baskets. The beneficial effect of manure application is noted for two consecutive seasons. The main factor preventing wider application of manure is cited as lack of means of transport (such as carts).

Crops

The major cereal crops in order of importance are, millet, sorghum and limited quantity of maize. Millet, followed by sorghum are adopted to the arid conditions of the area. Maize is grown in small plots around dwellings for fresh consumption during the latter part of the rainy season. Groundnut is a major cash crop, followed by cowpeas and bambara nuts. These are planted on light soils. In addition, sesame,a cash crop, and roselle,a sauce plant, are also planted.

Varieties commonly grown were noted :

Millet :	Two locals; one short panicle and a second long panicle.
Sorghum :	Red sorghum - one local White sorghum - two locals; Bellco and Yungu.
Maize :	Early variety , 90 - 100 days Late maturing variety.

The term "local" can mean varieties brought from outside the village but already considered adopted there. Varieties may stand for cultivars or ecotypes. It was clear, however, that farmers did not yet grow varieties introduced by development agencies or researchers.

/.....

The most productive land is assigned to white sorghum; red sorghum and millet are grown on soils of medium productivity while groundnuts and bambara nuts are assigned to poor land.

In all three villages, farmers identified insufficient water as the most important factor limiting crop production. The other factors were insect damage and striga infestation in Yalka; lack of credit in Kamsi and lack of implements and poor health in Kamsaoghin. In the last village there was noticeable skin infection, hence health is understable as a limiting factor.

Farmers recalled that crop yields were satisfactory before 1966. Since that time there has been continuous crop failure until the last season (1985). It was emphasized that crop failure was due to insufficiency or mal-distribution of rainfall. A good rainy season was described by the farmers as having the following characteristics:

- start of rainy season between May and mid-June with interval of less than seven days and the last rains occuring in early October.

Farmers indicated that substantial rainfall quantity is lost as runoff, and the improvement of soil moisture conservation is practiced, employing animal traction, construction of bunds using stone or wood branches, and cultivation, two to three times during the crop season.

The sequence of cultural practices usually starts with manure application on compound fields before the rainy season. Then fields away from dwelling are cleared and ploughed, particularly by farmers that own animal traction. Weeding and cultivation follow. Storage of unthreshed heads of grain is common.

Some farmers apply limited amount of fertilizer on sorghum, and spraying for insect control is not common.

/.....

The main tools used are hoe-manga (one in the village), daba and sickle or knife for harvest. The village has no implements or tools that could be termed "improved". The most difficult tasks are planting and weeding which are carried out during June to July.

Crop residue management

Most crop residue is collected for animal feed, crop stalk is utilized for construction and thorny bushes are burnt. As a result there is little residue left on the field.

Farmers are aware that compost application would improve crop growth based on observations of trials carried out in the province. However, the villagers did not try making compost themselves.

Animal Population and Production System

The survey of animal resources showed the following average number and composition of animals owned by an average family of seven :

Species		Percentage Within Species
Cattle:	Cows	26
	Heifers	38
	Calves	13
	Young steers	15
	Bulls	3
	Oxen	5
Sheep:	Ewes	39
	Bucks	19
	Castrates	15
	Kids	27
Goats:	Does	39
	Bucks	19
	Castrates	15
	Kids	27

/.....

A clear dominance of breeding females is noted in all the three species. Although destined for market, male lambs are not castrated. The farmers also keep poultry, rabbits and donkeys.

Production Systems

Some farmers entrust their cattle to the herders (Peuhl) although they assert that they do not derive any material benefit from the exercise. As regards the herders, they receive money, cereals and also take advantage of the milk from the cows which they are entrusted with.

Some farmers also practice transhumance with their cattle. The number of cattle remaining on the holdings all the year round does not exceed five. These are mostly culled or pregnant cows and sometimes lactating ones too.

With the recent government declaration to restrict the free movement of animals, farmers recommend the practice of guarding and feeding with crop residues stored for the dry season.

Breeding

Cattle

The major calving seasons are May-June and September-October, corresponding to the beginning and end of the rains, respectively.

The selection of sire for servicing is mostly based on the body conformation of the animal. The age at first calving ranges from 4 to 5 years and the calving interval is 3 years.

After weaning, which occurs at the age of 2 years, the males are sold mainly for slaughter while the females are kept for breeding purposes.

As far as beef production is concerned, farmers practice the traditional fattening system. That is, the males are castrated and left with the rest of the herd grazing for up to 5 years.

/....

Sheep and Goats:

The favourable periods for lambing and kidding are the months of May-June and October-November for both species. The interval between successive lambings or kiddings is 12 and 8 months for sheep and goats,respectively.

After weaning at the age of 6 and 4 months, for sheep and goats, respectively, the females are maintained within the flock and the males are sold mainly for slaughter.

There is no special supplementary feeding for pregnant or suckling sheep and/or goats.

Animal Traction

The animals used for traction are oxen and donkeys. Natural pasture supplemented with some salt and cereals is the major feedstuff during the rainy season, while crop residues constitute the basal diet of draught animals in the dry season. Culled oxen are sold for slaughter without being fattened.

Animal Health

The major diseases of sheep and goats are muzzle scab and foot rot and of cattle,are pasteurellosis, trypanosomiasis and tick borne diseases.

Feed Resources

Natural pasture is the main feed resource. Farmers practise fallowing and animals graze on it during the whole fallow period, which is up to 7 years. Animals are also given some feed supplements such as bran, salt and crop residues, during the dry season. However, the availability and source of finance to purchase the supplements are the major problems faced in the practise of supplementation. No forage production and conservation is practised. The farmers appear to be interested in the incorporation of forage in their production system.

/....

Water Supply

During the rainy season the animals are driven to rivers, but during the dry season when the rivers dry-up the animals are watered from water wells. Watering of the animals is done twice a day.

Manure Management

Manure from the sheep sheds and cattle enclosures are removed and stored in heaps before being transported to the field for application at the beginning of the rainy season.

KAMSI is located within the Province of Boulkiemde, in the district of Ramongo, 100 km west from Ouagadougou. The land feature is flat with gently undulating fields. A dry course passes through the village. A large part of the area of scattered shrub land is reserved for grazing. Scattered trees and shrubs prevail. Among the many species noted were Karite, Nere, Mangoes, Cail cidrat and fig tree. Acacia albida is not common in the area. Villagers identified various uses of the trees.

Farmers stated that the know-how for making nurseries existed locally. Problems in tree planting were insufficient water and damage by brousing animals.

The situation in Kamsi resembles that in Yalka. There are six bore-holes and some ponds in the village. During the dry season the villagers dig deeper to reach the water table, and the ponds dry up around November to December. The water supply is inadequate even for domestic purposes. The villagers expressed interest in growing vegetables, fruits, keeping more animals and constructing houses, provided they could have more water. Water table is estimated to be within 10 meters from ground surface. Preferred time for well-digging was around May. Assistance in procuring materials for digging was required. The villagers expressed their willingness to purchase low cost lift pumps collectively. Suitable locations for small pond construction are available. Again, the need for light equipment such as wheelbarrows and hoes was stated. Villagers indicated that they had the know-how to carry out the water development work.

/.....

White sorghum, millet, red sorghum, groundnuts and cowpea are the main cereal crops. Some fruit trees, such as mangoes, are planted. Vegetables were grown previously but these have been abandoned due to lack of water.

There are three markets near the village : Kabinou, 2 km, Ramongo, 7 km and Koudougou, 8 km. Cereals, chicken, goats and sheep are sold by villagers, in return, kola-nuts and tobacco are purchased, implying that Kamsi might be better placed in cereal production than Yalka. The mode of transport is similar to that of Yalka.

The land holding per household is estimated as ranging from ten to one hectare, with an average of three hectares. Four soil types were identified :

- Boŧe : clay soil, black to grayish colour, low moisture intake rate, hard when dry. Where drainage is not a problem satisfactory yield can be obtained. It is used for brick-making.

- Bissiga : sandy soil

- Ziguingda: gravely soil

- Bantoko : owlan, hydromorphic soil.

Manure application starts around April. It is applied on cereal fields. Yield increase is observed in times of favourable rainfall condition and the effect can be noted for two to three consecutive seasons. Insufficient quantity of manure due to few animals kept by farmers prevents wider application of manure.

The usefulness of crop residue in improving soil condition, such as increase in organic matter was recognized by farmers. However, other competing uses took priority over leaving residue on fields. On lowlands, crop residue is burnt to control weed growth. Two disadvantages associated with the practice were

/.....

noted: soil hardening, due to baking and fire hazard. Interest was expressed in gathering wild grass to serve as soil cover provided benefit in terms of crop yield were convincing.

Rainfall was below optimum for the last decade, except for the years of 1976 and 1985. Crops failed in the intervening nine years due to inadequate rainfall. A good rainy season is characterized by :

- early rains not later than June 5 with interval of 2-3 days;
- mid-season rainfall at least every week; and
- late season rainfall continuing up to mid-October.

Animal Population and Production System

The survey of animal resources showed the following average number and composition of animals owned by an average family of seven :

	Species	Percentage Within Species
Cattle:	Cows	30
	Heifers	19
	Calves	15
	Young steers	19
	Bulls	7
	Oxen	11
Sheep:	Ewes	38
	Rams	17
	Castrates	8
	Lambs	33
Goats:	Does	37
	Bucks	18
	Castrates	9
	Kids	37

As in Yalka, the predominance of breeding females is noted. However, the population of small ruminants in this site is bigger than

/.....

it is in Yalka. In addition to the above, farmers keep poultry pigs and donkeys.

The major problem encountered in manure storage is the loss caused by the poultry.

Production System

As in Yalka, farmers entrust their cattle to the herders in spite of the fact that they do not get any financial or extra material benefit from it. The herders are paid in cash, cereals and milk. Contrary to Yalka, the farmers at Kamsi do not practice transhumance.

With the recent measures aimed at limiting animal movement, the farmers recommend the practice of guarding the animals near by the dwellings and storing crop residues for dry season feeding.

Breeding

Cattle:

The favourable periods for calving are May-June and September-October. The selection of the sire for breeding is based on the colour of the coat and conformation of the body. The age at first calving is 6 years and the calving interval 3 years.

Farmers milk their cows while the calves are suckling the other half of the udder. As regards beef production, the system is as in Yalka.

Sheep and Goats:

May-June is the lambing season for sheep, while goats kid in March and/or October-November. The interval between lambings or kiddings is 12 months.

Feed Resources

The major feed resources are similar to those found in Yalka and constitute natural pasture and crop residues. Although farmers tend to practice supplementary feeding, the availability of the supplements and weakness of financial power to

/...

purchase them are the major handicaps. Forage production and conservation is never practiced, but the farmers are willing to do so if advised and supported.

Water Supply

The major sources of water are rivers during the rainy season and wells during the dry season. The frequency of watering is three times a day.

Manure Production and Management

The method of storage is identical to that observed in Yalka. The main problems related to manure storage are losses due to poultry and the run-off during early rains.

KAMSOAGHIN is located in the province of Kouritenga, department of Pouytenga, 150 east from Ouagadougou. The land feature is similar to that of Kamsi. A stream bed is located near the village. Some rockout cropping is observed 3 km from the village site. Major portion of the area is upland. Abandoned fallow serves as the grazing area. Some bush land, with scattered tree cover is noted. There was no indication of management of lowland zone, which is subject to flooding during part of the rainy season.

The vegetation is similar to that of Kamsi, with notable species such as, fig tree, Cassia, Karite, Baobab and Pilio stigma. Multiple use of the trees were cited. Problems of tree establishment were same as for the other two villages. Grass strips for soil conservation have been installed using Andropogon guyanas and other local species (Mopoka, Kanga, Gansase, etc.). In the past, farmers claim that grass could be gathered from surrounding fallow areas, but recently, due to drought, the supply is limited.

There are eight wells and one pond in the village. As the sources dry up during the dry season, there is acute shortage of water even for domestic use. This is a frequent happening before

/....

the arrival of the rainy season, around May, when the village woman spends a major part of the day waiting for the water in the well to rise in order to get a few buckets. There are stream courses surrounding the village. These too dry up early during the dry season.

In case water were more available, the villagers stated their priority of use - vegetable and fruit growing, supplementary irrigation for maize and rice.

Villagers stated that they had enough know-how to dig wells and that they do the work collectively. The best time for such work is around March. Depth to water table during the month was estimated to be 20 meters below ground level. The villagers indicated that they would like to own force pump collectively if the cost was within their means. Similarly, excavation of the stream beds would substantially improve water storage capacity. In all water development work there was need for equipments and the Rural Development Organization (O.R.D.) was mentioned as a likely source of assistance.

The main crops are red sorghum, millet, white sorghum, rice, groundnuts, maize and bambara nuts. Guava, mangoes and citrus trees are planted. The inhabitants related that cotton and vegetables used to be grown before ten years, but with the decrease in rainfall they were abandoned.

The major cereals and their utilization were described. Millet for food grain, drought tolerant; red sorghum for local beer brewing (drought tolerant);white sorghum as food grain, maize - early food crop as well as a cash crop - and rice. Groundnuts serve as food grain, sauce and cash crop. Similarly, cowpea and bambara nuts for food and cash. Sesame is either sold or used as sauce crop.

/.....

The following varieties and/or cultivars were cited:

Millet, two locals:

Kapeagla, 180 days
Kasablega, 180 days

Red sorghum, two local varieties

White sorghum:

Belpega, medium maturing type, white ears
Belsablega, medium maturing type, black ears

Maize, one variety, early maturing type

*Rice, one variety, medium maturing type

Groundnuts:

Sumkamwaga, 90 days
**Bonga, 70 days

Cowpea:

Bengtolega, 70 days
Bengsalega, 90 days

Bambara nuts;

Soumiego, 100 days
Soumpele, 110 days

Sesame, one variety 120 days.

Millet and sorghum are grown on the best land. Cowpea is planted on the same land in association with the cereals. On medium land, Binsiga, millet (Kasalbelga and groundnut (Bonga) are planted while the poorest land is either assigned to groundnuts or left fallow.

The sequence of cultural practice includes clearing and manure application carried out by those farmers who own animal /..

---

* There was an introduced rice variety, Alcam, 110 days but, due to inadequate rainfall farmers abandoned its cultivation.

** Both varieties introduced by O.R.D.

traction, and continues to end of June. June to August is peak for cultivation, weeding and harvesting are carried out in October.

The availability of farm tools is slightly better in Kamsaoghin than in the other two villages. There are 35 hoe-manga and one multicultivator in the village.

Manure is applied on red sorghum and maize fields in April. It is spread by hand and farmers with animal traction cover it with soil. Positive effect on maize and red sorghum is noted but carry over effect to the next season is not observed. The finite supply of manure is the major limiting factor for the improvement of the land productivity.

Crop residue is primarily used for animal feed. Farmers are aware that compost application could raise crop yields, but it is not apparently practiced, due to insufficient production of biomass and occasionally, water for composting.

Legume/cereal association

Cowpea is intercropped with sorghum and millet in the three villages. In Kamsi, the farmers indicated one crop association: three years of cereal followed by groundnuts, i.e. white sorghum ---- Millet ---- red sorghum ---- groundnuts. There was no indication of systematic crop rotation in Yalka and Kamsaoghin. Groundnuts and bambara nuts are sole cropped in the three villages.

Some Burkina phosphate was supplied by O.R.D. at a cost of 1,300 CFA/50 km in 1985. Some 70 farmers applied unknown quantities of the fertilizer on maize and groundnuts. Except for this isolated case there was no mention of fertilizer use in the village. Farmers were aware that fertilizer application could increase yield but they could not use fertilizers for the same reasons as in the previous villages.

/.....

The last year of good crop harvest was in 1973. Since then the village had continuous crop failure, including 1985. A good season described thus as having early rains falling between April-May, rainfall interval of 3-7 days during the season and rains continuing up to early October.

It was observed that more water is lost by evapotranspiration by the soil (farmers' observation). Two measures taken to conserve soil-water were, earth dykes, constructed with the help of O.R.D. and planting vegetative grass strips, such as Andropogon guyanas, in-between cereal fields.

Animal traction was introduced in the village 19 years ago. Currently, 34 out of 115 households own animal traction. It is expressed that use of animal traction for land preparation increases crop production through higher yield per area due to better seeding establishment and increased area cultivated.

Factors limiting more use of animal traction were noted as :

- insufficient implements
- not enough head of animals
- inadequate rainfall, hence animal watering is problematic
- improper harness.

Animal Population and Production System

The survey of animal resources showed the following average number and composition of animals owned by an average family of seven:

Species		Percentage Within Species
Cattle:	Cows	25
	Heifers	13
	Calves	13
	Young steers	35
	Bulls	4
	Oxen	17

/.....

Sheep:	Ewes	42
	Rams	4
	Castrates	25
	Lambs (not weaned)	29
Goats:	Does	32
	Bucks	16
	Castrates	19
	Kids	32

Unlike Yalka and Kamsi, less emphasis is given to breeding cows and heifers, and relatively bigger number of young steers and oxen are noted.

The bias towards keeping a larger number of castrates of the three species perhaps is associated with the big livestock market at Pouytenga, which is about 15 km from the village. In addition to the above, farmers keep poultry (chicken and guinea fowl) and donkeys.

Production System

The production system is almost identical to that in Yalka or Kamsi, but very few farmers entrust their cattle to the herders. A high percentage of farmers send some members of the family to transhumance with their cattle.

As a solution to the recent declaration by the government to restrict the free movement of animals, farmers in this area aim to guard animals near the dwellings, reduce the numbers, store crop residues and purchase supplementary feed ingredients.

Breeding

Cattle

As in the other two villages, May-June and September-October are the main calving seasons. The selection of the sire for breeding is mostly based on the colour of the coat (white being rejected) and the

/.....

length of the tail of the animal.

The age at first calving is 5 years. The interval between calvings is 3 years and the age at weaning not less than 2 years.

Concerning beef production, the fattening system is identical to the other two village sites. However, the duration of feeding for fattening in this site appears to be long and could take up to 5 years.

Sheep and Goats

Sheep lamb mainly in May and October, whereas goats kid in October-November and/or April-May. The age at weaning is about 4 months for both species and the lambing and kidding intervals are 12 and 8 months respectively.

Animal Traction

The animal used for traction are oxen and donkeys. The major source of feed for these animals, particularly the oxen, is natural pasture supplemented with the residue of dole (local beer), bran, salt and crop residues during the dry season.

Animal Health

Pasteurellosis, trypanosomiasis, scabs and foot rot are the common diseases of the ruminant animals.

Feed Resources

The resources of feed are similar to those found in the other two villages. The problems of obtaining feed supplements are similar too. Farmers have shown interest in forage production and conservation in the discussion.

/.....

Water Supply

The main water sources are rivers during the rainy season and wells in the dry season. The frequency of watering the animals is once a day, indicating the seriousness of shortage of water in the village.

Manure Production and Management

Farmers use a system of mobile enclosures (biomass) on the arable fields to let the cattle stay during the night to manure the soil. They do also collect manure from the sheep and goats,shed and store in heaps, as in the other village sites. The farmers appear to manage the manure better than the other sites. In order to minimize the losses by wind they water the manure heaps as required, and storage related problems are minor.

A N N E X II

List of Tree Species which Farmers keep in Fields

Local Name	Scientific Name	Ouahigouya	Koudougou	Koupela
Taangan	Butyrospermum parkii	x	x	x
Saabga	Lannea microcarpa	x	x	x
Rongha	Parkia biglobosa	x	x	x
Nobga	Solerocarya birrea	x	x	x
Pusgha	Tamarindus indica	x	x	x
Toêga	Adansonia digitata	x	x	x
Zaagha	Acacia albida	x	x	x
Vooka	Bombax oostatum	x	x	x
Goonka	Acacia sénégal	x	-	-
Mougounega	Ziziphus mauritiana	x	x	-
Wedga	Saba senegalensis	x	x	-
Kouka	Khaya senegalensis	x	x	-
Siiga	Anogeissus leiocarpus	x	x	-
Gaanka	Diospiros mespiliformis	x	x	x
Lêenga	Kimenia americana	x	-	-
Kakaanga	Ficus gnaphalocarpa	x	x	x
Kamssaogho	Ficus gnaphalocarpa	x	-	-
Yiilga	Mitragyna inermis	x	x	x
Koukouiga	Ficus vogelii	x	x	-
Keglega	Balanites aegyptiaea	x	x	x
Sanbtoulga	Lannea acida	x	-	x
Gorponsgha	-	x	-	-
Noëga	Pterrocarpus erinacens	x	x	x
Kagda	-	-	x	x
Cacia	Cassia siamea	-	x	-
Kakalga	-	-	x	x
Neem	Azaridachta indica	-	x	x
Manguier	Mangifera indica	-	x	x
Gayavier	Psidium gayava	-	x	x
Kondre	Terminalia avicennioides	-	x	-
Kouiguinga	Combretum glutin sum	-	x	-
Yandega	Vitex doniana	-	x	x
Citronnier	Citrus limonia	-	x	-
Oranger	Citrus sinensis	-	x	-
Koulinlaoga	-	-	x	-

Local Name	Scientific Name	Ouahigouya	Koudougou	Koupela
Kagda	-	-	x	-
Gonmiiga	Acacia seyal	-	x	-
Koutrmouka	-	-	x	-
Ragouga	-	-	x	-
Kandga	Vitex doniana	-	x	-
Sougdga	Gardenia ternifolia	-	x	-
Pingnega	Acacia nilotica	-	-	x
Siidga	-	-	-	x
Katre poagha	-	-	-	x
Kalyangha	Capparis corylbosa	-	-	x
Ronsdongha	Sterculia setigera	-	-	x
Goungho	Bombax costatum	-	-	x
Acajou	Kyaha spp	-	-	x
Eucalyptus	Eucalyptus restrata	-	-	x
Koonghan	Borassus restrata	-	-	x
Poupoungha	-	-	-	x
Pougloum	-	-	-	x
Subdga	Gardenia ternifolia	-	-	x

List of shrub species kept in the fields

Local Name	Scientific Name	Ouahigouya	Koudougou	Koupela
Lamboêga	Boscia senegalensis	x	-	-
Kaangho	Acacia pennata	x	-	x
Banglé	Piliostigma reticulata	x	x	x
Koglkom	-	x	-	-
Leléngo	Leptadenia hastata	x	-	-
Sougoudougo	-	x	-	-
Barkoudougo	Annona senegalensis	x	-	-
Koumbrsaaka	Cassia sieberiana	x	x	-
Yarséyamdé	-	x	x	-
Namaobeogo	-	x	-	-
Gondyinohgho	-	x	-	-
Koui	-	x	-	-
Warda	Combretum glutinosm	x	x	x
Wiluliiga	Guiera senegalensis	x	x	x
Yabraogho	-	x	-	-
Tangraêêga	-	x	-	-
Konkekkeoré	-	x	-	-
Nikansgha	-	x	-	-
Naaslébré	-	x	-	-
Gaanka/Gantonga	Diospiros mespiliformis	x	x	x
Mougntoôga	-	x	-	-
Mougnemouba	-	x	-	-
Sursutga	Dichrostachys cinerea	-	-	x
Gonziiga	-	-	-	x
Bar-andga	-	-	-	x
Garwiissi	Guiera senegalensis	-	-	x
Yamtüga	-	-	-	x
Sougdaaga	Securinega viresa	-	-	x
Sousoubdga	-	-	-	x
Kantamdé	-	-	-	x
Pôôndrpooré	-	-	-	x
Guirga	-	-	-	x
Titoré	-	-	-	x
Pourüga	-	-	-	x
Yindga	-	-	-	x
Guebaogha	Acacia macrostachya	-	-	x
Sonsée	Cochlospermum tinctorim	-	-	x
Poutpoûgha	Calotropis procera	-	-	x
Nagneponsgha	-	-	-	x

Local Name	Scientific Name	Otahigouya	Koudougou	Koupela
Silihkooré	-	x	-	-
Gatousso	-	-	x	-
Randga	Combretum micranthum	-	x	-
Karkoudouga	-	-	x	-
Foufouyoungha	-	-	x	-
Tokudugri	Moytenus senegalensis	-	x	x
Kambipagda	-	-	x	-
Wenlebendé	Crotolaria	-	x	-
Baagronga	-	-	x	-
Bitkombré	-	-	x	-
Sigdre	-	-	x	-
Guerdga	-	-	x	-
Guelenguengho	-	-	x	x
Kiisa	-	-	x	-
Yaon	-	-	x	-
Katre	-	-	x	-
Wimagonga	-	-	x	-
Pèèlga	Securidaeca longepedunculate	-	x	x
Gonpèèlga	Acacia seyal	-	x	-
Gonmiiga	Acacia senegal	-	x	x
Kanguinga	-	-	x	-
Saatiiga	-	-	x	-
Kondre	Terminalia avicennioides	-	x	-
Kikürtaaga	-	-	x	-
Zamnega	Acacia macrostacha	-	x	
Sougdinlèèga	-	-	x	-
Yoolga	Gnewia bicolor	-	x	-
Zulgho	Maerua crossifolia	-	x	-
Barkoudi	Anona senegalensis	-	x	x
Koumbwaogho	-	-	x	x
Bawenegmsida	-	-	x	-
Razougho		-	x	-
Lèègha	Ximenia americana	-	x	x
Mougnèga	Ziziphus mauritiana	-	x	x
Katinpoogha	-	-	-	x
Kalyangha	-	-	-	x
Gonpayangha	Acacia gourmaensis	-	-	x
Sansaïdga	-	-	-	x

1986-12

RECONNAISSANCE SURVEY OF THE FARMING SYSTEMS OF THE MOSSI PLATEAU IN BURKINA FASO

AU-SAFGRAD

AU-SAFGRAD