FARMING SYSTEMS RESEARCH UNIT

Working Paper Number 1

# Agriculture in Upper Volta:

# The Institutional Framework

By

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# INTRODUCTION

This brief survey of the organization of agriculture in Upper Volta was prepared as a working paper of the Purdue University/SAFGRAD Upper Volta Farming Systems Unit. It is intended to provide a summary of administrative units, agricultural institutions, and government policy towards agriculture for the convenience of Farming Systems Unit staff. A selection of maps and tables which place Upper Volta in regional context is also included.

Other working papers cover local ecology, population, and ethnic groups of Upper Volta (working paper number 2) and the Mossi farming system (number 3).

## Administrative Structure and Voltaic Agriculture

Upper Volta is a landlocked country bounded by Mali, Ivory Coast, Ghana, Togo, Benin, and Niger, with a surface area of about 274,000 $km^2$ (106,000 $mi^2$).[1] At independence in 1960, Upper Volta inherited an administrative structure consisting of eight departements (roughly equivalent to states) and 44 cercles (counties). A few of the largest towns (six as of 1975) are governed separately as communes, independent of the surrounding geographic/administrative units. The eight departements and their centers included:

| Département | Capital (Chef-lieu, Prefecture) |
|---|---|
| Centre | Ouagadougou |
| Volta-Noire | Dedougou |
| Hauts-Bassins | Bobo Dioulasso |
| Est | Fada Ngourma |
| Yatenga | Ouahigouya |
| Centre-Ouest | Koudougou |
| Sahel | Dori |
| Plateaux du Nord Mossi | Kaya |

These units are indicated on Figure 1; names and locations of the 44 cercles appear on Figure 2 below.

After independence, a national system of eleven Regional Development Organizations (Organisme Regional du Developpement, or ORD) was created. Although legally established in 1965, effective functioning of each ORD began at varying dates often linked to the availability of outside funding. Eastern ORD, for example, had no real operational capability until 1974 (Eicher et al 1976:3).

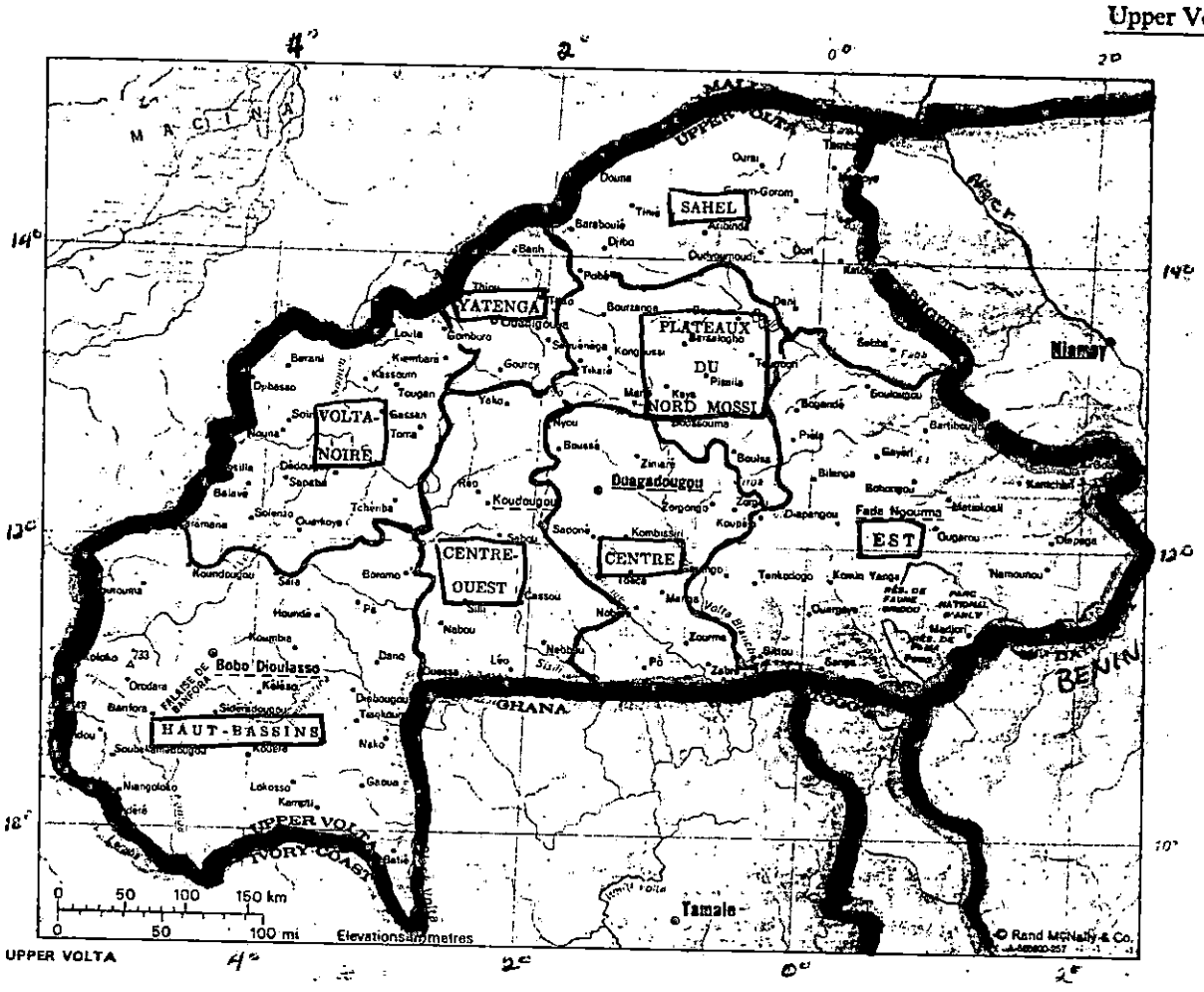



Figure 1. The Départements of Upper Volta at Independence*

(after Guiguemde 1975:1019)

* These units were replaced by a system of 10 départements, with boundaries similar to ORD boundaries, in 1974. (World Bank 1979).

The eleven ORD's and the cercles which are included in each are listed on page 5 and illustrated in Figures 2 and 3. Originally the ORD's cut across departement boundaries, but in 1974 the original eight departements were replaced by a system of ten departements with boundaries which coincided with ORD boundaries except that
ORD's were placed in a single departement. ORD and departement cut across ethnic boundaries, although one group is typically numerically dominant in each ORD.

Administrative responsibility for development activities in Upper Volta is presently shared by the Ministry of Rural Development and the Ministry of Planning, after a period in which the MRD supervised all development programs. At present the MRD is responsible for the ORD's and for a number of technical services (agriculture, forestry, livestock. hydraulics and equipment, and rural education services); the AVV falls under the MP. Such changes in administrative structure increase the difficulty of achieving desirable continuity in planning and policy in the short run, although the long run effects may be a better delegation of responsibility. Each ORD is responsible for extension, agricultural credit, marketing, and infrastructure such as roads within its geographic limits; this multiplicity of duties, without adequate personnel to carry them out, hampers ORD efforts to improve extension services. (see e.g. Eicher et al 1976). Since the creation of the ORD's an effort has been made to organize development projects to coordinate with ORD boundaries.

The ORD's have a monoply on the purchase of cereals; even the National Cereals Office (OFNACER) must purchase grain from the ORD's for its program of storing and reselling grain, which is intended to help

Table 1. - ORD's in Upper Volta

| Region and ORD (by Chef-lieu or seat) | Name of ORD | Cercles covered (numbers match Figure 2 below) |
|---|---|---|
| CENTRAL REGION | | |
| Ouagadougou | ORD du Ouagadougou | 15. Ziniare<br>16. Bousse<br>23. Ouagadougou<br>24. Sapone<br>25. Kombissiri<br>26. Zorgo<br>32. Manga<br>33. Zabre<br>34. Tiebele<br>35. Po |
| Ouahigouya | ORD du Yatenga | 3. Titao<br>4. Ouahigouya<br>6. Gourcy<br>7. Seguenega |
| Kaya | ORD du Nord Mossi | 8. Kongoussi<br>9. Barsologho<br>12. Boulsa<br>13. Pissila<br>14. Kaya |
| Koudougou | | 17. Yako<br>21. Reo<br>22. Koudougou<br>36. Leo<br>37. Tenado |
| Koupela | ORD du Centre-Est | 27. Koupela<br>30. Tenkodogo<br>31. Garango |
| EASTERN REGION | | |
| Djibo | ORD du Sahel | 1. Oudalan<br>2. Djibo<br>10. Dori |
| Fada N'Gourma | ORD de l'est | 11. Bogande<br>28. N'Gourma<br>29. Diapaga |
| WESTERN REGION | | |
| Bobo Dioulasso | | 38. Boromo<br>39. Hounde<br>40. Bobo Dioulasso<br>41. Orodara |
| Dedougou | ORD du Volta Noire | 5. Tougan<br>18. Toma<br>19. Nouna<br>20. Dedougou |
| Diebougou | | 43. Diebougou<br>44. Gaoua |
| Banfora | | 42. Banfora |

(Compiled by M. Saunders from diverse sources)

stabilize grain prices. Cotton marketing is handled by SOFITEX, a society combining 51 % shares controlled by the Voltaic government, and 49 % controlled by CFDT. The CFDT (Compagnie Francaise pour le Developpement des Fibres Textiles) provides management expertise. CFDT imports seed, which it distributes to cotton farmers, and fertilizer and pesticide, which are sold; some fertilizer is provided to ORD's as well. Producer, industrial, and consumer prices are all set by the Ministry of Commerce and Industrial Development. Major objectives in setting cereal prices have been 1) stabilizing grain prices and 2) keeping food prices low for consumers. OFNACER officially has a monoply on selling grain. (IFDC 1977, V. 4, pp. 8-9; J. Murphy, personal communication, 1980).

Official prices have usually been lower than actual prices in local markets (J. Murphy, personal communication, 1980). Minimum official producer prices have risen much more rapidly for cereals than for other crops, however. As Table 2 shows, the official price for millet/sorghum nearly doubled from 12 CFA/kg in 1970 to 22 CFA/kg in 1975, while peanut prices went from 18 CFA/kg to 22 CFA/kg, and cotton prices, from 32 to 35 CFA/kg. (IFDC 1977, V. 4, p. 11).

Government policy also includes subsidies for certain inputs. The IFDC study includes fertilizer recommendations for Upper Volta for major food and cash crops (Table 3 below), at both introductory "light dose" levels and more intensive "heavy dose" levels. Cost:price ratios showing the effects of fertilizer subsidies are shown in Table 4; at present the CFDT subsidizes 50 % of the cost of fertilizer and insecticides for use on cotton (J. Murphy, personal communication, 1980).

Table 2. Producer Prices for Crops in Upper Volta (4, 7)

| Year | Minimum Producer Prices, F CFA/kg | | | | |
|---|---|---|---|---|---|
| | Millet/Sorghum | Maize | Rice | Peanut | Cotton |
| 1970 | 12 | 13 | 19 | 18 | 32 |
| 1971 | 12 | 13 | 19 | 18 | 32 |
| 1972 | 12 | 13 | 19 | 19 | 32 |
| 1973 | 14 | 15 | 21 | 21 | 32 |
| 1974 | 22 | 22 | 30 | 22 | 35 |
| 1975 | 22 | 22 | - | - | - |

(IFDC 1977 v. 4, p. 31)

Table 3. Fertilizer Recommendations in Upper Volta

| Crop | Nutrient Rate, kg/ha | | | | | |
|---|---|---|---|---|---|---|
| | Light Dose | | | Heavy Dose | | |
| | N | $P_2O_5$ | $K_2O$ | N | $P_2O_5$ | $K_2O$ |
| Sorghum | 41 | 50 | - | 64 | 50 | 30 |
| Millet | 41 | 50 | - | 41 | 50 | 30 |
| Maize | 55 | 50 | - | 64 | 50 | 30 |
| Rice (rainfed) | 41 | 50 | - | 110 | 50 | 30 |
| Rice (irrigated) | 41 | 50 | 0 | 110 | 46 | 30 |
| Cowpea | 9 | 18 | - | 18 | 35 | 36+s |
| Peanut | 9 | 18 | - | 18 | 35 | 36+s |
| Cotton[a] | 18 | 35 | - | 50 | 52 | 30 |

[a]Cotton fertilizer is 18-35-0-7S-1.1 $B_2O_3$.

(IFDC 1977 v. 4, p. 20)

Table 4. Cost:Price Ratios for Crops and Forms of Fertilizer, Subsidized and Unsubsidized, Upper Volta, 1975

| Crop | Fertilizer to Supply Recommended Rates | Cost:Price Ratio | |
|---|---|---|---|
| | | Subsidized Fertilizer | Unsubsidized Fertilizer |
| Millet/sorghum | Urea + DAP | 3.9 | 4.3 |
| Rice | Urea + DAP | 2.9 | 3.1 |
| Peanut | Cotton mix | 2.9 | 10.4 |
| Cotton | Cotton mix | 1.9 | 6.7 |

(IFDC 1977 v. 4, p. 13)

According to the IFDC study (1977:9-10), the ORD's grant credit to farmers, using primarily funds lent to the ORD's by the BND (Banque Nationale de Developpement). at a favorable rate (5.5 % in 1977). Most seasonal credit (six-month loans) goes to cotton farmers, with repayments made in the form of deductions when the cotton is sold. Hence the repayment rate is good for credit of this type. The ORD's also grant one-year and two-year equipment loans using funds which they receive from the BND. Although the BND has the final say in these loans, many farmers fail to repay on time. (more than 90 % overdue at one time for 1972 loans).

An inadequate transportation infrastructure hampers all development activities. It is particularly serious in such areas as Eastern ORD (ORD de l'Est) where the population is densest on the periphery of the ORD.(see Eicher et al. 1976). Road-building projects are among recent development activities in Upper Volta, but many areas remain inadequately served. Figure 4 below illustrates the internal transportation network, while Table 5 indicates transportation costs (IFDC 1977, v. 4, p. 31)

Figure 4. Upper Volta - Transportation System

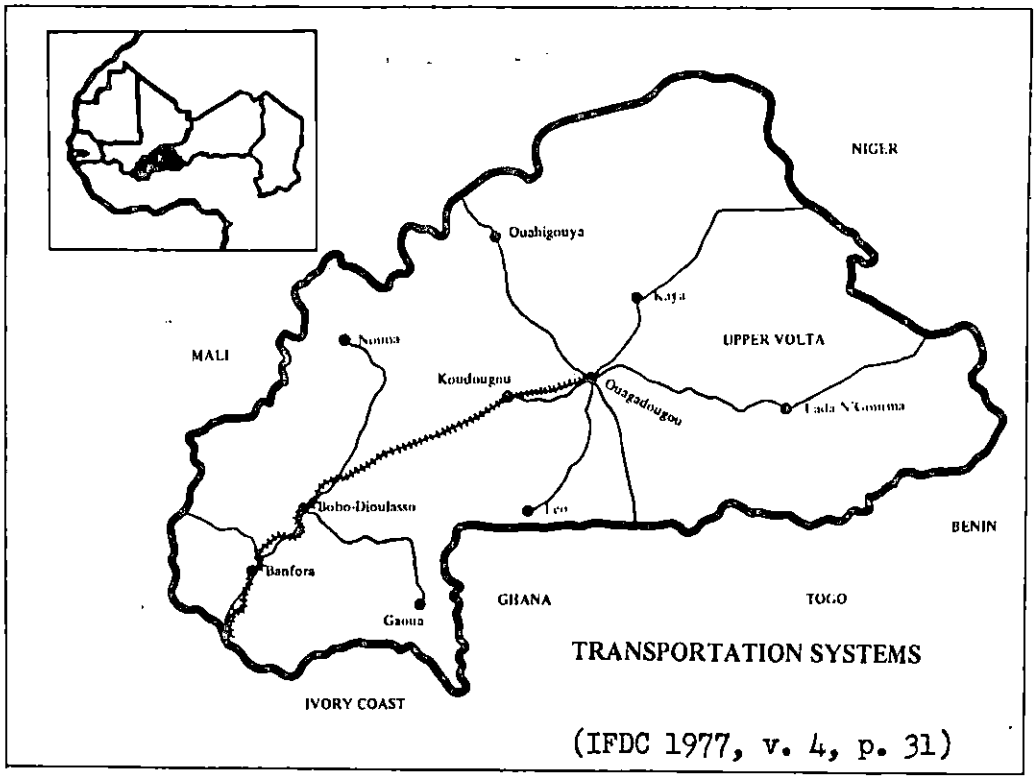
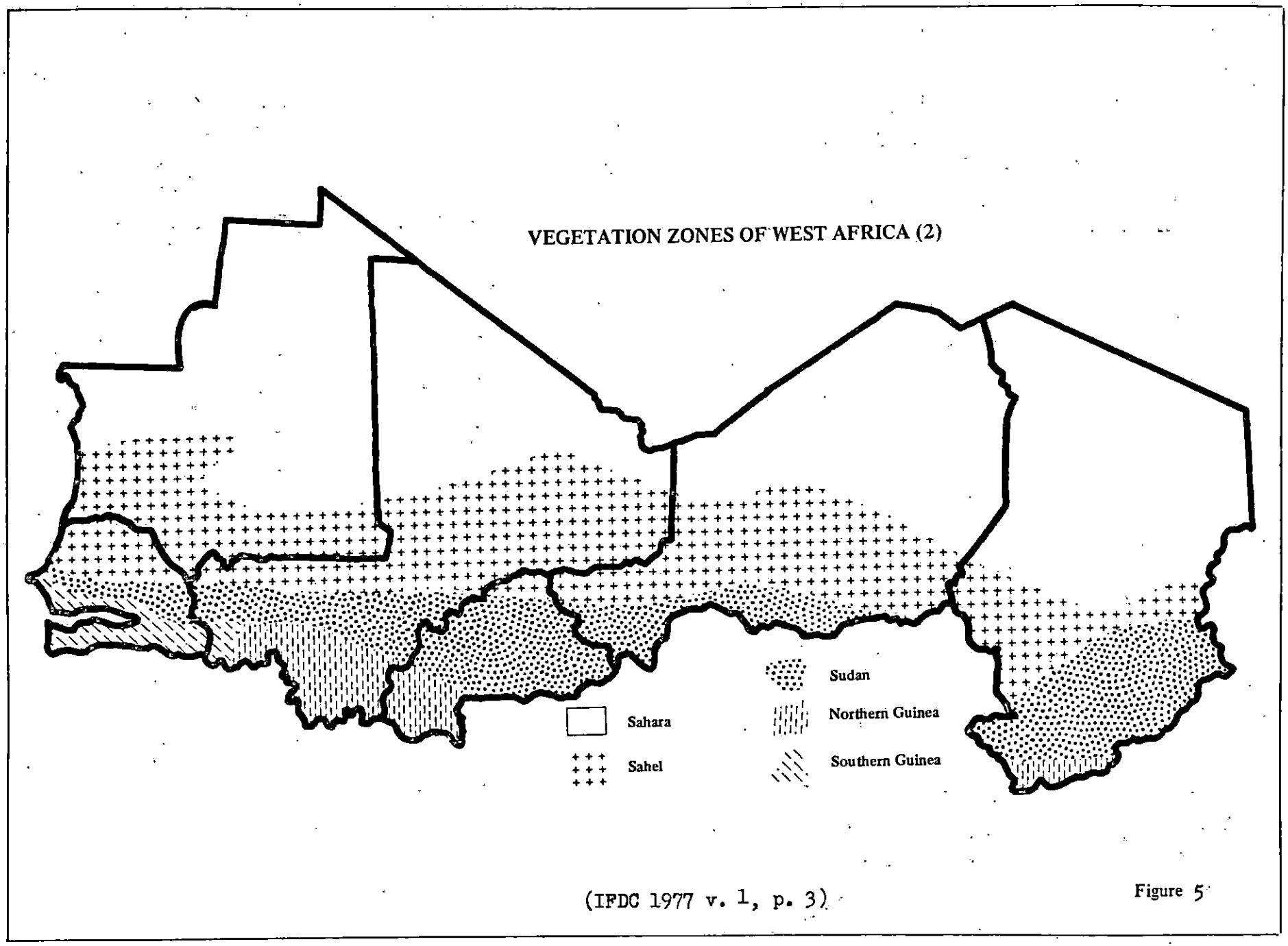



Table 5. Truck Transportation Rates in Upper Volta

| From | To | Mode | Distance | Estimated Transportation Cost[a] |
|---|---|---|---|---|
| | | | km | $/mt |
| Ouagadougou | Fada-N'Gourma | Road | 223 | 20.97 |
| Ouagadougou | Kaya | Road | 98 | 11.31 |
| Ouagadougou | Ouahigouya | Road | 181 | 17.72 |
| Ouagadougou | Koudougou | Road | 97 | 11.23 |
| Ouagadougou | Leo | Road | 165 | 16.49 |
| Bobo-Dioulasso | Banfora | Road | 85 | 10.33 |
| Bobo-Dioulasso | Gaoua | Road | 212 | 20.11 |
| Bobo-Dioulasso | Nouna | Road | 238 | 22.13 |

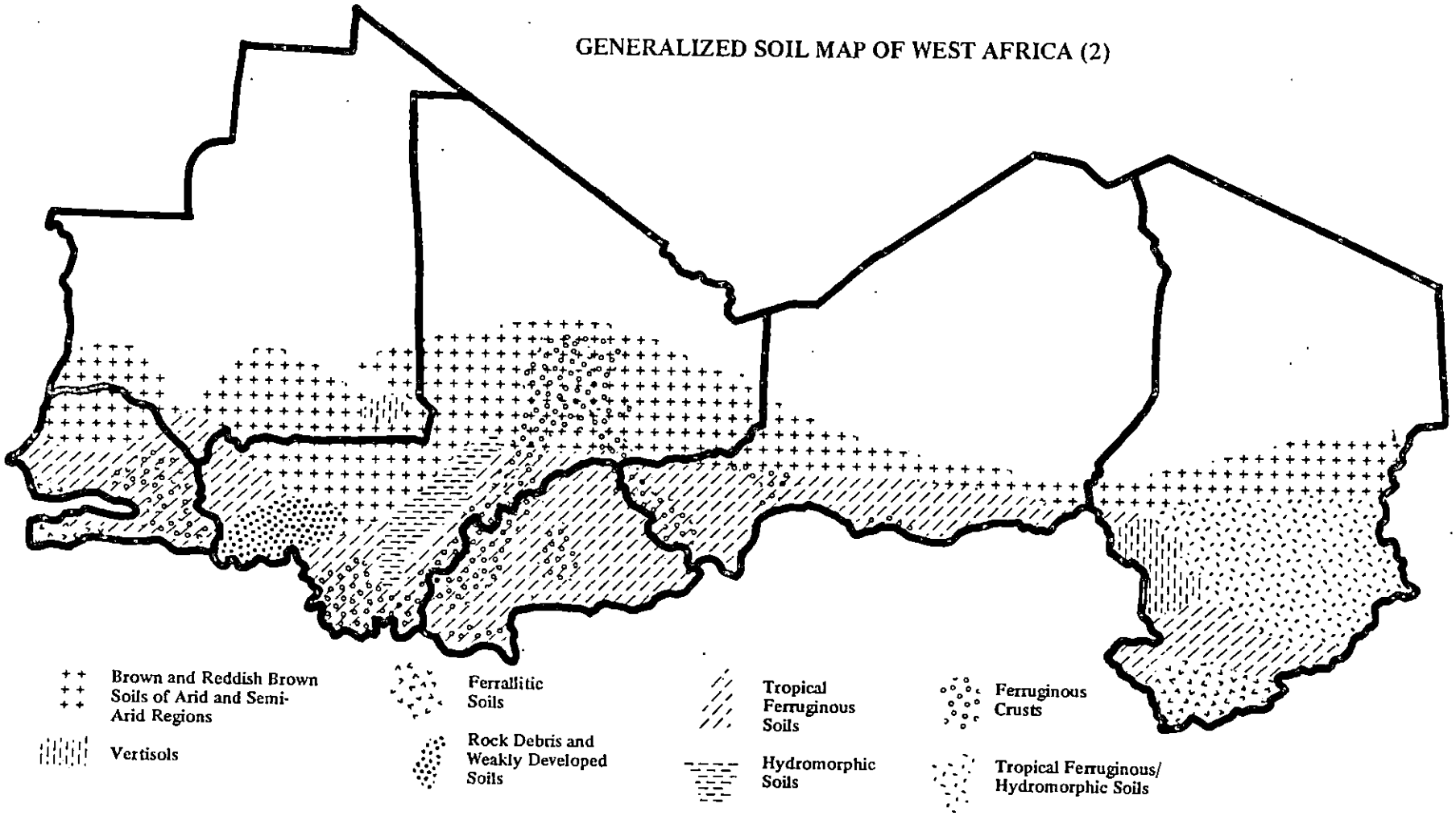
[a]Includes handling estimated at $3.74/mt.

(IFDC 1977, v. 4, p. 31)



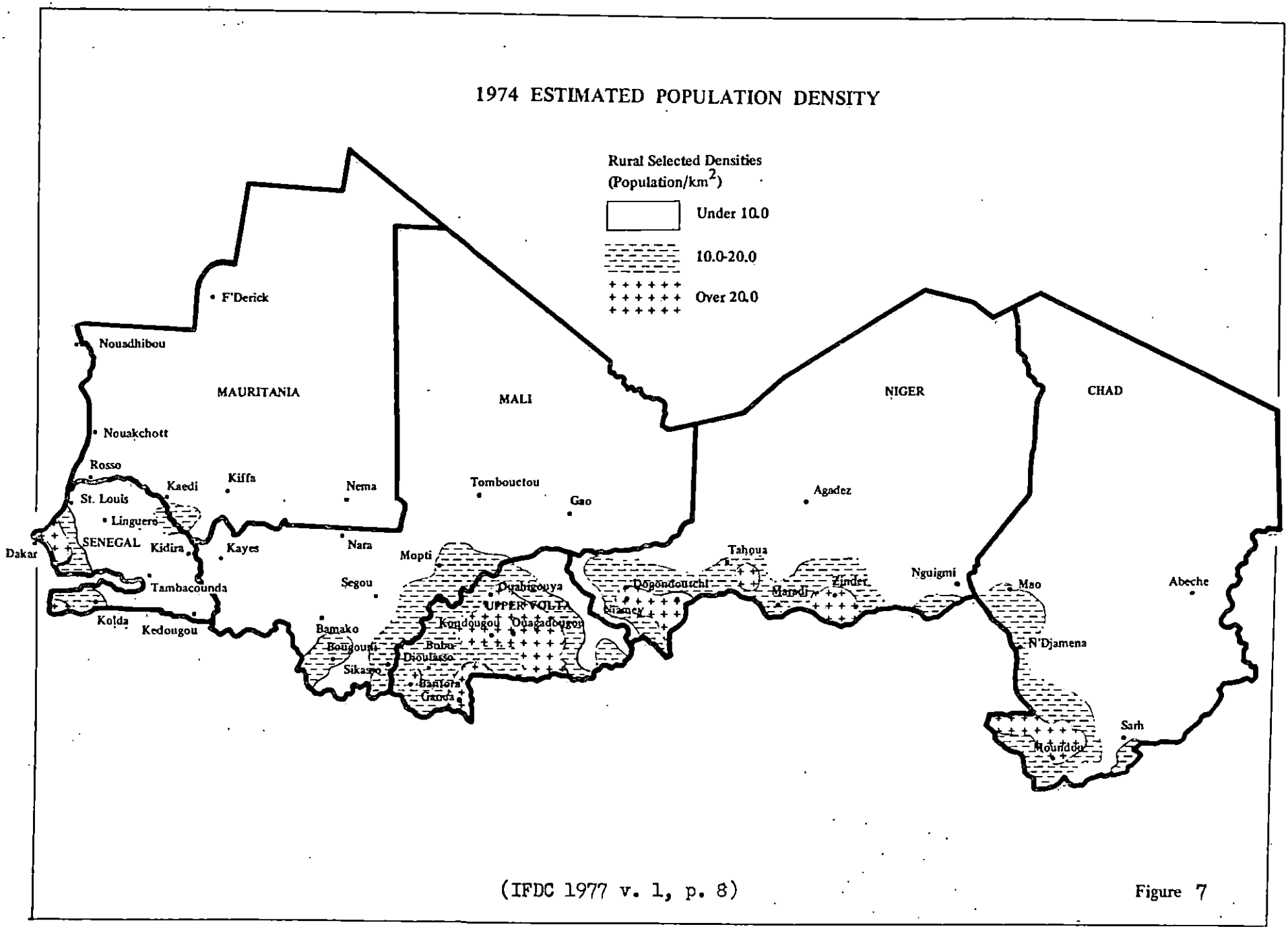

(IFDC 1977 v. 1, p. 3)

Figure 5



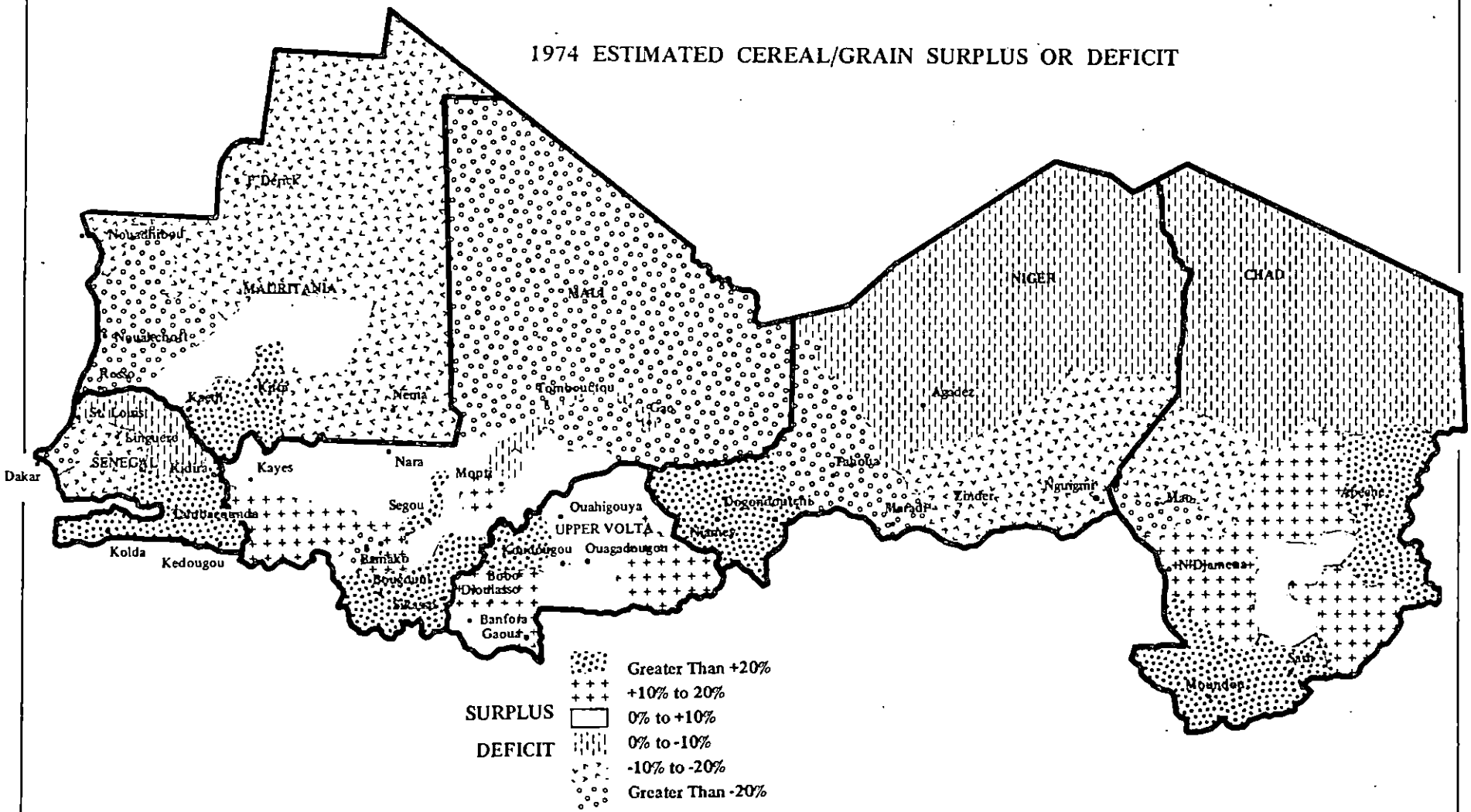

(IFDC 1977 v. 1, p. 4)

Figure 6



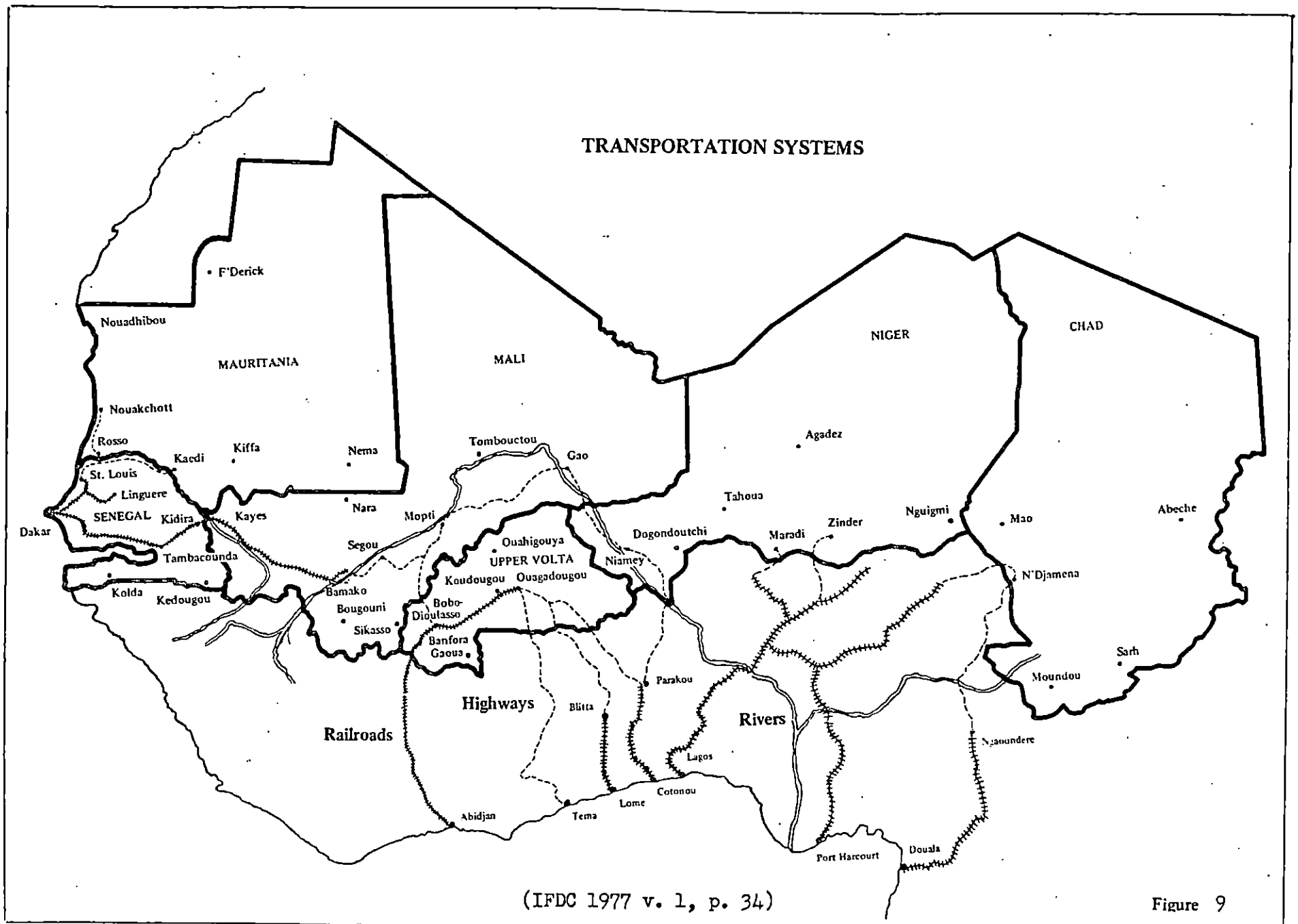

(IFDC 1977 v. 1, p. 8)

Figure 7




(IFDC 1977 v. 1, p. 11)

Figure 8




(IFDC 1977 v. 1, p. 34)

Figure 9

Table 7 Per Capita Income and Gross Domestic Product of Countries in the Sahelian Region (4, 5)

| Income or GDP | Chad | | Mali | | Mauritania | | Niger | | Senegal | | Upper Volta | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 |
| Per capita income, (total), $ | 84 | 66 | 55 | 46 | 90 | 152 | 78 | 86 | 217 | 189 | 38 | 56 |
| Per capita income, (farmer), $ | 48 | 36 | 34 | 22 | 60 | 58 | 56 | 54 | 101 | 73 | 27 | 28 |
| Per capita income, (nonfarmer), $ | 774 | 373 | 241 | 300 | 364 | 830 | 378 | 422 | 583 | 602 | 131 | 274 |
| GDP (1974), million $ | 300 | | 400 | | 300 | | 400 | | 1,100 | | 400 | |

(IFDC 1977 v. 1, p. 6)

Table 8 Estimated Population, Characteristics in the Six Sahelian Countries (5)

| | Chad | Mali | Mauritania | Niger | Senegal | Upper Volta |
|---|---|---|---|---|---|---|
| Population density, person/km$^2$ | 3.3 | 4.6 | 1.3 | 3.6 | 22.7 | 22.1 |
| 1975 population | | | | | | |
| Total, 1,000 persons | 4,199 | 5,668 | 1,330 | 4,579 | 4,452 | 6,058 |
| Rural, % of total | 86.1 | 86.5 | 89.0 | 90.6 | 71.6 | 91.7 |
| Urban, % of total | 13.9 | 13.5 | 11.0 | 9.4 | 28.4 | 8.3 |
| Agricultural, % of total | 89.3 | 89.6 | 85.9 | 88.5 | 75.0 | 87.1 |
| 1975-80 growth rate, % year | | | | | | |
| Total | 2.9 | 2.7 | 2.7 | 2.9 | 2.7 | 2.6 |
| Rural | 2.2 | 2.4 | 2.3 | 2.6 | 2.0 | 2.3 |
| Urban | 6.7 | 4.9 | 5.6 | 5.6 | 4.4 | 5.4 |
| Agricultural | 2.4 | 2.3 | 2.2 | 2.2 | 1.8 | 2.0 |
| Nonagricultural | 7.0 | 6.0 | 5.8 | 7.9 | 5.4 | 6.0 |
| 1975 active population | | | | | | |
| Active total, 1,000 persons | 1,475 | 3,097 | 409 | 1,429 | 1,903 | 3,299 |
| Active total, % of total | 35.1 | 54.6 | 30.8 | 31.2 | 42.7 | 54.5 |

(IFDC 1977 v. 1, p. 7)

Table 9 Average Crop Yields, 1970-1974 (7)

| Crop | Chad | Mali | Mauritania | Niger | Senegal | Upper Volta |
|---|---|---|---|---|---|---|
| | | | -kg/ha- | | | |
| Wheat | 1,684 | 1,333 | 287 | 878 | - | - |
| Rice paddy | 732 | 953 | 951 | 2,056 | 1,097 | 889 |
| Maize | 946 | 819 | 571 | 588 | 849 | 686 |
| Millet | 534 | 551 | 254 | 390 | 474 | 382 |
| Sorghum | - | - | - | 466 | - | 476 |
| Cowpeas | - | - | 281 | 106 | 282 | 254 |
| Peanut in shell | 588 | 602 | 500 | 559 | 719 | 439 |
| Seed cotton | 370 | 808 | - | 456 | 1,088 | 377 |

(IFDC 1977 v. 1, p. 13)

**Table 10 - Production and Potential Deficits of Major Cereals in the Sahelian Countries Based Upon 1970 Per Capita Consumption (5, 7)**

| Country | Average Production, 1,000 mt | | | Increases Over 1974 Production Needed to Meet Population Requirements, 1,000 mt | | |
|---|---|---|---|---|---|---|
| | 1961-65 | 1970-74 | 1974 | 1980 | 1985 | 1990 |
| | | | Millet/Sorghum | | | |
| Chad | 895 | 497 | 528 | 321 | 449 | 596 |
| Mali | 782 | 645 | 600 | 431 | 595 | 791 |
| Mauritania | 93 | 53 | 30 | 139 | 164 | 193 |
| Niger | 830 | 766 | 800 | 179 | 339 | 532 |
| Senegal | 482 | 459 | 500 | 33 | 111 | 202 |
| Upper Volta | 814 | 769 | 620 | 373 | 512 | 677 |
| Total | 3,896 | 3,189 | 3,078 | 1,476 | 2,170 | 2,991 |
| | | | Rice (Paddy) | | | |
| Chad | 29 | 37 | 37 | 22 | 31 | 41 |
| Mali | 170 | 161 | 200 | - | - | 22 |
| Mauritania | 1 | 1 | 1 | 43 | 50 | 58 |
| Niger | 11 | 37 | 43 | - | 7 | 15 |
| Senegal | 100 | 79 | 95 | 390 | 461 | 545 |
| Upper Volta | 34 | 32 | 25 | 23 | 30 | 38 |
| Total | 345 | 347 | 401 | 478 | 579 | 719 |
| | | | Maize | | | |
| Chad | 11 | 7 | 7 | 5 | 7 | 9 |
| Mali | 80 | 77 | 87 | 39 | 59 | 83 |
| Mauritania | 4 | 4 | 3 | 3 | 4 | 5 |
| Niger | 3 | 2 | 3 | - | - | 1 |
| Senegal | 32 | 34 | 40 | 49 | 62 | 78 |
| Upper Volta | 100 | 58 | 50 | 32 | 46 | 58 |
| Total | 230 | 182 | 190 | 128 | 178 | 234 |

(IFDC 1977 v. 1, p. 13)

Table 11 Imports and Exports of Agricultural Products (6)

| Country | | Value, $1,000 | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 |
| Chad | Imports | 10,510 | 13,440 | 12,080 | 15,350 | 19,260 | 28,180 |
| | Exports | 36,720 | 35,530 | 36,740 | 44,280 | 51,160 | 59,440 |
| Mali | Imports | 14,290 | 12,420 | 18,460 | 21,000 | 39,970 | 72,830 |
| | Exports | 21,930 | 31,730 | 32,300 | 40,820 | 40,050 | 42,680 |
| Mauritania | Imports | 12,030 | 12,700 | 14,220 | 16,180 | 21,760 | 39,230 |
| | Exports | 17,520 | 18,600 | 17,600 | 19,110 | 18,320 | 19,930 |
| Niger | Imports | 6,880 | 7,480 | 7,190 | 10,380 | 13,500 | 42,940 |
| | Exports | 34,990 | 41,000 | 37,330 | 49,890 | 36,650 | 25,310 |
| Senegal | Imports | 82,410 | 68,950 | 76,200 | 82,980 | 139,960 | 211,080 |
| | Exports | 77,740 | 90,370 | 55,250 | 126,950 | 91,300 | 145,180 |
| Upper Volta | Imports | 11,980 | 12,880 | 11,890 | 15,120 | 17,730 | 26,330 |
| | Exports | 24,040 | 24,130 | 21,530 | 22,870 | 27,840 | 39,180 |

(IFDC 1977 v. 1, p. 7)

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# INTRODUCTION

This survey of local ecology, population, and ethnic groups in Upper Volta was prepared as a working paper of the Purdue University/ SAFGRAD Upper Volta Farming Systems Unit, for the use of Farming Systems Unit staff. Other working papers cover the organization of agriculture in Upper Volta (number 1) and the Mossi farming system (number 3).

Several useful bibliographies provide access to the scholarly literature on Upper Volta, such as those of Izard (Bibliographie Generale de la Haute Volta, 1967), the African Bibliographic Center (French-Speaking West Africa: Upper Volta Today, 1960-1967: a Selected and Introductory Bibliographical Guide, 1968) and McFarland (Historical Dictionary of Upper Volta, 1978). Tauxier's Le Noir du Soudan (1912) is a classic early work. For land tenure information, Boutillier's "Les Structures fonciers en Haute Volta" (1964) is a good starting point.

Historically-minded researchers should note that the present-day nation of Upper Volta was incorporated into the Colonie du Haut-Senegal-et-Niger in 1904. Haute-Volta became a territoire d'outre-mer in 1919, but in 1932 its territory was divided between the Soudan francais (today's Mali), Niger, and the Cote d'Ivoire. Haute-Volta was reunited in 1947 as a part of the AOF, keeping that status until independence.

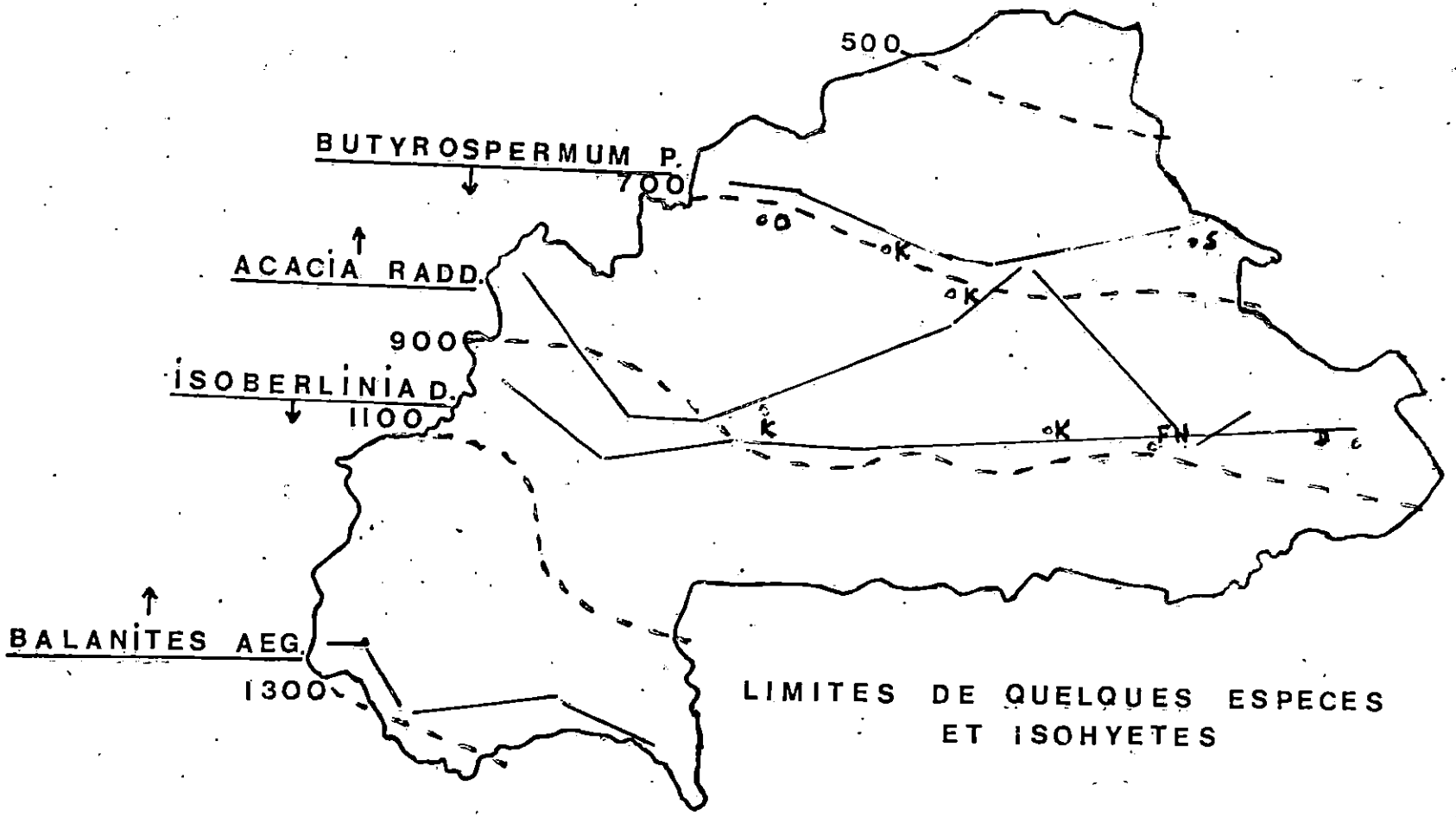
Local Ecology

Ecological conditions are of self-evident interest for any discussion of the agricultural potential of Upper Volta. As Paul Christensen has warned, in some ecological settings returns to improved agricultural practices are very likely to be marginal at best (P. Christensen to T.K. White, 2 April 1979). Here we provide a brief summary of soil types, rainfall regime, and vegetation zones, following the work of M. Terrible (1978) and others.

Upper Volta consists primarily of an extensive plateau sloping downward to the south, at elevations of 650 to 1,000 feet above sea level. The three Volta rivers (Volta Noire, Volta Rouge, and Volta Blanche) are the main rivers; they cut across the country and eventually join to the south, in Ghana, to form the Volta River, subject of the Lake Volta development scheme (Guiguemde 1975:1018). Climate is Sudanic in the south, where rainfall reaches a high of about 1300 mm in the extreme southwest, and Sahelizn in the north, with the 500 mm isohyte crossing the northeast (see Figure 1 ). Rainfall is concentrated in the usual three to four month West African rainy season, roughly from June until September. Some of the fertile river-basin areas along the Volta Rivers were less densely populated than the less-fertile Mossi Plateau in central and northen Upper Volta; this has been attributed to the prevalence of the fly Simulium damnosum, which is the vector for onchocerciasis (river blindness). The Volta Valley Authority (AVV) was created to organize a controlled settlement scheme on some of these lands following the WHO onchocerciasis eradication program; previous inhabitants have therefore lost land rights to the Voltaic government in areas placed under the AVV.

M. Terrible has suggested that Upper Volta can be divided into five major vegetation zones which reflect the interaction of soil type, rainfall and climate, and human and livestock populations (Terrible 1978). He describes the zones as follows:

Figure 1. Upper Volta - Isohytes and Limits of Certain Trees




(M. Terrible 1978: map)

1. zone nord: "formations claires ou herbeuses avec strate ligneuse haute claire a Acacia raddiana et Balanites aegyptiaca." (open or grassy formations with scattered trees characterized by Acacia raddiana and Balanites aegyptiaca).

2. zone centre-nord: "formations herbeuses ou ligneuses hautes claires ou complexes a Balanites aegyptiaca." (grassy or open woody formations or complex formations, characterized by Balanites aegyptiaca).

3. zone centre: "formations ligneuses hautes claires ou complexes a Butyrospermum paradoxum" (karite or shea butter tree). (Open woody or complex formations characterized by Butyrospermum paradoxum.).

4. zone centre-sud: "formations ligneuses hautes claires a Parkia biglobosa et Butyrospermum paradoxum." (Open woody formations characterized by Parkia biglobosa (nere) and Butyrospermum paradoxum (shea tree).).

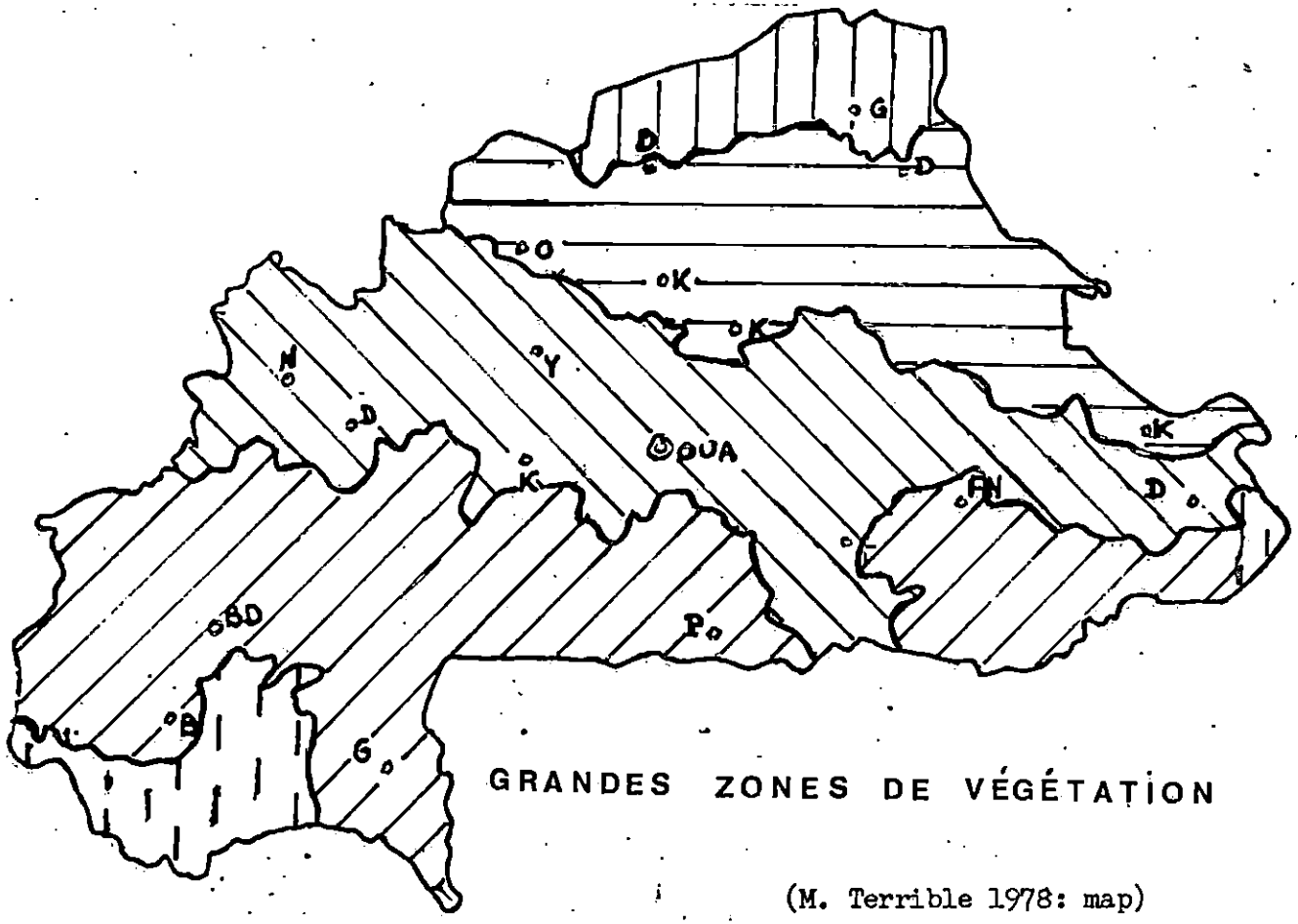
5. zone sud: "formations ligneuses hautes claires ou denses a Isoberlinia doka." Open or heavy woody formations characterized by Isoberlinia doka.

These vegetation zones are indicated in Figure 2, and actual land use is shown in Figure 3; for comparison, Figure 4 indicates ORD boundaries.

Terrible also describes nine major soil types found in Upper Volta (Ibid.: 5-6):

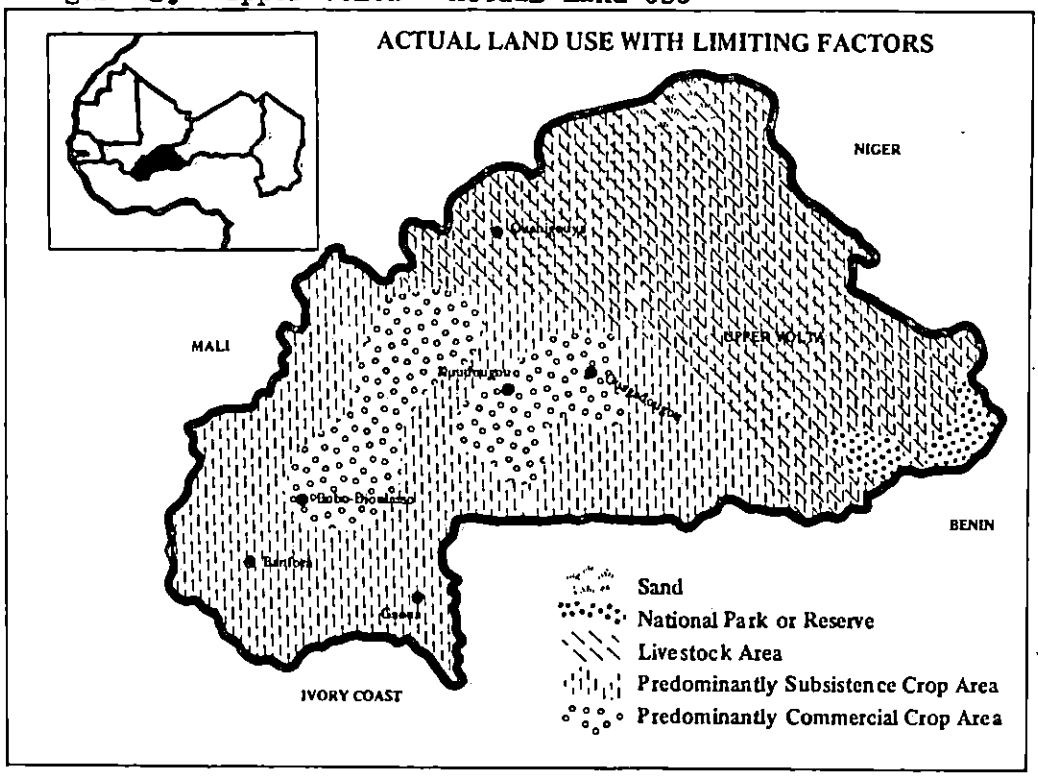
1. Sols ferrugineux tropicaux (tropical ferruginous soils)
2. sols gravillonnaires
3. cuirasses ferrugineuses
4. sols sableux eoliens (sandy eolien soils)
5. sols halomorphes (halomorphic soils)
6. sols riches en humus: bruns isohumiques
   vertisols riche en argile gonflante
7. lithosols (for example, around granite rocks)
8. sols squelétiques (badly washed out or leached)
9. sols hydromorphes

Figure 2 Upper Volta - Major Vegetation Zones

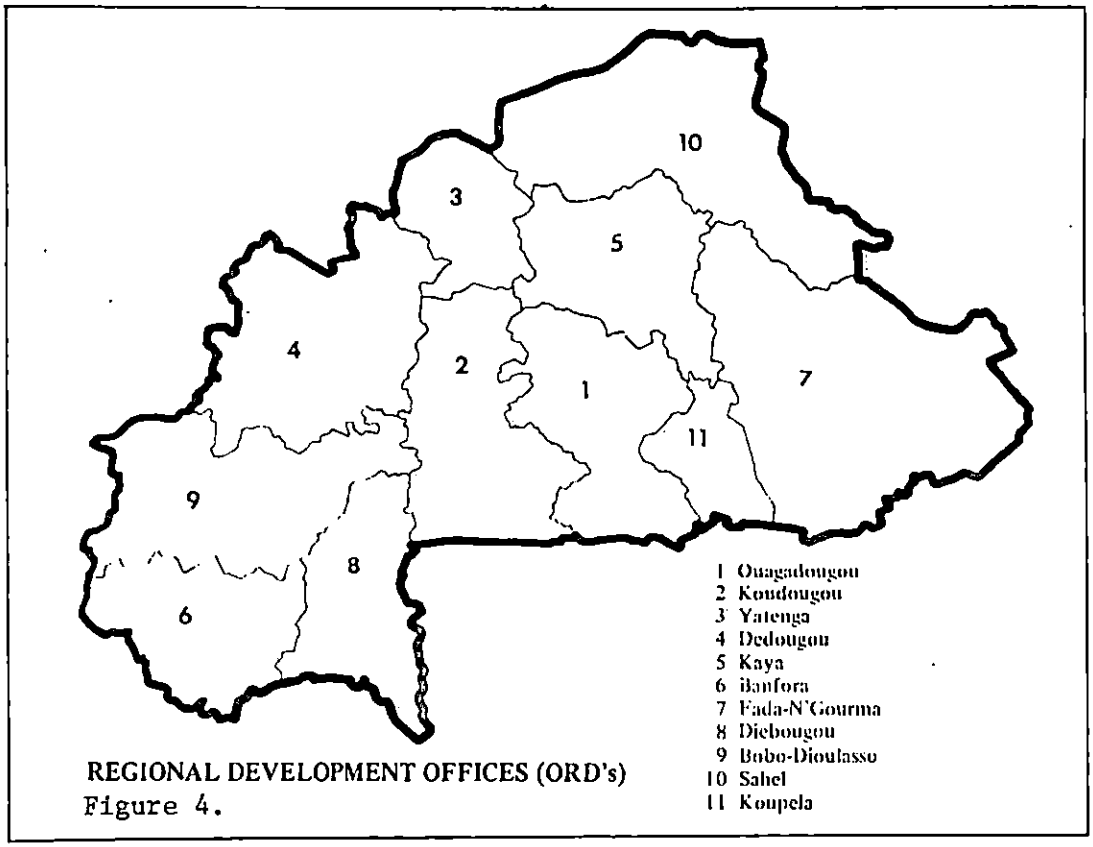



(M. Terrible 1978: map)

Figure 3. Upper Volta - Actual Land Use




(IFDC 1977 v. 4, p. 18)




REGIONAL DEVELOPMENT OFFICES (ORD's)
Figure 4.

(IFDC 1977 v.4, p. 18)

One important characteristic of the soil in many regions, such as Yatenga in the Mossi Plateau, is its fragility. Under traditional Mossi cultivation, topsoil may disappear completely from the fields closest to the compound, leaving a "useless lateritic pan" which cannot be farmed at all (Hammond 1966:28). When this occur, fields are left fallow and new fields are cleared; adequate fallowing may require 10-15 years or more. This is related both to farming techniques and to the soils themselves, which the IFDC has described in these terms:

> Most soils are classified as ferruginous tropical. Sands covered by laterite crusts are extensive in the northeast, southwest, and central regions. Soils of southern and eastern Upper Volta were developed from granite, gneisses, and schists. (IFDC 1977 v. 4, pp. 1-2).

Christensen has proposed the following division of Upper Volta into ecological zones for the purposes of the SAFGRAD Farming Systems Unit:

| Site to represent zone | Supporting Rural Survey | Institution Field Exp. |
|---|---|---|
| Dori or Aribinda | | |
| 2. Tougor or Boganda | | |
| 3. Ouahigouya | FED | FED |
| 4. Ziniare or Kaya | Purdue | ICRISAT |
| 5. Saria | IRAT | IRAT |
| 6. Nouna | | German Phosphate Inst. |
| 7. Fada N'Gourma | Michigan | Michigan? |
| 8. Hounde | | IRCT (?) |
| 9. Pama | | |
| 10. Manga | Purdue & AVV | AVV |
| 11. Kampti | | |
| 12. Banfora | | |

(P. Christensen to J. Collom, March 1979)

Of these, he considered the second group as the area of primary interest to SAFGRAD.

The IFDC estimated that there were some 510,000 farms in Upper Volta in the mid-1970's (1977 v. 4, p. 14), and hence arrived at an average estimated farm size of 5.26 ha/farm (Ibid.). Crop production potential was summarized:

> Upper Volta has about 8.9 million ha of potential cropland. Of the potential cropland, 4 % receives less than 350 mm of rainfall/year, 28 % from 350 to 600 mm, 29 % from 600 to 800 mm, and 39 % more than 800 mm. Around 2,4 to 2.7 million ha or less than 30 % of the potential cropland is cultivated annually. FAO estimates a potential for irrigation of 190,000 ha. Presently 4,000 ha is under partial irrigation or uncontrolled flooding. Irrigated land is increasing at a rate of around 400 ha/year. (Ibid, 11, 14).

The total area of Upper Volta is about 274,000 $km^2$ (about 106,000 $mi^2$). Of this total, about 8.2 % (about 22,214,000 ha) is under cultivation in a given year (compare IFDC 1977 v. 4, p. 10 with Ibid., pp. 11,14). The proportion of cultivated land varies from a low of 0.4 % (ORD du Sahel in the northeast) to a high of 17.8 % (Yatenga ORD in the center of Mossi country) (see Table 6, p. 13 above). The IFDC estimates that about 8,9 ha are potentially cultivable, as noted above, and that less than 30 % of this area cultivated in any given year.

The estimated area planted in cereals, peanuts, and cotton, by ORD, is shown in Table 1 below. As the figures indicate, cotton achieves greater importance in Bobo-Dioulasso and Dedougou ORD's than elsewhere. Peanuts are found everywhere except in the extreme northeast, but achieve their greatest importance in the centrally-located ORD's of Kaya, Koupela, and Ouagadougou. Cereals occupy the greatest proportion of cultivated land throughout the country, as expected.

Table 1. Estimated Total Cropped Area and Area of Major Crops for ORD's in Upper Volta (11, 12, 16)

| Region and ORD | Estimated Cropped Area, 1,000 ha | | | |
|---|---|---|---|---|
| | Total | Cereal | Peanuts | Cotton |
| Western | | | | |
| Bobo-Dioulasso | 150 | 105 | 11 | 20 |
| Dedougou | 240 | 200 | 11 | 16 |
| Diebougou | 200 | 140 | 16 | 4 |
| Banfora | 90 | 70 | 8 | – |
| Central | | | | |
| Ouagadougou | 490 | 390 | 15 | 4 |
| Yatenga | 220 | 205 | 9 | – |
| Kaya | 290 | 240 | 22 | 9 |
| Koudougou | 430 | 345 | 8 | 8 |
| Koupela | 130 | 100 | 18 | – |
| Eastern | | | | |
| Sahel | 140 | 130 | – | – |
| Fada n'Gourma | 190 | 155 | 17 | – |
| | 2,570 | 2,080 | 135 | 61 |

(IFDC 1977 v. 4, p. 19)

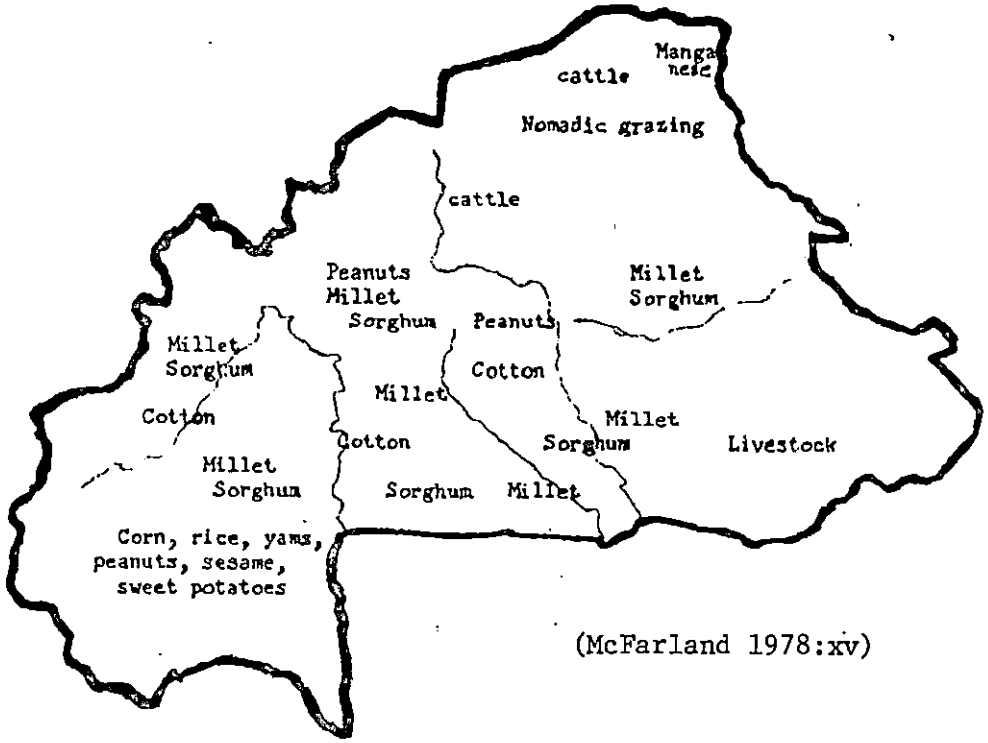
Table 2. Trends of Crop Production, Upper Volta (5)

| Crop | Production, 1,000 mt | | | | | |
|---|---|---|---|---|---|---|
| | 1961-65 | 1970 | 1971 | 1972 | 1973 | 1974 |
| Cereals, total | 956 | 1,032 | 881 | 871 | 829 | 699 |
| Rice paddy | 34 | 34 | 37 | 30 | 32 | 25 |
| Maize | 100 | 55 | 66 | 59 | 58 | 50 |
| Millet | 300 | 378 | 277 | 266 | 253 | 220 |
| Sorghum | 514 | 563 | 493 | 512 | 481 | 400 |
| Roots and tubers | 88 | 94 | 94 | 90 | 65 | 60 |
| Sweet potatoes | 35 | 34 | 34 | 32 | 20 | 20 |
| Cassava | 31 | 30 | 30 | 30 | 20 | 20 |
| Yams | 23 | 30 | 30 | 28 | 25 | 20 |
| Pulses | 138 | 135 | 125 | 120 | 100 | 95 |
| Cowpeas, dry | 71 | 65 | 60 | 60 | 50 | 55 |
| Groundnuts in shell | 59 | 68 | 66 | 60 | 63 | 40 |
| Sesame seed | 4.7 | 6.3 | 4 | 5.6 | 5 | 4.5 |
| Seed cotton | 7 | 32 | 45 | 35 | 28 | 24 |
| Cottonseed | 4.2 | 20.2 | 18 | 20 | 14.7 | 12 |
| Cotton lint | 2.3 | 10.9 | 10 | 12 | 9.8 | 8 |
| Tomatoes | 14 | 16 | 15 | 17 | 17 | 12 |
| Tobacco leaves | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.6 |

(IFDC 1977 v. 4, p. 14)

Recent trends in total crop production from 1961 through 1974 are shown in Table 2, which includes rice, maize, millet, and sorghum individually along with sweet potatoies, cassava, yams, cowpeas, peanuts, sesame seed, cotton, tomatoes, and toabcco. The IFDC also offers the yield and total production figures for Upper Volta found in Table 3. The sketch map below (Figure 5), reproduced from McFarland (1978:xv:), visualizes the relationship between ecological zones and major products of the various regions of Upper Volta.

Figure 5. Chief Products of Upper Volta by Region




(McFarland 1978:xv)

Table 3. Cropped Area, Yield and Production in Upper Volta (5)

| Crop | Area Harvested 1,000 ha | Yield kg/ha | Production 1,000 mt |
|---|---|---|---|
| | | -1961-1965 | |
| Cereals, total | 1,954 | 490 | 956 |
| Rice paddy | 45 | 756 | 34 |
| Maize | 160 | 624 | 100 |
| Millet | 728 | 412 | 300 |
| Sorghum | 999 | 514 | 514 |
| Sweet potatoes | 17 | 2,108 | 35 |
| Cassava | 6 | 5,500 | 31 |
| Cowpeas, dry | 301 | 235 | 71 |
| Groundnuts in shell | 111 | 526 | 59 |
| Sesame seed | 20.2 | 235 | 4.7 |
| Seed cotton | 42 | 160 | 7 |
| Tomatoes | 2 | 6,204 | 14 |
| Onions, green | <1 | 15,019 | 5 |
| | | -1970-1974 | |
| Cereals, total | 1,890 | 456 | 862 |
| Rice paddy | 36 | 889 | 32 |
| Maize | 84 | 686 | 58 |
| Millet | 731 | 382 | 279 |
| Sorghum | 1,030 | 476 | 490 |
| Sweet potatoes | 12.4 | 2,258 | 28 |
| Cassava | 5 | 5,200 | 26 |
| Cowpeas, dry | 240 | 254 | 61 |
| Groundnuts in shell | 135 | 439 | 59 |
| Sesame seed | 29.5 | 173 | 5.1 |
| Seed cotton | 87 | 377 | 32.8 |
| Tomatoes | 3.3 | 4,691 | 15.4 |
| Onions, green | <1 | 13,339 | 5.4 |

(IFDC 1977 v. 4, p. 13)

Population

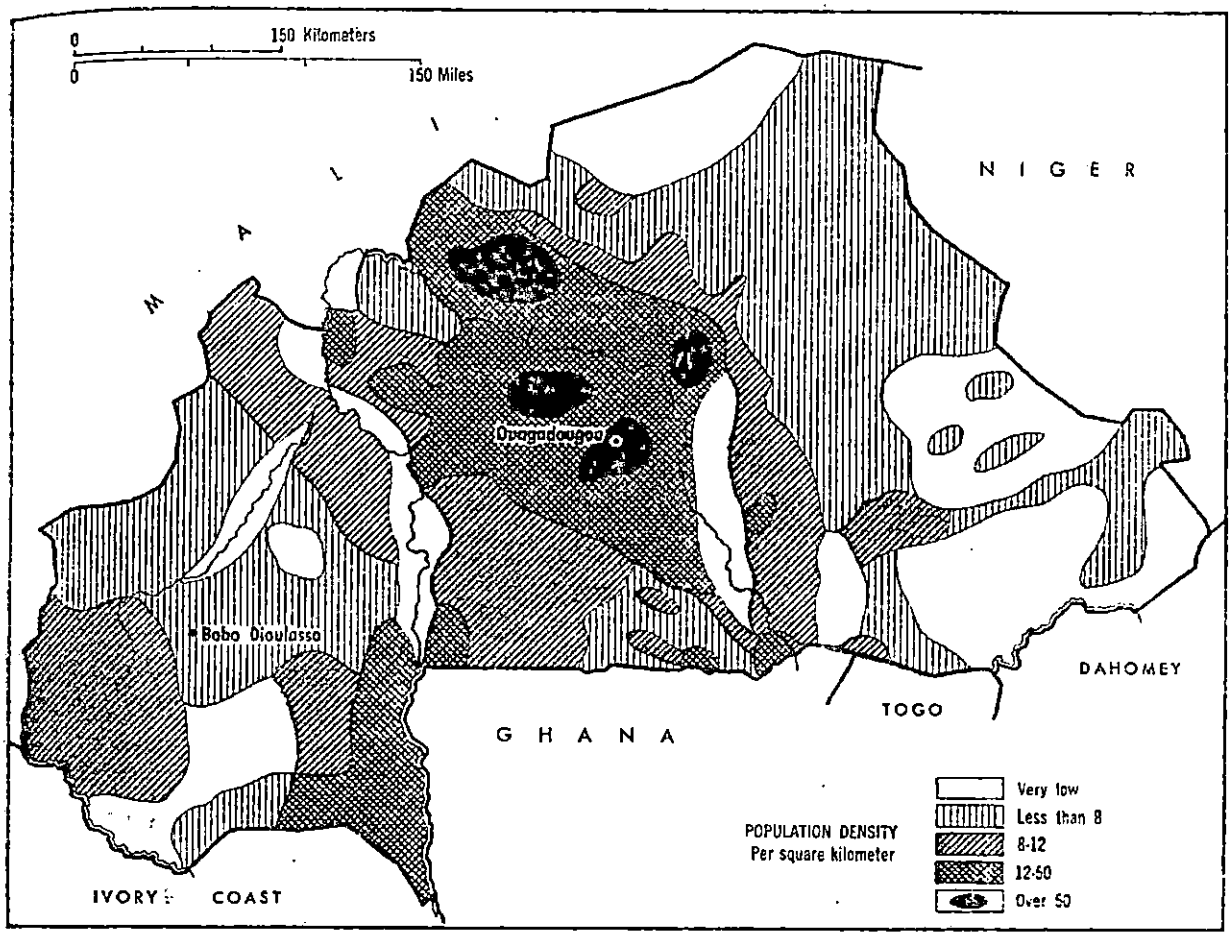
Although a new census of Upper Volta was taken in 1975, reports from the 1975 census are not generally available as of this writing. Thus the 1960 census remains the basic source of information on the population of Upper Volta, along with various estimates of interim population growth. Courel and Pool (1975) offer a good discussion of the population based on the 1960 census and other sources, while the IFDC report (1977 v. 4) provides some estimated updated information.

Among the significant features of the human population of Upper Volta are 1) the striking differences in population density by region; 2) the expected dominance of rural over urban population, typical of Africa; and 3) the bottom-heavy age pyramid, which is also typical of African populations which tend to be experiencing high fertility and rapid growth (outside of a low-fertility belt which involves Cameroon, Chad, etc. but does not affect Upper Volta.

Figure 6 below illustrates the uneven distribution of population. The total population estimated by the IFDC at 6,883,000 in 1980 (1977 v. 4, p. 3). Average population densities, shown in Table 4, range from lows of 7.0/km$^2$ (Sahel ORD) and 6.0/km$^2$ (Fada ORD) to highs of 27.8/km$^2$ or more in each of the five central ORD's. The highest densities are found in the ORD's of Koupela (30.2/km$^2$), Ouagadougou (35.1/km$^2$), and Yatenga (43.2/km$^2$), which are all part of the central Mossi area.

Some 90-92 % of the population was estimated to be rural during the 1970's. Table 5 draws on population information in conjunction with agricultural productivity to reach estimates of food consumption in kilograms per capital per year, given estimated rates of population growth.

Figure 6. Population Density in Upper Volta.




MAP 13. Population density map of Upper Volta, 1960-1961. (After I.N.S.E.E.)

(Hance 1970:81)

Table 4. **Estimated Distribution of Population of Upper Volta by Region, 1972 (4)**

| Region and ORDs | Population, 1,000 | Density, No./km$^2$ |
|---|---|---|
| Western | | |
| Bobo-Dioulasso | 326.4 | 11.5 |
| Dedougou | 479.4 | 16.2 |
| Diebougou | 360.0 | 20.6 |
| Banfora | 180.0 | 9.8 |
| Central | | |
| Ouagadougou[a] | 847.6 | 35.1 |
| Yatenga | 531.5 | 43.2 |
| Kaya | 592.6 | 27.8 |
| Koudougou[a] | 719.3 | 27.9 |
| Koupela | 272.6 | 30.2 |
| Eastern | | |
| Sahel | 259.6 | 7.0 |
| Fada n'Gourma[a] | 287.1 | 6.0 |
| TOTAL | 4,856.1 | 17.9 |

[a]Without city population.

(IFDC 1977 v. 4, p. 4)

Table 5. Estimated Levels of Food Consumption for Upper Volta (3)

| Commodity | Estimated Consumption, kg/capita/year[a] | | | | |
|---|---|---|---|---|---|
| | 1970 | 1975 | 1980 | 1985 | 1990 |
| Millet/sorghum | 129.8 | 130.8 | 131.0 | 130.7 | 129.7 |
| Rice | 4.1 | 4.3 | 4.5 | 4.7 | 4.9 |
| Wheat | 4.3 | 4.6 | 4.9 | 5.2 | 5.5 |
| Maize | 10.8 | 11.0 | 11.2 | 11.6 | 11.8 |
| Yam | 3.9 | 3.9 | 3.9 | 4.0 | 4.0 |
| Sweet potato | 5.0 | 5.1 | 5.2 | 5.2 | 5.3 |
| Cassava | 4.6 | 4.7 | 4.7 | 4.8 | 4.8 |
| Beans/peas | 20.2 | 20.6 | 21.1 | 21.5 | 21.9 |
| Vegetables | 11.7 | 12.1 | 12.5 | 12.9 | 13.3 |
| Peanut | 5.8 | 5.8 | 5.9 | 6.0 | 6.1 |
| Sugar | 2.0 | 2.3 | 2.5 | 2.8 | 3.0 |
| Fruit | 6.1 | 6.3 | 6.4 | 6.5 | 6.6 |
| Meat | 9.1 | 9.7 | 10.3 | 10.9 | 11.7 |
| Fish | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 |

[a]Figures for 1970 are estimated actual consumption and others are based upon an elasticity of demand.

(IFDC 1977 v. 4, p. 5)

As Table 6 indicates, the IFDC predicted that the urban population would increase by about 5 % per year from 1975 through 1990, while the population as a whole is expected to grow about half as rapidly. The rapid overall population growth, roughly 2.5 % per year, reflects the age distribution, which is shown in Table 7 below. More than half (54 %) of the population are in the two categories which can be expected to include most of the active working population, ages 15-39 and 40-64. Some 18 % of the population is made up of children under age five; only 3 % of those reported are classified as over age 64. It remains to be seen how these estimates compare with the results of the 1975 census when they are eventually released.

Table 6. Estimated Population and Growth Rates in Upper Volta (3)

| Section of Population | 1970 | 1975 | 1980 | 1985 | 1990 |
|---|---|---|---|---|---|
| Total, 1,000 persons | 5,384 | 6,058 | 6,883 | 7,850 | 8,993 |
| Rural, % of total | 92.8 | 91.7 | 90.5 | 89.2 | 87.7 |
| Growth rate preceding 5 years | | | | | |
| Total, %/year | | 2.4 | 2.6 | 2.7 | 2.7 |
| Rural, %/year | | 2.2 | 2.3 | 2.3 | 2.4 |
| Urban, %/year | | 5.3 | 5.4 | 5.4 | 5.4 |
| Growth rate of active population preceding 5 years | | | | | |
| Total, %/year | | 1.9 | 2.1 | 2.2 | 2.3 |
| Rural, %/year | | 1.5 | 1.6 | 1.7 | 1.7 |
| Urban, %/year | | 4.9 | 5.0 | 4.9 | 5.1 |

(IFDC 1977 v. 4, p.3)

Table 7. Estimated Distribution of Population of Upper Volta by Age Groups (4)

| Age Group, Years | Population, 1,000 | Population, % of Total |
|---|---|---|
| Under 4 | 958 | 18 |
| 5-14 | 1,353 | 25 |
| 15-39 | 2,098 | 38 |
| 40-64 | 870 | 16 |
| Over 65 | 147 | 3 |

(IFDC 1977 v. 4, p. 4)

Survey of Voltaic Ethnic Groups

The peoples of Upper Volta offer a rich and complex array of ethnic groups. Indeed it is difficult to establish a definitive listing of Voltaic ethnic groups, as available sources differ in the degree of detail they offer and in the classification into major units versus subgroups which is used. This discussion draws on Balima 1969, Courel and Pool 1975, Finnegan 1978, Gingess 1978, Guiguemde 1975, Holmes 1978, IFDC 1977 V. 4, McFarland 1978, Murdock 1959, Skinner 1964, Tauxier 1912, and Urvoy 1942.

The most detailed list of ethnic groups in Upper Volta is given by McFarland in his Historical Dictionary of Upper Volta (1978:xvii-xviii), reproduced as Table 8 below. This includes some 56 named groups under 7 major headings (Mossi, Senufo, Lobi, Ninisi, Habe [Bobo groups], Mande, and Gourounsi), and an additional 7 groups under the heading "other," for 63 groups in all. In 1964 Elliott Skinner included nine groups in his map of Voltaic ethnic groups, reproduced here as Figure 11 (Skinner 1964:frontice-piece). These are the Mossi, Gourma, Busansi, Gurunsi, Lobi, Senufo, Bobo, Samo, and Fulani. McFarland offers another map (Figure 12 below) which includes Mossi, Gurma, Fulani, Lobi, Senufo, Bobo, and such border groups as Tuareg, Songhai, and Zerma as well as some subgroups of these major headings (McFarland 1978:xvi). Virtually every one of the authors cited above classifies Upper Volta's peoples slightly differently.

Nevertheless there is some agreement on major categories. Most of the peoples of Upper Volta may be included in one of two groups, the Voltaic grouping and the Mande grouping, which together account for the majority of the population. This division is utilized by Murdock in his summary Africa: Its Peoples and Their Culture History (1959) and adopted by many other authors.

Table 8. LIST OF MAJOR ETHNIC GROUPS

MOSSI (Mole, Moshi)

Birifor
Gourma (Gourmantché)
Gurensi
Konkomba
Kusasi
Nankana
Ouagadougou
Tallensi
Tenkodogo
Wilé (Wala)
Yatenga
Zandoma

SENUFO

Gouin (Guin)
Karaboro
Komono
Minianka
Nafana
Nanerge
Turka (Tourka)
Tyéfo (Tiéfo)
Wara

LOBI

Dorosie (Dokhosie)
Dyan (Dian)
Gan
Kulango
Tusyan
Vigye

NINISI (Tinguimbissi)

Fulse (Foulse)
Kibsi
Kipirsi
Kurumba (Akurumba)
Lilse
Nioniosse

HABE

Bobó (Bwa)
Bobo Fing (Black Bobo)
Bobo Gbè (White Bobo)
Bobo Oulé (Red Bobo)
Deforo
Nienige

MANDE

Boron
Busansi (Bissa)
Dafing (Marka)
Dioula
Marka
Samo
Samogho
Sia (Sya)

GOUROUNSI

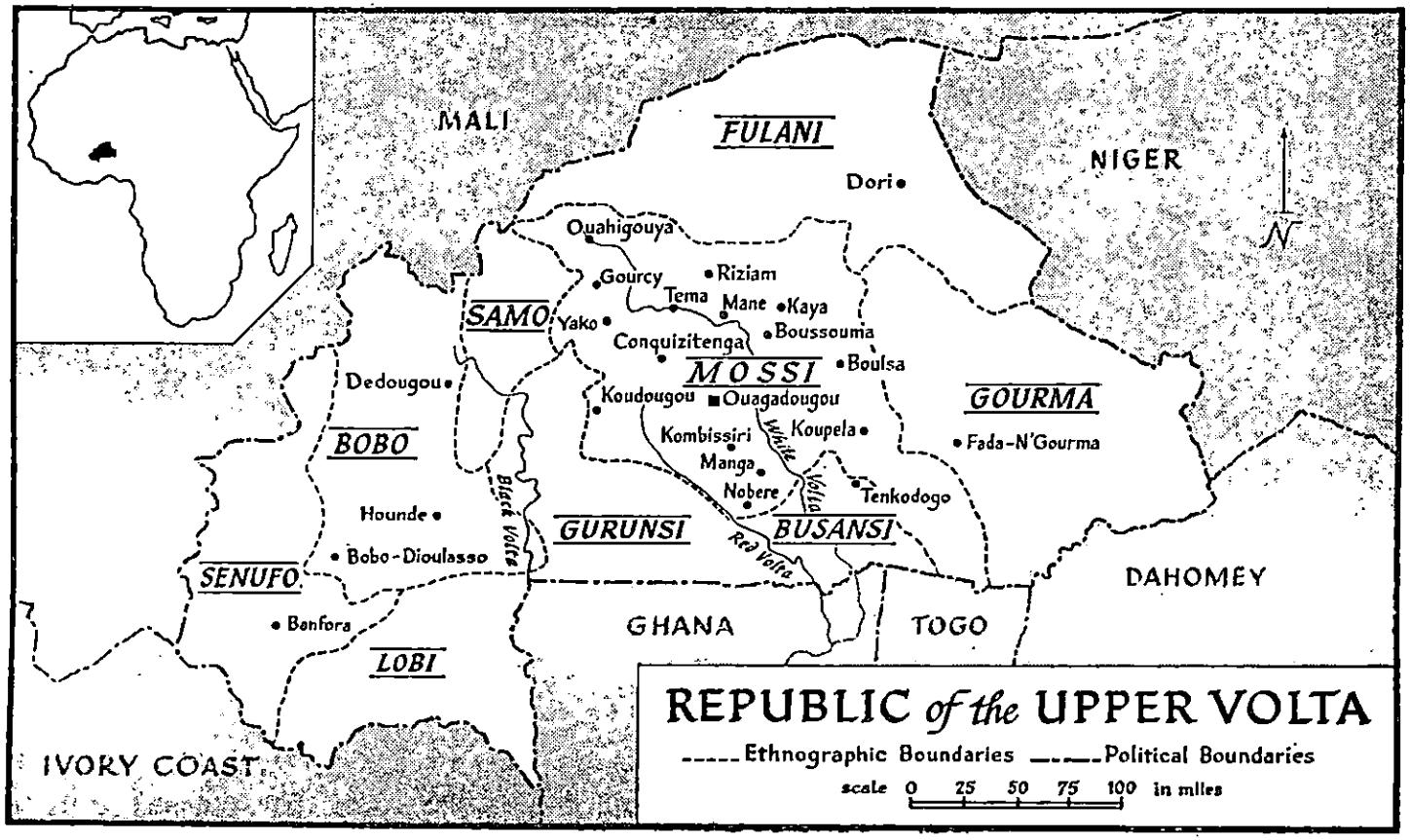
Awuna
Builsa
Dagari
Frafra
Isala
Kasena
Nounouma (Nunuma)
Sissala
Vagala

OTHERS

Fulani (Fulbe, Peul)
Liptako
Silma Mossi
Songhai
Tuareg
Yarsé
Zerma (Zaberma)

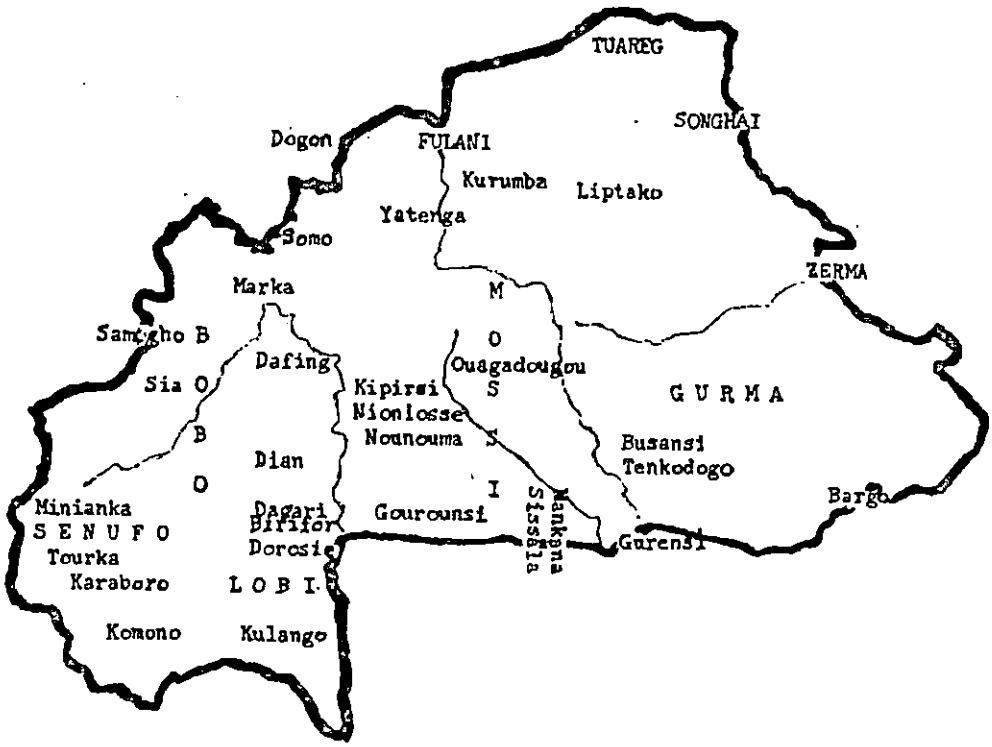
(McFarland 1978:xvii-xviii)

Figure 7. Ethnic Groups of Upper Volta- Map 1.




(Skinner 1964:fronticepiece)

Figure 8. Ethnic Groups of Upper Volta - Map 2.




Map 4. Ethnic Groups

(McFarland 1978:xvi)

Even authors who adopt the Voltaic/Manding breakdown as their starting point group the subunits in different ways and also arrive at divergent population estimates. The latter may at times be accounted for by the former, of course. For example, Balima (1969) and Guiguemde (1975), both presumably using the 1960 census as their starting point for population estimates, differ in ways which cannot be attributed to the difference in dates of publication:

| Group | Balima's pop. est. (1969:15) | Guiguemde's pop. est. (1975:1019) |
|---|---|---|
| A. Voltaic Grouping | | |
| 1. Mossi & related peoples (Gourmantche & Yarse) | 2,500,000 | 3,700,000 |
| 2. Gourounsi | 300,000 | 310,000 |
| 3. Bobo | 300,000 | 300,000 |
| 4. Lobi | 100,000 | 130,000 |
| 5. Dagari* | 60,000 | not listed |
| 6. Birifor* | 60,000 | not listed |
| B. Mande Grouping+ | | |
| 1. Boussansi | 100,000 | 50,000 |
| 2. Samo | 100,000 | 100,000 |
| 3. Marka | 80,000 | 80,000 |
| 4. Dioula | 20,000 | 30,000 |
| 5. Senufo | 120,000 | 50,000 |
| C. Other | | |
| 1. Fulani | not listed | 300,000 |
| 2. Bella | not listed | 250,000 |

*As Table 8 indicates, McFarland classes Dagari as a subgroup of Gourounsi (Gurunsi) and Birifor as a subgroup of Mossi (1978:xvii).

+McFarland groups Busansi (Bissa), Samo, Marka, and Dioula (as well as other groups) under the heading of Mande, and treats Senufo as a major heading in itself (Ibid.:xvii; see Table 8 above).

Working from the 1960 census, Courel and Pool (1975:738) offer figures on the percentage distribution of the population by major ethnic groups rather than actual population figures. Their calculations unfortunately excluded the two largest cities, Ouagadougou and Bobo-Dioulasso. They listed the following:

| | |
|---|---|
| I. Mossi (& related) | 48.0 % |
| II. Bissa /Busansi/ | 4.7 % |
| III. Gourmantche | 4.5 % |
| IV. Bobo | 6.7 % |
| V. Mande (e.g., Marka) | 6.9 % |
| VI. Gourounsi | 5.3 % |
| VII. Senoufo | 5.5 % |
| VIII. Lobi, Dagari | 7.0 % |
| XI. Fulani (Peul) | 10.4 % |
| X. Others | 1.0 % |

By 1977, the International Fertilizer Development Center adopted the following percentage distribution estimates:

| | |
|---|---|
| 1. Mossi | 50 % |
| 2. Gourma | 5 % |
| 3. Gurunsi | 6 % |
| 4. Lobi | 5 % |
| 5. Busansi /Bissa/ | 5 % |
| 6. Senufo | 7 % |
| 7. Western Mande | 16 % |
| 8. Fulani | 5 % |

(IFDC 1977)

As the maps in Figures 7 and 8 indicate, some clustering of ethnic groups by region does occur. Following Skinner's map, the predominate ethnic group or groups in each ORD (Regional Development Organization) are as follows:

Central Region:

| | |
|---|---|
| Ouagadougou | Mossi |
| Yatenga | Mossi |
| Kaya | Mossi |
| Koudougou | Gurunsi |
| Koupela | Busansi /Bissa/ |

Eastern Region:

| | |
|---|---|
| Sahel | Fulani |
| Fada N'Gourma | Gourma /Gourmantche/ |

Western Region:

| | |
|---|---|
| Bobo Dioulasso | Bobo and Senufo |
| Dedougou | Samo |
| Diebougou | Lobi |
| Banfora | Lobi and Senufo |

Even when one group is numerically dominant within an ORD, however, other groups are always present in smaller numbers. For example in the case of Kaya ORD, Fulani, Bissa, and Mossi may all be found either within a single village or in separate settlements within a few kilometers of each other (for examples of such mixture see McMillan 1979, Saul 1979, and Delgado 1979).

The reader should by now be adequately forewarned against any casual decision to select a sample stratified by ethnic group for research in Upper Volta. With the diversity of categories presently in use, it becomes particularly difficult to do any reliable weightings by ethnic group (given the difficulty in determining which subgroups are included in each category in published population figures and percentage distributions). Perhaps some of these problems have been resolved in the yet-unpublished 1975 census of Upper Volta.

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FARMING SYSTEMS RESEARCH UNIT

Working Paper Number 3

# The Mossi Farming System of Upper Volta

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# INTRODUCTION

This discussion of the traditional Mossi farming system of Upper Volta was prepared as a working paper of the Purdue University/ SAFGRAD Upper Volta Farming Systems Unit for the use of Farming Systems Unit staff. Other working papers cover the organization of agriculture in Upper Volta (number 1) and local ecology, population, and ethnic groups (number 2).

As the largest ethnic group of Upper Volta and one of the largest in West Africa, the Mossi have attracted much scholarly attention which provides a wealth of material. Since the three field sites chosen for socioeconomic surveys under the Farming Systems Unit, located at Zorgho, Komboinse, and Ouahigouya, all fall in predominantly Mossi zones, the Mossi farming system is of particular concern for this project.

# The Mossi Farming System

## Introduction

Members of the Mossi ethnic group make up about half the total population of Upper Volta. Including migrants now located in Ghana and the Ivory Coast, the total Mossi population may be as great as four million in 1977 (Finnegan 1978:280 ). Their language, Molé or Moré, is among the Voltaic subfamily of the Niger-Congo language family. The three CRD's of Ouagadougou, Yatenga (centered at Ouahigouya), and Nord Mossi (centered at Kaya) have predominantly Mossi populations, although here as everywhere much ethnic intermixture occurs both between and at times within settlements.

Modern Moré-speaking populations classed today as ethnically "Mossi" are of several different origins. Hammond describes present-day Mossi as an amalgamation of immigrants from the area that is now northern Ghana (Mamprussi and Dagomba ethnic groups) and the earlier or autochthonous peoples they encountered in their northward movement (1966:14). In the Yatenga area, he found that distinct terms were used for indigenous peoples who have assimilated to Mossi ethnicity (known as Nyonyose) and for a group of Muslim Manding origin, the Yarsé (Ibid.:16), who have also assimilated to Mossi but remain Muslim.

Historically the Mossi developed four kingdoms, Yatenga, Ouagadougou, Fada N'Gourma, and Tenkodogo. There are also important Mossi populations in the Kaya and Koudougou areas, but not Mossi states. The Mossi remained independent until they were conquered by the French in 1896.

About a fourth of all Mossi are now Sunni Muslim, most of them converted since the French conquest; some three-fourths remain devotees of traditional Mossi religion (Finnegan 1978:280). The dynamics of

conversion reflect the interplay of religion, social and economic organization, and such forces for change as long and short term labor migration (Lallemand 1977, Hammond 1966). So long as some kinsmen maintain the essential traditional rituals, the conversion of others can be tolerated without great disruption, but Islam may become increasingly important if Islamic law begins to affect customary land rights and other aspects of inheritance.

Units of Production: Mossi Farming Units

Traditional Mossi life is organized around the saka, the group of patrilineal kin who share a single compound. A saka should include all of the male members of the lineage currently living in the community, their unmarried female agnates such as sisters or daughters, and the wives of the married males, who come from other saka groups. The saka includes several extended or joint families and even more nuclear family units (one man, his wife or wives and children). In sum, the saka is a geographically localized segment of a patrilineage. Larger kin groups include the lineage (budu or boodoose) and the clan or booyalengo. (Hammond 1966:114-116 and Broekhuyse n.d., Vol. III, p. 17).

Members of the saka share one very large compound or concession, the zaka, which includes many dwellings and courtyards enclosed by a single wall. When a man marries, he builds a new unit just outside the wall and the wall is extended to surround it, adding his house to the patrilineage unit (Hammond 1966:116). Ideally all of the patrilineally-related men who live in the same village reside in a single zaka. However some men settle in the villages of their maternal kin and live there permanently.

The Mossi settlement pattern may be described as "dispersed settlements in which localized patrilineages or lineage segments dwell within walled compounds about 100 yards apart. Villages are formed of patrilineally related males and their wives who are from other villages" (Finnegan 1978:280). Villages of 600 - 1200 inhabitants are common, with some larger towns (e.g. pre-colonial political capitals); villages include some 40 - 80 zaka units.

Each of the large compounds termed zaka is headed by a zaksoba or chef de concession (compound head). Traditionally all the residents, male and female, of the zaka formed a single unit for agricultural production, working cooperatively under the direction of the zaksoba. As Broekhuyse notes, however, today this is likely to vary with the size of the zaka. The more people it includes, the more likely that smaller production units will have emerged with totally separate economic enterprises (Broekhuyse n.d., Vol. III, pp. 17-18). As he says,

> Aujourd'hui le zaka peut se composer de l'unité de production du zaksoba, de l'unité ou des unités de production de ses frères ou de ses fils, ainsi que des unités de production de personnes individuelles qui, outre qu'ils collaborent à l'une des autres unités, possèdent leurs propres champs. (Ibid., p. 17)

He offers the following summary schema of the organization of Mossi farming units:

> Le zaksoba est le chef de l'enclos et des terres qui y appartiennent et en outre, le chef de l'unité de production.
>
> Le puugsoba, un frère ou un fils, qui dirige independamment une unité de production de plusieurs personnes. Il est le chef de sa famille, de son unité de production, mais il n'est que l'usager des terres du lignage et non le propriétaire; il n'est pas le chef de la communauté, mais seulement le propriétaire de ses maisons et de ses greniers à lui.

> Les béondoba (béonda) sont les hommes et les femmes qui prennent part à la production collective de l'un des puugsoba ou à celle du zaksoba, mais qui, en outre, cultivent leurs propres champs et peuvent disposer librement des fruits de ce travail. (Ibid., p.18)

This raises the question of how one is to define an independent farming unit. Lallemand defined a distinct Mossi farming unit (or unité de production) as "là ou le champ de mil est exploité en vue de la subsistence de son ou de ses cultivateurs. . . ." She continues, "Son role est de subvenir aux besoins élémentaires de ses participants, tout en les dissociant économiquement des autres travailleurs de l'habitation. . ." (1977:49). In sum, an independent farming unit is defined by its responsibility for meeting the subsistance needs of its members. While both zaksoba and puugsoba as described by Broekhuyse meet this test, the béondoba/béonda do not. It is perhaps more instructive to look at Lallemand's own work.

Using the definition just cited, she found six different independent farming units in one large household of about 35 persons which she studied over several years from 1968 to 1971. The six units can be grouped into three types:

I. Traditional type (extended family)
   1. The zaksoba, his three wives, one married son and his two wives, plus adolescent children living in the household made up the largest farming unit in this household. It included 13 different persons as active farm workers, and they represented several generations and diverse ties of descent and marriage.

II. Nuclear family type
   2. One son and his wife
   3. One son and his two wives

   These two farming units differ from extended family units in having a much smaller number of active workers, in their shallow depth in generations, and in the lack of diverse kin ties among the members of each unit.

III. Solitary units made up of a single active worker each
4. An elderly widow, classificatory daughter of the zaksoba
5. The elderly widow of a former head of this household
6. A divorced son of the household head

These solitary farming units differ from the private farming done by members of the larger farming units (who correspond to Broekhuyse's beondoba category) in that each of the proprietors of these three units is responsible for providing his or her own millet for subsistance needs.

The complexity of Mossi farming organization is evident even in this brief summary. Mossi wives, except for elderly widows remarried in name only to young kinsmen due to inheritance of widows, are automatically incorporated into the husband's farming unit. While the zaksoba benefits from keeping his sons, nephews, and other kin in his farming unit, these men often prefer to separate. Very little mutual aid occurred between members of different farming units in the household observed by Lallemand, so far as farming activities are concerned. Within a single farming unit, members might voluntarily cooperate in cultivating the private fields or plots of group members. For example, Lallemand found that the wives of the zaksoba not only worked together on the collective fields of the household head; they also assisted each other in cultivating their private peanut fields. But they did not help the two elderly widows in the zaka in cultivating millet for basic food needs.

The Mossi distinguish collective fields cultivated for the benefit of the entire farming unit from the personal fields or plots which individuals cultivate for private profit. The cultivator of each personal plot holds the following decision-making rights, in Lallemand's view: he or she 1) chooses the location of the plot; 2) decides on its area; and 3) has full rights to the harvest from the plot. Profits

from personal fields, as well as from non-farming activities, were more likely to benefit other members of one's own farming unit than members of other farming units, even within a single zaka.

Lallemand reports that in theory all members of the farming unit work on the collective fields or pu kense from 8 a.m. till 5 p.m., but that in fact the system is much more flexible. She found that dependents may ask for, and receive, permission to spend entire days working on their personal fields (béologo, pl. beulse). The greater the supply of labor available to a given farming unit, the more free time for his or her personal fields each dependent member was likely to receive. None the less, adult sons of the zaksoba preferred to establish independent farming units even though it meant taking on the responsibility for providing the staple foodstuffs for themselves and their dependents.

Work on the collective fields takes priority over work on personal fields; a given operation, such as planting or weeding, is usually completed on the pu kense before it is even begun on private plots. Clearly timeliness of critical operations is a likely constraint on the production achieved on private plots. On their personal fields, both men and women tend to plant cash crops rather than grain. In the units observed by Lallemand, young men usually planted cotton, while women and girls planted peanuts and pois de terre.

In sum, distinct farming enterprises can be identified which correspond with a breakdown into that unit responsible for basic sussistence needs, versus other farming units. To adopt the terminology suggested for Senegal, these may be termed "primary" versus "secondary" enterprises. Both the zaksoba and the puugsoba may head primary

enterprises which draw upon the labor of a number of dependents; solitary individuals may also form "primary" enterprises when they must produce their own staple foodstuffs (at least the staple grain). "Secondary" enterprises contrast with "primary" enterprises in being essentially private, one-person enterprises with distinctly less access to land, labor, equipment, and purchased inputs than most "primary" farming units enjoy.

Hammond notes that children of both sexes join in farm work from the age of 7 or 8 years. Girls marry at 13 or 14 and at that point are incorporated into the farming unit of their husbands, whether a zaksoba or a puugsoba. A son continues to work with his father until at least early adulthood, although there may well be periods of a year or longer when the son is gone on labor migration away from the village. As Lallemand found, a vigorous youthful or adult worker is readily incorporated into a multi-person "primary" enterprise as a welcome addition to the labor force. In contrast, elderly widows were not so fortunate: they were left to farm alone, while elderly wives could "retire" from active farming as could elderly male household heads.(See Hammond 1966:86; Lallemand 1977:passim). Broekhuyse like Lallemand noted that some elderly women farm on their own: "A un âge plus avancé les femmes se retirent souvent de la production collective et deviennent independantes en ce qui concerne la production et la consommation." (n.d., V. III, p. 19).

One important constraint on the farming activities of women is noted by Hammond: menstruating women are considered ritually unclean and they do not work on the farms during their menstrual periods (1966: 80). While this may allow a woman some welcome repose, once again

the timeliness of operations such as planting, weeding, and harvesting could all be affected, particularly for the woman's private plot which she so often works individually.

Cooperative work groups have traditionally played a part in Mossi agriculture. Hammond describes two kinds of cooperative groups. One is recruited along kin lines, ward by ward in the village, to work for the village chief from time to time. In addition adolescent youth, both male and female, organize work groups and contract to perform a given task in return for a cash payment to the group. Little wage labor is available, although farmers whose crops have failed may turn to agricultural wage labor for income (Hammond 1966:91-92). Broekhuyse also notes a scarcity of wage laborers; he attributes it to an egalitarian attitude which makes it unseemly for one Mossi to be employed by another.

Access to Land: Mossi Land Rights

Broekhuyse offers a short list of basic terms relating to Mossi land rights which may be helpful in the following discussion:

Tenga: terre dans un sens général
Pugo: terre cultivée
Weogo: terre inutile, we = endroit qui ne sert à rien; ogo = pugo.
Tengkuguli: terre sacrée (où l'on cultive le sorgho rouge servant aux sacrifices).
Kangarè: terre vierge, forêt.
Puweaga: terre en friche
Tengsoba: tuteur rituel des terres, un dignitaire religieux de la tribu nyonjoncé
Solem: propriété foncière
Mam solem: ma propriété
Mam pasojè: ce qui ne m'appartient pas
Zienbonsa: prêteur de terres
Biebtingga: unité de consommation
Pugo: terres cultivées en commun
Béologa: terres cultivées individuellement
Ziensoba: propriétaire foncier
Zaksoba: chef du zaka, de l'établissement directeur des terres du zaka.
Puugsoba: père de famille; maître de ses champs, c.-à-d. non leur propriétaire mais leur usufruitier. (n.d., V. III, 30)

Hammond describes the Mossi of Yatenga as recognizing four basic categories of land:

1. households and farms, with the land held by agnatic descent groups (patrilineages or segments of patrilineages)

2. public land such as pathways and marketplaces

3. sacred places, where the Earth shrines are located

4. the "bush" or unoccupied, unfarmed land (1966: 72).

The responsibility for allocating land in the first category, households and farms, is held by senior male kinsmen; no individual has the right to alienate land, which is not private property but communal property of the patrilineage. Hammond stresses that "land is never privately owned" (Ibid.:102). Hence a Mossi man ordinarily acquires farmland only through his patriclan. The "collective ownership of land by all agnates, the spirits of their ancestors, and the future generations of their descendants" (Ibid.;111) provides one basis for the economic ties which unite patrilineal kinsmen, especially those who reside in a single zaka.

There are several other channels for acquiring land to farm. A young man may ask for land from his mother's patrilineage (Ibid.: 73) with a high probability that the request will be met so long as sufficient fields are available. For women, the situation is also different:

> Women do not inherit the right to use land. It is the duty of their husbands to provide them with sufficient fields. A woman can also request land from her husband's brothers or from his father. When she dies or is divorced, the fields she has worked are usually taken over by her sons or her husband's brothers (Ibid.: 75-76).

A man who receives land from his maternal kin is of course more likely to settle permanently in the zaka of the mother's brother or other kinsman in a village other than that of his own lineage.

Fields near the household are farmed semi-permanently until they become exhausted and must be allowed a fallow period (as much as 15 years) to recuperate. The manure of goats, sheep, and burros may be

used as fertilizer; liquid wastes and human wastes are not used. Plant residues are rarely used as "green manure" as they are valued as fodder, fuel, etc. (Hammond 1966: 33; 35-36). When the fields near the household are exhausted, the household is moved. The new zaka may be established either by a single nuclear family or by a larger extended or joint family unit, usually of less than 20 persons (Ibid.: 34).

In contrast to category 1, land in the fourth category (unoccupied, unfarmed "bush") is under the control of the earth priest or tengsoba, who represents the earliest inhabitants (e.g. the Nionsi). Permission to clear a field must also be sought from the secular authority, the village head. Given that the population density is in the range of 37 to 50 persons per square kilometer throughout the Mossi Plateau, land has long been a scarce commodity in many communities. Large-scale labor migration, particularly of young adult men, has served as a safety valve and has pumped cash back into the village economy which can be used for investment capital as well as for consumer goods.

The shortage of land has also contributed to Mossi involvement in various resettlement efforts, from the Office du Niger in Mali to the AVV (Volta Valley Authority) in southern Upper Volta. Typically it has been government policy to encourage Mossi to migrate and settle in less densely populated zones, while Mossi themselves have preferred temporary labor migration to permanent settlement elsewhere. Never the less, some young men have voluntarily moved their families to the AVV as a way of gaining access to farms sooner than would be possible in their home villages (this contrasts with some forced migration to the Office du Niger in the 1930's).

Agricultural Technology: Crops, Equipment and Tools, Inputs

Basic farm implements for traditional Mossi agriculture include the mattock (part hoe, part hammer), which is used for clearing fields; the hoe, used for planting and cultivation, and the knife, used for harvesting. Over the past twenty or more years numerous technical package combinations including chemical inputs and animal traction (Manga hoes, plows, seeders, etc.) have been recommended by Voltaic extension personnel. Efforts to introduce animal traction have been intended primarily to relieve the labor constraint, particularly for weeding.

These efforts have had only limited success for a number of reasons, which are not unique to Upper Volta. Among the problems are 1) inappropriate equipment for local conditions; 2) inadequate extension services for training farmers in the use of animal traction and equipment; 3) problems with availability or with repayment of credit for purchasing donkeys, oxen, or equipment; 4) failure of the technical package as a whole to prove profitable under Mossi small farmer conditions (or those of other ethnic groups), unless used for cash crops to the detriment of self-sufficiency in staple food crops. Broekhuyse (n.d. T. IV), Eicher et al. (1976), and Vollrath (1973) offer further discussion of these issues.

In the long term small-scale mechanization (animal traction) may prove profitable, but this requires efforts of several kinds. First, equipment offered by various extension programs in Upper Volta should be standardized, to ensure compatibility of available parts when multiple-piece packages are available and to minimize problems of upkeep (local repair capability and availability of spare parts). Second, more testing of proposed packages under farmer conditions (eg. the profitability of donkey vs. ox traction) is necessary. Thirdly, greater farmer experience with animal traction may bring improved results as new skills are mastered.

The most important Mossi crops are the staple cereals (millet and sorghum with smaller amounts of maize and fonio), to which more than half of the area cultivated is usually devoted; cotton, grown as a cash crop and for local use; peanuts; and garden crops where suitable land is available for dry-season gardening. In the Yatenga area, Hammond lists the following varieties of major species:

kasuya or cattail millet (Pennisetum spicatum and P. typhoideum); with stalks 5-6 feet tall and grains in a compact spike;

kenda (Sorghum vulgare), with stalks 6-12 feet tall and grains in clusters at the top of the stalk;

kew or fonio (Digitaria exilis), grown in smaller amounts

Kamana or maize (variety unspecified)

soom kam or peanuts (Arachis hypogea)

He lists additional crops without giving Mossi names: Bambara groundnuts (Voandzeia subterranea), Bengal beans, cotton, and such minor crops as sesame, sorrel, okra, eggplant, and tobacco. (Hammond 1966: 30-32). Other crops to be interplanted with millet are planted after the first weeding of the millet crop (Ibid.: 36).

Dry-season gardening is an individual activity like other types of "secondary" farming enterprises; often the gardener is a woman, as Hammond found this to be one of the few ways for a woman to earn cash at the time of his research (Ibid.:45). Manure is used to fertilize gardens, and new loam soil may also be collected from other areas and spread on the garden. Major garden crops include both indigenous and European tomatoes, okra, yams, sweet potatoes, manioc, gourds, onions, and eggplant. Much interplanting is typical to make full use of small plots, which are weeded by hand.(Ibid.: 42-44). Tobacco is another garden crop.

Other inputs which have been offered in the Mossi area include chemical fertilizers, seed treatments, and various chemicals for protecting stored grain from insect damage (see Broekhuyse n.d., V. III: p. ). Improved seeds of cotton are distributed through the CFDT/SOFITEX as described in an earlier working paper (No. 1) as are other inputs recommended for cotton.

Agricultural Calendar

Hammond gives the following description of the agricultural calendar in Yatenga:

1) clearing: performed in April/May. Plant stubble is pulled up or hoed up, and burned. Valued trees (shea nut trees, baobabs) are left on the field, other trees are killed.

2) planting: begins once the rains are regular, usually in early June in the Yatenga area. Cereals are planted first, with other crops planted in late June and in July. Crops to be interplanted with millet are not planted until the first weeding of millet is completed.

3) weeding: fields are weeded 2 to 4 times during the growing season, depending on the available labor. Young adult members of the household who migrate to Ghana or the Ivory Coast may stay for a year or more, rather than returning when the rains begin. July is the most critical month for weeding in most years.

4) harvesting: harvesting dates vary by crop:
   fonio - August
   millet/sorghum - November
   cotton - September through January
   maize, peanuts, beans - September/October.
   For grains, heads are cut from the stalk and the stalk itself is cut at the same time (for use as kindling). Heads of grain (panicles) are gathered into piles to dry before being stored in granaries. (Ibid.: 35-38).

Each household head has private granaries; the patriclan elder also has granaries for grain communally produced by the larger group. Cotton and peanuts are stored in woven "basketry" type granaries, while there are two types of clay granaries, one for threshed

grain and another for unthreshed grain. The latter is larger.

Fields follow a degree of rotation among major crops, which Hammond describes as follows:

| | |
|---|---|
| 1 - 3 years | millet |
| year 4 | millet or cotton |
| year 5 | cotton |
| three years | millet |
| one year | peanuts |
| one year | cotton |
| 1 - 2 years | millet, possibly followed by cotton or by fonio. |

Finally the field must be left fallow for a period of five or more years, with fifteen years perhaps being desirable (Ibid.:33). Overuse of the fields near the zaka, which are formed every year with inadequate return of organic materials to the soil, gradually degrades the areas closest to the compound into a "barren laterite pan" where nothing can be cultivated. Overgrazing of field stubble by livestock, and the practice of burning the bush, limit the addition of vegetable matter to the soil, in Hammond's view (Ibid.: 27). The lack of humus means that most types of soils do not hold water well, and run-off is increased by traditional soil preparation which does not require loosening the entire surface.

Soil Types

Broekhuyse (n.d., Vol. III, pp. 30-36) provides a detailed discussion of traditional Mossi soil classification in comparison with the scientific classification prepared for I.R.A.T. in 1970. He concludes that, as one would expect, the two classifications are similar in their evaluations of the cropping potentials of the major categories of soils. The complete discussion is included as an appendix.

Agricultural Productivity

In September-December 1973 and March-June 1974, Broekhuyse surveyed five villages of the Kaya ORD.i In two of the villages on traditional hoe culture was practiced, while the donkey-drawn houe manga had been introduced in the other three villages by ORD extension workers. For all five villages, he drew a sample which included 92 "traditional" units of production and 42 "modern" units of production. He defined a "Paysan traditionnel" by use of hand cultivation only, and a "paysan modernisee" by use of the houe manga and chemical inputs.

Traditional units of production in the Broekhuyse sample averaged 6.72 fields each, of which 84 % were owned and 16 % rented. In addition 36 % of the traditional units had lent out some fields to others. Modern production units held an average of 7.40 fields, of which 78 % were owned and 22 % were rented; nearly half (48 %) of the production units lent fields out. In all half (50 %) of the units of production in the total sample already cultivated fields of less desirable soil type, however (zengadega rather than the more desirable baongo or bole).

Table 1 below summarizes yield data for the Broekhuyse sample, for the 1973-74 crop year. Although the average total cereal production of the "modern" farming units was larger than that of "traditional" units, by 1420 kgs total versus 1214 kgs total), Broekhuyse attributes the difference not to improved techniques used by "modern" farmers but to a difference in labor supply. The modern units had on average 13 % more active workers (an average of 5.54 workers for modern units of production and 4.90 for traditional units of production). This suggests, of course,

Table 1. Cereal Yields, Kaya ORD, 1973-74 #

| | traditional units of production* | modern units of production** |
|---|---|---|
| Area in sorghum & millet[a] | 4.75 ha | 5.4 ha |
| Yield of sorghum[b] | 261 kg/ha | 288 kg/ha |
| Yield of millet[b] | 246 kg/ha | 192 kg/ha |
| Total millet/sorghum yield per farming unit | 1,214 kg average | 1,420 kg average |
| Average production per active worker | 248 kg | 256 kg |

* traditional farmers used only hand cultivation techniques

** modern farmers used the donkey-drawn houe manga and chemical inputs

# These figures do not include yields from the private plots of household members.

a Fields were measured with the use of a 50-meter tape.

b Harvests were estimated from the volume of the granaries (toudougou) in which the unthreshed grain is stored after drying, as follows:

1 $m^3$ of sorghum on the head (panicle) = 200 kg of grain

1 $m^3$ of millet on the head (spadix) = 107 kg of grain

(Broekhuyse n.d. T. IV:6, 47-50).

that it is the units of production with a larger supply of labor which can afford to obtain modern equipment -- a trend which has been noted elsewhere (eg. Koenig 1979 on the Kita, Mali, site of the Purdue West African Projects). Broekhuyse found that on average, one active worker produced 248 kg. of millet/sorghum on the farms of traditional units of production, and 256 kgs on the farms of "modern" units of production--not a striking difference in productivity per worker.(n.d. T. IV:49-50).

In addition to the data on cereals production found in Table __ above, Broekhuyse also noted production of maize, peanuts, and voandzou or Bambara groundnuts:

maize: planted on small plots near the house in both cases.
average production of 34 kg./ha in "Modern" units of production
77 kg./ha in "traditional" units of production

peanuts: 126 kg/ha in traditional units of production
226 kg/ha in modern units of production

voandzou: 98 kg/ha in traditional units of production
86 kg/ha in modern units of production

(Broekhuyse n.d. T. IV:51-52).

It is not clear, however, just what inputs were being used on these crops in each case. In other words, both the "equipped" or modern farmers and the "traditional" farmers may have been using only traditional techniques on these crops. Particularly in the case of small plots of maize, it is unlikely that animal traction would be utilized even by the "modern" units of production.

Decision-Making in Mossi Agriculture

This discussion of the traditional Mossi farming system has touched on several aspects of decision-making which may be summarized here. Several distinct decision-making units have been noted, and the differential access to land, labor, inputs, and other resources enjoyed by these units means that the "structure of opportunity" faced by these units is empirically different.

First, primary versus secondary farming units. A basic difference in resource allocation to cropping enterprises is to be expected between production units which must meet their own subsistence needs (primary farming units) and those which are free of this responsibility (secondary enterprises). Following Lallemand's discussion (see pp. 4-5 above), three types of primary farming units can be distinguished:

1. the traditional extended family type, headed by the zaksoba
2. the nuclear family type, headed by a puugsoba
3. solitary units with only one active worker, most often consisting of an elderly widow or divorcee.

The common characteristic of these units is their responsibility for meeting the subsistence needs of their members, and hence in their committment to the production of staple grains. They differ in virtually all other respects, most significantly in the amount of labor they control and in their access to or rights over farm land.

Given a limited supply of labor, much of the labor of any primary unit of production must automatically be committed to millet, sorghum, or other grains (maize and fonio). The heads of these units allocate land (i.e. fields or plots), labor, and occasionally (but rarely) modern

inputs to various cropping enterprises, and they control the harvest from these fields. Both the heads and other members of primary farming units may also engage as individuals in secondary farming enterprises.

Secondary enterprises contrast with primary enterprises in two basic ways: they are not responsible for producing staple foodstuffs, and they are essentially private, one-person enterprises. Hence they may devote themselves to cash crops, but in general they have more limited access to labor, equipment, and purchased inputs than do the two larger categories of primary farming units (the two mulit-person types). In addition, except for the secondary enterprises of the zaksoba himself, the individual undertaking these activities is usually dependent upon someone else for allocating to him or her the field or plot used for secondary enterprises.

Many individuals plant cash crops of cotton, peanuts, or dry season begetable gardens as private secondary enterprises. In this case the individual cultivator obtains a plot, decides how large to make it, and controls the harvest from the enterprise and any income derived from it (see p.5 and pp. 10-11 above). Since women, unlike men, do not inherit land use rights, a married woman expects her husband to provide a plot for her personal use. An elderly widow may be granted a plot by her husband's kin, or by her own lineage if she has returned to the zaka of her own patrilineage.

In addition, a Mossi man is in a position to make migration decisions as an individual, particularly decisions concerning labor migration (which may involve periods up to several years before he returns to the

village). Although ideally he should obtain the approval of the zaksoba, whose labor supply is diminished by his departure, ultimately he can simply leave, counting on gifts of cash and goods at his return to restore harmony with his elders. The structure of recruitment for settlers to migrate to the AVV (Volta Valley Authority) also allows a young married man to make a migration decision with or without the consent of his elders, although in this case the individual may be less willing to cut himself off from their support as he does not foresee an immediate cash income.

Some of the policy implications of the decision-making structure outlined here have been recognized in the organization of Voltaic extension services. For example, the delivery of extension services for cotton, a primary cash crop in Upper Volta, is by the CFDT/SOFITEX, separate from the ORD-based extension services for food crops, animal traction, etc. The empirical differences in resources controlled by the three types of primary farming units are also reflected in the generally greater availability of credit (e.g. for animal traction and equipment and for chemical inputs) for multi-person farming units of the traditional extended-family type or of the nuclear-family type. Such distinctions seem arational use of the limited resources of the Voltaic extension services.

Appendix: Traditional Mossi Land Classification Compared with I.R.A.T. Land Classification (Broekhuyse n.d. T. III: 30-36).

Classification traditionnelle des Mossi

Les Mossi distinguent un grand nombre de types de sol. Le plus souvent la classification est liée à l'usage que l'on peut faire du sol et cet usage est, à son tour, souvent lié à la capacité du sol de retenir l'eau. A cet égard il est très important de savoir si le terrain est situé à un endroit plus élevé ou plus bas de la pente. Par suite du lessivage les éléments les plus lourds et caillouteux du sol (les gravillons) sont restés sur les terrains les plus élevés et les éléments plus légers sont descendus.
Les sols argileux se trouvent souvent à proximité du talweg ainsi que dans les plaines et aux endroits peu élevés qui ne permettent pas l'écoulement des eaux, de sorte que beaucoup de particules d'argile s'y déposent. Certains sols sont bien perméables, e.a. à cause des élément sablonneux, d'autres ne le sont pas. Tous ces facteurs jouent un rôle dans la classification des Mossi, classification dont la liste suivante indique quelques éléments principaux. Cette classification, telle qu'elle a été donnée ci-dessous, n'est donc pas complète.

Classification des Mossi

Baongo: noir, noirâtre. Argile lourde, le plus souvent sans éléments sablonneux. Situé en contrebas, près des marigots. Le sol est favorable au riz et censé favorable au sorgho et au coton, ce qui dépend de sa perméabilité.

Bolé (ziensonggo). Moins noir que le baongo. Plus argileux et mélangé de sable. Situé parallèlement aux bords des marigots, des mares etc. Ce sol retient relativement bien l'eau; même au bout de 20 jours de sécheresse le sorgho continue à pousser et à mûrir.

Zienponsecho. Noirâtre. Contient relativement beaucoup d'humus, pas trop argileux, pas trop sablonneux. Sur cette terre on construit de préférence les habitations. Autour des enclos on cultive surtout du maïs.

T III : 31



Bisouga. Ce sol est rouge ou rougeâtre. Le sable en est un élément important. Cette sorte se trouve plus haut sur les pentes, au-dessus du ziensonggo. Favorable au petit mil, à l'arachide, au fonio, aux petits pois (voandzou).

Zengadega. D'un rouge noirâtre. Contient peu d'argile, beaucoup de sable et surtout des gravillons de latérite. Le fond (solide et) rocailleux se trouve déjà à 30-50 cm de profondeur. Le zengadega se trouve plus haut sur les pentes que le bisouga. Contient mal l'eau. On peut y cultiver le sorgho, le petit mil, l'arachide et le coton, mais s'il ne pleut pas régulièrement, les plantes se dessécheront.

Zimiougou. Rougeâtre; les éléments de sable et d'argile ne sont pas perceptibles. Ce sol se trouve plus haut que le zengadega. Défavorable à toutes les cultures. On pourrait rétablir le sol au moyen d'engrais; on pourrait y planter des arbres, si on les arrosait régulièrement. De ce sol on construit surtout des greniers (bibila-baouré).

Basenpouega. Sol pierreux, lessivé, situé plus haut que le zengadega, impropre à toutes les cultures, couvert de plantes arbustives et d'herbes. De grandes parties de ces terrains sont entièrement nues. Là où pousse l'herbe, le sol peut servir de paturage. Une partie minime de ce sol sert de séchoir pour les arachides. Le rétablissement en semble exclu.

Kuguri. Latérite, seuils en pierre.

Classification scientifique de M. J. Kilian I.R.A.T. 1970.

Les différentes unités de sols

Elles ont été établies en fonction des objectifs définis par la SATEC et sont surtout étroitement liées aux unités morphologiques aisément discernables sur les photos aériennes. Pour chaque classe il est précisé ci-dessous les critères de définition, les unités morphologiques correspondantes, les types de sols que l'on y rencontre et enfin les orientations culturales.

Classe I:

. Critères de définition:
cuirasse ou roches apparentes,
très gros éboulis

. Unités morphologiques:
- buttes témoins cuirassées et leurs piémonts immédiates;
- affleurements rocheux et leurs piémonts immédiats.

. Unités pédologiques:
sols bruts d'érosion ou squelettiques (lithosols, regosols).

. Orientations culturales:
La valeur agricole de cette classe est très faible et l'on ne peut y envisager, actuellement, aucune culture; localement le reboisement peut y être tenté.

Classe II:

. Critères de définition:
Cette classe correspond aux sols où l'on observe:
- une cuirasse plus ou moins durcie, apparaissant entre le surface et 45-50 cm de profondeur;
- des gravillons ou cailloux en forte densité, non soudés, dans la même épaisseur.

. Unités morphologiques:
- aux plateaux intermédiaires: très fréquents juste à l'aval des buttes témoins;
- aux glacis de démantèlement.

. Unités pédologiques:

- sols peu évolués d'apport et d'érosion, (hydromorphes ou non) sur matériau caillouteux ou gravillonnaire;
- sols hydromorphes minéraux;
- sols ferrugineux tropicaux remaniés à taches et concrétions.

La texture de ces sols est dans l'ensemble grossière et leur sensibilité à l'érosion est particulièrement élevée.

. Orientations culturales:

La valeur agronomique des sols de cette classe est moyenne à faible, les facteurs limitants principaux sons l'abondance de gravillons ou cailloux et la faible profondeur; de même les réserves en eau ne doivent pas être très élevées.

Cette classe peut être réservée au mil et arachide; le sorgho hâtif peut y être tenté.

Classe III:

. Critères de classification:

Cette classe englobe d'une façon générale les sols profonds où:

- la cuirasse ou les affleurements rocheux n'apparaissent pas avant 50 cm environ de profondeur;
- les gravillons, débris de carapaces et cailloux ne sont pas abondants avant 50 cm de profondeur également.

. Unités morphologiques:

Ces sols correpondent:

. aux glacis d'épandage situés en aval des plateaux intermédiaires;
. aux zones d'accumulation bordant les bas de glacis;
. aux larges dépressions de plateaux;
. aux zones d'ennoyage à l'amont de seuils.

. Unités pédologiques:

- sols ferrugineux tropicaux: modaux, lessivés hydromorphes, tronqués jusqu'à l'horizon B.
- sols bruns eutrophes, modaux ou vertiques;
- vertisols et paravertisols.

Afin de différencier les dominances texturales propres aux grands types de sols et utiles pour les orientations culturales, deux sous-classes ont été créées:

- sous classe III A: Sols dont la texture est à dominance grossière. Cette sous-classe s'observe surtout sur les glacis d'épandage situés en aval des plateaux intermédiqires. Elle caractérise certaines zones (Temnaoré et Dassouri en particulier). Elle correspond surtout aux sols ferrugineux tropicaux lessivés ou appauvris.

• Orientations culturales:

La valeur agronomique de cette sous-classe est moyenne. En sec, on peut y entreprendre des cultures de mil, sorgho, arachide.

Le faible pouvoir de rétention de ces sols en font probablement des sols de 2ème qualité (qualité moyenne) pour le coton. Des études pédologiques de détail seront nécessaires pour préciser les secteurs les plus propices à cette culture.

- sous classe III B: Sols dont la texture est à tendance générale fine. Morphologiquement elle correspond aux dépressions de plateaux, aux zones d'ennoyage et aux zones d'accumulation bordant l'aval des glacis d'épandage. C'est le domaine des sols bruns eutrophes et des sols vertiques. Cette sous-classe domine dans les secteurs de Fara et de Réo. Si les conditions climatiques sont reconnues favorables, cette sous-classe est probablement la plus favorable au riz pluvial.

• Orientations culturales:

Pour les cultures en sec cette sous-classe est de fort loin la plus intéressante et c'est dans celle-ci que les études classiques à grande échelle devront s'étendre le plus. Les sols y sont favorables au sorgho, maïs et surtout au coton (sols de 1ère qualité).

Classe IV:

• Critères de définition: Cette classe comprend les zones bordant les bas-fonds qui ne subissent que des inondations temporaires et de faible durée. Les sols formant ces zones sont sollicités touts l'année par une nappe phréatique aux faibles fluctuations. De nombreuses observations dans des puits ont montré qu'au maximum de l'étiage, la profondeur de la nappe phréatique se situait entre 1,50 et 2 m.

. Unités morphologiques:

Cette classe correspond aux environnements immédiats des bas-fonds. Ces zones de faible largeur (entre 0 et 150-200 m environ) s'étendent en auréole autour des bas-fonds proprement dits.

. Unités pédologiques:

sols hydromorphes minéraux à pseudogley d'ensemble. La texture de ces sols est très variable et reste sous l'étroite dépendance des sols environnants.

. Orientations culturales:

En saisons sèche, cette zone paraît être très favorable aux cultures maraîchères irriguées (par puits ou même par installation de norias) ou aux cultures fourragères irriguées. En saisons des pluies, quelques aménagements doivent permettre l'implantation de rizières.

Classe V:

. Critères de définition:

sols à texture hétérogène mais toujours situés en position topographique provoquant l'engorgement.

. Unités morphologiques:

Cette classe englobe tous les bas-fonds inondés périodiquement pendant des périodes assez longues. Ces dépressions se rencontrent le long d'un réseau hydrographique plus ou moins organisé ou se localisent dans des dépressions profondes.

. Unités pédologiques:

sols hydromorphes minéraux: à gley d'ensemble ou de profondeur.

. Orientations culturales:

Ces bas-fonds sont par excellence les zones à riz. En saison sèche, il reste possible également d'y implanter des cultures maraîchères.

J. Kilian - I.R.A.T.
mai 1970

## 4.3. Classification des Mossi comparée avec celle de l'I.R.A.T.

M. Kilian distingue 5 classes de sol, dont la troisième se divise en 2 types.

La classe I est comparable au kuguri et au dasempouega de la classification des Mossi.

La classe II comprend le zimougou, le zengadega (et en partie aussi le bisouga, ce dont je ne suis pas tout à fait certain).

La classe III A correspond au bisouga.

La classe III B correspond globalement au bolé (ziemponsecho, ziensonggo) de la classification des Mossi.

La classe IV correspond plus ou moins au baongo. Les Mossi entendent également par là les terrains un peu plus élevés.

La classe V (ce que l'on appelle les bas-fonds) est impropre aux cultures traditionnelles des Mossi. Actuellement on s'en sert parfois pour la culture du riz.

Les deux classifications ne diffèrent guère quant à l'utilité du sol pour les cultures traditionnelles. Quant à la culture du riz dans les bas-fonds les opinions sont identiques. L'introduction de la culture du riz était facile parce que les Mossi ne pouvaient jamais utiliser les bas-fonds pour d'autres cultures. La culture cotonnière se faisait traditionnellement sur le sol zienponsecho à proximité des habitations. Actuellement on recommande - à juste titre - l'usage du sol bolé pour la culture cotonnière. Les paysans savent bien que ce type de sol (qui ressemble beaucoup au zienponsecho) est le plus propre au coton, mais il n'est pas librement disponible, parce qu'il est très recherché pour la culture du sorgho, leur nourriture principale.

Placés devant le choix entre le coton et le sorgho, les paysans préfèrent le sorgho. On tâche de cultiver le coton sur d'autres terres impropres ou peu propres à la culture cotonnière (baongo ou zengadega).

J'ai établi l'usage des sols ainsi que la culture des végétaux en ce qui concerne le sorgho blanc, le sorgho rouge, le petit mil, l'arachide et les petits pois. On sème toujours le maïs autour de l'habitation. Les terres où l'on construit les villages sont du type zienponsecho.

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# Agriculture in Upper Volta: The Institutional Framework

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