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SOCIAL ANTHROPOLOGICAL AND RURAL ECONOMIC STUDIES IN MALI:
THE DUKOLOMBA FOREST
THE BANDIAGARA PLATEAU

by

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under the direction of

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Introduction

In 1974 the Agency for International Development contracted with the Research Foundation of State University of New York (No. AID/afr-C-1045) to provide social anthropological and rural economic studies of farm and pastoral production systems in two areas of the Republic of Mali under the scientific direction of Professor Michael M Horowitz.[1] The first area, the Dukoloma Forest[2], was selected because it was the locus of the then proposed Mali Livestock I project, the first of the major post-drought pastoral sector activities entered into by AID in the Sahel. The Directors of the Office of Development Services, Bureau for Africa (AFR/DS) and the Regional Economic Development Services Office/West Africa (REDSO/WA) agreed that the traditional "technical" approach to livestock development was less likely to respond to the new objectives of the project -- which included bettering the conditions and income of the rural producers as well as increasing yields -- than one firmly based on the social and economic realities of the area. An announcement of opportunities for field research in Mali was sent to all major graduate departments of anthropology in the United States.

Two graduate students in social anthropology, John Van Dusen Lewis of Yale University and John Aron Grayzel of the University of Oregon, were chosen from a large group of applicants and quickly established themselves in the field. They were joined by Dongui Sissoko, appointed as host country counterpart by the Office Malien du Betail et de la Viande (OMBEVI), the Malian government agency associated with the project. The research team spent 16 months in the Dukoloma Forest. Lewis focused on Bambara-speaking farmers. Grayzel studied Fulfulde-speaking mixed farmer/herdsmen. Sissoko distributed his time among a variety of ethno-ecological groupings.[3] The second region of study, the

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[1] The contract also provided for Michael Horowitz's secondment to REDSO/WA as regional anthropologist and director of social science research.

[2] There is considerable variation in the spelling of the Dukoloma Forest. Some of the variants appear within this collection of reports. We have not tried to make them consistent.

[3] Sissoko's reports were sent directly to OMBEVI, and are not included in this collection.

Dogon-speaking Bandiagara Plateau and Seno Plain, was selected because it is the central locus of Operation Mils, the Malian cereals production development organization. The opposition between intensive cultivation with manual watering on the Plateau and extensive rainfed cultivation on the Plain appeared useful in examining a series of propositions about the two forms of production. The original intention to have these studies undertaken collaboratively by an economist and an anthropologist was not achieved, for the anthropologist, Riitta K. Eskelinen, R.N., graduate student in anthropology at the University of North Carolina, completed her field research before the rural economist, Hamadoun Sidibe of Laval University, was able to arrive. In aggregate, the field component of the project began in the Spring of 1974 and continued through the Summer of 1978.

During this time, the students regularly submitted reports on their work, and these reports were widely distributed to Malian and to USAID officials and contractors. We have received a number of requests however, to assemble the reports under a single cover. Hence this edition has been prepared, which reproduces the reports as initially presented (except for retyping in the case of those done in the field and for translation from the French original for those of Hamadoun Sidibe). Copies are being made available to the AID Reference Center (DS/DIU).

One of the unanticipated payoffs from this research is the continuing contribution being made to Third World development activities by the members of the research team. Upon completing his work on this project, Dongui Sissoko was appointed official OMBEVI sociologist, and subsequently returned to the University for advanced training in his field. Dr. John Grayzel is currently AID social science advisor in Mauritania. Dr. John Van Dusen Lewis is an officer with the Rural Development Office, Development Support Bureau (DS/RAD), having previously been development anthropologist with the Malian office of the International Livestock Development Centre for Africa.

The research assistants and I would like to acknowledge the support and encouragement received from Malian and USAID officials during this study. Among the many who aided us, both materially and spiritually, we would like to single out for especial thanks, the following:

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Mr. Miles G. Wedeman, Director, REDSO/WA*

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FIRST QUARTERLY REPORT ON SOCIOLOGICAL RESEARCH IN DUGUKOLOMBA

John Van Dusen Lewis

September 20, 1974

This initial report will be divided into three parts. The first will be a brief review of logistical and administrative developments associated with my particular research effort. The second will attempt an encapsulated introductory description of those organizational features of Dugukolomba society which canalize significant economic choices. The third will make some crude, but hopefully timely, suggestions regarding the consequences and possibilities these societal features could have for the Projet Mali Livestock.

I. Aside from a briefing in Abidjan my second week in Africa, with a return trip to Mali via Bobo, Mopti, and Dogon country on an AID rented plane with the Shears, Horowitz, and Weisenborn, I spent May in Bamako taking the Bambara language course prepared for the Peace Corps and making research arrangements with L'OMBEVI personnel. In early June, N. Cissé of L'OMBEVI and a representative from Elebage for the Cercle of Ségou escorted me to Douna. There the forest ranger from the Service des Eaux et Forets, Brema Coulibaly, guided us to Dugukolomba, where, with Cissé's help, he explained to the chief and the village elders my purpose in coming to live with them. He then made preliminary arrangements for our lodging and other physical needs; all of which he has followed up on on numerous subsequent occasions. The village elders gave me his last name, Coulibaly or Kulubali, adding N'tji as a first name (N'tji is the name given to first-born sons among the Bambara of the Ségou area; it was given to me since I am the first white to "sit down," as they say, in their village).

In spite of Mme. Rupp's pessimism about Doukoulouma (as she and all other French mistakenly transcribe the name of the village), there is enthusiasm

for the Project. It was chosen as a base on the advice of M. Coulibaly. As the senior village in the area and, not unrelatedly, the sponsor of a weekly market it was the logical choice from a local point of view. Any other choice, I have since found out, would have implied, in local eyes, blatant favoritism in connection with the approaching project. Even so, I am told, some of the junior villages, who consider that their own leadership is more dynamic than Dugukolomba's, are a bit jealous that we are not with them. Every village chief in the area has presented us with a ram (total 6) except for the chief of the small village of Nyendela who gave us two chickens. Over half of the 40 "compound chiefs" in Dugukolomba have given us at least one chicken, while expatraite Dugukolomba "compound chiefs" in outlying hamlets have sent along chickens, a ram, and a goat in order to remind everyone of their ancestral claims on village privileges.

So far the study has been confined to Dugukolomba for two reasons. First, in the rainy season displacement is next to impossible without a Land Rover. Second, besides the mobilette I purchased on my own account, the research team is without any other form of transportation. My Malian counterpart, Dangui Sissoko, has not received his desired brand of mobilette or maintenance allowance from L'OMBEVI. I have given him a daily stipend and have shared my grain with him so that the research might go forward. This problem of displacement is only one of many encountered as a result of Sissoko's present lack of independent means.

However, given this situation, within the confines of Dugukolomba, we have had two months of fruitful research (following my return to Dugukolomba on June 10 with my wife and Malian counterpart - after another month of Bambara lessons and L'OMBEVI reunions). Having an articulate and well-educated homologue in Sissoko, who doubles as an interpreter, I have been able to harvest more complicated and sensitive data than might have been initially possible with an ordinary interpreter.

The major directions pursued in our 'base-line' sociological and economic study will become evident in the course of my presentation of the material in the next section.

NOTE: All expressions in quotes are glosses for Bambara linguistic categories.

II. I will begin this sociological section with a general description of the economic options available to key decision-making units in the village. All the factors of production are essentially subject to the disposition of the "compound chief" or "father." However, the male and female members of his "compound" can still exercise important rights in their own labor.

Younger male laborers - usually sons, grandsons, brother's sons, or, when these are lacking, daughter's sons of the "compound chief" - always have the option of leaving in search of wage labor in Segou, Bamako, and, above all, the Ivory Coast. Although these migrations can bring in some cash, most "fathers" are against them. They do not like the fact that the disposition of the cash is under the control of the youth; they fear the dangerous effects that travel and residence in a strange country may have on their most valuable hands; and, most of all, they fear that their "sons" will not return for the labor-intensive farming season. As will become clear, the real wealth of any "compound" is a function of how much labor it can mobilize in the rainy season. To lure the sons of young (as opposed to old), younger brothers home, the "compound chief" will build them private houses in the dry season and supply them with bridewealth much more readily than they needed to do in the past. Nevertheless, the Ivory Coast option has reduced the need for the young men to have their own "individual fields" as a way of controlling a personal cash supply. Therefore, nowadays, if the young man is home for the farming season, he will have more time to toil in the "great field" of the "compound chief."

For somewhat older men who still have an older brother or an older male patrilateral parallel cousin between them and the "compound chieftainship," but who as "family (not compound) chiefs" (i.e. they are married) cannot pursue migrant labor, the options are different. Before the Classement of the Forest in 1947 (the greatest trauma in Dugukolomba history, it seems, since the invasion of the Tukulor), it is said, there were less than 20 "compounds" in the village. That is to say that brother's sons worked for their uncles instead of setting up their own "compounds." At that time, as the desire for personal consumer items began to increase, "individual fields" began to proliferate. Following the Classement of the Forest, having a large "great field" for a large "compound" became virtually impossible, and so these younger brothers and dead brother's sons, who had been rehearsing their management skills on the new "individual fields," broke off to become "compound chiefs" themselves. This fragmentation process, which usually begins by the junior "family chiefs" maintenance of a separate "hearth" within the "compound," cannot, because of the Forest and the increasing desire for individual wealth, be as heavily stigmatized as it was in the past - particularly as the animist religious sanctions upon such individualism do not command their former credence. Thus, with the control of a compound in sight and with so many younger "brothers" (usually patrilateral parallel male cousins or brothers with different mothers) heading their own "compounds" already, the desire or need for these junior males to maintain an "individual field" has diminished considerably; there are only a few male "individual fields" at present in the village (W.I. Jones reports the opposite for Djoliba, on the Niger south of Bamako: see McLaughton, R. (ed.) African Food Production Systems). For these same reasons a "compound chief" will make greater efforts to retain the loyalty of the junior male than he was wont to do in the past. Even so, as long as the rules of inheritance remain unchanged, the "compound" can retain much of its traditional form. The junior male who leaves

the "compound" prematurely only has rights in the "compound" property if it has been divided up by the "father" before his death. The only instances of full or half brothers heading separate "compounds" in Dugukolomba involve cases where the "father" foresaw the friction which might arise after his death and so divided the property and the land tenure rights. Often the "compound chief" will free his dead older brother's son, giving him a separate estate long before his death. Allies can be made out of potential enemies in this manner. In sum, then, the "compound chief" must increasingly include his near contemporary male subordinate in the fruits of his own labor if this chief wants to retain any control over that labor.

On the face of it the women seem to have many fewer economic options. While little labor may be expected of an unmarried girl in her father's field, she is expected to carry a full labor load, in addition to household chores, in the field of her husband's family after marriage. For private income the women cultivate "individual fields," as numerous as ever in their case, draw upon botanical sources for the manufacture of soaps, shea butter, and countless spices which they sell at the market. It is understood that the younger married are free to cultivate their "individual fields" after around 5 PM. It is the older women who concentrate on spice and soap production for their personal income. A husband or a father-in-law will encourage the younger woman to have her "individual millet field," in fact, so that she may appear well-dressed without the "compound" treasury being drained.

Ultimately, however, it is the "compound chief" who will make the consequential economic decisions, innovative or otherwise. If a younger brother breaks away from the "compound" on account of the out-dated practices of its chief, his new "compound" will most likely be too small and have too few assets for there to be an effective margin for innovation in any case. Thus it is the legitimate

"old man" who remains in control of the maximum amount of strategic economic resources. As it seems that new patterns of economic activity can most effectively be organized by the firm which he controls, I will present the remainder of the material on Dugukolomba economics from the point of view of his options.

The "compound chief's" control of "family" labor can be read from the limitations on the options of disposing of their own labor for the three laboring types discussed above. Much of this control would not be possible without a complementary control of access to land.

Land tenure rights come in two unequal forms: rights from lineal succession and rights from the village. In both cases it is only the "compound chief" who can gain these rights: thus explaining the allegiance of others to the "compound chief" and the allegiance of the "compound chief" to his predecessor and to the village.

An exposition of the differences between these two kinds of land tenure must be prefaced with a brief description of Dugukolomba farming practices.

The "house fields" surround the village and are interspersed between the compounds. Every "compound" has at least two, one for maize (only a 2 1/2 month variety is grown) and one for "red sorghum" (3 months). Some farmers mix the crops in both fields seeding the maize in areas which have been particularly well fertilized. These "housefields" are cultivated indefinitely with no rotations by means of the application of sheep, goat, and cow manure. First the maize and then the "red sorghum" in these "housefields" supply the earliest harvest for the village putting an end to the notorious savanna 'hungry season' (there were no signs of skimpy eating before the maize harvest this year in Dugukolomba). Then, when the mosquito menace lets up a bit, village cows and then, later, peul cows are corralled on many "housefields" - often without the cow owner's knowledge if it is only a one night stand - where they feed on stalks and leaves and manure

the field in return. Sheep and goat manure is collected in the compounds by little children throughout the year for dry season distribution on the nearby "housefields."

Land tenure rights are held for "housefields" in much the same way as they are held for "bush fields," except that they do not depend as heavily upon village memories to be disambiguated since the "housefields" are cultivated every year. Those "compound heads" who are not descended from the earlier settlers of the village and those whose inheritance rights have been forfeited by the premature splitting up of a "compound" (i.e. all those who lack rights in land through lineal succession) must borrow or create "housefield" space, utilizing rights in land from the village. Faced with a lack of ownership of bush space, the farmer will borrow an area of bush for his "great field." But since certain capital investments are required to operate a "housefield," the farmer will prefer to carve his own "housefield" out of the bush separating the "bush fields" from the village goats, than to borrow (this free bush area is also where most "individual fields" are found). In the case of both the "housefields" and the "bush fields" the owner is obliged to lend any space which he is not using for no charge to any "compound head" of the village. The owner cannot reclaim this land while another's crop is still in it.

All "black mud," "mud and sand," and "sand" soil areas proximate to the village have been rigorously claimed in land tenure for generations. The length of the fallow has no effect on these ownership rights. Only "caked" soil remains available to be claimed by newcomers to the village. "Compounds" whose founding ancestor arrived in the village 3 generations ago can only farm "caked" soil without borrowing land from a member of the founding clan (Buare) or the one other group of kin whose settlement in the village has sufficient antiquity (2 "compounds" of Kulubali) for them to own land. Some say that this "caked" soil

becomes more porous after several years of cultivation, but since it has only been seriously cultivated since the Classement of the Forest, after which it was harder to borrow better land, most say that they are not sure yet. Most of the best land for sorgnum and millet, "black mud," is south of the village in the Forest, while "mud and sand" and "sandy" soils (better for peanuts) dominate north of the village.

The standard rotation practice of "bush field" space involves the concept of the "great field." When a new "great field" is cleared, if possible with a fallow of a generation (since the Classement of the Forest this has not been possible), the old "great field" is usually in its second to last year (a seventh or eighth year on "black mud," but usually a fifth or sixth year on "sand"). At this time the "great field" will be supporting its last year of millet (since the secheresse, invariably the faster "boboni" variety), with two small sections on the edge in peanuts (a faster, smaller variety named "kuruyeni" for the Frenchman who introduced them; Operation Arachide has been unable to supply, on credit of course, the village with seeds for a larger fast variety which have not first been spoiled by parasites) and Bambara earthnuts (called pois de terre by the French). The peanuts are primarily to pay taxes and the Bambara nuts for consumption. In this same year the new field is smaller than it will be the next year when it takes over the adjacent peanut and Bambara nut fields from the old field and assumes the "great field" status. For the first and second years (occasionally a third year will be risked as well) sorghum is grown on the field. The larger families grow the same 3 month "red sorghum" which they have in the "housefield." But the smaller families cannot harvest all this sorghum at the same time, so they grow "black envelope sorghum," which takes an extra month, in their bush field. In this second year of the new field, its first year as the real "great field," the old field is no longer supporting any millet, only fonio and a last round of

peanuts. It is only at this time that a farmer will put millet, as opposed to sorghum, in one of his "housefields." He most always has some millet since it makes for better "dege:" a sour milk and grain dish essential to Dugukolomba since they only grow rice in a few puddles, and this is usually left to the women and children. In the third year of the new field, adjacent bush areas are cleared for new peanut and Bambara nut fields, while the sites of their stands from the previous years are sown in millet as is the rest of the field. The farmers are well aware of the "fertilizing" effects of this legumes before millet rotation, and each year they expand the "great field" into bush to cultivate their legumes, leaving their old sites for an expanded surface for millet. However, in that part of the Forest returned to the villagers 8 years ago, on a temporary basis, for cultivation, this standard pattern is not followed. For those lucky "compound chiefs" whose land was released by this gesture (although the service may have thought they were helping the whole village), the "black mud" soil was too valuable to waste on peanuts. They have therefore borrowed land elsewhere for their legumes, devoting all of the Forest land available to sorghums (the first two years) and millet (the remaining six). Some farmers hope to continue these Forest fields for a ninth and last year, after that all of this land might as well revert to Forest since it is exhausted for agriculture. Now, of course, before the Project is in full swing, is the time to open up a new part of the Forest to village cultivators. If this gesture is not repeated on account of the Project's needs for all of the Forest, not only Dugukolomba and Dufonu, who will lose farming land directly, but the neighboring villages, who will be pressured to lend fallowing land to make up for the loss, will resent the Project. It will be difficult to forestall this resentment by converting them to permanent cultivation through composting in the "bush fields" because, 6 or 7 years after a field has been cleared, the farmers complain of the appearance of a weed ("sege"), which, they claim, passes

diseases on to the millet. This weed is much on their minds, and when it appears in a field they begin to make plans for its abandonment. Apparently the weed is not competitive with bush flora, and so is wiped out during a fallow.

A certain percentage of bean seeds are mixed in with the millet or sorghum seeds and sown at the same time in the same holes. This percentage has been reduced slightly on account of the secheresse: only with an extreme lack of rain will a bean vine inhibit the full growth of a millet stalk in the same mound. Even so, after the second weeding of the "great field," the bean vines are covering enough ground to prevent a third growth of weeds in many areas. The advantages of seeding the beans and millet together seem to outweigh the small risk involved (there wasn't a single "great field" without the combination, although the threat of marauding goats kept many from seeding beans in their "housefield"); the farmers say they have never seen beans in a pure culture; they cite the "fertilizing" effect the legume has on the millet, and the beneficial shade which the millet gives to the beans. With renewed confidence in the rains, the farmers say they could seed enough beans in their "great field" to feed 5 oxen through the dry season on just the leaves and stalks. They say they would much prefer to intensify their cultivation of beans under the millet on the "great field" than to set aside more of their already scarce land for a special field.

At present, bean leaves and stalks are dried and kept on raised platforms until they are mixed with salt and fed to plow oxen to strengthen them at the end of the dry season. Some store peanut leaves and certain grasses ("ngomi," "ngola," "jala") in special granaries for the same purpose.

We have seen how the "compound chief" who has not inherited land from his father or who has lost much of his rightful land to the Forest depends upon his non-stranger status in the village to procure land (on loan). It is usually these same "compound chiefs" who have also not inherited personal fishing

rights in certain swamp areas beside the Bani River which fill up in the rainy season. Yet at peak fishing times, when the river is going down and the swamp is draining, they have the right to fish, again, by virtue of their membership in the village.

The other "compound chiefs," those who have not forfeited their rights as descendants of the earliest settlers by setting up their own "compound" before they have achieved seniority, do not depend directly on the village for their land or, in most cases, swamp tenure rights. As long as these descendants of the first settlers can maintain a knowledge in village memories of their lineal claims, they can always reclaim land for their own farming needs regardless of the length of the fallow or of who may be using it at the time. However, since all these land-owning "compound chiefs" (with the exception of two Kulubalis) are members of the Buare clan they all stand in a long line of succession to the "village chieftainship": the oldest Buare of the oldest "generation" (not necessarily the oldest in age) is the chief. Thus, while those without rights in land through lineal succession depend on their village connection to farm, most of those with such rights still depend on the village connection both to guarantee those rights and to ensure their eligibility for succession to the chieftainship.

Every Monday and Friday the village "association" has the right to detain younger men (under 35 approximately) and unmarried women from the "compound" labor force for its own purposes: cultivating together in a "compound chief's" "great field" for a fixed fee (a ram, or a he-goat), in several women's "individual field" (for a certain number of standardized calabashes-full of grain depending upon the size of the work group in each field), or for no charge in the field of a "compound" that lacks the labor to feed itself that year. After all the tardy "great fields" in the village have been given their final weeding by the "association," the latter sells its Monday and Friday labor to "compound chiefs" in neigh-

boring villages or does public service work on the Dugukolomba grounds, such as repairing the market shelters, for no charge. No "compound chief" has ever successfully been able to keep his young laborers from fulfilling their obligations to the village "association." This discussion of the "association" is our last example of a strategic relationship which the decision-making "compound chief" has with his "village." At all periods in the farming season which require an intense output of labor one can claim the labor of the "association" of one's village before a farmer from a neighboring village can. Any "compound chief" who seeks more independence by moving to a smaller village or a "hamlet" (politically but not economically attached to the mother village) loses this advantage, since his new community will only have a small "association" if it has one at all.

This village solidarity, through which the "compound chief" is guaranteed access to land and for which he sacrificies labor to the "association," is expressed in an ethnic idiom. A villager is a villager because he needs and uses land. A villager therefore presents himself as a "farmer" ("cikela"; the category "bamanake," Bambara man, has too many general meanings to be effectively contrastive with other ethnic labels: Fula, Bozo, Maraka etc.). The only "casted" family reported for any of the villages in the Dugukolomba area is a seasonal "blacksmith" group from Ngola. Otherwise, all specialized categories of people come from the larger villages along the trade routes, such as Touna and Cinzana on the goudron. Thus to be a member of a village like Dugukolomba is to have one's ethnic identity understood. Dissociation from one's village or from any village disqualifies one from identifying himself as a "farmer." A "farmer" who goes to another village market is called a "trader" ("julake") there. At the Dugukolomba market a full time trader is usually known as a "maraka." The most mobile group of all is considered to be the most ethnically different: the "Fula."

III. It should be clear from this description that the authority and control of the "compound chief" over the factors of production depend, to a large extent, upon his membership in the village. Therefore, a Project which addressed itself only to these "compound" production units would be wasting a valuable organizational resource.

It is with these sociological facts in mind, and emboldened by the early stage of the research, that I venture to propose a particular kind of village approach to both the Forest Project and L'embouchement payasan.

It must first be recognized that cattle herding is not, at present, an activity which is seen as involving village allegiances. As we have seen the predominant cattle herders, the "Fula," are in part characterized by their lack of a village referent. While, during the farming season, the village sheep and goats are herded out of the village in one troop by a "Fula" hired by the village, cattle herding is the responsibility of each individual owner. Of the 8 plow owners in the village, 3 have over 30 cattle, one has about 15, and 3 of the 4 others have only 2 oxen to pull their plows. All these cows are herded in a single troop during the rainy season, when they have to graze at least 15 km north of the environs of Dugukolomba where there is too much mud and mosquitos at this time. However, each of the major proprietors contributes his own shepherd: usually a younger son who has been excused from farming for this purpose (this individual often becomes one of the more unhappy and alienated members of youthful society in the village, when he is there). It is these same plow owners, as well as 2 other "compound chiefs," who command more than an average amount of labor, who are, naturally, the most anxious to obtain Mali Livestock credit as soon as the Project begins. The other, less 'wealthy' "compound chiefs" are more emphatic about their identity as "farmers"; they claim that they will have to wait and see how the others fare with the Project before they get involved.

If Mali Livestock is going to serve more than these nine 'wealthier' "compounds," some way must be found of involving the 31 other "compounds" in the village with the Project.

It is ridiculous to expect two or three of the smaller "compounds" to cooperate as one unit in the raising of cattle. But the rivalry between compounds need not preclude certain attempts at cooperative effort in Dugukolomba (as W. Jones said it did in Djoliba, see reference above). I hope I have successfully shown the importance of village allegiance for the economic viability of each "compound": without it the "compound" would lose clan or borrower's rights in land, access to a vital reservoir of labor in the "association," and retribution (guaranteed first by the "host" in the village, which any "Fula" coming into the area must obtain, and then by the "village chief") for any depredations "stranger" cattle may have caused in its field. Possibly, this strategic "village" structure can be used to stabilize a social inequality which will only be aggravated by the Project as it stands now.

I recommend that sections of the Forest be evaluated in terms of their relative worth for cattle raising and then be distributed between the villages and "Fula clans" (these units await clarification from the other sociologist) involved in the Project according to a ratio, for each village or clan, of cattle sold vs. number of independent managers ("compound chiefs" in the case of the Bambara) accepting the credit risk. As I see it the advantages of this plan are as follows:

1.) It would be in the interest of the wealthier managers in the village to persuade and aid other "compound chiefs" to accept the credit risk, since this would improve the ratio according to which their village was delegated control of Forest resources.

2.) As it would be the responsibility of the village to regulate the grazing,

in its own interest, of that part of the Forest put under its control, fewer functionaires would be required to regulate movements in and out of the Forest. The cattle raisers could, to a certain extent, become the enforcers rather than the violaters of Forest rules.

3.) The confusion, emphasized by Mme. Rupp, as to who should pay who what for the use of the Forest can, possibly, be cleared up by this plan. The village would pay an annual rental to the Project for that part of the Forest which has been given to their charge. It would be up to the village to assess its own cattle owners (the village chief already is responsible for collecting all village taxes) and all outsiders wishing to graze in their part of the Forest in order to meet this rental. This aspect of the plan would also cut down on the number of functionaires required to administer the Forest. Again, the local villagers will always have a much better idea of who is moving in and out of what parts of the Forest than any outside administrator. Furthermore, if the village profits on their rental of their part of the Forest, this will only stimulate a greater interest among these non-cattle herding Bambara in having a greater number of cattle grazing on land which used to be theirs for agriculture. Thus, resentment of the cattle project, on the part of the local villagers who don't like to herd cattle, could be forestalled in this fashion. The Forest which was taken away from them in 1947 could become a productive resource again; its productivity for the Bambara would be a function of how many, rather than how few, cattle are being raised in the area. Thus, the local villagers will be less embittered about having a greater number of cattle filing past their fields into the Forest around harvest time.

Before the different, qualitatively-scaled, areas of the Forest are distributed between the local villages according to the ratio described above, it would be helpful to map out traditional, pre-1947 tenure rights on Forest land in

order to add 'legitimacy' to these Forest assignments. An aerial photograph of the area would be helpful to this end.

FIRST FIELD REPORT

John Grayzel

November 10, 1974

Background Summary

Upon arriving in Mali on June 21, 1974, I was met by John Lewis who had already been in the country since May and who was then occupied in language study. Lewis had already visited the area of the livestock park and had made arrangements to settle in the village of Doukouloumba. My own first two weeks in the country were spent getting acquainted with the general situation, making contact with U.S. Embassy and OMBEVI officials, and arranging for Bambara lessons.

In early July, Lewis, his wife, Dangui Sissoko-our Malian homologue, and my self, took an OMBEVI Land Rover to Doukouloumba. The purpose of the mission was to install the Lewis and Sissoko in their village, and at the same time, to allow me to review the situation regarding my own future installation. At this time the rainy season was in force and the area along the forest could only be traversed with great difficulty.

With the exception of two young Peul herders, no other Peuls could be located along the borders of the forest. The local Peul settlements were to the north and provided inaccessible at the time. Contact was made, however, with Nabougou, a village situated 7 km. from Zinzana on the northern road to Katiena. This village has a significant Peul quartier and had favorably impressed Rupp-Rochelle as possible prospective participants in the Project. Since my proposed installation date was to be in late August, during the height of hivernage when the route to the other Peul settlements would have still been impassable, tentative arrangements were made to locate myself there.

Upon returning to Bamako, my wife and I continued Bambara language

lessons until the end of July. At that time we began to learn Peul. Because of the difficulty of studying this language due, among other things, to the lack of any developed materials, a minimum of five weeks seemed necessary to establish a background from which progress could be made in the field. At this time I also acquired some Peul informants who provided invaluable information on their culture, as well as serving as guides in the investigation of cattle marketing in the Bamako area. As a result of these activities my tentative installation date at Nabougou was advanced to the second week in September.

Between the beginning of September and October unforeseen problems regarding the acquisition of a vehicle arose that delayed my proceeding to the field. Since this situation has already been thoroughly described in several previous memoranda further discussion seems unnecessary. With the difficulty temporarily resolved, my wife and I proceeded to the field on October 13. Because of the availability of transportation and better road conditions, it seemed appropriate that the first endeavor be a general reconnaissance of the region to acquaint ourselves with the general situation and permit the local population to become aware of my presence. On reconsideration, it seemed advisable to postpone a final choice of a permanent base until after this initial period of information gathering. We therefore installed ourselves in a tent at Doukouloumba from which, aided by the hospitality of the Lewis', I have since been operating.

Preliminary Findings

Because of the relatively short period of time involved, the extensive area to be covered, the necessity of establishing personal relations before too many prying questions can be asked, and the somewhat suspicious nature of many of the informants, all information presented must be seen as subject to later verification or alteration. However, as of the moment, the following preliminary

observations seem justified:

1) The major boundaries within which cattle raisers steadily depend on the forest stretches west-east from Zinzana to Bla and north-south from Kouna to Doukouloumba. Within this area the simple largest concentration of Peul herders centers around Falinbougou. In addition to its high concentration of cattle raisers, the area between Falinbougou and Gweina (7 kms. NE) seem to be a crucial boundary vis-avis the determination of migratory patterns. While the Falinbougou herds seem dependent on the forest, the Gweina herds travel north during the rainy season and east during the dry.

2) The basic migration patterns of the herds vary from village to village. Some villages nearest the forest, such as Nabougou, keep their cattle in the area all year round. Others such Falinbougou (perhaps because of herd size) must cover much greater distances. The Falinbougou herd, for example, travels to the Niger River during Hivernage, and as far as Goua and Gan (20 kms. SE of Koutiala) in the winter, representing a range of over 100 kms. north to south.

The exact determinants of these choices has not yet been established. A serious question is not only why some herds go one place and others, another, but also why some areas seem to be consciously avoided. (For example some areas, such as the lands east of Goulabougou seem unused despite the presence of seemingly desirable grass ("NGOMI").

3) For those villages whose herds travel long distances, a sort of semi-transhumance pattern is followed. The herds are sent out under the guidance of young boys, sometimes accompanied by some women to cook, etc. However older, not just elderly, family members seemingly remain in the central village. All crucial decisions are made by them, including any change in the herds immediate location. At the moment the herds are fairly near the villages (12-15 kms.) and communication is maintained by go-betweens, usually on bicycles or mobylettes. Exactly what

occurs when the distance widens and travel becomes more difficult (i.e. when the herds cross the river) remains to be seen.

4) The Peul, as a group, seem somewhat worthy of the popular stereotype that describes them as "mefiant." While hospitable, they are guarded and secretive. Often they will refuse to provide requested information or will respond falsely. They are, however, fairly honest in admitting that they fear that the collecting of information on them is designed to help in either the taxation or control of their herds. At the same time, certain elements, especially among the younger generation, seem more open to change subject to their clearly seeing that it is in their interest. A major focus of research will therefore be the sources of this distrust and to suggest ways of overcoming it. Our own experience in which the village of Falinbougou first refused us the right to settle in their community, but later requested our coming is indicative that such difficulties can be overcome.

5) The Peul-Bambara dichotomy, while true in many ways, is not totally synonomous with the environmental exploitation of the region. In fact, numerous Bambara possess significant herds. Likewise, all the Peul seem to have cultivated land, whether worked by themselves or hired help.

Bambara owned herds are either given over to the care of Peuls, or are tended by Bambara herders. Apparently there are even some Peul herds that are given over to Bambara supervision.

The degree to which generalities as to Bambara or Peul attitudes, values, etc., are actually the result of their means of livelihood must be more closely determined. For example, the seemingly more cooperative Bambara might well change in attitude, with a change in the nature of their material interests.

6) In terms of the forest itself, little can yet be said. It is impossible to determine even the present number of cattle it supports by direct question.

Various subtler means, such as identification by markings are being attempted. For the moment all one can say is the figures in the Rupp-Rochelle report are certainly underestimated (for example in one day of vaccination, five village, of which only one is seemingly a large holder of cattle, produced 1,250 animals from out of the immediate surrounding forest). Questions as to the desirability and availability of different grasses, etc., are also being looked into, but most have not yet been sufficiently investigated to produce any reportable results.

Future Actions

After a series of preliminary observations, sufficient information seemed to exist indicating the area surrounding Falinbougou as the most interesting vis-a-vis studying the Peul. The difficulty presented, however, was that while most family members, including the major decision makers remain in the villages, the herds were 12-15 km. south in the forest.

Likewise, immediately after the harvest, the herds should move into the fields of the villages immediately bordering the foret classe. Observation of forest activity on a daily basis plus human interaction during this critical period of Peul-Bambara cooperation seemed to call for settling in the immediate forest area. However to acquire the minimal confidence of the Peuls as well as any in depth understanding of their life, conversely called for settling in one of their central communities.

The final decision made was therefore to set up two households - one at Falinbougou and one at Dofounou - 4 kms. from Doukouloumba. My plan is to spend alternating series of days at each spot, the length being determined by immediate circumstances. Arrangements have been made and accomodations should be ready to permit my settling in after the second week of November.

Conclusion

It is of course absurd to suggest that any definitive conclusion concerning the Peul or cattle herding in this area can yet be drawn. However, I do feel that at this point one very important point can be made, and should be clearly recognized. While recognizing the past value of the Rupp-Rochelle report in providing a preliminary orientation to the area, it can now definitively be said that its coverage, if due only to the haste forced upon the team, is too scanty and inaccurate to use in predicting any future decisions.

The Rupp-Rochelle report is orientated towards the identification of specific villages seemingly amenable to project participation. In many cases, ease of accessibility by the team seems to have been the determining factor in which sites were investigated. Neither Falinbougou, or any of the other Peul communities, nor numerous smaller Bambara settlements were visited. However, it must now be realized that the Foret classe de Doukouloumba represents a nexus of a much vaster ecological zone for cattle raisers. Immediate proximity and apparent cultural pliability are insufficient criteria for determining the legitimate interests of the concerned population.

In addition, to the extent that any group now utilizing the area will be forced to alter their pattern of environmental exploitation, a determination must be made as to available alternatives. For example, according to the basic project outline, the availability of grazing land may actually be decreased during the first three years of the Project. Such possibilities argue for an extension, if only minimally of research into outlining areas to inquire as to the limits of flexibility in cattle migration patterns, and its consequences on other neighboring areas.

All this argues for an increase in communication between the technological side of Mali Livestock and the present sociological research team. At

present, the teams lack knowledge as to the specific plans by which the forest will be changed and managed, handicaps its ability to direct its research in the most immediately useful directions. Likewise expectations as to the Project are already sprouting among the people of the area. A valuable sideproduct of such research as is now being conducted should be to lay groundwork for better community understanding. The proper flow of information between all interested parties could prevent the growth of false expectations. It would therefore seem desirable for such a two way channel to be opened as soon as possible.

Miscellaneous Problems

1) As previously noted, the Peul have already demonstrated their extreme sensitivity to having others collect information about them. I believe the situation is most delicate since their ultimate degree of confidence can affect the success of the Project. I have already, of course, assured them of our purpose. Unfortunately some statistical data is necessary on which to base future decisions. As a result, for example, I am, through various means, trying to determine the various cattle proprietors and the size of their holdings. However I do feel an obligation to protect their confidence. I therefore feel, unless it is definitely necessary, such information should be kept as general as possible. For example, in this report where I note that five villages produce 1,250 head for vaccination, I intentionally didn't name them as I saw no real necessity. Such an approach may be a little less statistically satisfying, but ultimately much more beneficial to all concerned.

2) As of the moment, I have been unable to find a single person in the immediate area who speaks both Peul and French. Most of the Peuls do of course speak Bambara, but this is not entirely satisfactory. Firstly, I can never find out what is being said around me among themselves. Secondly, I have already

seen that there are things the Bambara will tell me about the Peul when no Peul are around, and I suspect it might work two ways. A Peul interpreter would therefore be of great service. I am, of course, still looking. One temporary solution is that Timbo at the Embassy is taking a vacation in January and may come out to help me for a month. Being Peul, as well as perceptive, he should be able to make an appreciable contribution to the ongoing research. In this regard, John Lewis mentioned that he thought you had suggested January as a possible time for the conference in Upper Volta. If so, I'd like to request that month be spared, as the research opportunities then available will be too great to be foresaken.

3) Lastly, but not least, and never ending is the transportation problem. As the report itself indicates, I think the area to be researched is even greater than previously realized. Likewise the nature of the social relations that exist, and the division of labor requires that I be continuously able to move between the central village (the center of decision) and the herds. In this regard, I've already had young herders tell me that there's certain information I can get only from their fathers.

The problem is not at this moment because the rented Renault will probably do the job in the local area, but at the end of December, when the herds cross the Bani and head for the marshy area around Gan, things will change.

I know people are probably tired of being presented with this seemingly perpetual problem, but what other problem should you have with a transhumance society, but one of transportation. Likewise my status as sub-contractee-graduate student doesn't seem to be an emic category that affects either the Peuls' choice of destination or the inability of my stomach to survive living in the forest for any prolonged period of time unless I have the means to transport minimal supplies to set up camp. (The Peuls even joke about the inability of others to drink their water - referring to it as "True Peul water"). My suggestion is a

helicopter, but I'm open to reason.

SECOND FIELD REPORT ON SOCIAL ANTHROPOLOGICAL RESEARCH IN DUKOLOMBA AND ENVIRONS

John Van Dusen Lewis

December 16, 1974

1. I shall introduce this second field report by responding to some comments occasioned by my first submittal. It is hoped that such a commencement will not only forestall any future misunderstanding, but, at the same time, it will provide the reader with a preliminary exposure to the issues before he is swamped by the illustrative detail in the text proper. Those queries which are not answered in this introductory section are left for later sections, since they can be more effectively addressed in the context of the presentation of relevant data.

First, let me apologize for my attempt in the first report to organize, in the interest of brevity, the material from within. That is to say, in order to avoid undo repetition, I tried to have my themes and even my conclusions emerge directly form the presentation of the raw data. I am glad to have been notified that this did not work but for the most patient of readers. For those who did persevere, and who did learn from my report, I hope that the repetition necessitated by the more categorical organization of the present report will not constitute too great a presumption on their time.

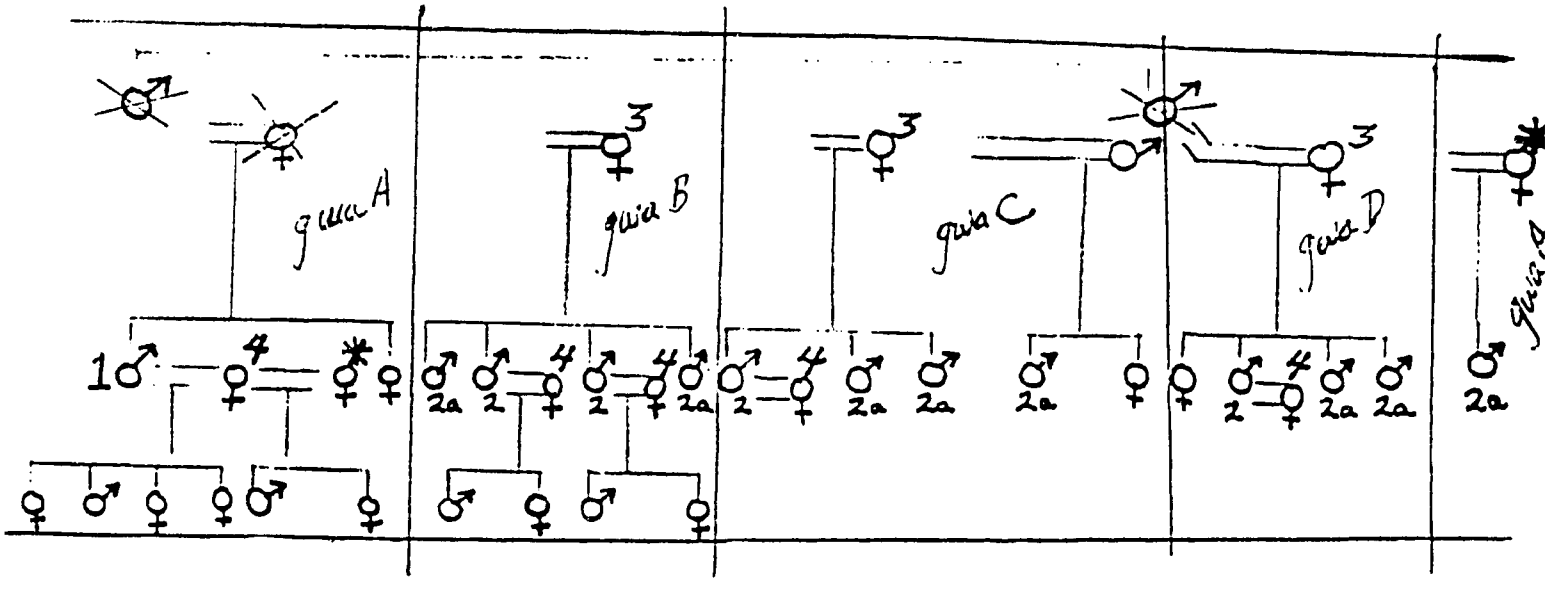
Secondly, I ought to respond to the most unqualified criticism of my report since it has brought into question the very utility of my efforts. To one reader, my concluding recommendations "indicate a total lack of understanding of present Project plans for managed grazing in Dukolomba Park." If "present" plans are substantially the same as those outlined in the "Project Mali Livestock" write-up which I received last May, then I would derive the misunderstanding reflected by this comment from my failure to specify, 1) whether I was making recommendations with regard to the plans for L'Embouche Paysanne or with regard to the

plans for the management of the Parc; and 2), whether I was pointing out incompatibilities which I saw between these sub-projects and economic organization in the area, on the one hand, and between the sub-projects themselves relative to that organization, on the other. I also failed to be explicit about the point of view from which I was making these recommendations: that of L'Embouche Paysanne. The goal of managing Dukolomba Park most efficiently for the maximum production of cattle for the market may not always be consistent with the stated goal of giving an economic up-lift to the greatest possible number of families in the vicinity. (In fact, a fear that the forest will become the private ranch of a few wealthy commercants in the area has been one of the most spontaneous reactions here to the proposed Project). Insofar as the goals of the sub-projects are inconsistent, I feel that it is our job to aid whoever has to make the choice between them, to make an informed choice. I appreciate being forced to specify these contradictions, for they are real ones: as will be alluded to below, an augmentation of the number of cattle in the region could be resented by the mass of cultivators unless a sufficient number of them were benefitting from that presence.

By way of addressing one query calling for a diagram of family organization, I will review the essential information presented in the last report in diagram form so as to be able to move on to my more contemporary observations without an undo expenditure of wind. A diagram is also a good place to introduce some of the Bambara terminology, which I avoided doing in the last report, only at the expense of burdening the text with awkward glosses. In addition, an exposure to some of the Bambara terminology used in the organization of production will be useful to any reader intending to have field involvement with this or any other project in most of Mali.

In order to introduce the standard structure of the firm (the

production unit - here the concession, or (du), and of the household (the consumption unit - here the shelter and hearth, or gwa), I will diagram the genealogical organization of the only concession (du) in Dukolomba where these two are not the same: the exception that proves the rule, so to speak, and therefore the most illustrative. Each distinct status position which will figure in the text below is given a number.



siblinghood

= marriage

X death

* the same woman - It is not uncommon for the wife of a dead concession chief (dutigi) to marry the next dutigi (1) but it is rare, as in this case, for her to marry into a generation just below that of her former husband. Marrying

a dead husband's younger brother (dògòke) is common; marrying the older brother (koroke) is unheard of.

1) Dutigi: possessor of the concession (du).

2) his dògòkew (younger brothers - w signifies plural). In this case, the oldest dògòke among the children of each old woman.

3) musokòròba: old woman who heads a separate hearth (gwa) (except the older brother of gwa A, who is in the Ivory Coast, his place being taken by the next brother in line). Each one of these gwaw is comprised of children of the same mother (badenw). Children of only the same father (fadenw) are seen as natural rivals: the word fadenya (ya is a suffix corresponding to '-ness') means 'jealousy.' These consumption units (gwaw) are represented in productive activity by the presence of an individual field (surafòrò; literally, nighttime field) for each one. As this is the only concession (du) with separate hearths (gwaw) in Dukolomba, it is also the only concession with nighttime fields (surafòròw). Each gwa receives specified amounts from the granary of the grand communal field (fòròba) of the whole concession (du), the field where all dògòkew are required to work except in the evening (sura) and on Fridays. These specified amounts are allocated according to the amount of labor contributed by each gwa, and decided by the dutigi in consultation with the possessors of the hearth (gwatigiw). But each gwa can embellish on this allotment with supplements from the granary of their exclusively-held surafòrò.

2a) Cegwanaw (the unmarried men; literally, men without a gwa). These are the potential emigrators to the cities and to the Ivory Coast (two of them are there now), whose financial and geographical volatility is the headache of every dutigi (see below).

3) Muso kòròbaw (the very old women) - Having married sons, these women are excused from cooking in the concession (du) and working on the fòròba; their

daughters-in-law take their place, theoretically, but even without a married son a woman who is old enough will be excused. They are thus left free to tinker with their woman's-individual-field (musofòrò), grow and prepare condiments for sale at the market, and even, if their legs will carry them, make the Wednesday trip across the river to the Touna market, where the ecology is different enough to produce crops (cotton, sweet potatoes, and several important condiments) which can command a good price at Dukolomba and points north. These independent financial activities are encouraged by the dutigi for the musokòròbaw but not for the wives (the finitigi).

4) Finitigiw (married women; literally, possessors of full-length cloth). Married sisters are circled on the diagram. They are in their husband's due, most of the time, see below. Of all the status positions mentioned, this one enjoys the least economic independence. They, however, unlike the dògòkew, are given personal reward for their travail in the fòròba by being permitted to keep millet found in the fòròba after the men have harvested what they want. (An unscrupulous musokòròba can also make her appearance at the fòròba at this time - after the heavy weeding is finished - and take her pickings.) In addition, the dutigi rewards these wives with extra millet at the threshing ground. These two sources of millet enable the finitigiw to buy their personal necessities, cloth (fini) in particular, without burdening him further.

Now a diagrammatic presentation of the organization of field space, before we pass on to the major issues of this report in the next section;

	OLD FÒRÒBA	NEW FÒRÒBA
FIRST YEAR OF CYCLE	MILLET w/ beans; cow peas; peanuts	fallow, the length of which depends upon the availability of land.
SECOND YEAR	fallow; MILLET w/ beans; peanuts; cow peas	SORGHUM w/ beans
THIRD YEAR	fallow; FONIO; cow peas; peanuts	SORGHUM w/ beans; beans
FOURTH YEAR	fallow; FONIO	cow peas; peanuts; MILLET w/ beans
FIFTH YEAR	fallow	cow peas; peanuts; MILLET w/ beans
SIXTH YEAR	fallow	peanuts; cow peas; MILLET w/ beans
SEVENTH YEAR	fallow	MILLET w/ beans; peanuts; cow peas
EIGHTH YEAR	fallow	MILLET w/ beans; peanuts; cow peas

There are two kinds of concession-wide-operated field space. First, the manured housefields (sofòròw): these are cultivated every year with the assistance of sheep and goat fertilizer which is piled in the du and periodically removed by young boys and scattered on the sofòrò. After the sofòrò harvest, cattle are corralled for the night on these housefields, during which time they eat the sorghum (usually; millet sometimes) stalks, and leave their benefice. (Fast maize, the other sofòrò crop, is harvested over a month before the sorghum and therefore its stalks do not remain as fresh for the cattle.) Second, the fallowed bush fields (kungofòrò): the rotation of all major crops grown in the bush revolves around the principle of the fòròba, as can be seen in the diagram included herein, which illustrates the standard practice for "sandy" soils of Dukolomba. (These soils are more typical of the region as a whole than the "black mud" found in the forest, where the ground can support a maximum of nine years of grain cultivation as opposed to the seven maximum shown in the diagram).

To continue from the diagram: If sorghum is started in a new fòròba, different from the old fòròba of the diagram, a fallow of 14 years will be obtained for the old fòròba. This is the bare minimum, even on the "black mud" in the forest. The possession of a fourth fòròba locale would be ideal since it would permit that fallow of a generation (20 years) which is the Bambara ideal, but it is unknown except in hamlets and newer villages (see below). In the "black mud" of the forest, fallows can be shorter - the last fallow was an enforced one dating from the Classement of the Forest in 1947 to the release of an area for cultivation in 1966.

All millet and sorghum is seeded with greater or lesser amount of beans, depending on the cultivator-in-question's fear of secheresse. If rainfall is adequate, a large quantity of beans can be grown as a ground cover in the fòròba, without noticeably inhibiting the growth of the millet or sorghum. Even if the

beans don't give seeds (which has usually been the case recently, including this year), their fertilizing effect on the fòròba is appreciated, and their stalks are carted home to be fed to mules, or are preserved to feed draught oxen at the end of the dry season. The farmers claim that if they needed more bean stalks, they would gladly grow them in the fòròba, but they do not see the point of using up valuable land for a pure culture of beans.

With this scheme in mind I can conclude this introductory section by responding to some important questions posed in relation to my discussion of this agricultural system in the last report. (Questions posed about the management of this system will be answered throughout the next section). It was queried how yields were maintained as the fòròba got older and its soil got weaker. I hope the diagram shows how each year the fòròba is expanded a little into the surrounding bush, until that year when a new fòròba is initiated elsewhere. It was also queried why the fòròba usage is maintained in savannah areas where land pressure is not as great as in the Dukolomba area. Although for the Bambara a single fòròba makes it easier to remember land tenure claims from generation to generation, I think in both the land-scarce and land-plenty situations a single great field receives the major farming effort because the firm can more easily protect its crops from animal pests if they are grown in the same space (preferably with another great field not too far away). From the time when the crop begins to ripen, one dutigi (or responsible kòròkè if his dutigi is too old) in each grouping of neighboring fòròbaw stays late into the evening with his rifle (for the wild boar), and his dog (for the monkeys), protecting the fields, and rising before dawn again the next morning to do the same. The next night a neighboring field-owner will take his place. Such cooperation is carefully arranged for fear that if two field owners were guarding adjacent fields at once they would be continually investigating the noises made by the other owner.

STRATEGIC CHOICES FACED BY EACH STATUS GROUP AND THEIR IMPLICATIONS FOR THE PROJECT

II. The foregoing diagrams represent the only straight description to be found in this report. The rest of the material with related conclusions will be presented from the point of view of the context in which it is lived: the situation of choice. By describing the options favoring and the constraints impeding certain key decisions made by individuals in their capacity as occupants of the status positions outlined above, I hope that that residue of these strategic decision situations known as the social structure will most clearly reveal itself. In particular, it is hoped that the major theme of this report, the effect of the structure of the village upon the economic options enjoyed by the firm, can become most salient when viewed successively from the standpoint of several decision-making situations. As part of the discussions of each situation, the implications of the relevant social structural features for social change in general and for the Project in particular will be explored.

Each section will adopt the point of view of the holder of one of the different status positions identified above. Within each section, the choice situations will be taken up in the order of the importance of the social structural features which they implicate in their resolution.

A. <u>Strategic choices considered from the point of view of the dutigi (concession chief)</u>.

1) <u>The option to abandon a big village for a small village or hamlet</u>: As the same factors operate for those considering the mirror choice, the abandonment of a small village or hamlet for a sizeable village, the constraints on this decision can be read from the following as well.

a. The advantages of the small village or hamlet:

1. greater availability of cultivatable land; fewer land tenure restraints on its selection.

2. possibility of a longer fallow

3. the necessity, because of a smaller village labor supply (see below), for the concession (du) to remain large.

4. If providing younger brothers (dògòkèw) with individual fields (surafòròw) is necessary for keeping this large du together, land can be readily found. In larger villages the dutigi does not give up any of his own land to his dògòkèw for their surafòròw. They must find it on their own. But then a large du is not necessary for survival in a larger village (see below).

b. The disadvantages of a small village or hamlet:

1. absence of a mass labor force at peak farming periods, when the faster the work is completed, the greater will be the final yield:

During weeding, a ton (association of youth to be found in every village, see below) is usually hired to finish the second weeding in most of the medium-sized to larger fòròbaw. A he-goat or ram, or a corresponding quantity of millet, is charged for a morning's work (the price is fixed regardless of the size of the ton, so a bigger village with, therefore, a bigger ton, gains here.) A smaller village or hamlet can hire the large ton of a nearby large village, but such an advantage is compromised by what the proximity of the larger village implies: a high demand for cultivatable land in the area.

The asset of the large ton is also realized during the short space between the end of the rains and the drying up of the water holes (to be found outside each village where dirt has been removed for previous brick manufacture), when mudbricks can be made in quantity without the time-consuming chore of having to use well water for the task.

Threshing time brings the second major loss sustained by a settlement with a small labor force. After they are cut, the grain stalks are stored in carefully arranged heaps designed not to collapse if attacked by animal pests. Upon completion, they are covered with thorns in order to discourage these visitors. However, in the smaller settlements, much more labor has to be expended on these heaped structures (it is the dutigi himself, or his successor if he is too old to work, who designs and builds them.) They must stand inviolate, particularly against termites, for a longer period of time awaiting a labor force sufficient for the threshing. In larger villages it is sufficient to spread some DDT on the ground and carefully pile the millet, in such a way that it cannot collapse if deranged by an animal, on top. This is possible since the millet won't have to remain long in this condition, even if it is last in line of harvests to be threshed, before the entire labor force of the village finishes the other fields and is available to thresh it. Lacking access to this large and therefore rapid labor force, the dutigi of a small settlement must carefully defend his millet heap against the long-term interest of termites and animal pests: it is set off the ground on logs, and each layer, a foot or so thick, is covered by millet stalks, to prevent the heap from falling in before the next layer of millet heads is placed on.

With the threshing of sorghum, however, even in the larger villages, if it can't be beaten right away, it has to be carefully built up off the ground since the termites will attack it in a matter of days, instead of weeks as in the case of millet. There is no option for the sofòrò̀w (housefields) of sorghum; luckily the work of the youth from a single residential section of the village is sufficient to beat it right away, since sorghum grains are immeasurably easier to eat off the chaff than millet grains are, before the village goats and sheep attack it.

But finally, it is when the millet is spread out for the threshing that the farmers of a small settlement lose. In Dukolomba, a big village, with all the able males working together, the millet from a big fòròba can be beaten off the head in two days. But in the small settlement it would take over a week to beat the same amount of millet, by which time, termites can have well-established themselves on the threshing ground. Even if the dutigi of a large fòròba in a small settlement found outside labor to assist them with threshing, he would have to pay extra for it. For labor from his own village, he is only expected to feed them meat (a goat is slaughtered if enough fish can't be found) at the work site.

Given this importance of the millet threshing moment as a limiting factor upon the productive possibilities of the firm, it can be seen why a dutigi can get so upset when a sturdy youth leaves after the second weeding for the Ivory Coast, (see below). Very few of the youths from the villages discussed in this report have left this year. They are waiting in anticipation of what they call "my work," inspite of the fact that I have told them all that I have been told that such work as there might be cannot start before the next farming season, if then. Nevertheless, this pipe-dream of the youth has given the dutigiw much pleasure, since nearly the complete village labor force is around to beat the millet this year. Whatever disappointment the youths may come to feel when the harvest is in (though the dugutigiw haven't given them much chance to think about it yet - they even asked me not to tell the others that the work would not be coming, but I did not heed this request), it appears the dutigiw are most pleased with this initial effect of the Project on village life.

2. Less protection of fields from pests in the surrounding bush: Since there is more bush surrounding fewer fields at the smaller settlements, there is a larger staging ground for the monkeys, birds, and wild boars, which constitute

the constantly discussed threat to the kungoforow (bush fields), (goats and sheep being the menace of the soforow - housefields). In addition, a dutigi can't always guard his field (no one else is expected or trusted to except the dutigi's successor if the dutigi himself is too old), particularly after dusk and before dawn, the visiting hours of the wild boar. In a larger village, with a more fixed land tenure regime, families with adjacent holdings have been making the rounds to their fallow fields together for generations. Thus protection for their standing crop is guaranteed by the presence of neighboring fields in the same crop (see above).

3. This next disadvantage applies only to the small village, not to the hamlet. In the circle of Ségou, the chefs d'arrondissement are encouraged to draw upon the tonw in the villages under their jurisdiction for various unremunerated public works. (They sometimes have the habit of doing this at inconvenient times relative to the farming schedule). Villages without tonw are asked to contribute a certain number of laborers relative to their population, which often exceeds the number they would otherwise have in their ton. In any case, we have already seen how moments of great labor demand in the farming season are relieved through access to a ton. Therefore, very few villages are without a ton. A hamlet pays its taxes through the mother village but is too far away for its young to participate in the ton of the mother village. Thus the hamlet escapes this public service work, and it is up to the mother village to get them to pay their share in some other way. With this in mind, however, at Independence the government declared all hamlets with over 100 taxable heads to be villages. It is these small villages which suffer from this public service work, because in Katiena (chef lieu d'arrondissement) at any rate, the same amount of work is required of each village regardless of its size.

4. Finally, a du which falls short on its tax payments is in a more secure position in a larger village. The village chief (dugutigi), who is responsible

for collecting the taxes in his village (dugu), for a 4% rebate, can be detained by the chef d'arrondissement if all is not paid. In a larger village it is easier for the dugutigi to raise the missing sum, to be paid back within the year by the recalcitrant du, to get himself off the hook. In a smaller village, however, the dugutigi will have more trouble finding this money. Thus, the du in question will be shamed into raising the money immediately, often by the disadvantageous sale of an important asset. Taxes are collected after the harvest, when both crops and animals (except for rams when Tabaski falls at this time) command their lowest price.

2) The relative advantages and disadvantages of deciding to go to a large village: They can be seen, as we have noted, as the mirror image of the constraints upon leaving for a small settlement outlined above. There is, however, one factor which throws off this balance: anyone who settles in any village is always guaranteed land. And anyone who asks can settle in any village; the only discouragement that he could be shown, or, in any event, that my informant would acknowledge, would come with the size and quality of the land given him. Generally speaking, though, any village will be hospitable since labor is always scarcer than land in the last instance. This need for a large labor force explains why most farmers have remained in the large villages even now, long after the threat of warfare has vanished.

3) Conclusions: A typology of village structures: I have isolated village size as an important factor effecting the economic success of the firm. I will now add a second factor, that of village age, in deriving a typology of villages which reflects the local reality as it influences the destiny of the production unit. This typology will specify those aspects of village structure which influence the economic viability of the firm (the du). It will include all those villages placed by Mm. Rupp in the region of first proximity relative to the forthcoming Project, except those which articulate heavily with the trading system which passes through

Cinzana-Gare (Sangola, Nabugu, Sonsoronbugu, Nyendela, Duna, and their hamlets), and which the resources of my study have not been able to include as yet. In these villages, because of the nearby volume of trading activity, and the consequent market for craft specialization; the economic destiny of the individual firm is less dependent upon the land and labor resources of the particular village in which it is situated, even when that firm is engaged in extensive farming.

Type A - The Hamlet: usually comprised of a few large families who think they can make it on their own. They seek to claim the best land in a new area for their successors, but they know that their large duw (concessions) need the labor of new settlers. In addition, the new settlers will have to rely on the large duw who founded the hamlet for many of their needs, especially if these duw have cattle (see below). Examples: Kòlòkèwèrè, Dawariwèrè, Musabawèrè, and the several hamlets of Dingola and Bla.

Type B1 - The large new village: This is a hamlet which has recently succeeded. The large duw which founded the hamlet have attracted enough settlers (usually duw too small to start up a hamlet of their own), to support their original enterprise. The large duw in these villages have land tenure claims proportional to their size. (In large old villages - see below, Type C1 - this is not always the case, since their size is more an outcome of the caprice of disease than a fact of their original enstallment on the land). The large duw have a following of newer settlers in their village, usually of duw too small to have started their own hamlet or to compete with these founders. These new settlers are obliged to the founders for the various necessities involved in setting up their new home. And yet these large duw, being new in the region, have few obligations to nearby kin or affines who could drain their capital. Other things being equal, a large du in a large new village (Type B1) will command greater assets and be inclined to take more risks than a du of the same size in a large old village (Type C1).

Examples of large new villages: Ngola, Nianiwere.

Type B2 - The small new village: This is a hamlet which has failed. Instead of attracting the settlement of numerous small duw, the original founding duw have themselves broken up into little ones. The only sign of wealth in these villages is a larger proportion of cattle per capita than is found in the larger villages. It could be that it is more economical keeping cattle in a small village near the river, like these, since the danger of these cows traversing another farmer's kungoforò (bush field) is slighter. However, the size of these herds is not nearly sufficient to liberate the duw in these villages from the constraints which the farming calendar makes upon their economic flexibility, as is the case with the Fula hamlets. Examples: Balangowerè, Sidikiwerè, Babaniwerè (not quite a village yet, although as an older hamlet with the same number of small duw it meets the requirements of Type B2), and Gwalabugu (discounting the influence of the failing calcium forge there and its Tukulor owner).

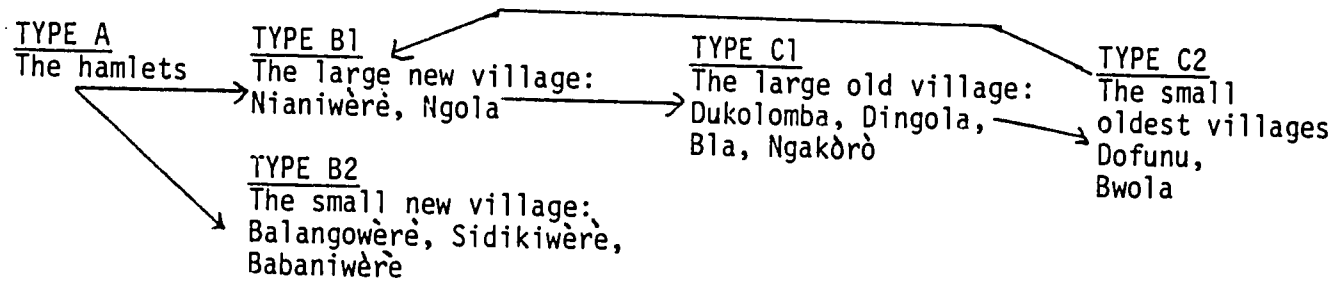
Type C1 - The large old village: This is a successful village which through the passage of time has seen the larger duw, active at its founding, break up into smaller units. Thus the proportion of the population in larger duw is less than is the case with the equally as large, new villages (Type B1). In addition, as was alluded to above, strength of land tenure holdings does not as closely correspond to du size as with the new large villages. Their fields represent a smaller percentage of the total field space of the village than is the case with the large new village. Thus they do proportionately more work for other duw in the village than do the members of the larger duw of the large new villages. Also, the larger duw in these old villages have many links of kinship and alliance with smaller duw in the area, and of hospitality and exchange with neighboring Fula and Bozo. Therefore, it is more difficult for them to concentrate their assets for a major innovation without breaking one of these ties. Their dutigiw see more clearly than

the dutigiw in the large new villages the importance of the economic improvement of the whole village. The latter may phrase their goals in terms of the development of the village, (which they more fully control), but the evidence of economic relations therein suggests that it is their own duw which they have in mind. Lastly, the older large villages will all have over-flowed into several hamlets, signalling a saturation of its land capacity and a perception by the large duw that they could do better on their own. All of the villages studied in this category (Dukolomba, Dingola, Bla, and Ngakòrò) have hamlets, while none of the equally as large new villages do. Nevertheless, because of their size, a crucial advantage for farm production (see above), these large old villages display a prosperity which surpasses that of the smaller villages, old and new, if not that of the large new villages.

Type C2 - The small old village: These are the oldest villages in the area. They constitute the residue of a large old village, the larger duw of which have split up, over the generations, or gone off to a hamlet, which will have long since become a village in its own right. These small old villages are better off than the small new villages since the duw in the former have many established relations in the area through which they can maintain some economic specialization. Often these contacts can be effectively wielded to provide a larger work force for the labor bottle-necks in the farming season discussed above, than would be available from the village itself. For example, a prospective groom and his age-mates are expected to donate work to the field of the fiancee's dutigi, if they are from a nearby village. This practice would represent more of an assistance to the older villages, who were accustomed to marrying in the area, than to the newer villages who have fewer ties in the region. If the village becomes small enough to permit the land tenure regime to become more flexible, then a large family may rise again to dominate the smaller duw. As we have noted, the latter, because of

their local connections, could supply a more diversified economic support to the renaissance of large duw in their village than could the smaller duw of small new villages. Examples: Dofunu, Bwola.

This typology of village structures can be summarized by a diagram of their structural evolution from one into the other:



The farmers themselves have a vocabulary for these differences between villages. Residents of the older villages refer to those in the newer villages as tonjon (literally, slaves of the ton), the name given to those who obtained their power and place as vassals to the Bambara king of Ségou and not, by implication, from their ancestor's arrangements with the 'vital forces of nature' in the region. The people in new villages in my typology are called tonjon even though the villages were all founded in this century. The people of Nga kòrò are called tonjon inspite of the age of the village since, as the seat of a pre-Ségou Maraka Masa (a canton-wide figurehead with a judiciary role), it came to have close administrative ties with Ségou rule. In this sense then, a village which became a direct vassal of Ségou rule became 'new' again, probably in more than an idealogical way. The word tonjon has thus been extended to connote an element of forced and abrupt occupation. The residents of the older villages distinguish themselves as bamana, or, more specifically, as "people of the wet earth," or people of the swamps," depending on an important ecological feature of their region. The tonjon themselves deny this appellation, claiming to be bamana as well. When pressed

they will admit to being tondenw (children or members of the ton of the Bambara king), but, they add, so is everyone else. The newer villages' residents never claim a more prestigious appellation than the residents of the older villages but the latter always mark themselves off from the former.

4) Implications of the village analysis for the Project: Mme Rupp, in her report, correctly anticipated, I feel, more volunteers for L'embouche paysanne from what I have typed as the newer villages. For these six newer villages she foresees 73 volunteers out of a total population of 1,566 (she uses the 1969 census). For the six villages I have typed as older, she foresees 63 volunteers out of a total population of 3,052. I hope my analysis has clarified why the dutigiw in the newer villages are more ready and, in the case of the large new villages, better prepared to volunteer. They have already innovated insofar as they or their fathers have moved away from the mother village; therefore, they would be more disposed to innovate again. They also have fewer local relations who could lay disintegrating claims on their accumulated capital. However, most of the paysans in the area live in the older villages, where the distinctions of wealth are not flaunted or openly sought in front of one's numerous kin and affiness. For this majority, L'embouche paysanne would be more enthusiastically embraced if it were seen in some way as a village effort; the time taken for it would be seen less as an evasion of village responsibilities. The more innovation-prone dutigiw in the newer villages would be agreeable to some sort of village approach to L'embouche since are always anxious to display the productive activity of their firm as a village affair. It is desirable for them to manifest this 'village consciousness,' since it is characteristic of the outlook of the elders in the more prestigious older villages.

In my last report I suggested that if access to the Parc was administered through the authority structures of the relevant villages, full participation in L'embouche paysanne would seem like less of an anti-social act to the

majority. I have found it unwise to make any more specific suggestions before ascertaining what "present" Project plans are.

5) The decision to grow a cash crop (i.e. peanuts; the soil is said to be too "hard" for cotton, quite aside from the precarious rainfall in the region.):

a. Conditions inhibiting an expansion of peanut production:

1. Soil conditions: After the end of the rains the "black mud" south of Dukolomba and Dofunu is baked hard as a brick. Thus while the soil will produce a good peanut crop during the rains, many peanuts are lost on account of the difficulty of removing them from this bricked soil. That is to say, many nuts break off from the peanut and remain in the soil or fall on the ground, and time cannot be found for the laborious task of retrieving them all before the monkeys arrive. The "sandier" soils towards the north (are considered by the cultivators if not by the Operation Arrachide representative stationed in Katiena, who measures yield rather than labor input), to be preferrable for peanut cultivation, (even though fewer nuts per hectare are yielded), because the labor is less taxing.

2. However, the monkeys also find it easier to remove peanuts from the "sandier" soils. Thus these pests discourage an increased investment of labor time in peanut production in both soil areas.

3. The fact that the French encouraged it cultivation gave peanuts very bad credentials. It wasn't until they were asked by an Independent Malian Government that the cultivators of Dukolomba would grow peanuts for taxes - in-spite of the fact that peanuts command a significantly better price than millet at tax time. They saw the French peddling of peanuts as an attempt to deprive them of the use of their land to grow a consumable crop: millet. Before Independence, they only grew it for their sauce needs. It might also be mentioned at this point that the French extension officer explained composting (l'engrais vert) to them, but they say that they couldn't find the time to prepare the compost at

the time it had to be done, so nothing came of it.

4. Disappointments with official support of peanut cultivation - Money needed by the official buyer to prevent the cultivator from being reduced to selling his crop at the commercial price often does not arrive at the market from Segou when the cultivator needs to sell. Even if he doesn't need to sell, there is the fear that an official price will never arrive, and there is nothing he can do with peanuts except sell them. Whereas, if it were millet, he could store it against a bad harvest. Thus the cultivator is forced to sell at the commercial price to a commercant, who in turn sells it to the official buyer at the official price when the money arrives. The commercant and the official buyer split the difference between the two prices for otherwise the latter might just as well do what he's supposed to do: buy directly from the cultivator. Also, last year Operation Arrachide sold, on credit, ten sacks of a new variety of peanut (bigger than the tiny one presently cultivated, but more resistant to low rainfall than the large variety which the cultivators already have seeds for), to five dutigiw in Dukolomba. Once the sacks had been delivered, it was discovered that all the seeds had been spoiled by parasites. And yet they still have to be paid for.

Ngola has a resident O.A. representative who can probably forestall some of these difficulties for that village. But Ngola's large volume of peanut production is also to be attibuted to its "sandy" soils, its flexible land tenure situation (as a new village), and (as a large new village) the large interest in and possibility of expanding production. (Cattle is the forte of the other large new village discussed above: Nianiwèrè).

b. Conditions inhibiting a market-oriented expansion of millet production:

1. Labor bottlenecks (weeding and threshing) in its cultivation.
2. Shortage of land relative to the present technology.

3. Setbacks in purchasing plow equipment experienced during the Secheresse.

4. As with peanuts, tardiness in the arrival of the official price.

6) The decision to loan land:

a. Advantages:

1. The land is cleared by the borrower, who may be removed, after one year of cultivation, by the owner, who can thus use the still strong soil himself without having to do any of the work of clearing.

2. An ally is gained in the person of the borrower, who has been given access to land for no charge.

3. One is enabled to make the prestigious claim of having fulfilled village-wide obligation to extend hospitality to strangers. Not the least of the reasons for which such hospitality is sanctioned is the augmentation of the village labor force which it ensures. As we have seen, those with larger fields, the older duw, have more to gain from an augmentation of the village labor force than those with smaller, borrowed fields. The new arrivals in a growing or big village thus assist, as we have seen, the older and larger duw to maintain a higher level of production. Also, as we have seen, without the new settlers, necessarily arriving in small duw, (for otherwise they could have started their own hamlet for themselves - see above), the large duw who founded the village as a hamlet cannot succeed. These new settlers sustain the increasing wealth of the larger duw without the production possibilities of their own firm improving that much.

4. When one loans part of one's ancestral fòròba which is not being used, although the fallow of that section is foreshortened, it becomes easier to protect that section of the fòròba which is being used, from animal pests. As we have seen, the bush next to a kungofòrò is a dangerous staging ground for

birds, if it is grass, or monkeys, if it is trees. It is better to have another field than raw bush next to one's crops.

b. Disadvantages:

1. The fallow of one's unused foroba space is interrupted. This disadvantage is more exacting in a large old village where the land tenure regime has become more constricted, and, through the passage of time since the regime was set-up, more arbitrary with regard to the size of present duw. Whereas, in a large new village the large duw are the founders and therefore able to control land commensurate with their size. Thus, for them, loaning land to 'strangers' represents less of a displacement of their farming regime than for the duw of the large old villages. Yet the large duw of the large new villages receive the same benefit from the augmented labor supply.

7) The decision to exact payment for a field damaged by another's cattle herd: The danger of cattle spoiling a ripe field is greatest for the larger villages on the way to the river a month after the rains have stopped, when many of the water holes to the north have dried up. Hamlets and small villages are less vulnerable to this spoilage, since they are surrounded by more bush which the cows can pass through with less chance of straying into a ripe field.

a. Reasons for not exacting payment:

1. No family can afford to alienate a milk producer: without rice to complement the amino acids in millet, milk becomes a much more strategic element in the diet. The second most important dish after the ubiquitous millet dough (to) with its leaf sauce (na), is a porridge (dege) which is made with at least some sour milk. This is eaten at least every other day. Aside from to, almost every other major dish can be made with sour or fresh milk. Thus every village household depends upon the good will of the herd-owning duw in the village.

Particularly, as the old women (musokòrobaw) in these duw who sell the milk never change the price (an equal volume of millet, that is), but only respond to shortages by being selective about which customers they will oblige. In fact, the only way the milk-selling women can make the price change with supply is to water the milk down, but this can only go so far. The household also doesn't want to alienate transhumant milk producers or large herd-owners of a smaller village who might be more likely to have a surplus of milk and therefore would be more willing to accept less value for the milk than the equal volume of millet payment.

2. Bambara cattle owners, being in glass houses themselves, can't throw stones. Since the cattle owners in one's village aren't expected to pay for spoiling village fields they themselves cannot turn around and exact payment from another herd owner from elsewhere who might have spoiled his field. This outside herd owner may have important economic relations with the villager whose field was spoiled previously by the inside herd owner. The outside herd owner, if find, would punish his customer since the latter comes from the same village as the inside herd owner who had fined him. The punished customer will in turn spread malice in the village against its herd owner, who exacted the payment from the outsider. Thus the inside herd owner, particularly in an older village, where the wealthy are more responsive to the will of the relatively poor (see above), does not fine the outside herd owner for the spoilage. This seems to be the case even though he has more power with which to do so than has the ordinary cultivator. The inside herd owner explains this situation by saying that if he exacted payment, the villagers would say behind his back that he had spoiled his own field in order to get the money. In fact, the Fula are said to seek hospitality in villages where the leading families are large herd owners, for they know that there, if an accident happened, there would be less chance of their being fined.

In Dukolomba this year with over ten significant incursions of

cattle into kungoforo, payment was exacted only once. And this exaction was made, not by a dutigi at all, but by the junior ton in the village whose group field had been damaged. The ton charged the Fula herd owners 30,000 FM. But the elders of Dukolomba intervened in an attempt to get the youths to drop the charge, but only succeeded in getting 5,000 FM knocked off the charge. These particular Fula paid readily, since they are accustomed to soliciting Dukolomba hospitality as they use the Forest grasses and the river water.

These relations with cattle owners in nearby Bambara villages and with Fula who pass through the vicinity are, as we have seen, more developed in the older villages. Thus, it is more improper for a farmer in these villages to fine local herders for a damaged field. However, the field owner in a newer village, whom, as we have seen, has a more direct and commercial approach to his economic destiny, will be more likely to exact payment. He has fewer local contacts to offend. One spoilage was inflicted on a Ngola field this year; a Fula hosted at Dukolomba was the culprit. Payment was demended (although it has not been received yet).

8) The decision to consult the dogoke in management decisions: Until I can witness the planning of fields next spring, it will be difficult to say to what extent this decision is taken.

a. Advantages to be accrued from the joint consultation:

1. The dogokew may be less critical of a management decision, and, thus, more enthusiastic about its implementation if he has beer consulted. However, in no instance has a dogoke been seen taking more responsibility for the foroba than the koroke (older brother). It is the latter who goes out to guard the field day after day even when there is a lull in the farming work. He is the last one to leave the field in the evening, letting out wild shouts to scare away any wild boar in the region before he goes. As we have seen, he, furthermore,

often arrives at the kungofòròba before dawn in order to insure its protection.

2. If the dutigi can capture the enthusiasm of the dògòkè, the latter may be more likely to suppress fadenya (rivalry) and thus remain in the du.

3. There is a strong precedent for meetings between the married men (musotigiw) in one concession (du): they all have to be consulted when anyone of their wives asks for grain from the fòròba granary when it is her turn to prepare the communal meal. This consultation is necessary in order that the wife may remain above suspicion of having asked (only a male can actually reach a calabash into a fòròba granary) for extra grain with the intention of siphoning off some for her personal granary.

b. Disadvantages which might accrue from too much joint consultation:

1. If the dutigi does not appear to be able to make up his own mind, the dògòkèw may lose respect for his capacity to manage the corporate affairs of the du and leave the concession (du) altogether (see below), in order to become his own manager.

2. Such a reliance on the dògòkèw may undermine the authority of the dutigi in the work situation. Normally, in the fòròba a dògòkè cannot even rest without the express permission of the dutigi (or ranking kòròkè if the dutigi is absent).

SECOND FIELD REPORT

John Grayzel

February 18, 1975

My first field report, as noted, was rather scant and based upon rather rapid observations. This second report attempts to give a somewhat broader and deeper picture of the situation vis-a-vis cattle raisers in the Doukoulouma area.

Basic Regional Divisions:

Generally speaking, to understand the present exploitation of the forest area by cattle raisers, it is necessary to view it as part of a much larger region. A definite delineation of the greater regional boundaries will be impossible until the pattern of herd movement has been followed for a year. However, broadly speaking, it can be said to be divided into three major regions: 1) the classified forest and bordering villages, 2) the region north of the forest and extending to an area approximately on line with the village of Kouna, 3) the area south of the river, beginning on its southern bank and extending perhaps as far as the border area of Upper Volta, south of Sikasso and Kouri.

Within this greater region, two basic methods of cattle herding exist - sedentary herding and migratory herding. Under the sedentary system, the animals remain within a close proximity of the village throughout the year - perhaps up to 12-15 kilometers and near enough for those in the village to obtain the milk. Under the migratory system, the herd travels from region to region, its exact location and time of movement being determined by the specific situation that exists as of the moment.

BASIC HERDING POSSIBILITIES AND THE CRITERIA FOR CHOICE

For the sake of example, several stereotypes can be created to comonstrate the existing alternative herding patterns:

1.) Beginning with the rains in late June, the forest region and most parts of the southern bank of the river begin to flood. To avoid the water and the mosquitoes, the herds move north, the largest assembling area being in a horizontal band from approximately 14.70^{o} to 14.90^{o} latitude. Not only local herds but cattle from across the river gather to take advantage of what is reportedly an abundant supply of water and grass. Local people claim that in the area between Kouna and Falimbougou up to 10,000 head are found.

2.) With the drying up of the land in September, comes the ripening of the millet fields and the increased danger of their being damaged by the herds. At this point many of the herds take refuge in the forest to await the harvest. Present information seems to indicate that the forest has always been the limiting factor as far as the availability of food during the year. However in the past, the claim is made that at its best, it could support during the months of October-November up to 14,000 head. When this was true, the herds would wait till the fields were ready and then return to graze in them and provide manure until about January. Since the drought, the lack of grass has caused many to split their herds and send some across the river as early as the end of October. This year in October, a positive count of 3,912 head using the forest was made and this probably represents a figure 20% below the real number.

Those animals not crossing the river graze village lands. Those within 6-8 klms. of the Bani usually drink from the river. Herds further away are supplied with water from wells. The animals drink twice a day in hot weather, once a day in cold weather.

3.) In January and February, a second exodus of cattle begins. The entire area from Nani till at least Koutiala seems to be used. Some herds spend the entire season till June fairly near the river, others progressively move south, and some head to regions as far as Mpessoba at 14°S. At the same time, other herds remain in the village environment making do with the available resources.

4.) With the beginning of the rains, which start earlier in the south, those herds that have crossed the river begin to move north again until they find themselves in the original rainy season grounds.

Here it must be emphasized that no single pattern exists for all the herds or even for the same herd from year to year. Even in any one year, an owner may split his herd, sending some to one place and some to another. Decisions are based on the individual's situation vis-a-vis several criteria. Among the most important are:

A. the availability of food and

B. the avialability of water; however the idea of "availability" is modified by other circumstances - for example:

C. the availability of a good herder:

Can he be trusted to take the cattle far away?

How competent is he in finding new grass? etc.

D. the avialability of additional labor:

Are there enough hands to draw water from a village well for a large herd?

E. the health of the animal:

Can it survive a long voyage?

F. the composition of the herd.

Aparently the "Gongo" is not as dependent as the "Meri" on fresh grass and the "Meri" is harder to control in the presence of cultivated fields.

G. the nee for milk in the village, both as food and as revenue.

H. the need to keep cattle nearby for other reasons - such as labor, bride price, to sell for coming expenses (i.e. taxes) etc.

I. the personal relations that one has in other areas to aid in obtaining permission to graze the fields and finding a host.

J. The actions of others as they affect the availability of resources i.e., How many others must use the well or graze the same land?

It should also be stated that I believe, though I am not yet sure, that no area is completely devoid of use in its entirety during any season. The question is one of relative use in terms of quantity and activity. I therefore suspect investigation of all three regions will be necessary throughout the year.

Basically for Project purposes, I feel it advisable to stress the previously expounded delineation between the movements of herds rather than the movements of the owners. While there are strong correlations between ethnic identity and herding methods - no one group has a monopoly on any one technique nor are the two techniques mutually exclusive for any one owner. There are Bambaras whose cattle migrate across the river and Peuls whose herd stay by the village throughout the year; in addition large herd owners will often split up their herds and while the majority leave the area, others are kept behind to fulfill minimum needs for milk both dietetically, and as a source of income.

BASIC ETHNIC DISTINCTIONS

Group ethnic identity, however, is a useful aid in delineating the alternative possibilities for cattle raising. Accordingly, the ethnic distinction I will emphasize are those that I feel best spotlight and explain present pastoral practices and will be of most use in predicting future behavior. No attempt will

therefore be made to decipher the many subtleties of ethnic identity in the region that would be of academic but little practical interest.

Three group distinctions of importance are "Bambara," "Peul" and "Furba Fula."

The Bambaras represent the overwhelming majority of inhabitants of the area. Their language predominates as does their traditional claim to much of the land, which stems from the long historical association many of their families have with the area. They are predominantly agricultural and seemingly place a strong cultural emphasis on cooperation and community. I shall leave all in depth analysis of them to John Lewis except as it is immediately pertinent to those presently involved in the pastoral process.

The Peuls represent a small fraction of the population, perhaps 1-3%. In addition, the majority of them are fairly new to the area, having come there after 1940 but having been mutually associated long before this migration. For example, the villages of Falimbougou-wèrè, Siguine-wèrè, Botiewèrè, as well as the Peul population of Nyamakewèrè, and Sulimaniwèrè, represent a single political entity vis-a-vis the government. They pay their taxes as a unit to the arrondissement of Zinzana and, in reality, do not consider themselves under the jurisdiction of any of the Bambaras, even if they are physically installed in their midst and by dint of their permission.

The Peuls have a strong cultural identity as different and superior to the Bambaras. Among themselves they speak Fulfulde but are virtually all bilingual and completely fluent in Bambara. Their fluency in Bambara is demanded not only because of their minority position demographically, but because of the necessary economic interaction between the two groups.

At this point it should be emphasized (as already mentioned in Field Report #1), that neither the Peuls nor anyone else living in the region or

even using it on a seasonal basis can be termed nomadic. In fact, the delineation of nomadic, transhuman, and sedentary does not suffice to describe the subtleties of the situation. The good of the herd is considered of primary importance. If the herd must move, someone must move with it. This can be a younger son, a paid herder or the owner himself. If he who is herding the cattle is married, the wife will go along. Younger boys usually sleep out with the herd, older men, especially with wives, may live in temporarily constructed shelters or more often make arrangements with some sedentary agriculturalist to lodge in the nearest village.

However everyone has a definite identity as coming from such and such a village. Everyone has an established homestead somewhere, including cultivated fields. Lastly, and perhaps most important, nobody apparently likes moving around. Traveling with the herd is considered a burdensome task for the herder. Likewise it is economically undesirable in that the separation of herd from village means an undersupply of milk for the family remaining at home; both for consumption and as a source of revenue for the women, who have a right to sell it, but must use the profits to buy the spices to cook the family's food.

However the Peuls are not sedentary in the same sense as many Bambaras. The possession of land has little status value and they rarely seem to employ all that is available. They have no historic or sentimental ties to the area they now inhabit. Therefore, should conditions warrant it, they are prepared, at any moment to re-establish themselves elsewhere. Causes for such resettlement may not only be the requirement of the animals for food and water, but may also result from conflicts with others in the area or to avoid political authorities whose presence they find too pressing.

This last problem would seem of immediate concern to the implementation of the managed grassland project. In my first report, I mentioned my intention

to look into the sources of the present day "distrust" on the part of the Peuls. While some of this distrust may stem from something inherent to the pastoral life, there are certain historical incidents of which the people still speak, coloring their interpretation of present day events and their reactions to them.

Basically the presence of many of the Peuls in the area, of which those of Falimbougou are a part, is traceable to a diasporia from the region around Fana (between Bamako and Segou). It is a three stage movement that began in 1893, when they were defeated at Bongati by the French after having rebelled against the newly established colonial rule. They thereafter dispersed mainly to the south. In the early 1940's, the colonial Vichy government in order to obtain supplies began a massive and continuous confiscation of cattle and milk products that caused a second movement into the present day region which, at that time, was apparently quite wild and capable of providing refuge. In August and September of 1968, occurred the third historic trauma and perhaps the most powerful present influence. At that time the government of Modibo Keita announced that within the next few months the herds were to be communalized and become state property, and that people would thereafter work for the government in return for food and goods. The result of this was a massive migration of cattle to neighboring countries. This was arrested only because of the coup d'etat that followed two months after. However the experience was far from forgotten and, in fact, upon first hearing of the park project, the immediate association was made that a new "regroupment de betail" was at hand, and this suspicion still remains. (It should be noted here that this account has been verified by various persons who worked for the government at that time).

Throughout their recent history, however, they have apparently always been an only partially pastoral people. Cattle are certainly of central importance to them, but at the same time, they are virtually all cultivators of

millet and sometimes beans for fodder. While not as enthusiastic or diversified agriculturally as the Bambara, their emphasis on cattle may let them surpass the Bambaras in terms of efficiency. The possession of cattle means the availability of draught oxen. In Falimbougou, the major Peul hamlet that uses the forest, every head of family has a plow. The use of the plow plus the availability of manure makes some Peul, the producers of significant quantities of millet (3,000 kgs. a year by a single proprietor with a small family, not being unusual, and over 6,000 kgs. not being unheard of). The millet itself is grown and used both for family consumption and for sale.

It appears that this combination of herding and agriculture is of fairly ancient origin. The major difference in the past was that prior to French domination, slaves did most of the work. Today slave labor has been replaced by paid workers. Thus it is often said by the Bambara of the region, that "the Peuls don't grow millet, they buy it." For example, to beat the millet of his field, a Peul will pay another 200 FM for a day's work. A field yielding 1600 kgs. of millet can require 25-30 men and an expenditure of well over 5,000 MF since food and kola nuts are provided in addition to wages.

The Peul social situation further exacerbates the need for wage labor. To begin with, the Peuls live in relatively small hamlets - Falimbougou, the largest Peul hamlet that uses the forest, has 87 regular inhabitants and because of the need to travel, the total number are never in the village at one time. Thus demographically, they would be hard pressed to produce a sufficiently large communal work group to satisfy village needs similar to the Bambara Ton. In Falimbougou, the average family living as a unit has 8.7 members - the largest family unit of the village has 22, the smallest, 2.

In addition, the Peuls are extremely conscious of their social standing. The overwhelming majority of Peuls in the area are of noble caste, and as

such would lose status vis-a-vis another for whom they have worked. If a young boy or man needs money, about the only work he will do is be a herder - which pays 2,500-3,500 FM a month, plus food and clothes. Even then, he will seek employment in another region -- perhaps as far as the Ivory Coast - where he has no chance of working for someone with whom he will have permanent social relations. Thus the ironic situation evolves that people leave the region to seek work as herders far away at the same time as other Peuls from Macina and Mopti come into the region to find the same jobs. As far as tasks such as weaving, dying, building grass granaries, etc., the solution is always to pay a Bambara to do the job.

The Furba Fula, represent the third significant ethnic group. Their existence itself reveals the complexity of ethnic classification and the relation between ethnic identity and predictable behavior. The Furba Fula generally follows the Peul way of life. His major commitment is to his herd and his settlement patterns and willingness to move is judged by their needs. Like the Peul, his social commitment is more to the immediate family than to the community. Residence is usually in a Peul village or Peul quartier of a Bambara village, though single Furba Fula families, like single Peul families, can be found residing in a Bambara settlement. Often the family will speak only Bambara, or Bambara and a little Peul, but if asked to identify himself, the Furba Fula will say he is Peul, and likewise will be so identified by Bambaras, unless they are requested to make the specific distinctions. However, well established Peuls will identify him as different from them.

The origin of the Furba Fulas is traced by the local population to the times of the Bambara kings when war captives were made into herders to guard the royal cattle, themselves originally obtained by capture. However, there is a definite process whereby various Bambaras today seek to transform their identity to that of Peul. For example, a Bambara child may be given to neighboring Peuls

to bring up, or at an early age become a herder for a Peul without sons. Payment is often in the form of cattle - up to one baby bull every 3 or 4 months. Thus the youth may slowly acquire his own herd. In other cases, the transformation begins in late life when a cultivator with cattle finds himself with a significantly large herd. The transformation can begin with the adaptation of Peul ways in housing or dress. While supposedly intermarriage between Bambaras and Peuls, or Furba Fulas and Peuls is taboo, one finds that men who possess large wealth in the form of herds can cross the line. Apparently this often is a several generation process, with the Bambara first marrying the Furba Fula and establishing his children's identity as Furba Fula, and the Furba Fula marrying a Peul and establishing the Peul identity.

THE BREAKDOWN OF CATTLE OWNERSHIP BY VILLAGE AND ETHNIC GROUPING

The following is a list of villages that have so far been identified as having herds that use the forest. They are listed with the number of owners of herds and the total number of cattle counted.

Village	# Bambara Owners	# Peul Owners	# Furba Fula	Total # Cattle
Abdoulayewèrè	0	1	1	77
Boala	3	2	3	249
Babaniwèrè	2	1	0	145
Dofunu	3	0	0	130
Balongowèrè	3	0	0	124
Doukoloumba	6	0	0	237
Sekoranje	0	0	1	40
Falimbougouwèrè	0	7	0	337
Falimbougou Bambara	4	0	0	67
Nyaniwèrè	8	2	0	369
Dinkola	8	0	0	94
Blan	3	1	-	125
N'jedougou	2	1	0	145
Doukakouko	1	0	1	40
Kouna	1	2	0	200
Moussabawèrè	3	0	0	60
Kelekewèrè	2	1	0	125
Nabougou	3	4	3	339
Ngola	4	0	0	67
Sidikiwèrè	4	0	0	56
Niedela	3	0	1	114
Jonkewèrè	0	2	0	80
Botiewèrè	0	2	0	145
Sulimaniwèrè	0	2	0	68
Jina	4	0	0	42
Nyamakèwèrè	0	3	2	203
Dakala	2	0	0	60
Togo	2	0	0	40
Sibiriwèrè	1	1	0	15
Siguinewèrè	0	1	0	35
Tibi	1	0	0	28
Sanogola	1	0	0	40
32 villages	75	33	12	3912

It must be emphasized that these statistics only represent herds that used the forest from October 1974 to December 1974. The figures also represent only those animals actually observed and counted. There are many more herds in the region that didn't use the forest during this period. Moreover, since herds are often split and the identification is made by the mark of the owner, and information given by the herder, it often happens that the same herd seen on different days may actually represent two herds of the same owner.

The maximum number of animals that theoretically can travel in one herd is 200, but experience seems to indicate that during this period one herd with one herder never exceeded much more than 100. I know for a fact that certain owners for whom 100 animals are recorded have at least two herds of 100 each - thus double the recorded number. I would therefore estimate that these figures are underestimations of at least 20% across the board. In the case of large herd owners the number may actually be twice as much, and since it is mostly the Peuls and Furba Fulas who have the largest herds and are most prone to split herds up, their numbers would seem to be relatively less representative of actual herd size than that of the Bambaras. However even using these figures, we arrive at the fact that average number of cattle per owner is:

25.5 for the Bambaras 48.3 for the Peul 33.4 for the Furba Fulas

An adjustment based on the reality of the situation would further favor the Peuls and Furbas vis-a-vis the Bambaras. A per capita figure based on actual population has not yet been figured, but there is no doubt that it will reveal several cows per Peul and Furba (estimated 4-8) and probably a fraction of one cow per Bambara. Lastly it should be recognized that these figures represent a post drought situation after the 50% herd dessimation locals claim occurred during the past few years.

THE IMPORTANCE AND MEANING OF ETHNIC BOUNDARIES

The importance and relation of ethnic identity and occupation has already been much noted in the literature of anthropology (i.e. M. Horowitz). In the present situation, one can see the multifaceted nature of the process. It is basically a two way process. The orientation and practice of one ethnic group may seem more condusive to its members accepting or rejecting a certain way of life. However, looking at the process on an individual basis, one must question this static picture of ethnicity. Actually people are always choosing the roles they will play. The case as exemplified by the Furba Fula seems to be that when a choice is made, it involves adapting a certain way of life, and with this way of life may eventually come a new ethnic label.

At the moment, I would hypothesize that the crucial factor is herd size. The larger the herd, the more difficult it is to supply it solely by well water, the more inadequate will be the food supply of a small area surrounding the village; the more difficult it is to control the animals from wandering and damaging crops, and the larger is the economic interest and investment of its owner in looking after the herds needs in preference to that of his agricultural pursuits.

There seems no question that the Peuls and Furba Fula culturally put an overwhelming emphasis on cattle. Thus almost all the herds of these groups seem to migrate from the home settlement - the search for good grass being their primary concern. At the moment, of the 75 known Bambara herds, I know of only two that cross the river - one from N'jedougou and one from Bwawere. They are also the two largest Bambara herds of which I presently know - one being between 100-200 head - the other over 200 head. I would postulate that they represent the beginning of a process of recrientation of life style by those who own

them; of which many of the Furba Fulas represent the intermediate stage and of which many "Peuls" who 2 or 3 generations back were not Puels, are the final product.

Of course, there are factors that may well be altering this transformation process. With the introduction of the bicycle and mobylette herd owners are able to monthly and bi-monthly visit their cattle regardless of their wanderings. Thus they are no longer faced with the drastic alternative of either becoming migratory themselves or losing control of the fate of their cattle for long periods of time. This process is of importance to the Project and our ability to predict the future behavior of would-be participants. It indicates two necessary conclusions. One is that we must not assume that a man's present ethnic identity and its associated economic activities precludes his choosing a total reorientation of occupation should it prove to his benefit. The second is that information derived from a specific ethnic group is not just applicable to that group, but also may be applicable in the future to the members of another group who may choose to follow a similar means of livelihood. Thus to speak of the Bambara way of life is also to note many of the overwhelming restraints on actions of anyone who chooses to be predominantly a cultivator. Similarly to know the Peuls is to know the constraints on the activities of a man who chooses to place a heavy reliance on cattle for his economic survival.

THE ECONOMICS OF LIVESTOCK RAISING

Mamadou S. Ba in a paper "Mali Faces Drought" that was presented at the recent Sahalian Drought Conference in Senegal, makes the following statement:

> "At most, we might say that the Sahelian stockfarmer has not yet become economically minded since monetary revenue has little meaning for him." (BA: 1974:4)

This line of reasoning is compatable with long standing stereotypes of cattle people, to the effect that their cattle's value, as a subsistance resource or for social or aesthetic purposes takes precedence to the hard economic realities of the market place. At best, it suggests that there is something that must be changed in the mentality of herding people before they will be able to take full advantage of their fiscal wealth in animals. The evidence so far gathered in the Doukoloumba area seems not only to contradict this assumption, but to stand the situation on its head.

Approximately 30 kms. SW of Falimbougou and some 25-30 kms. from Ségou is the town of Bossain. It is the central market for cattle, not only from the region, but for herds as far as Macina. Buyers apparently from as far away as Koutiala may come to acquire animals en masse for the export trade. The market is held on Tuesday all year round, and the transfer of 400 to 600 head in a single day appears standard. Because the importance of market opportunities seems central to any ultimate understanding of the commercial strategy of the herders, the study has been extended to include this market. Eventually we hopefully will be able to document the year's fluctuation in prices, supply, and demand. However, already significant information has appeared.

Firstly, to say the local cattle people are not economically oriented is completely fallacious. In fact, the vast amount of trading is apparently done by Peuls either for themselves or as agents because of the subtle intricacies that can mean a good or bad sale or purchase, and the extreme sophistication required. There are local Peuls who will buy one or two animals one day from a surrounding village, and sell it the next day at Bossain for a profit. There are even people who will obtain a profit by meeting a less experienced seller on his way to market, buy the animal there, walk it a few kilometers more to the market and resell it for a gain.

The less experienced owner will sell his cow for less than full market value for various reasons. One important factor seems to be that many large buyers will only buy from people they already know, for credit reasons or because unless they know the reputation of the seller they can't be sure the animal isn't stolen or hasn't in fact already been sold to another. (One incident of a man selling the same animal twice was personally witnessed). This practice would seem significant vis-a-vis the proposed "embougement paysan" because it would seem to indicate that the small farmer may conduct both purchase and sale through agents, and will probably have to pay highest prices to buy, but not receive full market value when he sells.

In terms of what is offered for sale, so far, the full spectrum of possibilities seems available at any one time.

One can find one year old bulls going for 12,000 FM., young 2-3 year breeding calves for 25,000, 8-9 year old bulls for 60,000-70,000 FM.

The true fluctuations of the system can only be known after a full year's work, but people have already made claims which if true, could severely throw into question the economic feasibility of some of the Project design. To begin with, the highest prices seem to be immediately after the rainy season, in September-October; the lowest prices are in the dry season, April-May, except for labor oxen which command up to 75,000 FM just before plowing.

One reason for this may be the condition of the animals which are fattest after the rains. If so this would argue that if fat animals were available in April-May, the price would be higher. However, other factors appear to be at work.

One claim is that during the hottest months the cattle cannot be driven south to the coast without heavy losses and hence the demand for export animals is low. A second factor is that this is the hardest time of year for the

animals in any herd. People are reluctant to buy for investment until this high risk period passes. Conversely even if a man has cattle in good condition it makes poor economic sense for him to sell since they are the most likely to survive. Rather it is most sensible economically to cull the herd of the poorest animals, which if they die will represent a total loss. Again to some extend this difficulty may not arise if a peasant has only one or two cows to begin with, or if with a managed grassland he need not fear large dry season losses. However, even if this were true, the question still remains whether there is profit to be made according to the seasonal price structure which will be based on competition from animals from non-participating herds.

The last problem is more complex and stems from the basic function of cattle as an economic resource. Here the secret word is NEED. Cattle are sold for cash when the need arises, such as taxes, a marriage payment, etc. A crucial factor in the situation is that the seller does not want any significant amount of loose cash. Loose cash is cash lost on little nothings or demanding relatives. It is therefore desirable to tie up cash as quickly as possible. As a result if a man needs 8,000-10,000 FM, he will often sell the smallest animal he can, usually a very small bull. The other strategy is to sell a large animal, take from the receipts the money needed and immediately buy another cheaper animal to take home. Of course the final decision as to what to sell depends on the individual's monetary need in conjunction with the needs of his herds and depending on which animals are most expendable.

This last activity of actually selling and buying on the same day points out a second most important factor - namely that animals, especially cattle, represent a form of bank or stock for available cash. They are somewhat harder to spend, lose, or get stolen than hard cash and they yield interest in the form of offspring. Therefore once his immediate needs are satisfied, a cattle owner is

more interested in increasing the size of his herd than selling them off for cash benefit. This attitude would seem no less rational or economically oriented than that of a Rockefeller or rich oil sheik who can in no way spend all he has and so continuously invests and accumulates. Unfortunately it presents problems for the livestock Project, to the extent that it wants to increase production but places an artificial control on ultimate animal numbers.

The ultimate problem is that the cash needs of a rural inhabitant are rather limited. Anyone with a significant herd has in reality, more wealth than he can use. However, and this must be emphasized, in many cases the limit on cash needs results from the limit of useful products or services available to the rural dweller. For example, the Falinbougou, the inhabitants are apparently willing to pay for a professional well, but there is no service available to dig it. Cement, medicines, salt, are just some of the wanted products that may be available in the city, but difficult for the rural person to obtain at a fair or sometimes even exorbitant price. This problem is rooted deep in the realities of rural versus urban life and cannot be solved by one shot methods, (for example, every family in Falimbougou already has a plow and most have radios and bicycles). Under the "problem" section of the paper, some "temporary" solutions are offered but, in its entirety, the problem can only be solved through a much vaster program coordinating projects for increased production with projects that increase the flow of needed goods and services that can not be afforded.

PROBLEMS AND SUGGESTIONS

Embodied in the preceding discussion is the suggestion of several looming difficulties that I foresee. For the sake of clarity, I will more specifically list some of these again, each followed by what I think is a possible solution.

1) The closing off of the forest: As outlined in this report the forest serves two purposes:

A. It is the gathering area for herds, especially in the early fall when they are most likely to damage fields.

B. It is the passage way to the river where many herds drink.

In both cases, access to and through the forest is already a reality upon which many local herders depend. The problem has several facets. Firstly, to totally enclose the forest during the initial period of construction might be catastrophic. To ask those who have invested in herds based on their ability to obtain river water, to suddenly end this reliance and remain in suspended animation for the one to three years it'll take to sufficiently develop the forest, till they have the chance to participate, seems not only unjust, but possibly disastrous. Likewise to suddenly deny the herds during harvest time any resting ground away from the cultivated fields will likely, at the least, cause significant loss to local agriculturists in damaged fields and a general increase in herder-farmer tension.

Secondly, even after the forest is opened, problems will exist. I would personally predict that none of the larger Peul herd owners and probably Bambara owners as well, will be willing to immediately commit his entire herd to the park. To begin with the Project is an unknown and it will take several years for them to be convinced that it works and that it is not just a political scheme to gain control over their herds or to increase tax revenue. In addition, experience has taught them that in terms of natural calamities, alone, i.e. disease, drought, etc., it is unwise to keep all the animals together in one place. At best, they will be willing to "try" the forest while hedging their bets by keeping other cattle out.

Unless the forest is managed, at least in the beginning, in such a way that its existence is not totally incompatible with alternative non-managed

grazeland herding, it is likely that many of the Peuls with large herds will join the already significant southern movement that many eventually drain the country of more cattle than the Project will add. In line with this, I would strongly urge the consideration of two plans of action.

Firstly, the forest should be worked in stages thus providing continuous refuge for herds during the months when the fields are ripe. Secondly, both during construction, and after permanent operation has begun, three or four small corridors should be provided to allow village herds to still drink at the river and to allow migratory herds to cross. These solutions might not only help avert the previous mentioned problems, but would also be demonstrative of the Project's good faith and sincerity in saying that participation in the grazeland is voluntary; for if conditions are created that make any other form of local herding impossible, participation is, in terms of real politik, mandatory, and this point shall not be missed by the local populace.

Secondly, the creation of an atmosphere of confidence is the second major problem to be focused on. I have already mentioned some of the specific historic conditions that have instilled in many a distrust of government. To these, two other factors can be added. Firstly, the local people are neither dumb nor unsophisticated, and anyone who has had any in depth experience with them knows that the last thing in the world on which they place any value, are eloquent words and grandiose promises - especially of governmental figures or their American associates. Secondly, the general Peul cultural emphasis is to carefully investigate a situation before one acts. Thus before the herd migrates the proprietaire will often visit all the possible sites available before moving his animals, even if he has already used them for many years.

I would like to advance the idea that this propensity for prior investigation by herders can be used to overcome present suspicions not only as to

the Project's intentions, but as to the basic competence of those directing it. It is already felt necessary to send numerous Malian officials abroad for study tours, and foreign experts are continuously dropping in to "view the situation first hand." If money could be found to send six to eight carefully chosen rural herders to the States for two weeks to see the reality of modern mixed farming, dairy operations, and ranching, the resulting benefits might be of inestimable value. If these men were carefully chosen, based on the respect their opinions hold in the region (in contrast to certain powerful but feared political figures), I believe they could do more on their return to convince others of the advantages of cooperation than any other group will ever accomplish.

I sincerely believe this proposal is both sound and realistic and would possibly set an example to be followed in the future. Of course, if the Doukoloumba Project works, it itself will provide [illegible]ple for future action. While this is generally recognized, it does not seem to me that it has been accepted that certain inconveniences and inefficiencies may have to be tolerated in the interest of gaining the ultimate goodwill and cooperation of the people. For example, I also suggest that the general timetable for putting into operation the park take into account that the first few years, not just the first or second, be designed largely as a demonstration of the advantages to be gained, and that sufficient opportunity for participation be reserved for those who may be a little cautious before committing themselves. Ultimately such patience would be rewarded by a fuller participation by the population and a wider sharing of its benefits.

Lastly, the creation of a strong supporting economic milieu is the third specific problem I wish to pinpoint. As already discussed in this paper, it is admittedly very complex and not open to a simple or single solution. However, at least, one can begin to consider the problem. What is ultimately necessary, I

believe, is for the Malian government to look upon the Doukoloumba region, not only in terms of the park project, but in terms of creating a new model of regional development. If, in addition to the park, other government projects, were introduced, i.e., a well program, rural bank ("caisse popular"), rural Somiex, etc., new conditions could be created that would take advantage of the new earnings of the participants, as well as providing an incentive for the accumulation of cash capital and greater participation in a more extensive market economy.

FUTURE ACTIVITIES

Present research involves three basic coperations. First, with the aid of research assistants, the three primary areas: north of the forest, the forest region, and to a smaller extent the southern banks, are traversed on a weekly basis to record the presence and movement of herds in the area. Secondly, continuously increasing personal contact with owners is made in order to gather more specific information as to the actions of individual herds from which more general principles can be extrapolated. Thirdly, more recently, additional research into marketing has begun to be gathered every Tuesday at Bossain. It is foreseen that these three areas of focus will continue throughout the year until the statistics for one annual cycle can be obtained.

Of immediate concern is to attempt to refine the very rough preliminary figure given in this report and to begin to acquire more technical information on cattle diet, sex, and type distributions and the particulars of ownership. With the presence of the Land-Rover, a larger geographic area should be covered and an attempt may even be made to contact some groups that have recently moved out of the area due to the drought, and might possibly be interested in returning.

With an increase in available statistics on the inputs and outputs

of the presently operating system, I hope in my next report to concentrate less on suggestion as to how the park project can be created and more on how it should be managed. In regards to this, any additional information that could be supplied vis-a-vis specific details of how the forest might be run would aid in obtaining feedback from the possible participants themselves before final and possibly detrimental decisions are made.

LAND AVAILABILITY FOR DUKOLOMBA, DUFUNU, AND DAWARIWÈRÈ

John Van Dusen Lewis

March 11, 1975

That section (270 hectares ?) of the Forêt Classé de Dukolomba which had been declassified and remitted to that village on a temporary basis has just gone through its eighth and final, given present agricultural practices, year of cultivation.

Without technological innovations, this land should receive at least twice as many years as it was cultivated, but ideally three times as many (24 years), in fallow before being cleared again for cultivation. Therefore this section (#2 in the diagram below) might as well be classified back into the Forêt Classé so that it can be included in the range management schemes.

However, as one of the largest villages in the arroundissement of Katiena, Dukolomba is not economically viable without access to the strong soils to its south in the Forêt Classé. This year at least half of their grain harvest and over half of their commercial peanut harvest came out of section #2.

It is difficult to imagine the residents of this village participating with enthusiasm in any aspect of the forthcoming Mali Livestock Project once they realize that that very Project was responsible for halting the Service des Eaux et Forets' practice of lending them land out of the forest. Since the parcel presently on loan, section #2, is now exhaused, it is an excellent time to loan a comparable section in another part of the forest before the fence building plans become finalized.

If the forest had never been classified, after leaving section #2 in fallow, the farmers of Dukolomba would have cleared the next great fields together in section #3 towards the river, south of section #2 (see below). Since

section #3 falls in the center of the future cattle range, it does not seem feasible to loan it. Before loaning section #2 to the farmers of Dukolomba, Eaux et Forets loaned them section #1 which has been fallowing since the loan of section #2 in 1966.

Even though it has only experienced an 8 year fallow, section #1 could still give the villagers a few good years of grain under traditional agricultural usages while they were learning to shift that same section into a rotational scheme that would insure permanent cultivation. In fact, the promising of this new section of forest land to replace the old would be a handy way of ensuring that they seeded a sufficient amount of the land in legumes not only to permit permanent cultivation through proper rotations, but also to guarantee that a sufficient amount of cattle forage is being grown by the participants in L'embouche paysanne.

Details on locations and areas of each of the loaned sections for all three of the settlements are available from the mapping service at L'OMBEVI. The tiny hamlet of Dawariwere, itself moved out of the forest with the Classement in 1947, could be given its little alottment in a long fallowed area without too much trouble. But Dufunu, like Dukolomba, will most likely have to be moved back to the section they too abandoned in 1966, since I would expect that their other ancestral fields lie to the south of their present alottment, further into the forest, too much in the way of the ranges to be developed.

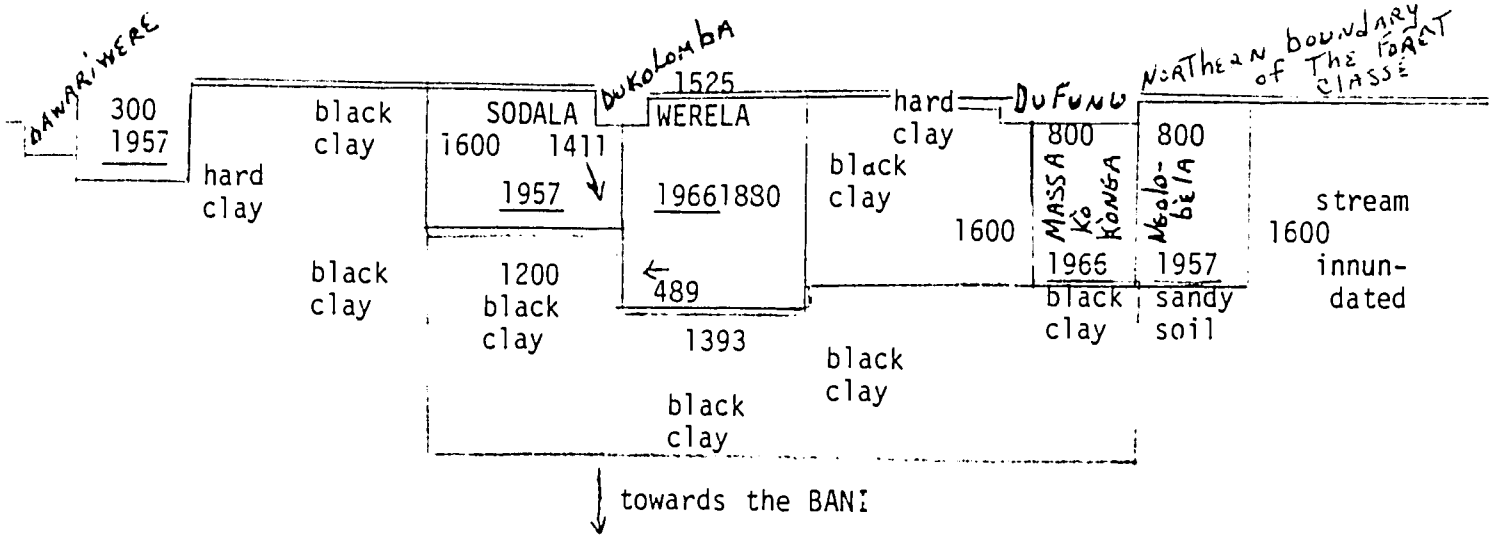
THE FARMING NEEDS OF DUKOLOMBA, DUFUNU AND DAWARIWERE

John Van Dusen Lewis

April 28, 1975

The following is intended as a supplement to my earlier memo concerning the farming rights of Dukolomba, Dufunu and Dawariwere in the Forêt Classé de Dukolomba. I recommended there that these villages be loaned fresh fallow from within the forest since all those areas presently on loan for farming are nearing (Dufunu) or have reached (Dukolomba) the end of their cultivation cycle (9 years). I noted that such an updated loan was imperative, inspite of the small percentage of range space that would be sacrificed, so that these villages could remain viable enough to participate in the Project. (The geographical position and the wide-ranging historical ties of these villages makes their participation strategically necessary for the development of a mutually reinforcing relation between the forest range sub-project and that of L'Embouche Paysanne. Services located in or near the forest for the range management work will be of little use to the participants in L'Embouche Paysanne from villages to the north if the intervening border villages, and their neighboring allies, have become alienated by a project which has meant the loss of vital farming space for them.) Furthermore, I suggested that the prospect of this loan be used as a device for ensuring a minimum necessary amount of forage cultivation by the initial participants in L'Embouche Paysanne.

In this memo, I am adding geographical details about which sort of loan would be the most effective. From this point on I will be referring to the sketch map below. The underlined dates refer to the time of the loan of the specified parcel. The exact dimensions of each parcel are given (in meters) when known or approximated from the scale of the crude Eaux et Forêts map of the Forêt Classé when not known. With the assistance of an aerial photograph, a presentation with greater precision could be given.



As can be seen from the map, the two family hamlet of Dawariwere (15 km east from Duna) was not considered to be in dire enough need of fallow for farming when the second loan was made (1966) to the two larger villages. It should be remembered, however, that this hamlet was situated well inside the area now comprising the Forêt Classé. With the classifying of the forest lands in 1948, Dawariwere was removed to the northern border of the new Forêt Classé, on the same parallel on which Dukolomba and Dufunu were already situated to the east. Given that the large village of Ngola had claimed farm space to the north of Dawariwere's present location, it is not surprising that Dawariwere has attracted no new settlers since 1948.

It should also be remembered that, between the classifying of the Forêt Classé in 1948 and the first land loans of 1957, Dukolomba and Dufunu were forced to exhaust much of their farming space to their north, outside of the classified zone. It should also be noted that now that Dukolomba's 1966 land grant (Werela) is farmed out (Dufunu, being a smaller village, wasn't obliged to clear their 1966 grant - Massakò kòngo - immediately upon its loan; the area can thus support two more years of millet, it has been farmed for six), some farmers have been compelled by land shortage to reseed their old fields in Sodala (the 1957 loan) which can have only enjoyed an eight year fallow.

In the last memo, I recommended the return of these 1957 loaned parcels to the farmers. But I was not aware at that time that Sodala was so small nor that Ngolobèla was so recently abandoned (being a smaller village, Dufunu wasn't pressed by land shortage to clear Ngolobèla, the 1957 loan, until 1960; this pushed up its abandonment to 1969 when Massakòkòngo was cleared.) Nor was I aware when I wrote the memo that these 1957 grants remained at the disposition of the farmers even after the new 1966 loans were given; they were not being farmed because they were exhausted.

When recommending the retention of these 1957 loans from inclusion in the forest range to be constructed, I was trying to avoid having the range area broken up by fenced off field plots, as would be the case if the villager's fallows towards the Bani were liberated for farming. Upon reflection, however, I have realized not only that the range management scheme will require the forest land to be parceled up in any case, but also that the lands to the north of the forest, closer to the villages, are better suited for the full capital investments of the range management scheme since, even when the rains are heavy, they will not become innundated (the river is said to have risen to within 1/2 km of the southern boundary of Werela.) Thus, on the map in red I have designated the approximate boundaries of a single parcel which could serve as the field space of both villages indefinitely, that is, if the giving of this field space is made contingent upon the adoption of a rotation scheme including forage legumes as outlined in the last memo.) I have, in addition, confined this plot only to black clay soil zones since these provide the richest and most durable soil for farming, while at the same time it is not as popular with the cows as sandier soil.

As the dry season has gotten drier a further advantage to having a field parcel in the center of the forest range has come to my attention: it seems as if much of the forest has experienced a greater or lesser degree of range fire

since the rainy season. Since fields are always surrounded by fire breaks, having a long thin field parcel running through the center of the forest range as I have suggested would serve to protect the grasses on either side from fire.

In closing let me add, as the villagers have on numerous occasions, that even if the range managers cannot set aside some range space for their millet fields, there seems little reason, with the declassification of the Forêt Classé occasioned by the Project, why the villagers cannot be given access to some innundated areas down by the river for growing rice. As I noted in an earlier report, the capital investments necessary for developing these rice fields would stimulate their participation in L'Embouche Paysanne as a way of raising the funds.

THE STATUS OF THE OX-DRAWN PLOW IN DUKOLOMBA

John Van Dusen Lewis

April 29, 1975

The historical absence of the plow in West Africa has provided a basis for some important misconceptions about traditional agriculture in that region. A common feeling has been that if Africans had only known about the ox-drawn plow, they could have improved their lot long ago. This belief, however, was nourished by an ignorance of African history which has since gone out of fashion. Given the history of the Western Sudan, then, it seems impossible that the Sudanese could not have known, since at least the beginning of the Christian era, about the ox-drawn plow in wide use in North Africa at that time.

Some who accept the likelihood of this trans-Saharan awareness, nevertheless, argue that Sudanese blacksmiths were not technologically competent enough to make plows. These same blacksmiths, however, began to make effective rifles as soon as they learned what was required. And, furthermore, now that the plow is at last seen as economical in some circles (see below), these blacksmiths are now making the plow itself in their traditional shop with age-old tools. Although these locally made plows are more fragile than the European make, their inexpensiveness has found a demand among the poorer farmers who work the softer, sandier, stumpless soils.

In short, the hazards of the diffusion of cultural techniques cannot be used to explain the absence of the plow in Sudanese agriculture. Its rejection had an economic basis which is of particular interest since some of these same economic constraints still operate today.

Below I will present some technological and sociological evidence from Dukolomba on factors impeding the acceptance and utilization of the ox-drawn

plow. The different combinations of these impeding factors with the much more celebrated factors encouraging the use of the plow (too well known to bear repeating here) determine, at any given point in history, whether or not the use of the plow will be economical. An appreciation of the financial impediments to the purchase of plow and oxen will be taken for granted here, the discussion that follows being nothing more than a consideration of the conditions under which it becomes economical to overcome them.

A. Technological impediments to the acceptance of the plow.

Every farmer interviewed has either offered or admitted that "the plow tires the soil more quickly than the hoe." This fact would constitute an impediment of some degree to plow acceptance even if land were abundant enough, which it isn't, to permit frequent field abandonment: the labor saved by the plow remains less than that expended in clearing a new field (according to informants). Boserup (The Conditions of Agricultural Growth 1967 ca. pp. 30-40), if I remember correctly, bases her discussion of the rejection of the plow by traditional African cultivators on a similar observation.

Those farmers who wish to sound modern and advanced wave this constraint away by saying that fertilizer can easily correct this soil fatiguing effect of plow use. When pressed for particulars, however, they admit that they can afford neither chemical fertilizer nor the cows, carts, and labor necessary for the application of sufficient natural fertilizer to their large bush fields. When pressed further, one farmer suggested frequent field abandonment with fallows so short that the additional clearing work would be limited. He was thinking of the short composting fallows used at the agricultural extension centers. He was at pains to add, however, that such frequent moves would make the important job of cooperative field guarding between neighboring field owners more difficult, since they would diminish the chances of the neighbors farming in the same area at

the same time.

Agricultural extension personnel in the region are equally as unrealistic in their efforts to sound modern. They say that if the farmers were "educated" to adjust the depth and width regulators on their plows to suit their particular soil conditions, then too much of the topsoil soil structure would not then be exposed to decompose on the surface. It appears, however, that the success of this "education" is a function of the quality, and therefore of the price of the plow involved. Even with a prohibitively expensive plow, however, to break the resistant "black clay" soil of Dukolomba at all, a deeper plunge than entirely necessary for producing an optimum stand of millet is required. Thus with plowing, the soil is worn out more quickly than is necessary for the production of a same amount of millet.

Three types of soil structure are recognized as significantly affecting farming practice in the Bani region: "red sand" on the southern, more recently alluvial side of the Bani; with "black clay" on the north bank grading off into "white sand" 20-30 km north of Dukolomba. In the two sandier areas not only is the depth of the trough made by the plow more easily regulated, since the soil is less resistant, but even if it were not so controllable, the farmer has less to lose in any case, since it is more necessary to expose sub-soil to the crop in a sandy area. However, there are some qualifications to the overall desirability of plowing in the sandy areas, although they are not as serious as those that intercede in the "black clay" zone. Plowing the softer soil of the sandy zone, one cannot make mounds as steep or troughs as thin as is possible with a hoe or in the clay zone. Thus fewer millet rows per hectare can be planted, with more clearing labor and more land space being required to maintain productivity. Weil notes the same drawback to plow use for sandy soils in the Gambia in "The Ox-Plow in Central Gambia" in P. McLoughlin (ed.) <u>African Food Production Systems</u>

pp. 251-2. Otherwise, however, it would seem that the introduction of the plow should encounter less resistance in the sandy areas than in the clay zone. In order to explain the exceptions to this rule we are obliged to go beyond a consideration of the technological constraints governing it acceptance to an analysis of the sociological ones.

To fully understand the advantages of the sandier soils with regard to plow use, one has to be introduced to the Bambara practice of filakè. Filakè means, "second made"; it is the mound made with the same hoeing strokes as accomplish the final (usually the second) weeding. Thus the newly hoed-down weeds get packed into this "second made" mound to ferment and compost throughout the dry season until that mound receives the seeds of the next season's millet. In addition to ensuring the fertility of the mound rows to receive the new seeds and that no seeding will be done in the tired mound rows supporting the preceding stand of millet, the four to five quick hoe strokes which make a filakè also conserve labor since no new mounds have to be made in those precious moments between the first rains and seeding the following season. Since the implementation of the filakè practice requires the cultivation of the same field space for two successive years, its advantages discourage the early abandonment of a field site. Such mobility would limit the number of adjacent cultivating seasons which could be straddled by a filakè.

Now, if the plow could make filakèw while weeding at the same time, as does the hoe, so much the better: none of their advantages would be lost and much labor would be saved. Where there is a sufficient consistency of sand in the soil, most plow owners make their filakè with the plow. However, they are restricted to doing this somewhat earlier, when the standing millet is not too high as to interfere with the passage of the oxen. Thus, the plow filakè season remains somewhat shorter than the hoe filakè season. This time loss is somewhat compensated,

nevertheless, by the fact that, while a hoe made filakè is most easily formed the day after a heavy rain, a plow can continue to make filakèw for a few more days after the rain before the ground gets too hard for it.

The "black clay" soils are said to lose the humidity of the rains more quickly than the sandier earth. Thus, in Dukolomba all but one plow owner refuse to make their filakèw with the plow for fear that the roots around the young millet shoots will be exposed to too much dryness if soil between them and the surface is removed to make the new furrow. Characteristically, agricultural extension officers, national and expatriate, whose centers are in sandier areas, and filakèw plowers to the north and south attribute this reluctance to Dukolomba's "backwardness." Yet, the plow owners here prefer to wait until the millet is too high for the oxen to pass, at which time the roots are deeper and safer from being dried out, before they hoe up their filakèw, even though it is considerably harder to hoe in the clay than in the sand. Also, by waiting to make their filakèw, the farmers of Dukolomba and environs in the thickest part of the clay zone, risk getting caught with only have of their filakèw made by an early end of the rains. Even so, they do not risk plowing or even hoeing these "second mounds" earlier. It is hard to say whether or not some would risk plowing their filakèw under better rainfall conditions, since there were so few plows in the thick clay zone before the secheresse. Those few who had plows did not risk it.

Since the sandier soils are said to retain more moisture longer, plow owners (a higher proportion of the farmers in these zones - see below) are willing to make more of a cavity next to the young roots of the standing millet and thus they plów their filakèw. We have already seen that, if so desired, this plowed cavity can be kept shallower in the sand in any case.

Given, then, that a plow owner farming "black clay," being less likely to plow his filakèw, will save only half the labor from his purchase that

a plow owner in the sandier areas has saved, and given that the plow tires out clay soil more quickly than sandy soil (since it is harder to keep the plow from cutting deeper into the more resistant clay at the same time as it is less desirable for it to do so - see above), one would expect the plow to have an older and wider distribution in the sandier areas. To a certain extent this seems to be the case. However, the secheresse has introduced a further complicating technological factor. Since in the "black clay" zone millet yield responds positively to an increase in rainfall, whereas in the sandy zone - particularly the "white sand" zone - millet output suffers from an overabundance of rain, heavy rains before and between the dry years gave the clay farmers somewhat more of a surplus with which to ride out the famine. The "red sand" zone, (where millet suffers less from heavy rains than in the "white sand" zone in any case), being south of the Bani, experienced less drought than those zones north of the river. Thus it was the "white sand" zone which felt most strongly the effects of the secheresse and, therefore, suffered a relative loss in plow purchasing power. Consequently, although it may be twice as desirable to have a plow in a sandy area as opposed to a clay area, since the secheresse, one does not find, other things being equal, twice as many plows. Variations from a distribution of plows according to ecological desirability, which cannot be explained by the differential incidence of the secheresse, require a sociological explanation.

B. Sociological impediments to the acceptance of the plow.

When the elders of Dukoiumba, upon being confronted with the ox-drawn plow by the French, told the laboring youth of the village that the "cow hoe," as it is called, would wear out their soil too quickly, they, as we have seen, were not lying. But it wasn't just the soil that they were trying to economize on. As the decision makers, but not the laborers, in the family firm, these elders felt

that with the labor saving device of the plow they would lose control over the youths who, feeling less needed by the family, would drift away, either to the Ivory Coast or into their own separate firm. Thus in purchasing a plow, the elder would lose not only its price but also control over labor which he could use to advantage throughout the year. The youths were to be shamed into staying at home by the spectre of famine which would result from their being absent during the mound making and the weeding season. Both elders and youths concur on this explanation of Dukolomba's early avoidance of the plow.

However, some youths called their elders' bluff and set up their own concessions or went away to the Ivory Coast anyway, forcing those elders who could afford it and who, not unrelatedly, had enough cows to buy a plow. Those family heads as yet unconverted to Islam have been able to keep their youths from voyaging, and they are the only ones, of those who could afford it, who have still resisted buying a plow. But like conversion, plow purchasing has only come recently to Dukolomba. Most plow owners still regard the ties of interdependance which unite the family labor force as more valuable than any other asset.

Now, with eight plows in Dukolomba and more coming in every year, the unified family labor force seemed threatened with obselesence by the labor-saving device. However, the recent commercialization of peanut production in the area has given the extended family, cooperative work force a new lease on life. The exploitation of wide family and village exchange labor ties can get a larger peanut field seeded sooner than can the isolated, small firms which earlier resulted from the erosion of the large cooperative firms into more commercially competitive fragments.

These smaller firms abound in the newer villages and hamlets where there are fewer restraints on their formation; a newer settlement is but an assemblage of fragments broken off from an older one, with smaller family firms and fewer

elders to restrain their further fragmentation. Ecological conditions being equa a newer village accepted the plow more quickly than an older one like Dukolomba. The younger head of the small, colony firm feels he can cultivate and control more millet if he is on his own. Since he not only makes the decisions but also labors, he gains more personally than an elderly retired family head by the purchase of a labor saving device.

GUIDE TO HIRING LABOR FOR THE CLEARING OF THE FORÊT CLASSÉ DE DUKOLOMBA

John Van Dusen Lewis

August 1975

I suggest that the heads of the village communal labor groups (tonw) be contacted for the specified amount of laborers indicated for each village listed below. The heads of the village ton, called tontigiw, are all born within the same one or two years and thus constitute the membership of a single flan-bolo or age grade. I think it would be wise to mention to these tontigiw that if they feel that the forest labor management requires more authority than they are entitled to on account of their youth, they should feel free to convoke a separate ton with older flan-bolo in charge. Each flan-bolo serves 2-3 years time as tontigiw. The age at which the ranking flan-bolo gives its festival and then graduates from the ton depends on the demographic structure and labor needs of the particular village. The ton is merely the most commonly used communal labor force, but flan-bolow can be added to or subtracted from the ton depending upon the size of the task. In each case, the members of the oldest flan-bolo present are responsible directing the others, their juniors. In any case, I feel that the decision to call in flan-bolow older than the tontigiw for the forest labor should be left up to the latter and not to the village elders. The responsibility for having the proper number of laborers at the proper place each day and for distributing the earnings to each laborer according to the number of days which he has contributed should be left up to the tontigiw or the oldest flan-bolo as the case may be.

Below is presented what I feel to be the most equitable distribution of the coveted forest labor jobs. In rationing the jobs between the villages I have taken into account three factors. They are, in order of the priority given them: (1) proximity to the forest, (2) size of village, and (3) locally recognized

tenure rights on forest lands. Alternative plans are added in case of unforeseen contingencies.

Employment Plan One: 100 full-time laborers; Douna 15, Nyendòla 15, Dukolomba 40, Dufunu 20, Gwalabougou 10.

Employment Plan Two: substitute reserves for the above: Ngola 25.

Employment Plan Three: 200 full-time laborers: add Sidikiwèrè 10, Balangowèrè 5, Nianiwèrè 20, Bwala 15, Dingola 25 to both of the above.

Employment Plan Four: 100 laborers summoned according to their proximity to that part of the forest being cleared on any given day; WEST: Douna 20, Nyendèla 20, Ngola 30, Sidikiwèrè 15, Balangowèrè 10, Kelekèwèrè 5 (this last is the only hamlet I have had to mention since the village through which it pays its taxes, Tongo, is far from the forest zone and thus not listed here; all other hamlets in the zone must seek their place in the quota for their mother village as listed). CENTRAL: Dukolomba 50, Nianiwèrè 30, Bwala 20. EAST: Dufunu 30, Gwalabougou 10, Dingola 40, Blan 20.

REPORT ON ANIMAL PRICES AT THE MARKET OF BUSSAIN

John Grayzel

August 21, 1975

The report below concerning market prices and their determinants is incomplete in that the crucial period of September through December is not represented. However, this information has been specifically requested at this time for decisions being made vis-à-vis providing credit for cattle buyers, and "embouche paysan." Therefore submitted below is the data compiled so far and the tentative conclusions I draw from it.

THE MARKET

Bussain, written Bosse, on the Ke-Mecina map of the Institut Geographique National is a large town situated approximately 40 klms. south-east of Segou. It has a weekly market, on Tuesday, which draws large numbers of sellers of all types of animals, not only from the surrounding region, but at least as north as Niono and Tenekou. Large scale buyers come regularly from Bla, Koutiala, Ségou, and Sikasso. Local buyers and sellers, especially Bambaras, will often work through Peul middle men who receive 500-1,000 FM for the services rendered.

There are also local traders who will buy animals on the village level and resell at the higher market prices. Usually these men buy the animal outright, but a few well known ones will agree upon a price to be paid the villager when the animal is sold at Bussain. The legal nature of these transactions are neither sales on credit or an agent guaranteeing a minimal price, but rather something in between. For example, the animal is never returned even if the traders must sell it at a loss. On the other hand, in the one case I know of an animal dying on the way to the market, the trader paid the villager only 60% of the prior agreed upon price.

The market is stretched over an extensive area, with specific sections for: sheep, goats, donkeys, horses, young cattle up to four years of age, and old cattle, five years and over. The market starts at around 8:00 AM., is in full swing by noon, and is usually over by 4:00 PM. Cattle prices are arrived at through bargaining, often in Peul, with the payment almost always very consciously made in view of surrounding witnesses to the transaction. As a result, the going prices become fairly general knowledge early in the day, which serves to standardize and speed up further transactions. Once an animal is sold, it is moved to the fringes of the market. As early as 10:00-11:00 AM., large herds bought by "commercants" can be seen leaving the area on the hoof, or by truck.

In addition to the sales at the market, there are traders who go out to meet the sellers before they ever reach Bussain, often to resell the animal at the market itself. One reason a seller may be content to transact business outside the village, even at a loss of several thousand francs, is that his animal is part of the clandestine trade, having either been stolen from someone, or misappropriated from family stock. He thus may be willing to accept a lower price than risk being seen by someone who knows either him, or the animal.

THE STATISTICS

Three local youths assist me on a day by day basis in collecting statistics on cattle movement, market costs, etc. One of these is assigned weekly to Bussain where he witnesses specific transactions, the money counted, and afterward asks the animal's age. I periodically visit the market, but find any continual presence more obstructive than valuable. However, I later check his findings with others acquainted with the market, and have found them to be (generally) accurate.

This information is assembled in the following attached appendix of

graphs and charts.

Appendix 1: "Number of cattle counted at noon at Bussain Market." Since it is impossible to keep track of every animal entering and leaving the market, I have a head count done of all animals present at 12:00 noon, which is usually the peak period. However, since trade starts at 8:00 to 9:00 AM. and some animals have left by noon, while others have yet to arrive, it must be realized that the total number of animals traded exceeds these figures. Head counts at 4:00 PM. usually reveal less than 5% of the animals remaining to be sold and these are almost always of poor quality.

Appendix 2: This shows, only since April, the number of small animals represented, the majority of which are young bulls.

Appendix 3: The monthly average price for 'boeuf castre' 7-10 years old, and 'boeuf de labour' 7-10 years old." The difficulty in arriving at these statistics has been the lack of conformity in the sample available on a week to week basis. Since the statistics failed to show any significant difference in price between pur Zebu and Dama-Zebu mix, I have lumped them together. Likewise, since an exact determination of age is not always possible, for averaging purposes, I have created three categories: 7-8 year olds, 8-9 year olds, and 9-10 year olds. I first found the average for each of these categories and then used the average of these categories to arrive at the monthly average. Several other averaging methods were tried and all produced a basically similar pattern.

Appendix 4: "Prices for young bulls 2-3 years of age, and cows 2 years of age, and 3-5 years of age." The average price of cows 3-5 years of age was arrived at in a similar fashion as that of adult males, i.e., the average of two previous averages: 3-4 year old animals, and 4-5 year old animals.

Appendixes 5 and 6: "Prices for large and small sheep and goats." Timewise it proved to be impossible to do an in depth analysis of the prices of these animals.

Thus at each market, a single representative animal is chosen and the prices received for the four weekly animals is used to determine the monthly average.

Appendixes 7, 8, 9, 10: These represent the actual raw data itself. Each price shown is that received and recorded for a specific animal. I am including this data so that others can reach their own conclusions and because certain other interesting patterns are revealed in the distribution of the data itself.

IMPORTANT RELATED EVENTS

1.) The month of February was tax time in the arrondissements of Katiene and Zinzana.

2.) On January 28 and February 4, there were "Gendarmes" present at the market, whose appearance resulted in an immediate exodus of many sellers with their animals.

3.) At the end of May, the roads to the Ivory Coast were closed for the exportation of cattle. No large scale buyers came to the market during June, and they only reappeared in mid-July, when they said the Upper Volta border was again passable, but that a backlog of animals remained at Sikasso.

OBSERVATIONS AND CONCLUSIONS

From the submitted information, I draw the following tentative conclusions, which have been discussed with local people, and, which, so far, have gained their concurrance.

Observation 1: Lowest cattle prices occur at tax time, which for the Bussain area was in February. The date for tax payment, does, however, differ throughout the country. Therefore when studying the prices at any market, this date for local tax payment is a crucial factor for consideration. People claim these prices are

the lowest for cattle for any period during the year. This is not apparently true for sheep and goats, whose lowest prices are during the rainy season, when they are afflicted with disease.

Observation 2: Highest recorded prices and sales for "boeuf castre" occur in April. People claim this is because the animals are in good shape, and because at this time, the largest number of commercants come to the market. The differentiation between the April high price and the February low price is approximately 13,000 FM.

Observation 3: The difference in price between a small male sheep and a large one is 12,500 FM. (Appendixes 5,6). This means a farmer can earn virtually the same money on 2,500 FM. investment in sheep as on a 62,000 FM. short term investment in cattle, and this does not even take into account the higher price for white rams available before Ramadan. While a sheep has to be held for a longer period of time, the work involved in fattening it is incomparably easier than that of fattening an ox, while at the same time the financial risk is so much less. This easily explains why one finds many small cultivators fattening sheep for resale, but never cattle, and brings into question whether it makes any economic sense for them to change.

Observation 4: The factors affecting price and quantity of cattle differs in the case of "boeuf castre," "boeuf de labour," older cows, and young bulls and cows. All are affected by the necessity to sell at tax time. Apart from this, the export market is seemingly the largest determinant of "boeuf castre" prices. The local agricultural calendar is of utmost importance vis-a-vis "boeuf de labour." Older cows are almost always in poor condition - called "flelangolo" ("broken calabash") - and sold when their time is up. Younger animals seem to be largely designed for the local market. There is a large demand for them in April, but also in June and thereafter. One possible explanation I have received is that June is

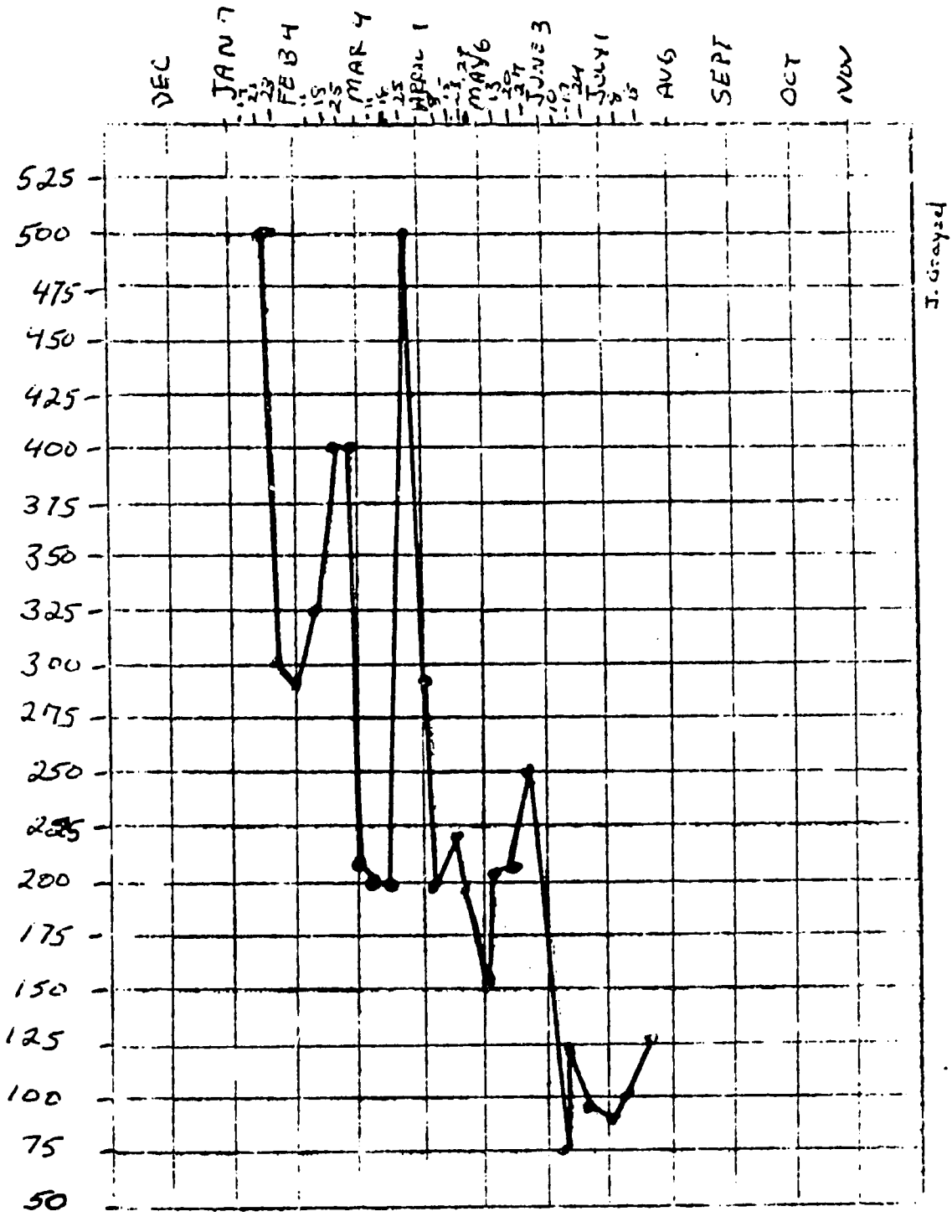
a time of year when taxes and marriages are usually through, and those with spare money buy young cattle for investment. On the other hand, the claim is made that many people, especially Bambaras lose many younger animals during the period of lush vegetation and rain, when the herd doesn't return to the well to drink. Many young animals wander off and join other herds, never to be found. Thus they rather sell them, especially since sufficient buyers exist to obtain a high price.

Observation 5: The closing of the Ivory Coast Road had immediate effects on the market. Apparently the price of "boeuf castre" was already descending in early May before the border was closed. In any case, at least at Bussain, the result was not a lowering of price, but the virtually complete drying up of the supply, until the resolution of the Mali-Upper Volta dispute opened up the alternative route.

Observation 6: Lastly, as shown in Appendix 7, in April and early May, another interesting phenomenon occurred. There appeared on the market a significant number of cattle in extremely good condition. This apparently is the best time to sell these animals since favorable traveling conditions insure a large number of export buyers, the price is high, and to hold them longer is just to increase the owner's costs and risks. Unfortunately due to the closing of the Ivory Coast Road, the June prices for quality "boeuf castres" are virtually non-existent. But, if, as seems indicated, the price for quality cattle in April is as high, if not, higher than May and June, one is faced with the question as to why additional cattle produced under the livestock program will not all be sold at this time and therefore fail to relieve the meat shortages in June. How to insure these animals sold during this crucial period for the domestic market remains to be solved.

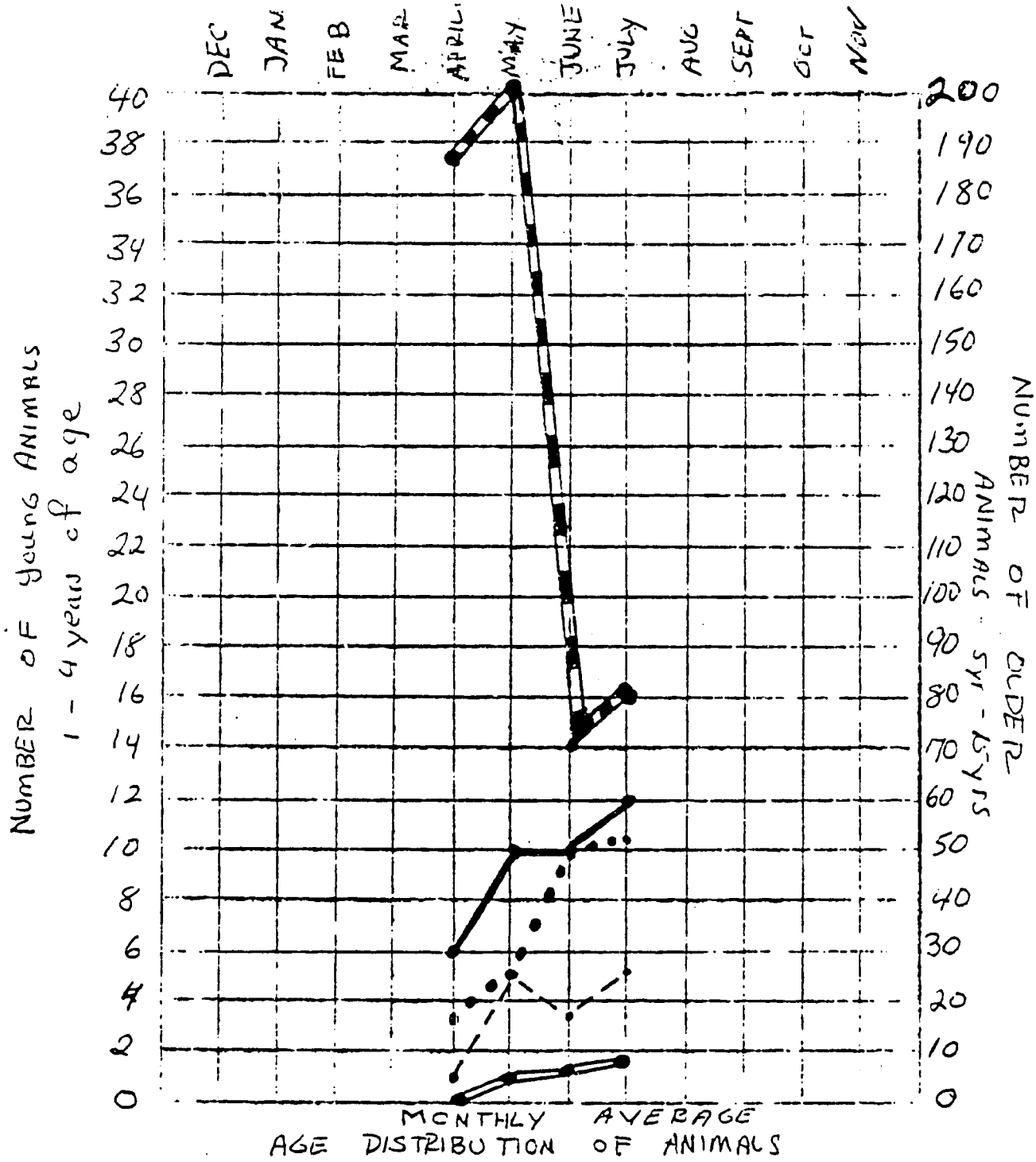
In any case, as already noted, these incomplete statistics are being submitted because of immediate need. Further consideration of the problems will be discussed in my final report and recommendations.

APPENDIX 1



NUMBER OF CATTLE COUNTED
AT NOON AT
BOSSAIN MARKET
CERCLE DE SEGOU

APPENDIX 2



— = 4 year old cattle

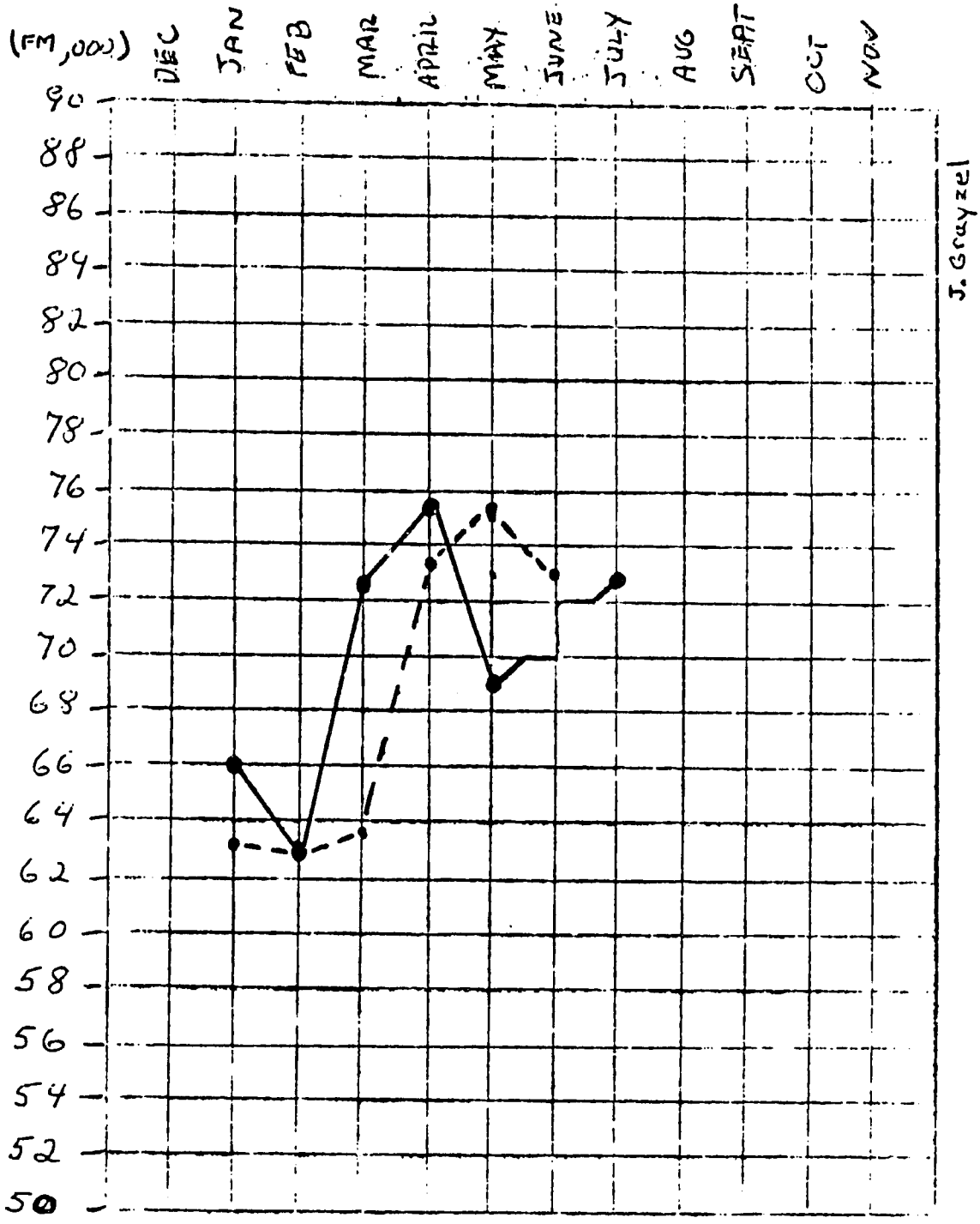
- - - - = 2 year old cattle

• • • = 3 year old cattle

═══ = 1 year old cattle

▮▮▮ = 5-15 year old cattle

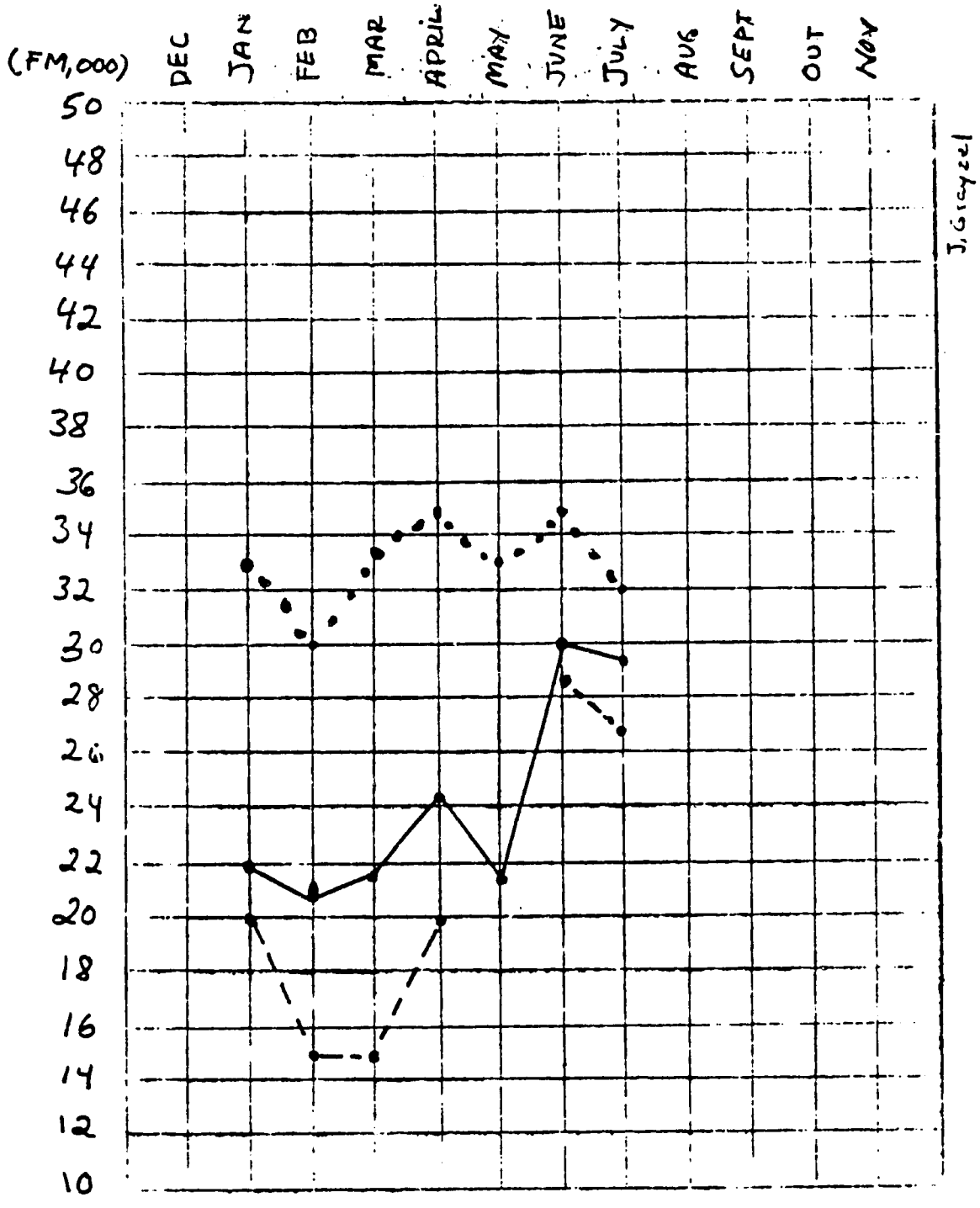
APPENDIX 3



AVERAGE MONTHLY PRICE
BOSSAIN MARKET

BOEUF CASTRÉ —— 7-10 yrs
BOEUF DE LABOUR - - - 7-10 yrs

APPENDIX 4



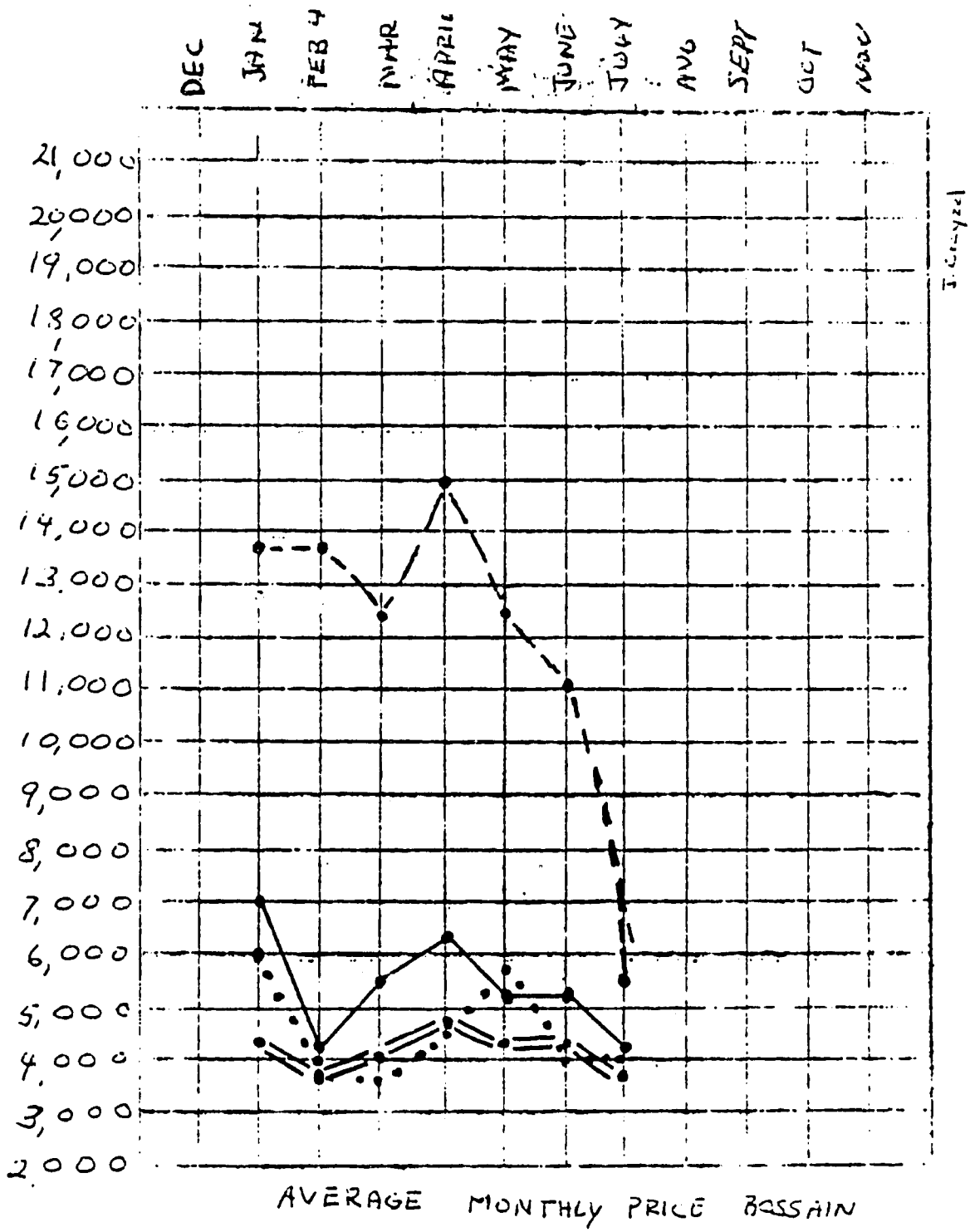
AVERAGE MONTHLY PRICE

BOSSAIN MARKET

Young Bull —— 2-3yrs. Cow - - - 2yrs

Cow 3-5yrs

APPENDIX 5


DEC
JAN
FEB
MAR
APRIL
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
21,000
20,000
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18,000
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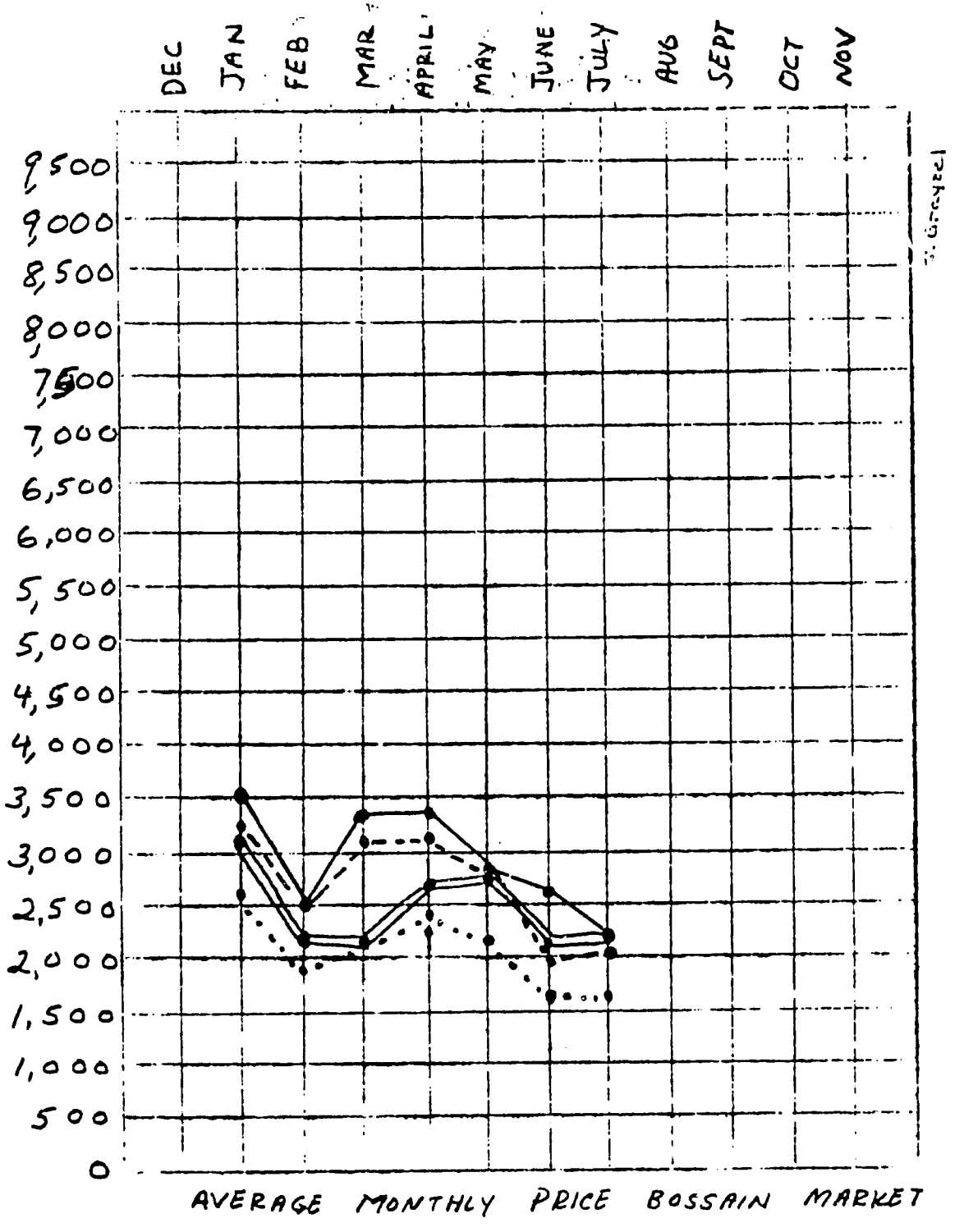
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
AVERAGE MONTHLY PRICE BOSSAIN
LARGE MALE SHEEP
LARGE MALE GOAT
LARGE FEMALE SHEEP
LARGE FEMALE GOAT

APPENDIX 6



— — — Small male sheep

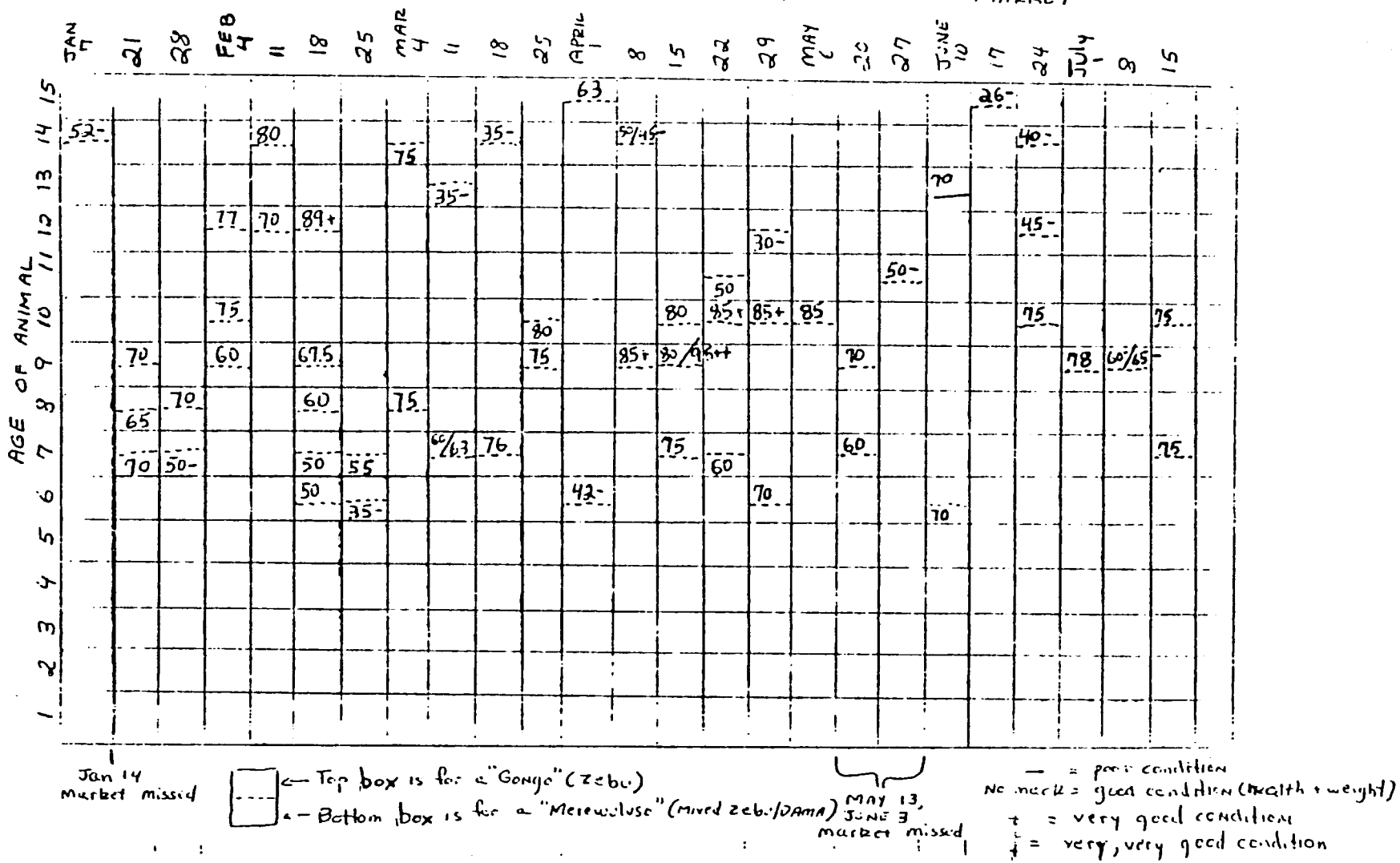
——— Small female sheep

• • • • Small male goat

═══ Small female goat

APPENDIX 7

RECORDED PRICES OF BOEUF CASTRE - BUSSAIN MARKET



Jan 14 market missed

Top box is for a "Gongo" (zebu)

Bottom box is for a "Metewulose" (mixed zebu/DAMA)

MAY 13, JUNE 3 market missed

— = poor condition

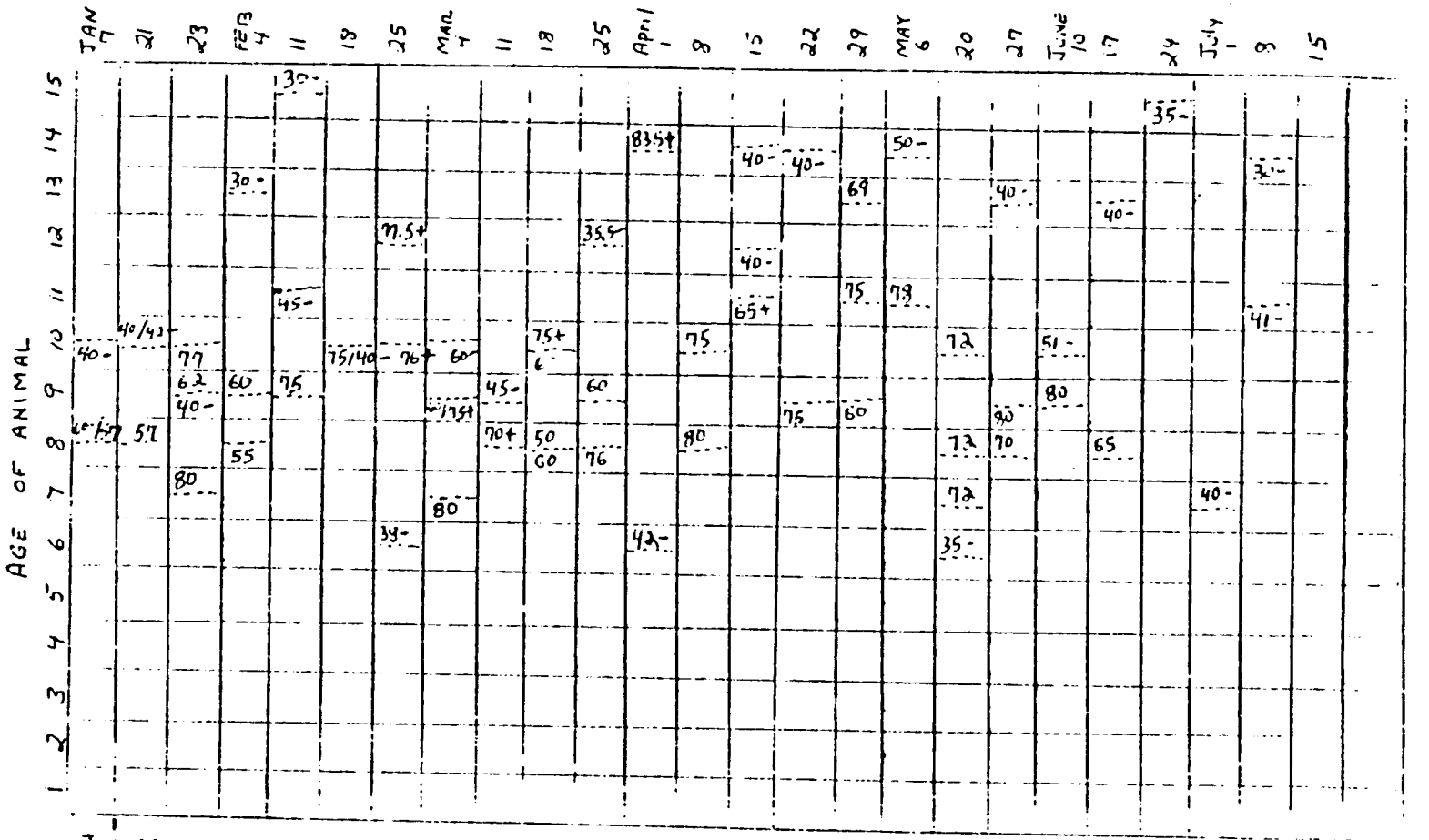
No mark = good condition (health + weight)

+ = very good condition

++ = very, very good condition

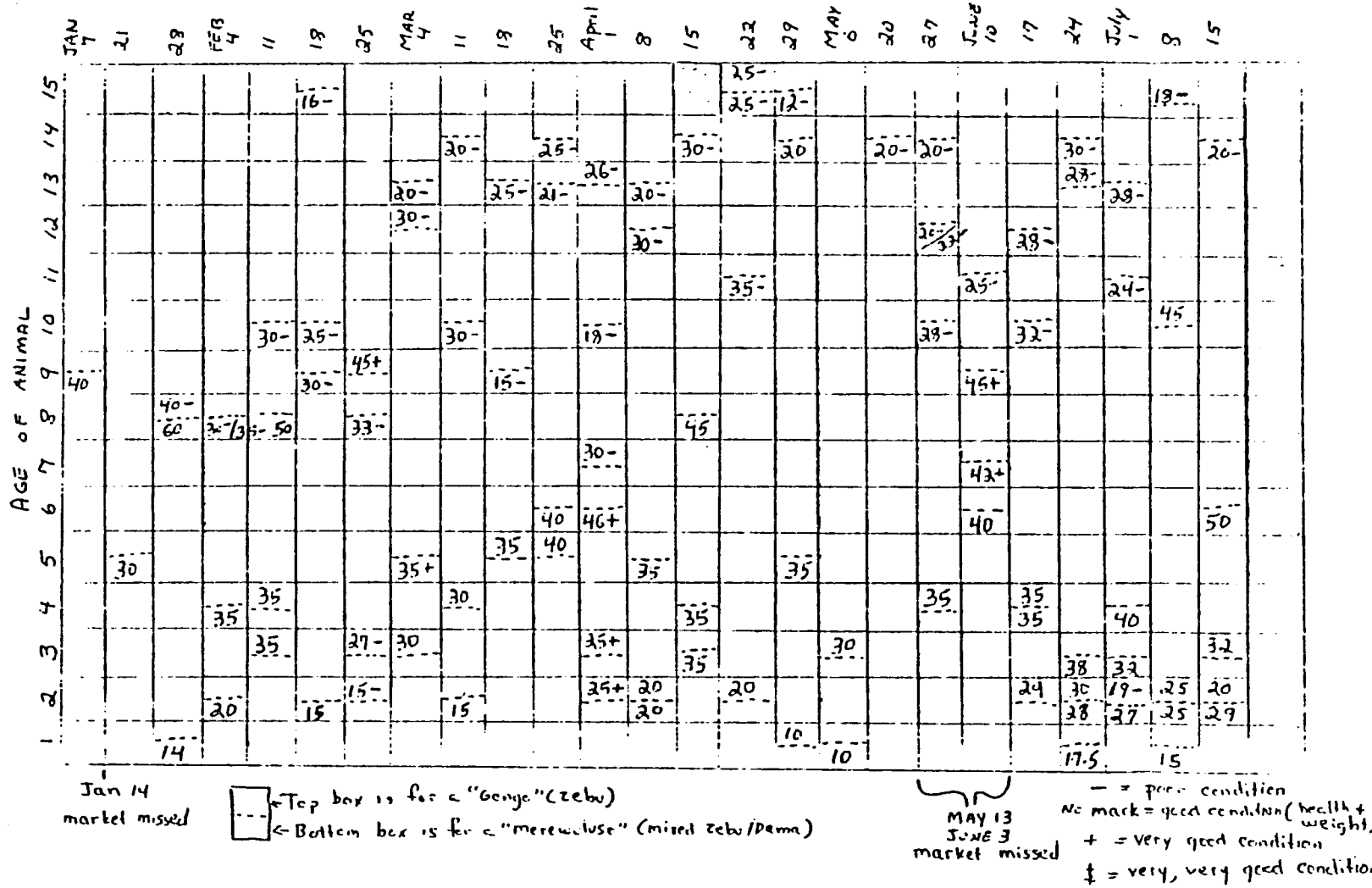
APPENDIX 8

Recorded Prices Beef de Labour - Bussain Market - Cercle de Segou



APPENDIX 9

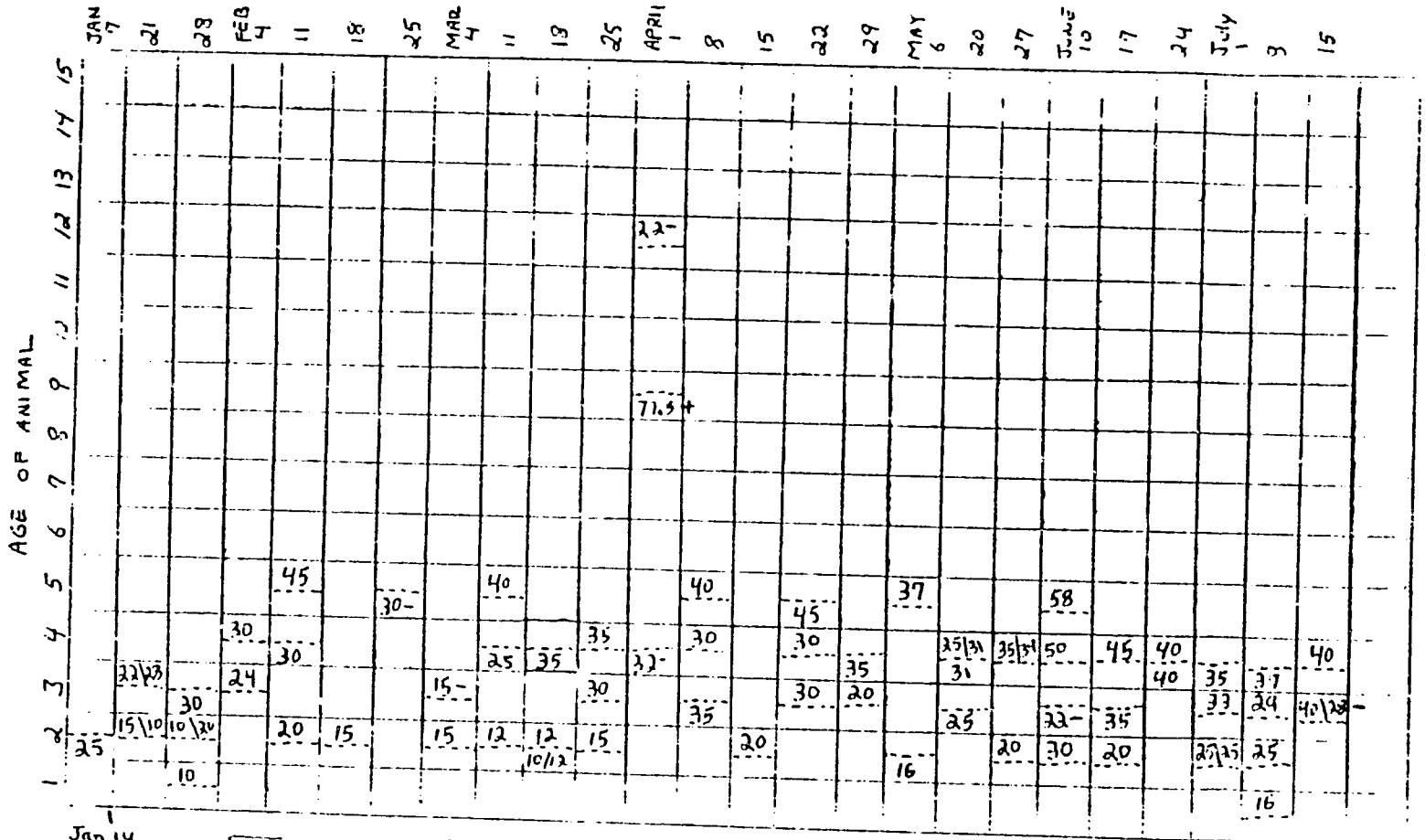
Recorded Prices Cows - Bossain Market - Cercle de Segou



APPENDIX 9

APPENDIX 1D

Recorded Prices Bulls — Bussain Market - Cercle de Segou



← Top box is for a "Gongo" (zebu)
← Bottom box is for a "Mere-wolose" (mixed zebu/Dama)

– = poor condition
No mark = good condition (health + weight)
+ = very good condition
‡ = very, very good condition

FINAL REPORT ON IMPLEMENTING L'EMBOUCHE PAYSANNE IN THE DUKOLOMBA REGION

John Van Dusen Lewis

August 22, 1975

Much of my research has been directed towards solving the problem of how the Mali Livestock I credit intervention can precipitate a structural change in the economy of Dukolomba forest region which will bring the greatest good to the greatest number for the greatest amount of time beyond the life of the Project. In this report I will treat the existence and form of that credit intervention as a given, since it was designed prior to this research. Thus the variable left to be quantified concerns that form of borrowing unit (encadrement) which would stand to benefit the most as a focus of the credit intervention.

I will present an indigenous classification of the various kinds of units which could be seen as receiving the credit. The potentiality of each for furthering the Project goal, as stated above, by means of the credit assistance will be considered. Having explored the evidence in this manner, I will recommend an implementation procedure which could maximize the effectiveness of this subproject.

A. First set of potential borrowers: those for whom credit assistance would be redundant.

1) the famaw or functionaires: One would think that a program entitled l'embouche paysanne was not conceived of to assist salaried government workers. However, some of the latter not only in the chef-lieux d'arrondissement (Cinzana, Katiena) but also in Segou seem to feel otherwise. They argue that most peasants would only default on the loan if they were foolish enough to accept it. They explain that the majority of the loans will just end up in the hands of the full-time commercants (julaw), through "peasant" fronts if necessary, if the more needy

famaw (that is with respect to the julaw) are debarred from participation.

However, my findings indicate that all the embouche activities which the credit intervention is supposed to make possible can be and often are, initiated within the confines of merely a petit functionaire's official salary. Furthermore, the average peasant is capable of profitably wielding larger sums than his French-speaking, functionaire often gives him credit for.

Nevertheless, once denied access to the credit funds, some famaw at the chef-lieux could complicate the access of a peasant favored with a loan to the necessities (salt, fertilizer, conttonseed) supplied by the government consumer cooperative and vital to the success of his credit venture. There should be some way of guarding against this danger without compromising the real goals of the Project.

2) the julaw or traders: Many Bambara farmers (cikèlaw), particularly younger brothers (dògòkèw) of family heads (dutigiw), family heads of slave descent, or recent settlers of newly founded villages (see below), do a little concerted trading on the side. However, Bambara sociology is such that a full-time jula can only operate outside of his natal village. At home, surrounded by kin and jealous equals, he could not or would dare not consolidate enough capital to free himself from the need to farm. Therefore, a jula is by definition someone who lives by the turnover of liquid capital. To the degree that the l'embouche activities as conceived of in the project design are profitable, the julaw are already engaged in them. They already have sufficient capital to get started. Giving them easy credit would only help them to produce more cows without changing the economic structure of the region; it would be redundant.

Consequently, I would be wary about enrolling first generation strangers to the area (as we have seen, all major julaw must be strangers) in the credit program. Quite aside from their superior capital resources the famaw and

the julaw also have, or can afford to buy, the connections requisite for guaranteeing an adequate supply of consumer cooperative staples necessary for conducting the embouche enterprise. This enterprise becomes much more of a risky business when one is forced to buy salt at artificially inflated prices maintained by hoarders. Certainly those who already have connections enabling them to obtain unhoarded staples are those least in need of project assistance.

Citizens other than the famaw and the julaw should be enrolled in the credit program it is is to realize the goal of increasing the number of producers bringing cattle to the market for sale. In order to increase merely the number of cattle brought to the market the credit intervention would not be necessary since, as my data indicate, present cattle producers can increase production easily without credit and with much less risk. However, new cattle producers, the farmers (cikèlaw), will be enticed to the market with difficulty, even with the incentive of easy credit, unless the Project can ensure then a steadier supply of outside staples such as salt than is presently maintained by the SOMIEX cooperatives. In order for such a guarantee to remain once the financial and administrative umbrella of Mali Livestock is removed, salt distribution (for one) may have to become decontrolled. At present such a guarantee exists only for the famaw, the major julaw and their favorites.

3) the fulabilèn and fòròbafula or large cattle herd owners: The fula bilèn and Fulani speaking herders, while the fòròba fula include bambarized Fulani and herd owning Bambara farmers. If they haven't already, these herd owners could increase the number of cattle they brought to the market more readily through better management practices than by means of any credit assistance. If they became the object of a loan before their cattle management practices were streamlined, no qualitative change in their market position would take place.

Furthermore, a herd owner does not run much less of a risk than

a non-herd owner in accepting credit for cattle purchase since cows catch diseases and suffer from famine as a group. A farmer with then cows can be left without any after a blight almost as easily as a farmer with one cow.

B. Second set of potential borrrowers: those for whom a credit intervention could make a permanent difference (subsistence farmers or cikèlaw).

1) the dutigi, gwatigi, fa, or chef de famille: Accepting credit is a risk. Accepting credit for cattle purchase is an even bigger risk. For a farmer, sheep and goat production is a much safer way of gaining a greater profit with less of an investment in labor time. However, a farmer will accept this greater risk if he wants to plow. If it weren't for his desire to plow, he could use the credit just as effectively for buying goat and sheep and at much less of a risk. In the forest region during the secheresse, cattle herds were reduced by as much as 40%, flocks of sheep sometimes by 5%, and goat numbers not at all.

Therefore, I don't think that the embouche credit scheme should be billed to the farmers as a strictly meat producing affair. Rather its advantages for replacing aging plow cattle should be stressed. The embouche loan will bring the farmer a more secure profit by permitting him to plow a larger peanut field than it will from opportune cattle sales. With the credit the farmer can buy a younger plow ox when these are cheapest (at the end of the rainy season), then, if he has enough sheep, goats, and peanuts to get him through tax time (February) so that he won't have to sell either his new or his old plow cow, he can sell his aging ox when plow cattle, old and young, command their highest price - May and June. Then with the younger, less decrepit plow cow he could cultivate more field space. The credit will have permitted him to buy that younger cow when it was cheapest, instead of when it was most expensive: in May or June after he had sold his old cow. Or, if he preferred to wait until a new ox was cheaper, without the credit he would have to go through the farming season one plow cow

short. The fact that herd owners can sell plow cattle at the time of their highest demand and yet still have oxen left over with which to farm is another reason why credit assistance would be redundant for them. As we have seen, this is not so for the farmer with only two or three oxen.

It follows that the credit assistance would be of the greatest assistance to plow-owning farmers with a reduced number of oxen, but who do have sufficient goat and sheep assets to cover their taxes and a possible default on their loan. However, in order to register a sufficient number of farmers who conform to these criteria, the credit program would have to spread itself very thin over a large number of villages. There are two dangers in this: (1) The dynamism of the one or two farmers who received credit in any given village would be sabotaged by jealous peers and kin. He would lose their cooperative labor services since these neighbors would not want to assist an operation dedicated to a product (cash) to which they did not have access. They could look upon the credit recipient's millet production as subservient to his cattle "commerce," i.e. as intended for sale to assist that commerce rather than to help neighbors and relatives faced with hardship. These jealous neighbors could withhold communal labor from this credit recipient, and his millet output would suffer accordingly since millet yields can be greatly increased by quick weeding and quick threshing both of which depend on group labor. By becoming an isolated recipient of credit, a farmer could jeopardize his present level of production; Bambara sociology being what it is, equalities in the amount of labor given and in the amount of produce consumed are sanctioned by a fear for one's reputation, all of which ensures maximum subsistence production and minimum commercial enterprise. (2) A certain kind of village (tonjondugu), of which there are a limited number, would be unduly favored if only these mixed-farming peasants received the credit assistance. These newly settled villages, where neighbors have come from different directions and

from different ethnic and kin groups, experience less jealous rancor and, not unrelatedly, have proportionately more plow-owning families. However, lacking the jealousy syndrome, these newer villages lack the developed cooperative labor system which is motivated by this syndrome in the older villages. Consequently, these newer villages produce proportionately less millet. In any case, the newer settlers only found the sandier soil areas unclaimed, the clay soil areas already being farmed by the older inhabitants. While the sandy soils usually produce less millet they are better suited to livestock raising. This circumstance has further encouraged these newer settlers to concentrate on individual livestock holdings rather than reputation-building millet production. When there are more cattle in a village, many of its residents are in less need of credit assistance to get a field plowed. Sufficient "credit" can be supplied by a cattle-owning neighbor; peanut profits can be converted into personally owned cattle by the oxen borrower. Less inhibited by local jealousy and benefitting from the greater number of cattle living next door, oxen-short plow owners in the newer villages are freer to engage in l'embouche activities without the stimulus of a credit intervention.

Thus, we can see that the credit program could produce more social change in the region if some way could be found to encourage plow users in the older villages to participate. On account of the two dangers outlined above, concentrating upon plow-owning, oxen-short farmers alone as a focus of the credit intervention will not necessarily lead to a realization of Project goals. The newer villages (tonjonduguw) would become ascendant in the area in the same manner in which the famaw, julaw, and fulaw would consolidate their ascendancy if they were able to become the recipients of easy credit.

2) the somaw or lineage members: At present the residents of the older villages, the majority of the population, have not yet fallen too far behind the more

individualistic settlers of the newer villages. While not as free to compete for a place as a livestock broker or for a greater role in the kola nut trade, the old-timers working in groups produce more crops per capita than the more individualistic newcomers. Not only do the duden (junior members of a family or concession) in the older villages refrain from taking away labor time from the communal fields of the concession (fòròba) to devote it to their personal fields (suraforow or jònfòròw), as do many duden in the newer villages, but they also labor in the fòròbaw of neighboring concessions (duw or gwaw) on an exchange (dama) basis during the many labor bottlenecks in the millet farming cycle.

When labor is exchanged between duw belonging to the same lineage (soma or kinda) accounts are not as strictly kept, with the result that smaller duw within the lineage produce more than if they were on their own and had to compensate for all services rendered. Like the concession (du, gwa), the lineage (soma, kinda) is headed by its oldest members. The concessions in the lineage form a separate quartier (sokala) of the village. While certain trees and undivided, ancestral, fallowing fields constitute the only corporate property of the lineage, the lineage elder (somatigi) still has important ceremonial duties with respect to their somaw or kindaden at circumcisions, excisions, and weddings and funerals.

I see no reason why a group of family heads (dutigiw or gwatigiw), particularly those in the same soma or kinda (lineage), who individually lack sufficient collateral, and who are already sharing a single plow, could not incorporate together to accept credit with the end of adding a younger plow cow to their team. Within the soma, in any case, the ranking of authority by age is made irrefutable by the strength of kinship ties so that this sort of cooperative corporation would not be beset by the organizational problems that often plague communal enterprises. A participant who shirked on his share of the labor or on his share of a defaulted loan repayment could be more effectively shamed or bewitched into responsible

action by his kin than by anyone else.

By suggesting such a group focus for credit intervention, the Project administrators could arouse a greater participation from the older villages. More farmers would be willing to risk such partial participation. With more farmers involved in a single village, individual participants would encounter that much less jealousy manifested by their kin and neighbors.

3) damadenw or members of groups exchanging labor: These are groups of families, not necessarily patrilineal kin but often at least in-laws of each other, who mutually aid each other during labor bottlenecks in the farming cycle. These groups could also be offered the option of organizing themselves to accept a single credit risk. The chain of management authority would not be as secure as with the somaw, but in most cases it should prove viable.

4) dudenw (junior members of a concession or jònfòròtigiw (personal field) - i.e. property owners): The dama associations discussed above are organized by dutigiw, the managers of the communal field of the concession (fòròba). However, most of the larger concessions have adult "younger brothers" or "sons" who conduct personal enterprises (jònfòròw) of their own: a personal field, a sewing machine, an intra-village kola nut trade, kerosene sales, and, most of all, dry season emigration to the Cote d'Ivoire. While in the village these dudenw are permitted to work on their jònfòròw or surafòròw, so to speak, at dawn, at dusk, at night (sura); in otherwords, when they are not required to be present at concession-wide (fòròba) or at village-wide (see below) work efforts.

These juniors have even less collateral than most of the dutigiw. However, unlike the dutigiw, who are responsible for the survival of their dudenw, these jònfòròtigiw do not compromise their village reputation as much by the open pursuit of commercial profit. Whatever assets the duden jònfòròtigi risks on his enterprise are his alone and not a public trust (fòròba fenw) like the assets managed

by the dutigi.

5) gòdenw, tondenw or association members: It has been suggested that the village ton, powerful in assets, could serve as some kind of credit guaranteeing mechanism for its members (dudenw and younger dutigiw) who could not otherwise take the credit risk of l'embouche paysanne on their shoulders. It was argued for the duden ton members in particular, as we have seen, that they would be freer to innovate since they were not responsible for fòròba assets; all that they lacked was collateral which could be unwritten by some specific agreement between the ton member (tonden) and the tontigiw. The ability of the latter to exact heavy fines from the tonden was remarked upon.

However, while the ton is a powerful organization with many assets earned over the course of its many labor details throughout the year (only the chef d'arro ndissement doesn't pay them), using those assets to aid a single individual in a direct way is considered fundamentally opposed to the constitution of that group. The ton returns its assets to the village, to be sure, but only in the form of a village-wide feast or through the upkeep of village facilities such as the market place. All other associations of age-grade members (jew), of which the ton is only the most conspicuous example, operate on the same principle: all earnings are returned to the village (the unit which defines the horizontal limit of the age grade or flan-bolo) in the form of a festival or nyèna jè. While the composition of a soma or dama work group depends upon the association of dutigiw and dudenw all of different ages, the jew associations (of which the ton is only the biggest) use the village-wide age grades (flan-bolow) as their buildings blocks for membership. The soma and the dama associations are used to enlarge the labor force of the du for specific purposes. The du only releases laborers of the appropriate age-grade to the jew because the jew produce festivals (nyèna jè) not personal assets. If the ton started using its earnings to aid individual members, dutigiw

might stop releasing dudenw of the designated age grades to work for the ton on Mondays and Fridays, and they would stop paying their duden's ton fines.

Nevertheless, since every method of bringing middle income farmers from the older villages into the Project is worth investigating, I think the credit administrator should still ask the villagers their opinion of this alternative. As he will be seen differently than I was, he may get different answers than I did.

C. Conclusion:

Lastly, on the basis of this evidence, I will summarize my suggestions for the implementation of l'embouche paysanne.

I have recommended that the heads of full time farming (cikè) families (dutigiw), particularly those in the older villages to be listed below, should be the primary focus of the credit intervention in order that the Project goals stated at the beginning of this report be most effectively realized. I added that larger units of somaw (lineage) or damadenw (reciprocal laborers) could be used to incorporate poorer families into the credit advantage. I noted that this alternative could be particularly effective in the more communalistic, older villages where these associations of duw are strong. Furthermore, I counseled that duden with sufficient jònfòrò (private) assets could facily carry on cattle production activities unencumbered by any responsibilities to the fòròba public trust, and all the supervisory jealousy which that entails, other than a specified amount of their labor time, but that their ton association cannot be easily used to support them.

I warned that extending credit of the size and form of that designed for l'embouche paysanne to those with already a high commitment to a cash flow income would be redundant and wasted in terms of the Project's long term goals. For this reason I recommended that the initial credit initiatives radiate out of a village like Dukolomba, which is situated 15-20 kms into the "bush" rather than from villages like Douna or Cinzana where a large proportion of the population can, and

does, avail themselves of the cash flow opportunities of the large market places which the hardtop road gives them access to.

It remains for me to specify which villages contain a high proportion of those farmers for whom the credit intervention could make the most fundamental difference.

A.) Older villages in the arrondissement of Katiena near to forest facilities: Dukolomba, Dufunu, Bwala, Dingola, Blan, Katiena, Dougakòngo, N'tjidougou, Falinbougou. Gwalabougou is the only new settlement in this part of the arrondissement; as a new village it is dominated by wealthy julaw and their workers; it also has as many Bozo fishermen as it does farmers.

B.) Older villages in the arrondissement of Cinzana near to forest facilities: Douna, Sanogola, Ngabougou, Sonsorobougou, Ngakòrò, Tongo. Even though these are older villages, being near the main trade route, they contain larger julaw and fulaw populations deriving much of their livelihood through the market place. For reasons with which we are already familiar, julaw and fulaw are even in greater evidence among the stranger populations of the newer villages in this part of the arrondissement of Cinzana (the tonjòn duguw): Ngola, Sidikiwèrè, Balangowèrè, Nianiwèrè, Bwawèrè, Musawèrè, Ndenzanawèrè, Bukura.

Therefore, in order to ensure that the credit program produces the maximum economic transformation in the Dukolomba forest region it would be safe to concentrate its initial efforts on the designated part (1) of the arrondissement of Katiena. This course would (1) simplify administrative problems surrounding the promulgation of the credit offering (incidentally, working with only one chef-lieu would reduce the number of famaw able to pester the Project administrator for some of that easy credit), (2) ensure that predominantly older villagers were contacted, so that the Project would not possibly, inadvertantly facilitate the economic domination of the region by residents of newer villages, (3) stimulate

trade passing through the arrond. of Cinzana villages to the west on its way to the highway; thus these villages (listed above - 2) would benefit from the sub-project without directly receiving credit at first.

CATTLE RAISERS AND CATTLE RAISING
IN
THE DOUKOLOMA FOREST AREA

by

John Aron Grayzel

September 1975

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Conclusion I:

The classified forest at Doukoloma is an integral part of the economic life of a fairly easy to delineate surrounding area, bordered on the south by the Bani River; on the north by those villages adjacent to the main route from Zinzana to Katiena, (of which Ndiedougou and Falinbougou are the most northern); on the east by Bla and Goualabougou; and on the west by Sanogola and Nabougou.

While occasional individuals from outside this area make use of forest resources, no other communities, including the administrative centers of Zinzana and Katiena, have as significant an interest, or as established a dependency on it as those outlined. Neither will any others suffer any immediate appreciable loss through its reallocation as a managed grazing land. Present dependency includes the use of its grasses not only for grazing, but as building material for roofs, mats, and fences; the use of the area for containing cattle immediately preceding the harvest season; the use of the river as a watering source; the use of forest land for farming; and the use of forest paths and areas for river crossing during the transhumance.

Outside villages, including Katiena and Zinzana should not be allowed to usurp the rights of those already dependent on the forest,unless and until they themselves decline to participate. Particularly feared by local villages is the power and possible domination of the project by large herd owners of Kouna and Gweina. The initial inclusion of such outsiders can only lead to jealousy, disillusionment and lack of cooperation. On the other hand, because of complex established relationships and interdependencies between neighboring villages, such as the northern fringe village of NGakoro's traditional sovereignty over the forest, too great a limitation on project participation could also produce negative reaction.

Recommendations:

A. Opportunities for project participation should be limited

to those inhabiting the area already exploiting the forest. Especially important are the Bambara villages of Doukoloma, Dofounou, Ngola (Nouola), Dangolola, Bouala, Ndiela, Balangokawere, Kelekewere, Ngakoro, Boiwere, Moussawere, Falinbougouwere, and Ndiedougou; the Peul hamlets at Falinbougouwere (Fulablenwere), Siguinawere, Botiewere and Diongokawere; and the Peul-Foroba Fula hamlets at Nabougou, Nyamakawere, Abdoulayewere, and AbdoulayeBariwere.

B. Two fundamental uses of the forest should be delineated:

1. As a long term grazing area, in connection with which it should be accepted that those villages nearest the forest are the most dependent on it and, therefore, deserve limited preferential rights.

2. As a holding area during October-November to avert excessive crop damage, in which case the larger herd owners are the most dependent on its use.

One suggestion as to how these two uses can be balanced is to experiment with allotting each herder a certain number of grazing days per year and, allowing him to determine whether it is more advantageous for him to graze ,many animals for a short time, or a few for many months.

C. Since some restraint must be put on the level of each individual's participation, and since 100 head is the normal size for a non-transhumance herd, and 200 the maximum single grazing unit even for pooled transhumance herds: to allow herders the possibility of most efficiently splitting their animals for partial inclusion in the project, it would seem desirable to confine any single owner to a maximum of 100 head, and to determine the quota for any single village or combination of hamlets in aggregates of 100 or 200.

D. A committee of representatives from the most important villages should be established. These villagers would participate with project personnel in determining the allocation of rights to use the

grazing land and would also act as project agents to explain to others the rationale behind each decision.

E. An entrance grate and path from the forest border to the traditional crossing area opposite Nani should be maintained for transhuming herds. Such a path could double as a fire break and there seems no inherent reason why it need be fenced, since, under supervision, the forest and river can be traversed in two or three hours.

Conclusion II:

Cattle raising as practiced by both Peul and Bambara, is an important factor in the high agricultural productivity of the region. Involved is not only the use of draught oxen and the provision of fertilizer, but also the reinvestment of wealth from animals to further production by hiring wage labor and investing in plows. Failure to adequately coordinate new innovations in herding with contemporary farming practices can easily negate the actual efficacy of such practices for the target population, and thereby encourage their rejection of the project.

Recommendation

A. An adequate agricultural extension program and sufficient personnel should be integrated into the project to encourage a balanced local development and increase the attraction of the project to the local population.

Conclusion III:

The practices and economics of cattle raising in the Doukoloma area are intricately interwoven with events and circumstances beyond its immediate boundaries.

The present animal population already seems to strain the year round grazing capacity of the land, and is maintained only through the mechanism of the transhumance, which not only relieves

overgrazing, but seems to be beneficial in generating healthier, more productive animals than those left behind.

Meanwhile, the time and place of cattle sales is significantly influenced by national and international conditions. Thus taxes in March means there is an additional pressure to sell animals during a month when conditions already favor extensive selling, rather than in May or June when sufficient sellers are lacking. The poor quality of animals available in May and June in most markets is not because no quality animals exist, but, partially, because most are in the south, on transhumance, and are directed to the more lucretive Ivory Coast trade. The closing of the Ivory Coast frontier in Spring, 1975, however, did not result in a redirecting of these animals, but in a disastrous drop in market prices that forced people to hold back from selling, and convinced them that such proposals as investing money to fatten steers for sale during these months was unwarrantly risky.

Recommendations :

A. The idea of establishing improved grazing areas should be expanded to incorporate the concept of a scientifically managed transhumance that would, through seasonal rotation, greatly increase the full utilization of a series of grazing lands at their peak periods.

B. OMBEVI should take a more active role in assessing the implications on cattle raising of independent governmental decisions, and should urge the government to consider such information prior to taking action on such issues. (i.e. tax time, the importation of salt, etc.)

C. The economic viability of intensive fattening of cattle should be reassessed and weighed against the cost of diverting already existing quality animals from the south to northern markets through better transport facilities and higher fixed prices.

Conclusion IV:

General suspicion of the ability and motive behind both governmental and foreign assistance projects is even present among the rural population. Rapid, effective response to a few immediate, technologically simple problems, would be more effective in overcoming such attitudes than any grandeous promises of future benefits. In the Doukoloma area the two most common complaints involve: the seasonal difficulty of obtaining adequate salt and water for the herds.

Recommendations

A. Strong governmantal action must be taken to assure an adequate suppy of salt at a fair price in the rural areas.

B. Present hydraulic improvement programs that are in operations, or soon to begin, should direct some of their activities to cooperative pilot villages in the Doukolomba project area.

Final Field Report

Introduction

A general background of cattle raising practices in the Doukoloma area has been provided in previous reports and responses to questionnaires. Some of the material has been repeated so that this report might be, to some minimal, extent self-contained. The emphasis, however, is on supplying more specific data on various processes and activities as observed from October, 1974 through December, 1975. As I, myself, left the field in October, 1975, information for the last two months was obtained by an assistant whom I retained for this purpose.

Methodology

The data here-in presented does not represent all information gathered, but rather those examples whose veracity has been tested through intense personal observation and repeated rechecks. The inaccuracy of official statistics, such as tax records (generally 20%-30% of actual herd numbers), makes recourse to such sources of dubious value. In the Doukoloma region this is especially true of the Peul , the majority of whom are not recorded in the records of their present villages, but are grouped together as a long standing administrative unit which originated over twenty years ago in the neighboring arrondissement of Sanando. Efforts to correct such deficiencies through quick, extensive surveying tends to be met with characteristic suspicion and lack of success.

The only available alternative is standard participant observation, while relying for explanation on repeated discussions with people with whom a personal rapport has been developed. The result is a relatively small sample size, but, supported by a thorough understanding of circumstances, it remains more accurate and reliable than large scale random sampling. The format of this report is reflective of this approach. Specific data is presented in concise graphs and charts, while the commentary is predominantly

concerned with providing the specific circumstantial and methodological background.

However, as concentrated micro-socio-economic studies are no more self-sufficient than sweeping studies, any conclusions and recommendations made are based, not only on the information presented, but after consideration of previous reports by myself, John Lewis, Dangui Sissoko, and the OMBEVI-FAO report of R. Rochette, and Mmme. Rupp.

Names and Places

Lack of standardization of geographic nomenclature in the Doukoloma area is prevalent not only in the literature, but among the local population, who are capable of offering several variations of the name of a village, none of which correspond to that on the IGN map. I have chosen to employ those geographic names that will be most helpful in allowing someone unfamiliar with the area to locate it on a standard map, and those terms for ethnic groups or categories which will best serve someone working in the area through a French speaking interpreter. Thus, sometimes, a French word is employed if generally understood- i.e. Peul (Bambara: "Fula", Peul: "Fulbe"), while at other times an indigenous term- i.e. "Foroba Fula" is used when no readily accepted translation exists.

Ethnic Identity:

Much of the data is broken down according to the ethnic identity of the people concerned: "Peul", "Bambara", or "Foroba Fula" Two points must be emphasized. Firstly, these are labels used by the local populous themselves and not the imposition of an outside observer. Secondly, while ethnic distinctions do have an historic basis, ethnic identity is somewhat flexible, and a small number of individuals do alter their's, usual concommitant with a reorientation of their economic occupation. Therefore, ethnic patterns are a useful tool for analyzing and predicting economic behavior. However, in no sense should they be employed as the

sole reason for denying a specific individual a new economic opportunity.

The distinction between Bambara and Peul is fairly clear. While both groups farm and own cattle, the Bambara identity and emphais is on agriculture, with cattle viewed as a secondary activity. The converse is true of the Peul . Between the two, there are also a series of stereotyped ethnic markers involving dress, housing, social structure, language, and behavior.

The Foroba Fula (translation:"Public Peul") are a group originating from slaves, of assorted background, who were herders for the Bambara kings. While they don't speak the Peul's language, in outlook and living style, they closely approach their ways. As a result, Bambaras usually refer to them as Peul, and it is only more traditionally established Peuls who are clear to make the distinction. Since they are only present in very small numbers in the Doukoloma area, it has not been practical to classify them separately for all statistical purposes. However, as will be seen, their separate identity is an important factor in explaining certain phenomena, and therefore cannot be completely disregarded.

The Area Studied:

Plate I is a section of the IGN Ke- Mecina detailing the general area surrounding the classified forest. Those villages pertinant to the study are underlined. This includes, in addition to those villages who regularly make use of the forest: the major local markets of Dicuna and Ndiedougou; the major cattle market of Bousse (Bussan); the Peul village of Weina (Gweina) which did not use the forest this year, but represents the largest single concentration of cattle in the area; the villages of Kouna, Sekourani, and Diourou which are not intricately connected with the area, but from which specific individuals send cattle to the forest,(largely because of long established personal relations); and those villages south of the Bani to which herds from the Doukoloma region traditionally transhume.

SECTION OF THE KE-MECINA MAP OF THE INSTITUT GEOGRAPHIQUE NATIONAL SHOWING DOUKOULOUMBA REGION

__ underlined villages particularly germane to study

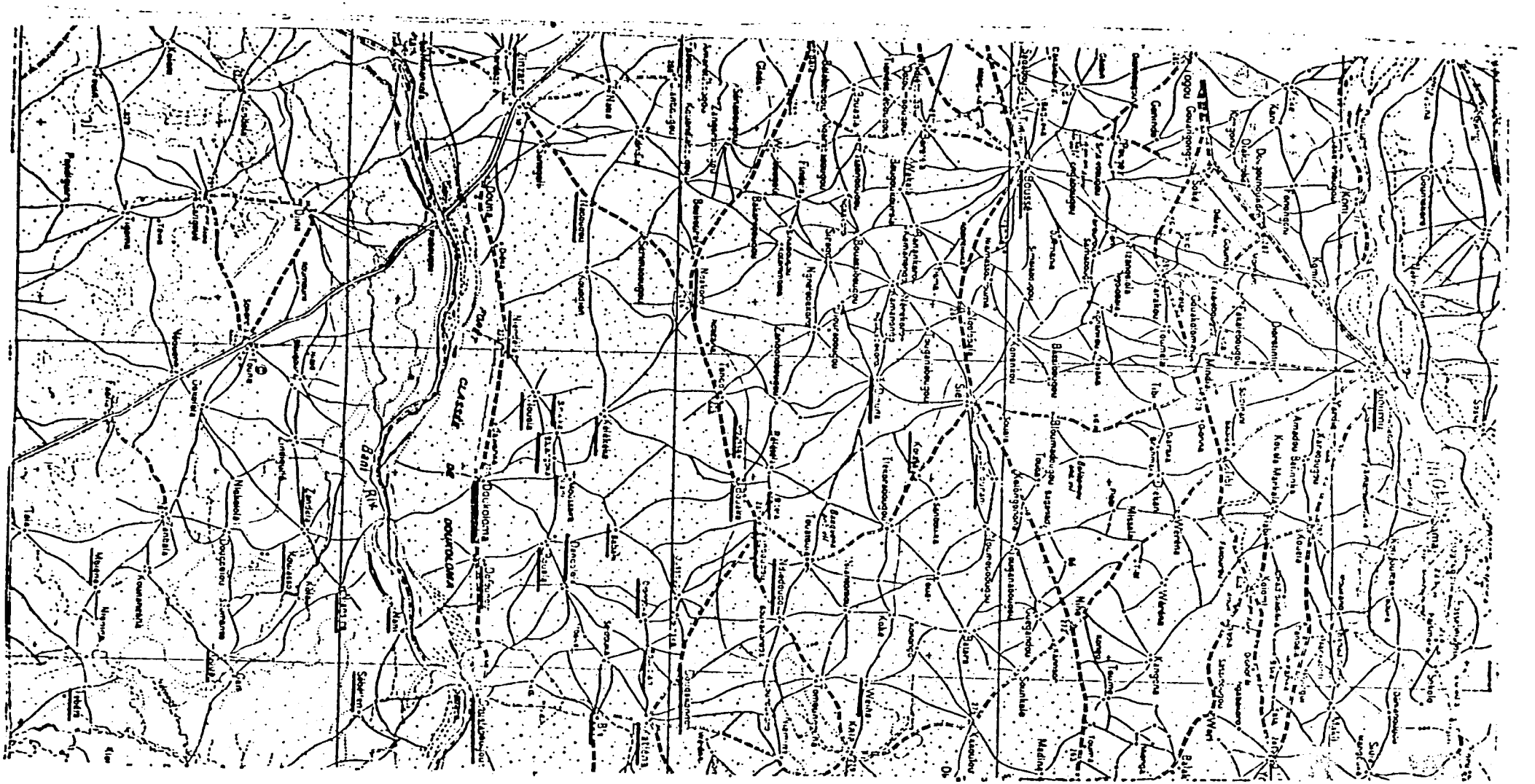


Plate I

Those villages that formed the nucleus of the study and whose herds were followed for 1974-1975, are detailed on Plate II. They were chosen based on daily surveys of the forest to determine the presence of specific herds. None used the forest every day of the year, and a few, namely Bitelawere, Tongo, Ndezana and Ngakoro made virtually no use of it at all this year. They are all, however, settlements to whom the forest is an important factor of consideration in chosing grazing for their cattle.

Basically, the area is bounded on the south by the classified forest; on the north by the Zinzana-Katiena road; on the east by Goualabougou and Bla; and on the west by Sanogola and Nabougou. Generally, a village's dependency on the forest is in direct proportion to its proximity to it, but the larger herds, 100 plus head, throughout the area rely on it during the months prior to harvest.

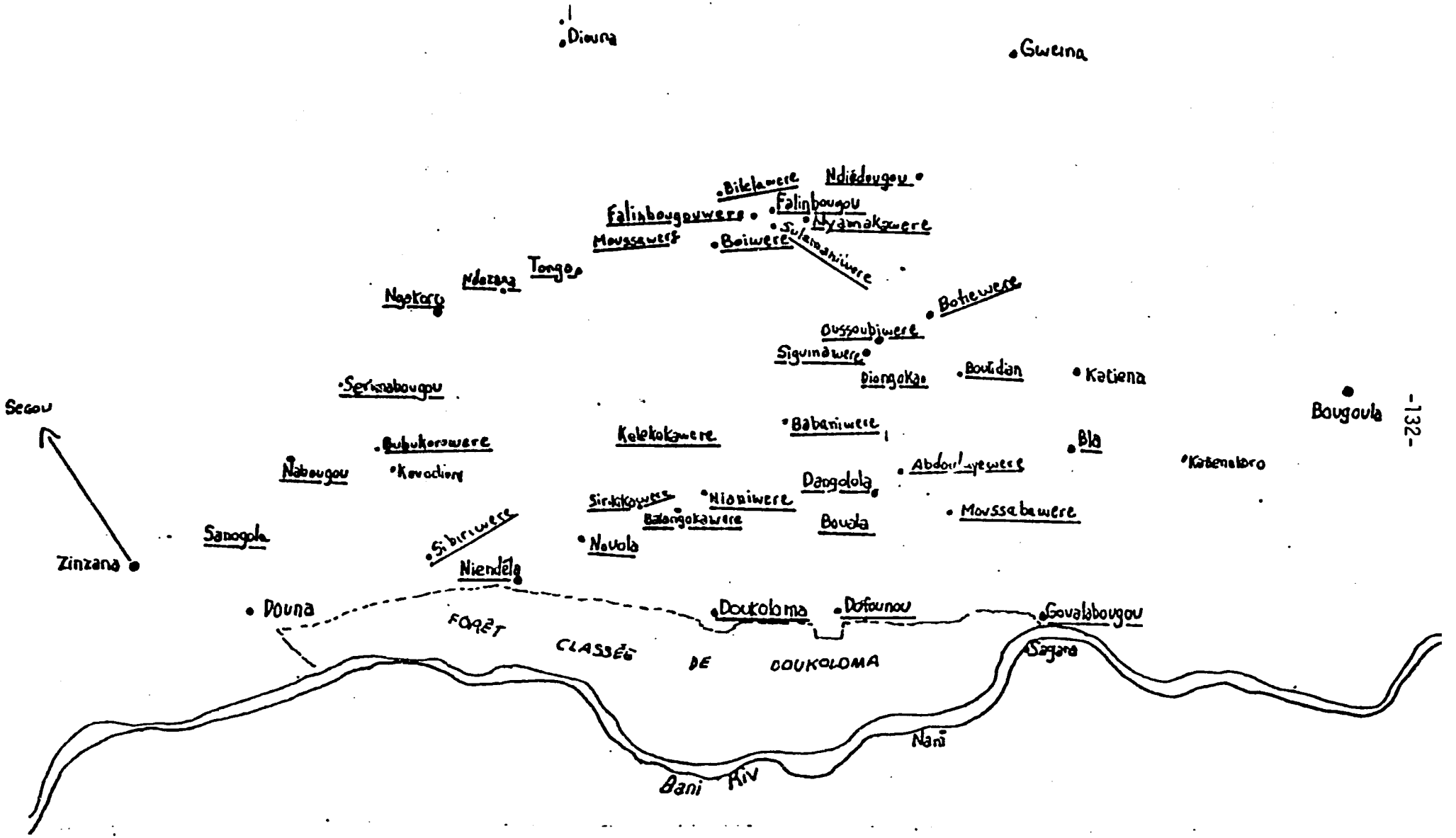
Herd Demography

A breakdown of the herds in the region by numbers is recorded in Plate III. Plate IV compares the representative proportions of different size herds among different ethnic groups. The recorded animal population approximated 8,000, with 3,100 belonging to Bambaras, 3,100 to Peuls, and 800 to Foroba Fulas. Of the 8,000 total, approximately 500 were owned by Peuls and Foroba Fulas living outside the area. A random sample of villages within the area resulted in a per capita figure of 6.7 cattle for the Peul , 3.5 for the Foroba Fula, and .6 for the Bambara.

Herding Patterns

Plate V through XVI trace cattle movements from October, 1974 through September, 1975. Arrows indicate the direction of the movement; the numbers in brackets represent those animals moving along that route. Unbracketed numbers represent the total population of animals found in the specific area for that month, including those newly arrived animals aready recorded in the brackets.

MAJOR AREA OF STUDY



all cattle in <u>underlined</u> villages were accounted for and followed Oct."74 - Sept.'75

Plate II

REPRESENTATION OF DIFFERENT SIZE HERDS
IN
DOUKOULOUMBA AREA SAMPLE

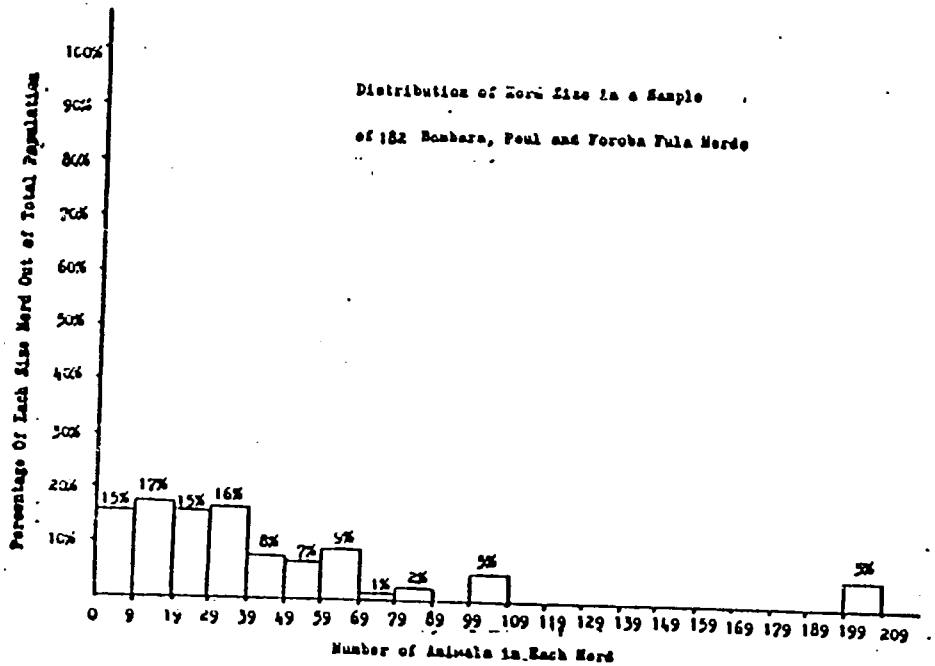
Number of Animals in the Herd	All 182 Herds	9 Bambara Herds	72 Peul Herds	14 Foroba Fula Herds
200 - 209	10	2	7	1
110 - 199	0	0	0	0
100 - 109	9	1	7	1
90 - 99	0	0	0	0
80 - 89	3	1	2	0
70 - 79	2	1	1	0
60 - 69	16	9	6	1
50 - 59	12	2	6	4
40 - 49	15	6	7	2
30 - 39	30	22	7	1
20 - 29	27	16	8	3
10 - 19	31	18	13	0
1 - 9	27	18	8	1

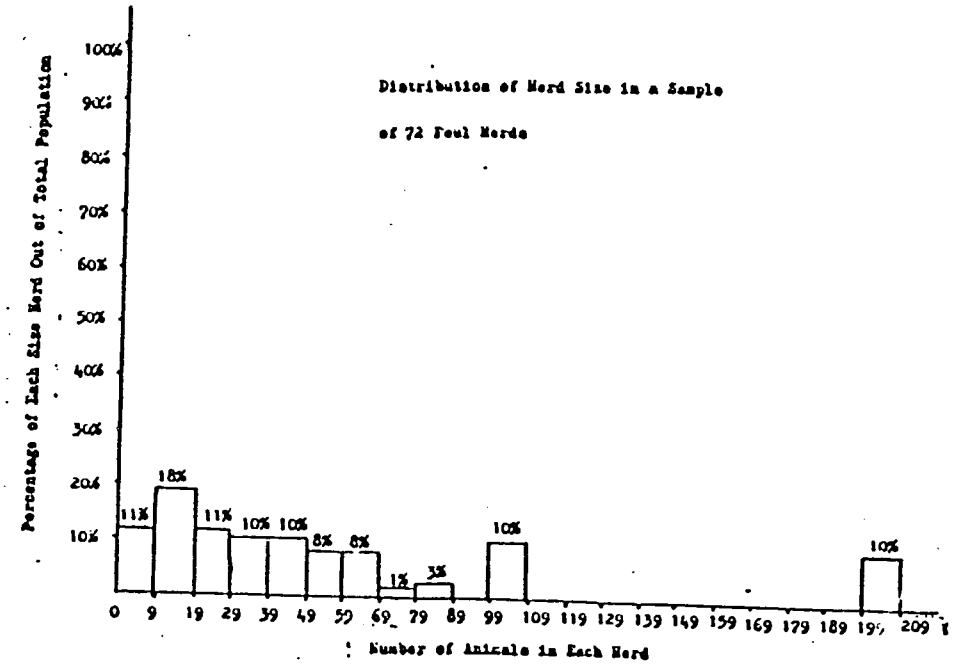
AVERAGE HERD SIZE

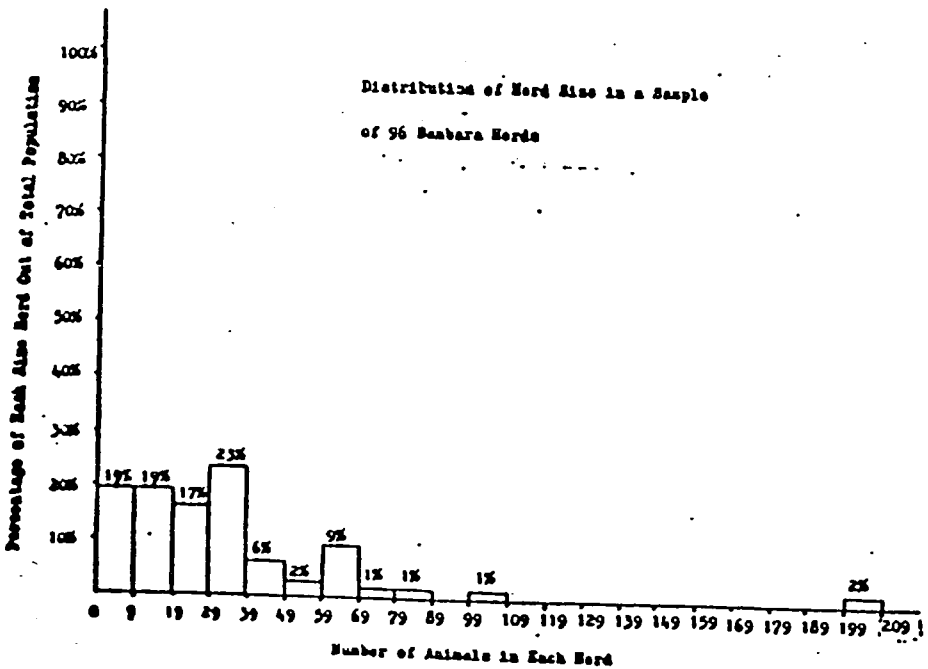
All Herds 42.9
96 Bambara Herds 32.5
72 Peul Herds 56.9
14 ForobaFula Herds 56.6

All Herds 0-89 Head 32.8
Bambara Herds 0-89 Head 28.9
Peul Herds 0-89 Head 41
ForobaFula Herds 0-89 Head ... 53.3

Plate III


Distribution of Herd Size in a Sample
of 182 Bambara, Peul and Foroba Fula Herds
Percentage Of Each Size Herd Out of Total Population
Number of Animals in Each Herd


Distribution of Herd Size in a Sample
of 72 Peul Herds
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd


Distribution of Herd Size in a Sample
of 96 Bambara Herds
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd

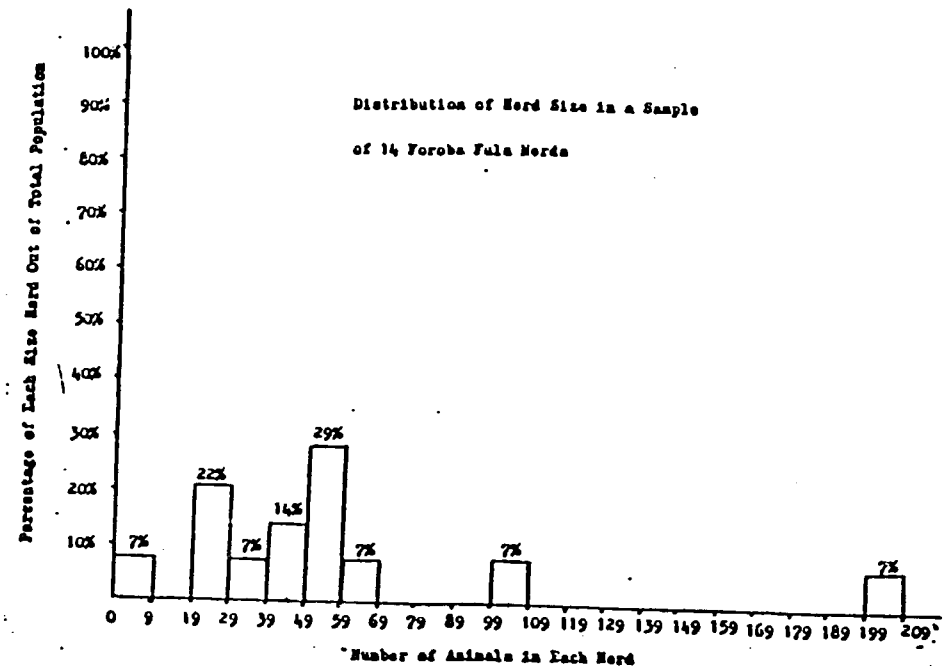

Distribution of Herd Size in a Sample
of 14 Foroba Fula Herds
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd

Plate IV

This information was gathered with the aid of three local assistants. The total region was divided into three areas:

1) From the Bani, north to Dangolola
2) From Dangolola north to Ndiedougou
3) From the Bani, south to Mbiena

Continuous sweeps of these areas were made during which all animals seen were counted. An entire area could be covered in 5 to 10 days. Ownership of animals was established based on personal knowledge of the herder, and the identifying signs with which most cattle are marked. North of the Bani, all animals were recorded; south of the Bani only those from the Doukololma area were followed. Knowledge of movements into the far southern regions around Mpessoba and the Koro-Bani was obtained thru periodic visits, and information supplied by herder-friends from my village, whose cattle grazed there.

Numbers have been recorded precisely as counted and are indicative of the 5% plus monthly variation that was unavoidable under the circumstances. At the height of the transhumance, about 30% of the total cattle population is across the river. During the rainy season all are on the northern bank. The entire process as revealed in 12 monthly segments from October, 1974 to September, 1975 was as follows:

October, 1974: - Plate V- A significant movement of animals, especially large northern Peul herds, begins into the forest. During this, and the following month, the cattle population in the forest proper is at its yearly high, in an effort to avoid damaging the ripened millet fields. It is a period of tense relations between pastoralists and agriculturalists, stemming both from actual crop losses due to negligent herders, and the propensity of some field owners to exaggerate these losses in the hope of gaining added compensation

November, 1974 - Plate VI - Some of the fields have already been cleared and movement becomes crisscrossed as herds graze on the left over millet stalks in different villages. Now agriculturalists who previously complained of cattle trampleing their crops, search for herds to fertiliz their fields. A major concentration of animals is around Dangolola where a large supply of water exists till late in the season.

December, 1974 - Plate VII - With many millet fields already grazed

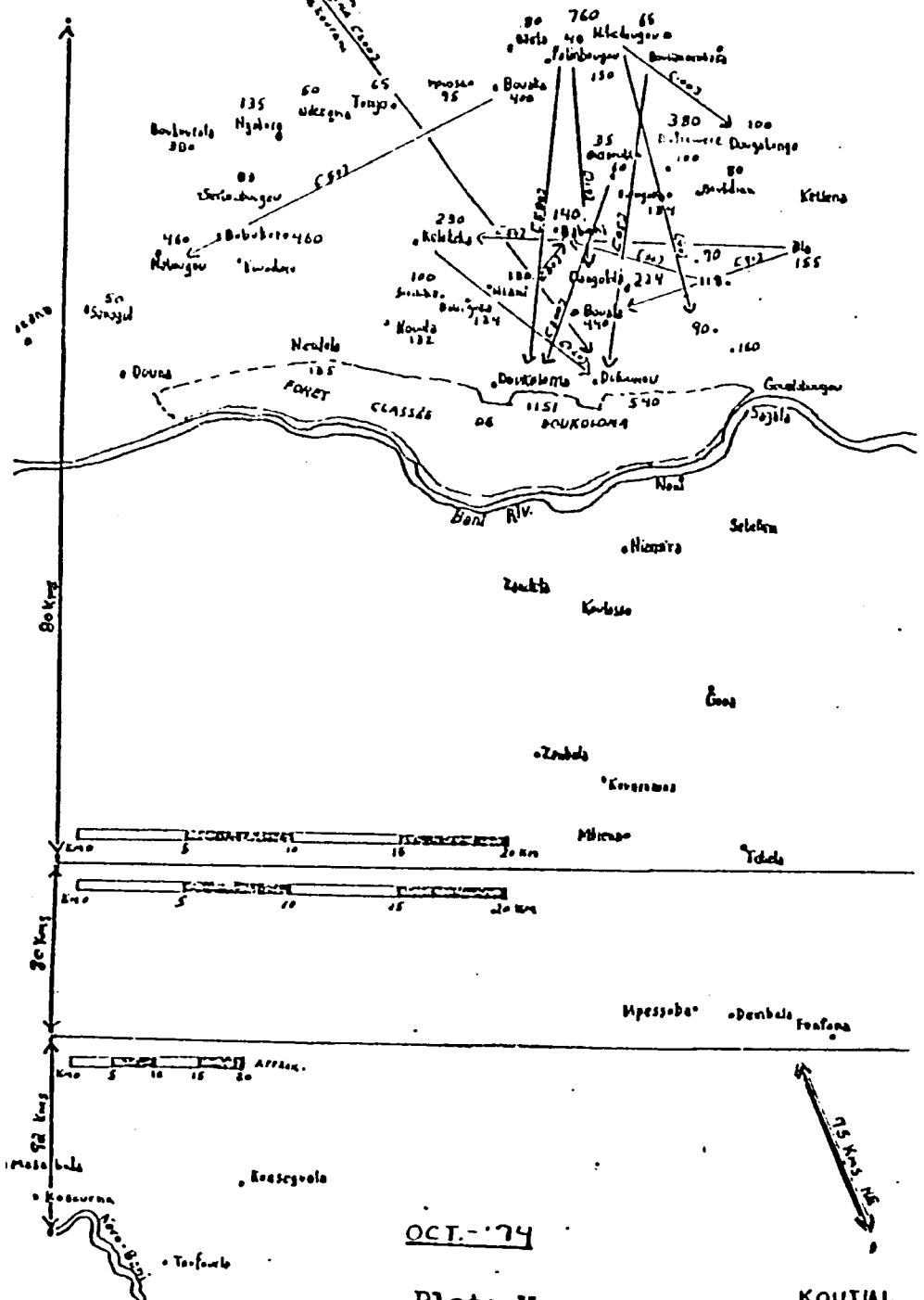


Plate V

KOUTIAL

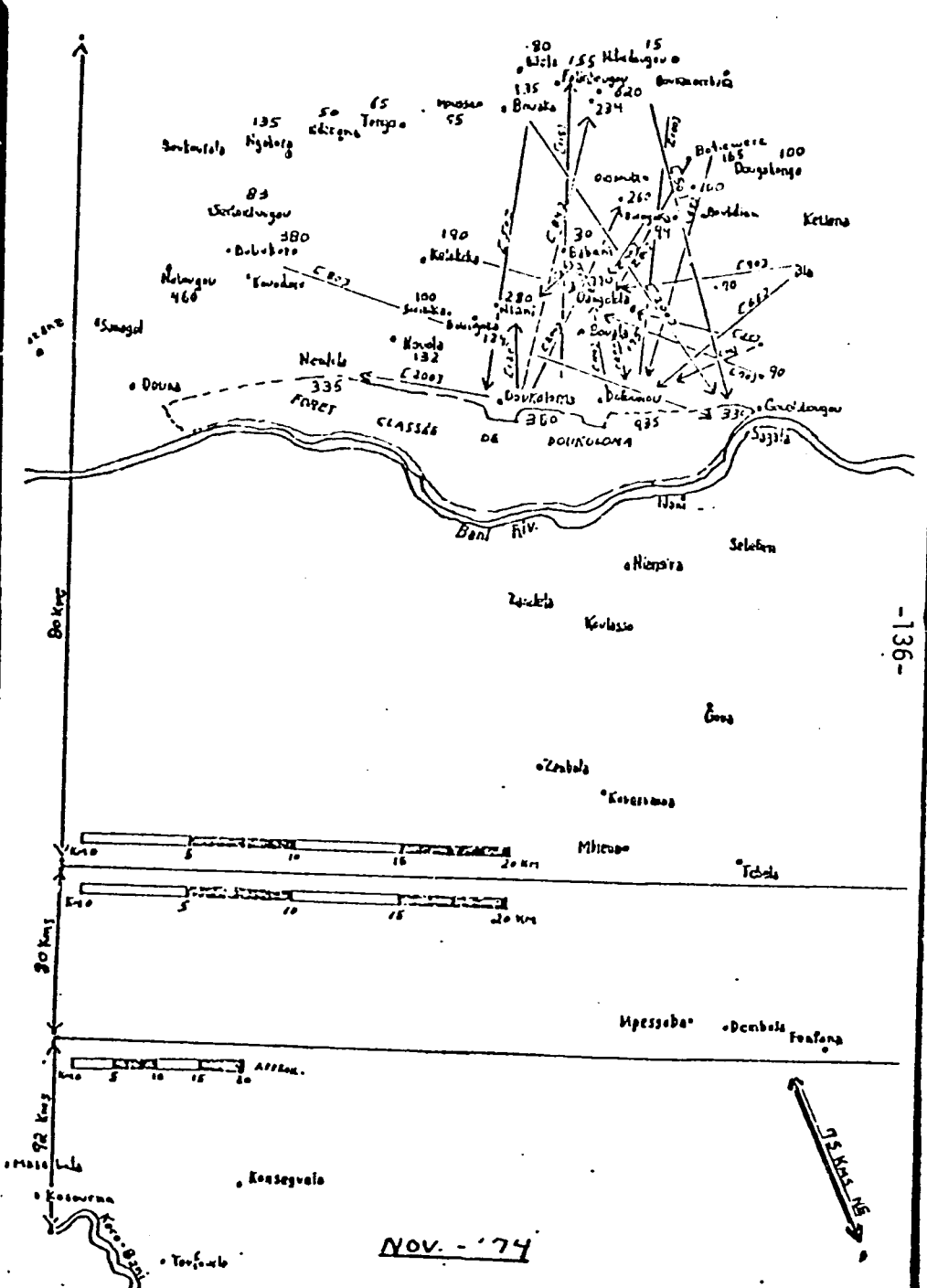


Plate VI

KOUTIAL

and grasses beginning to dry, the first movements of the transhumance begin . The major retarding factor is the permission of the villages south of the river where the wetter climate delays the harvest. Such permission becomes increasingly important the further from home one travels, and the more dependant one becomes on the hospitality of a local sponsor. Such hospitality is courted by bedding the animals each night on the sponsor's field, providing free milk, and, if the relation is well established since many years, by granting larger favors such as the loan of plow oxen during the rainy season.

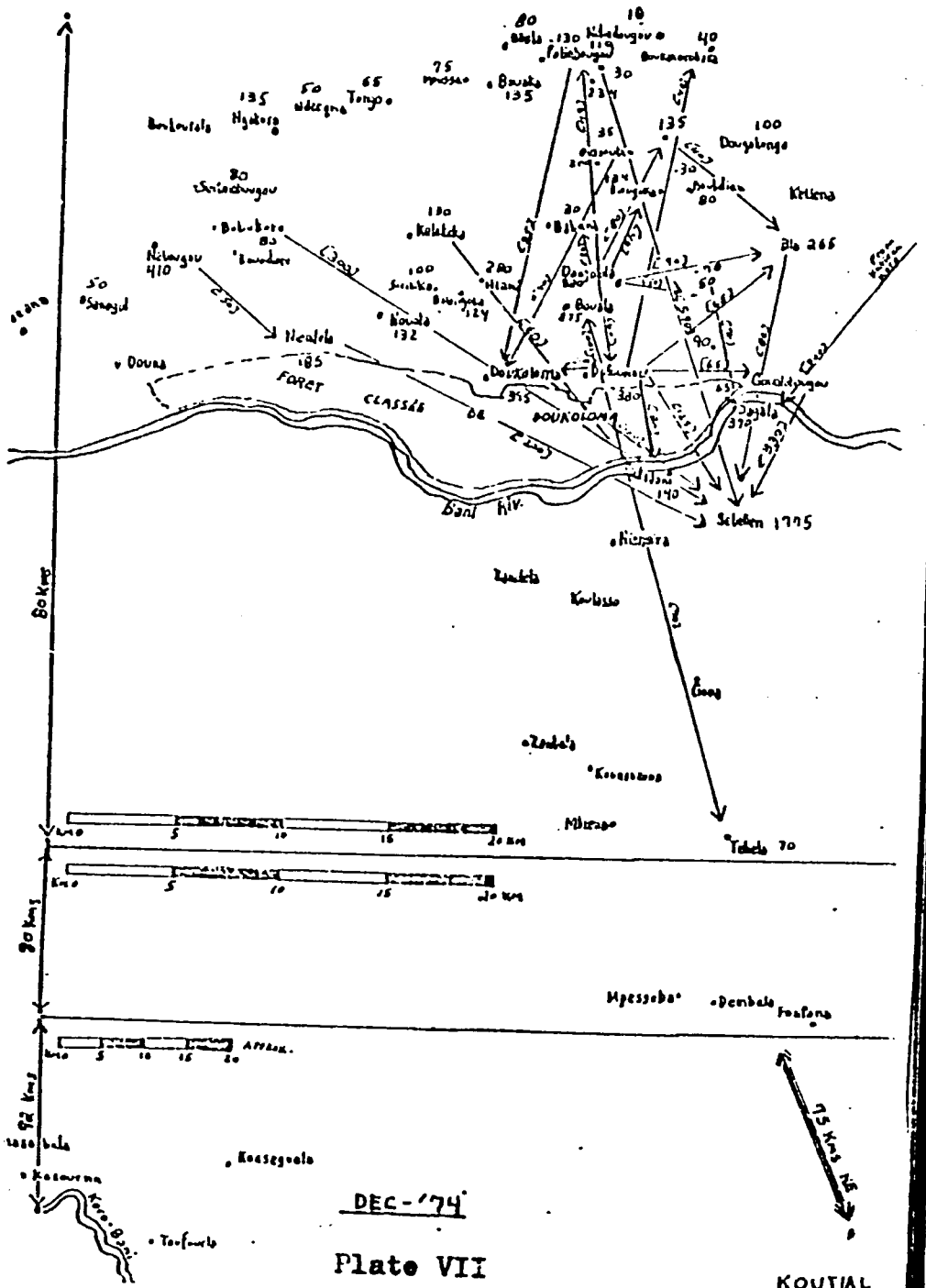
The river is crossed near the village of Nani where there is a break in the steeply inclined bank, and where the aid of Somono fishermen is obtainable to help control the herd and ferry across calves too weak to swim. There is also vested in the chief of Nani a ritual authority over the river that few wish to challenge by not seeking his permission to cross. No official fee exists for this consent and assistance, but "unofficial" expressions of gratitude, such as a young bull every few years, are periodically provided. In previous years, some of the traffic was diverted to the Bani bridge at Douna, but a serious auto accident discouraged further attempts.

The herds regroup at Sebetian which, prior to the recent drought, reportedly was lusher and better watered than at present, and capable of supporting a larger percentage of the migratory herds

January, 1975 - Plate VIII - An ongoing process is established where-in continuously arriving herds strain an area's grazing capacity, there-by causing the earlier arriving herders, (often the most concerned and demanding), to seek new pastures. The dispersion westward, and as far south as Mpessoba, follows the traditional pattern of pre-drought days. Last year several people went as far as Koutiala and returned highly satisfied. A small movement of 80 animals southwest to the Koro-Bani is the beginning of a similar migration this tear.

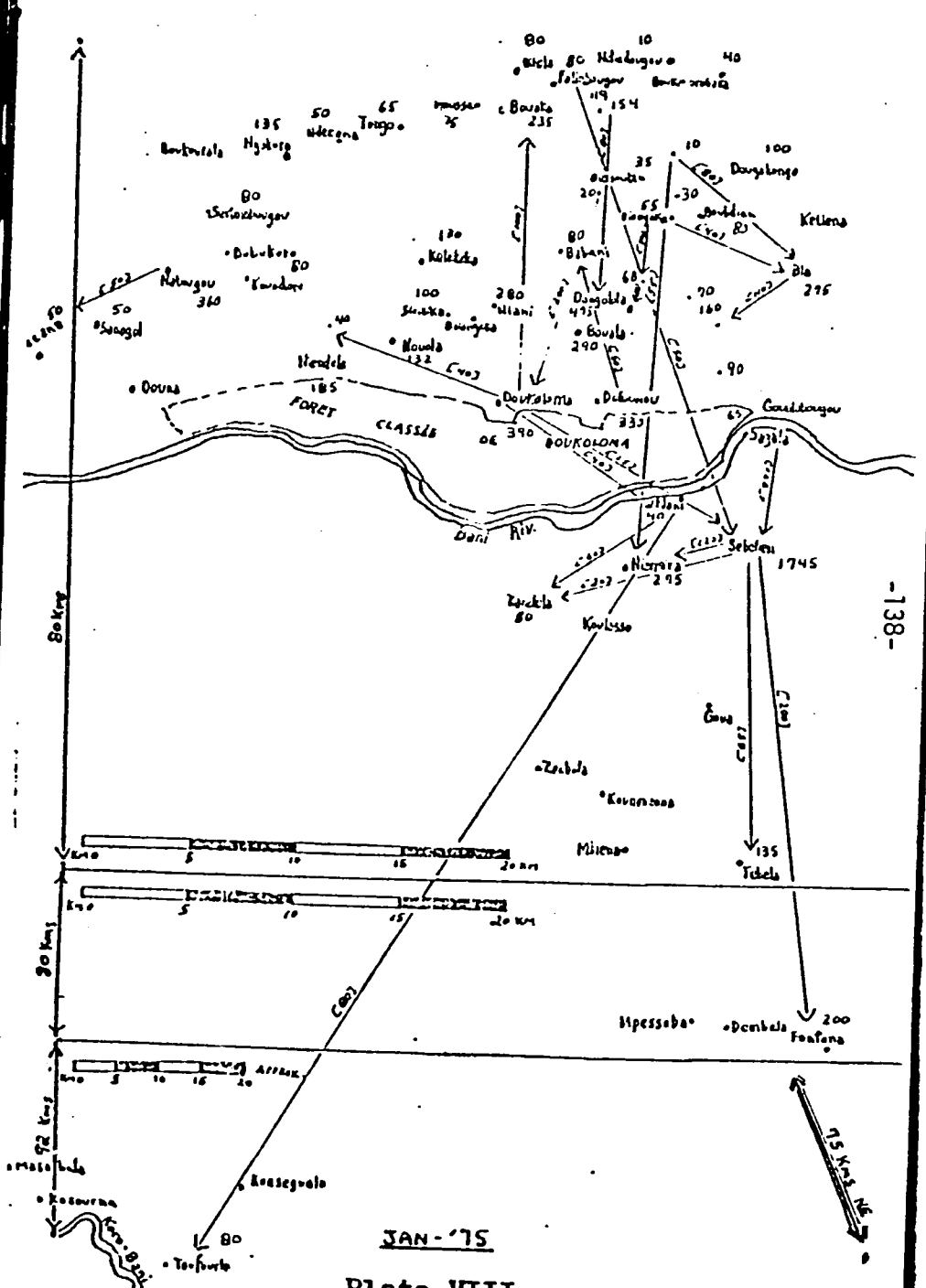
In the Doukoloma area itself, a process begins of continuously repositioning smaller herds, depending on alternations in the micro-environment of particular villages. Especially determinative is the descending water table, causing the large scale watering of animals to become progressively more difficult, and encouraging owners to delegate the care of some animals to people in villages with more favorable conditions.

February, 1975 - Plate IX - Movement south continues as more herds head for the Koro-Bani. Generally the search for good pasture is competitive, and the attempt is made to hide, at least for a while, any new discoveries. Here, however, because of distance and lack of familiarity, many people sought to travel and camp within a short distance of each other; thus demonstrating one unifying factor in an otherwise diversifying situation.



DEC-'74

Plate VII



JAN-'75

Plate VIII

March, 1975 - Plate X - Further continuation of the southern migration. One herder, due to an outbreak of disease among his cattle, is chased back across the river, from Tebela to Douna

April, 1975 - Plate XI - The situation stabilizes. One group of 40 animals left behind for milk, now crosses the river to join the main portion of the herd. The diseased animals at Douna are chased eastward to a secluded area.

May, 1975 - Plate XII - The situation remains basically static.

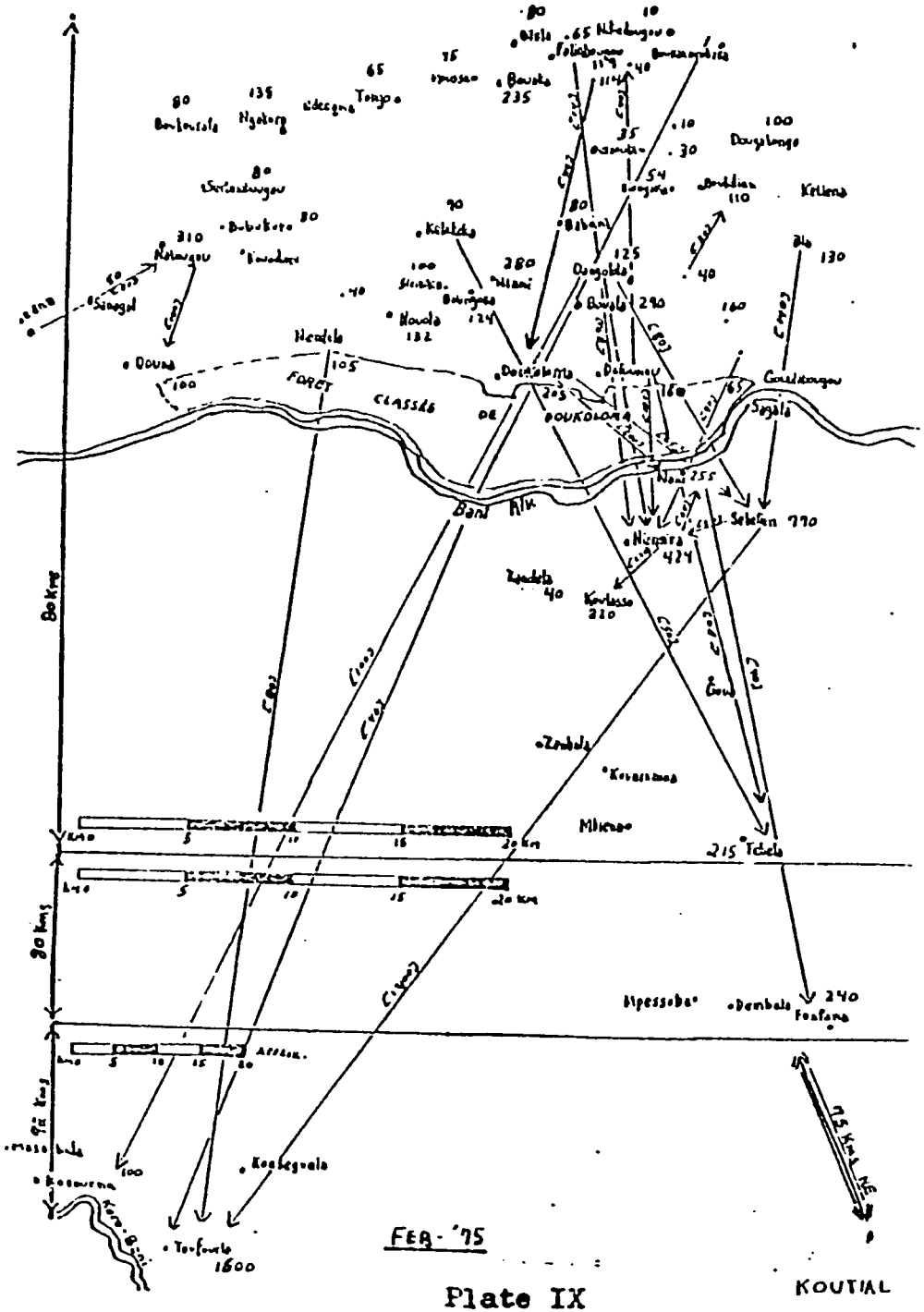
June, 1975 - Plate XIII - As a result of rain, beginning in late May, a new movement begins.(c.f. Plate XVII - Rainfall Statistics - Douna, 1975). As the same time as transhumance herds begin leaving the Koro-Bani, to escape the mud and mosquitos, animals from northern villages, which are still dry, are sent to the classified forest to feed on the new sprouts. Sometimes this last decision is actually made by the animals who smell the fresh grass and escape during the night.

July, 1975 - Plate XIV - The need for plow oxen, plus fear of the rising river water, hastens the return of the herds to their villages. Most return during the first week; the last crossing is July 15th.

August, 1975 - Plate XV - The herds remain near their villages and are corralled at night to prevent their wandering into fields. The region north of Falinbougou is now lush and capable not only of supporting local animals, but also visitors from the north.

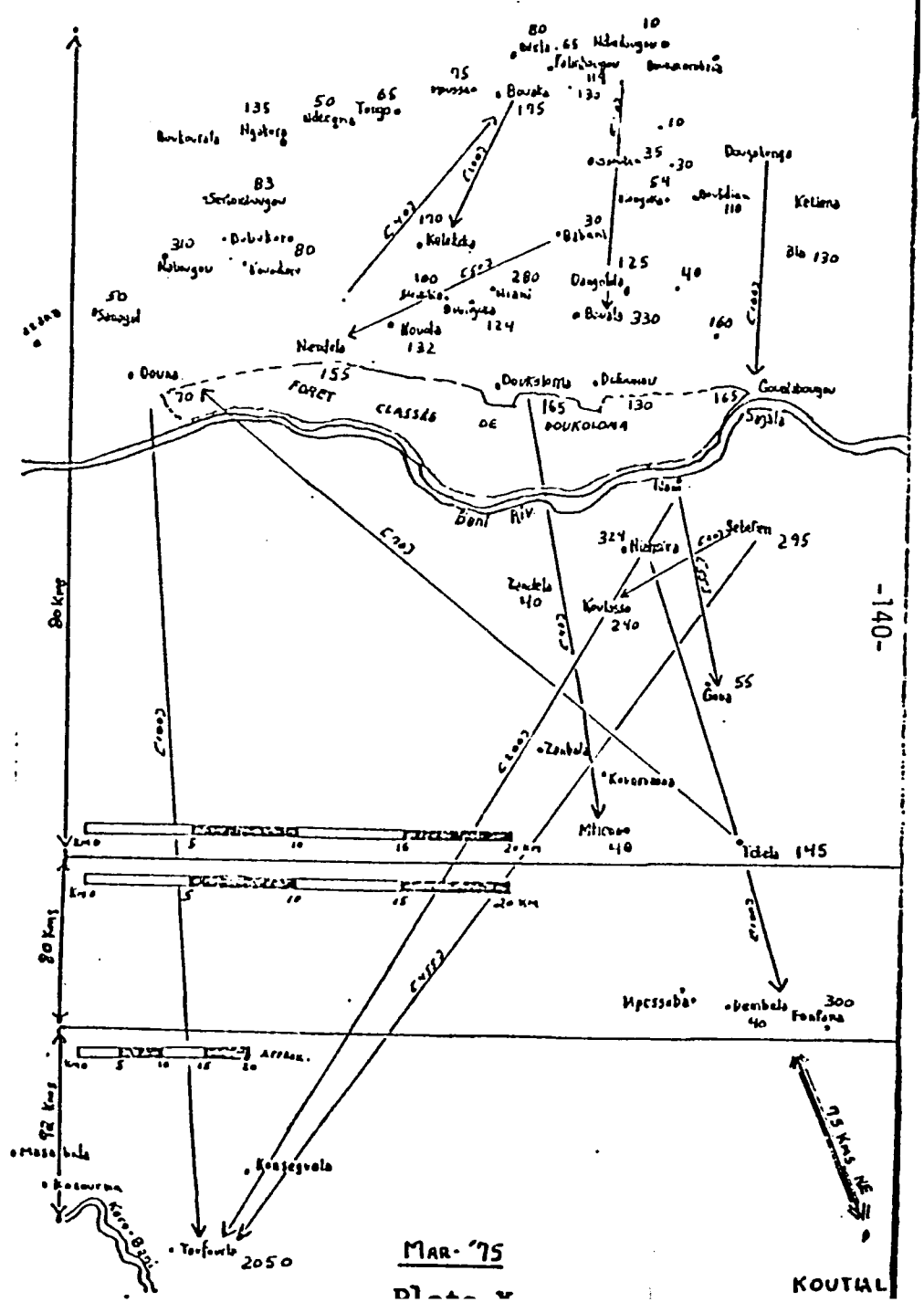
September, 1975 - Plate XVI - Same as August

October, 1975 - Research ended in the first week of October, 1975. At this time, various owners were preparing to move their herds southward, as in October of the previous year.

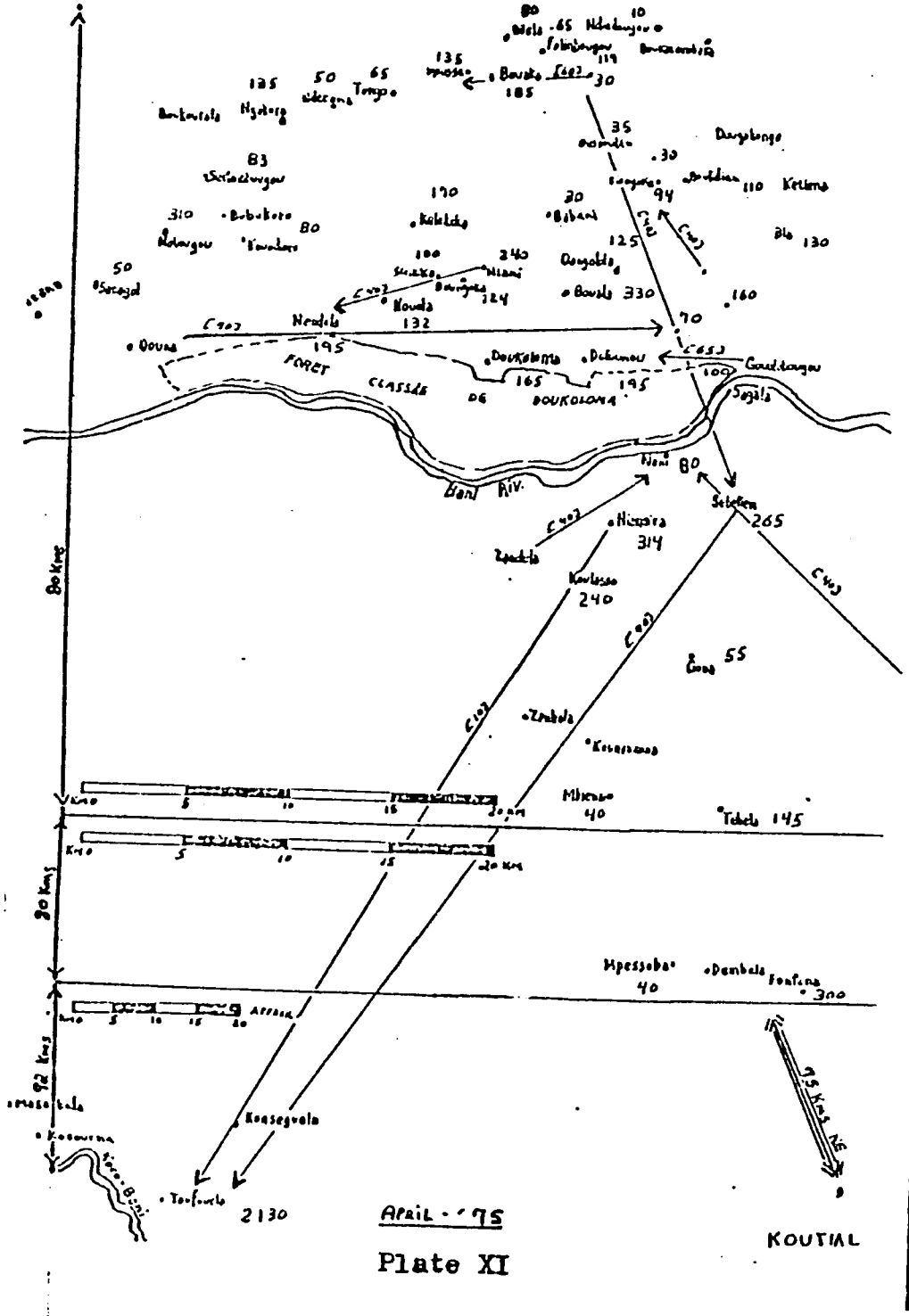


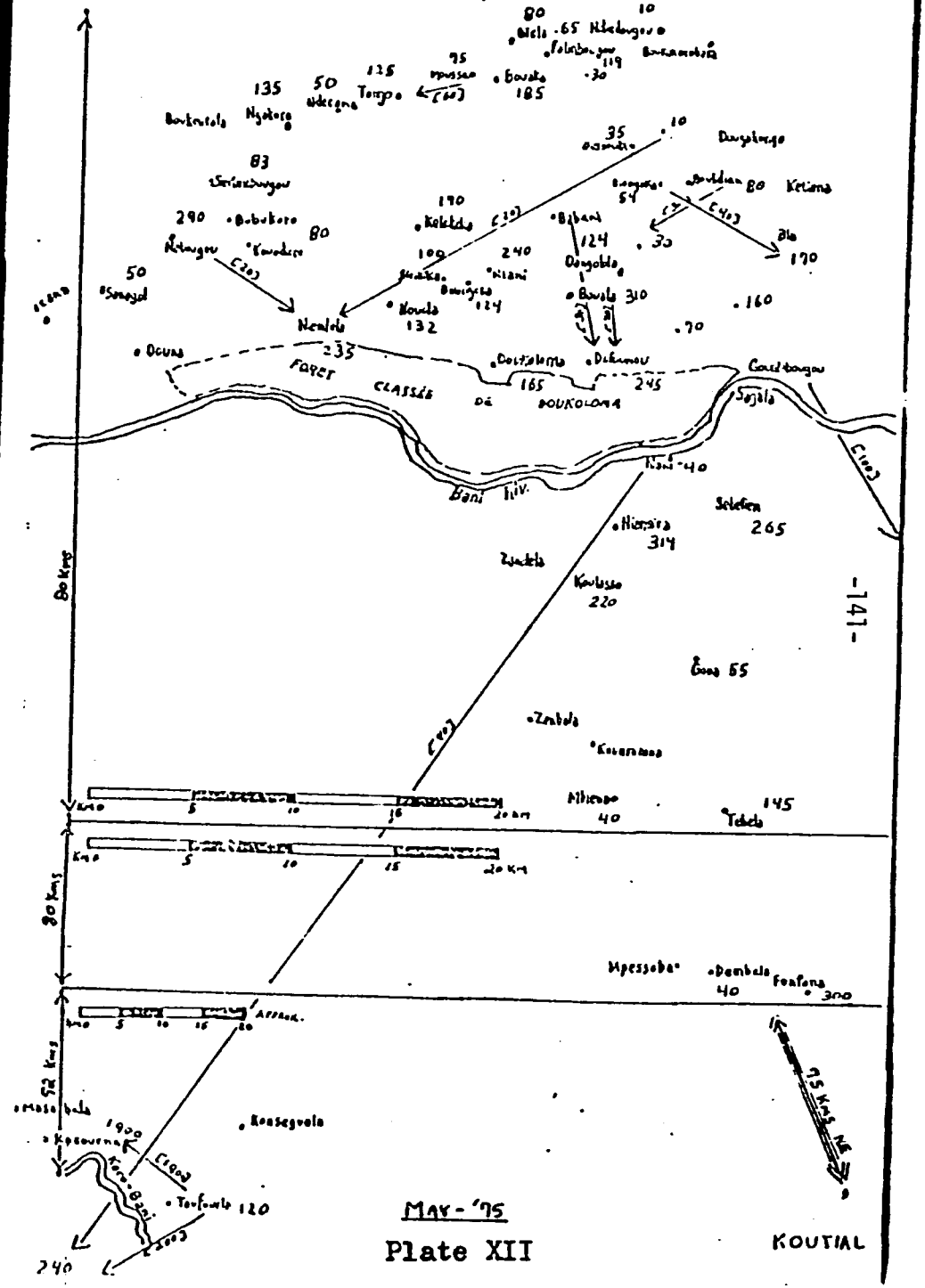
FEB-'75

Plate IX



MAR-'75


FORET CLASSEE DE DOUKOLONA
Bani RIV.
Ouna
Nendela
Doukolonna
Dikonou
Goudougou
Sogola
Selefen
Niangara
Zwakola
Kouloso
Zabola
Kouassoua
Mbiesso
Tekela
Mpessoba
Dembela
Fonfona
Kouseguela
Torfouela
Kouourna
Kara Bani
Bokoro
Nyakoro
Tongo
Ketiana
Dougoula
Bibani
Kekelda
Bubakoro
Kouakoro
Niani
Bouaka
Nouala
Bouala
Sorogol
Bla
Koutiala
75 Kms NE
APRIL - '75
Plate XI


FORET CLASSEE DE DOUKOLONA
Bani RIV.
Ouna
Nendela
Doukolonna
Dikonou
Goudougou
Sogola
Selefen
Niangara
Zwakola
Kouloso
Zabola
Kouassoua
Mbiesso
Tekela
Mpessoba
Dembela
Fonfona
Kouseguela
Torfouela
Kouourna
Kara Bani
Bokoro
Nyakoro
Tongo
Ketiana
Dougoula
Bibani
Kekelda
Bubakoro
Kouakoro
Niani
Bouaka
Nouala
Bouala
Sorogol
Bla
Koutiala
75 Kms NE
MAY - '75
Plate XII

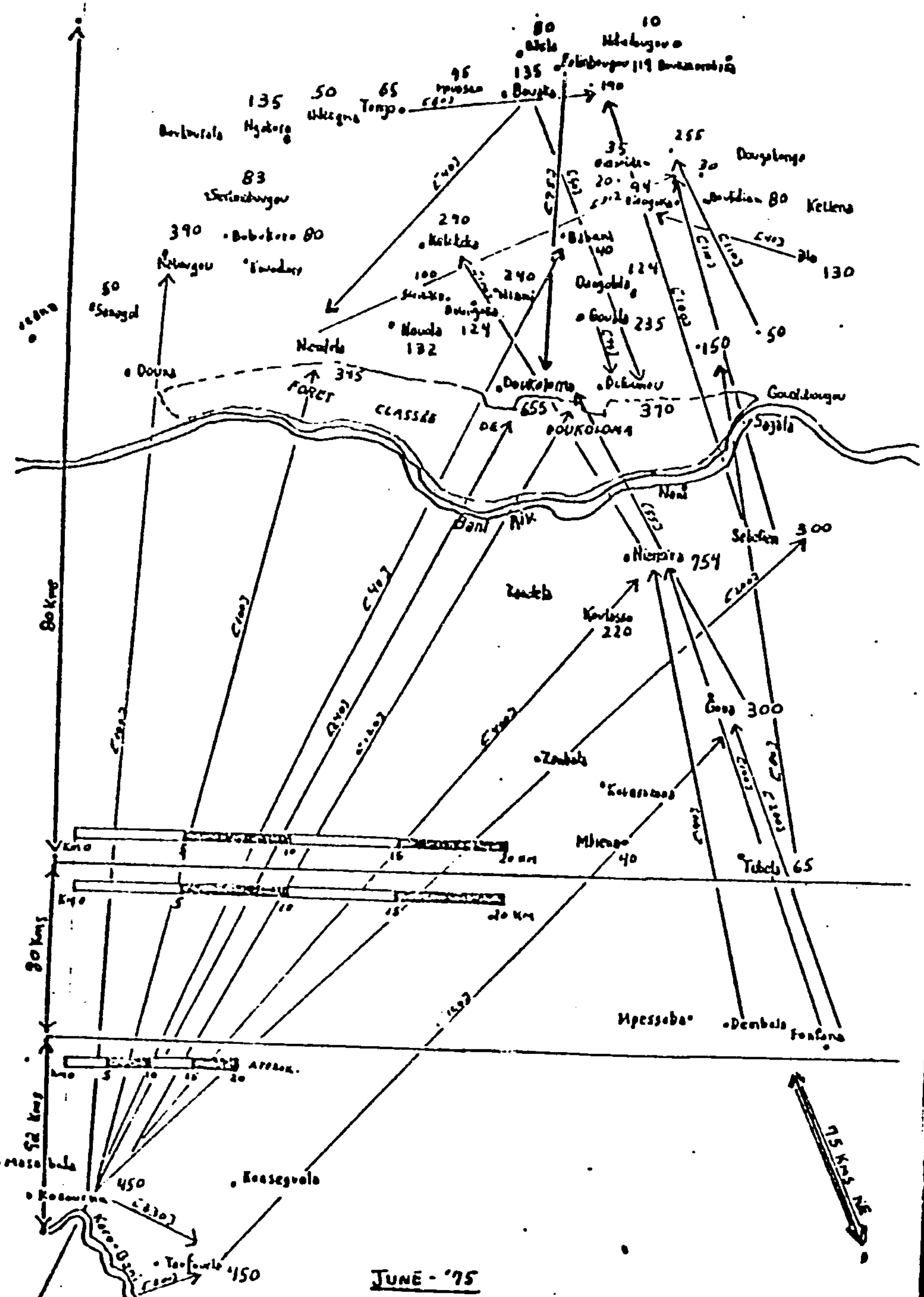


Plate XIII

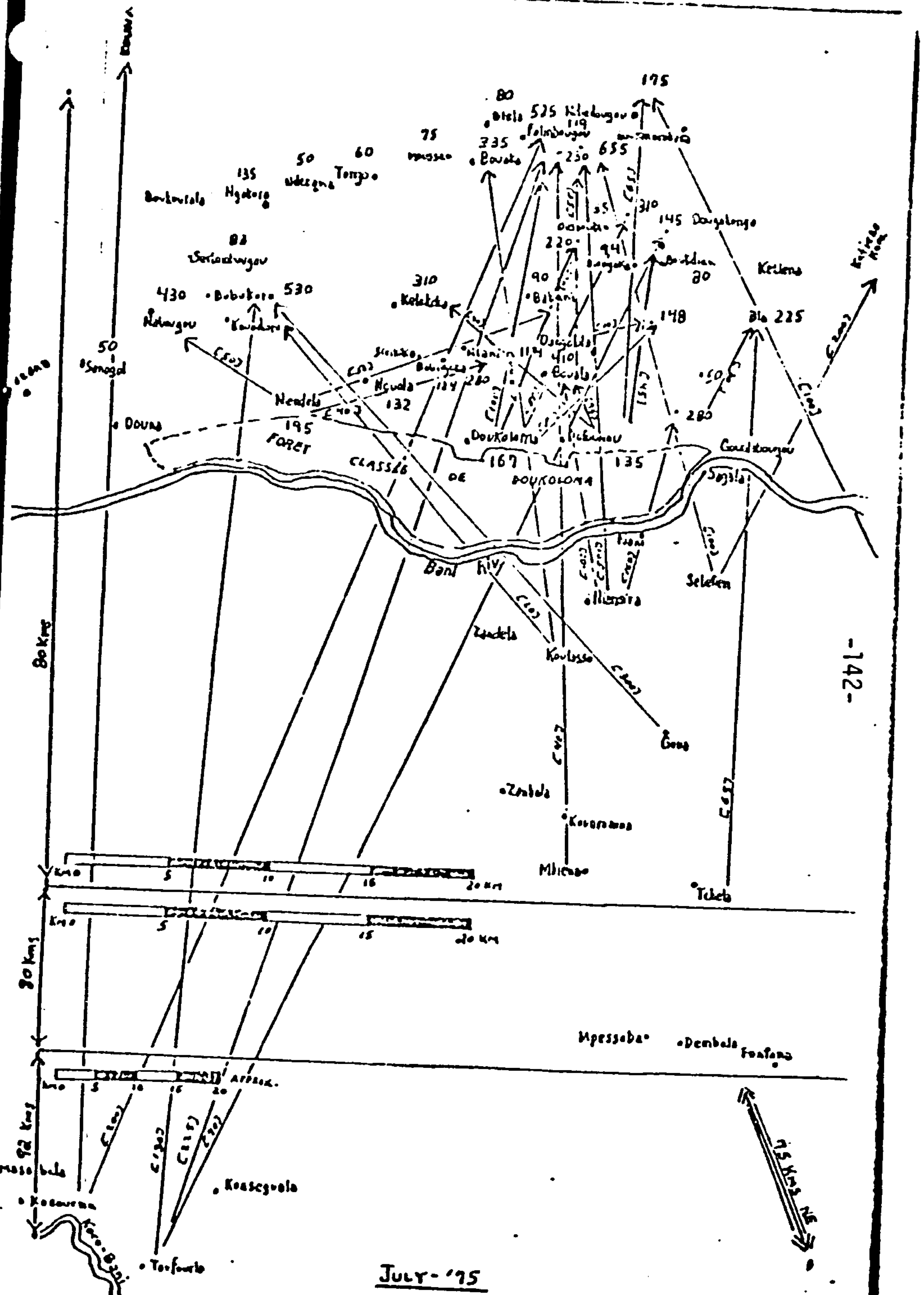
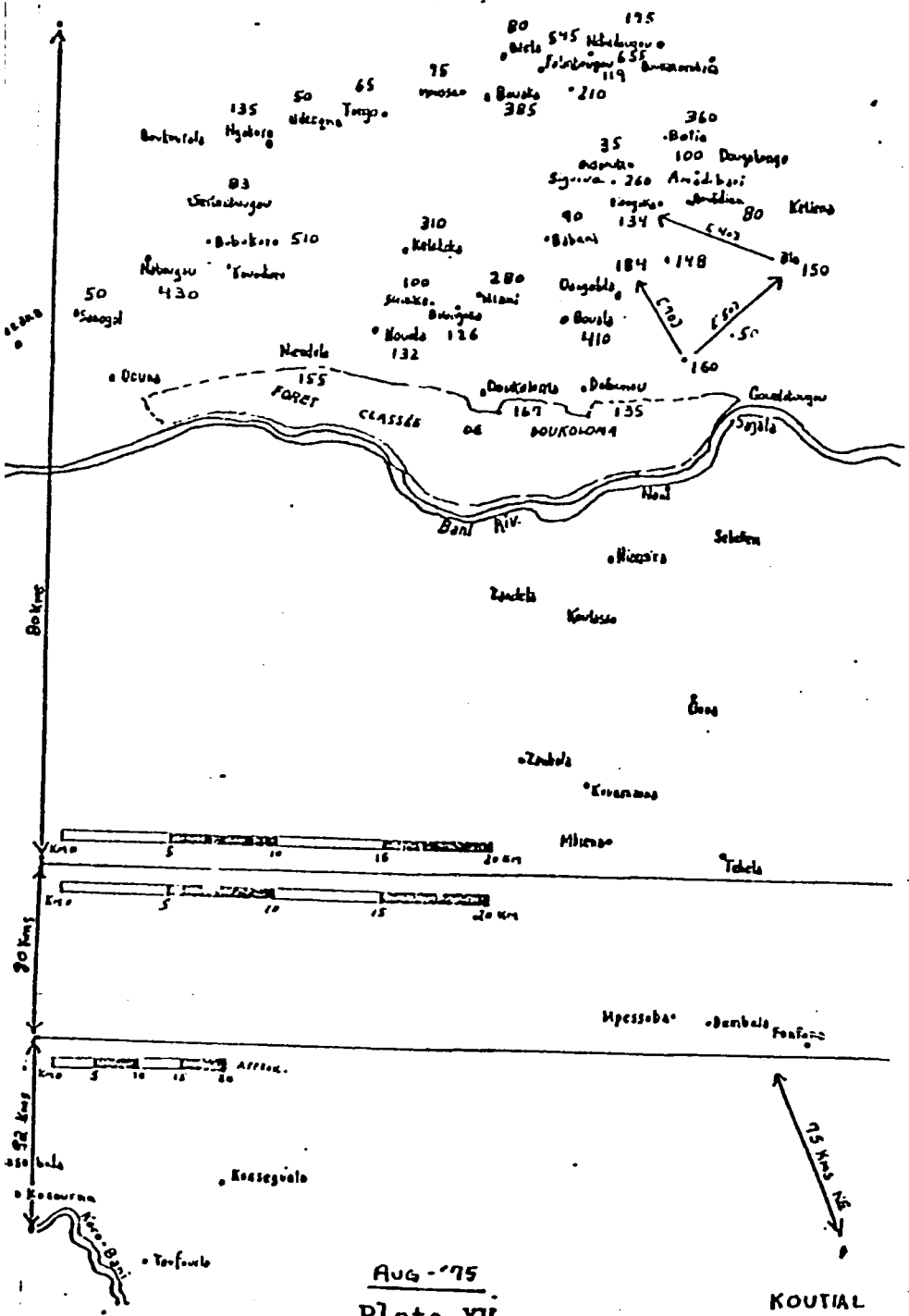
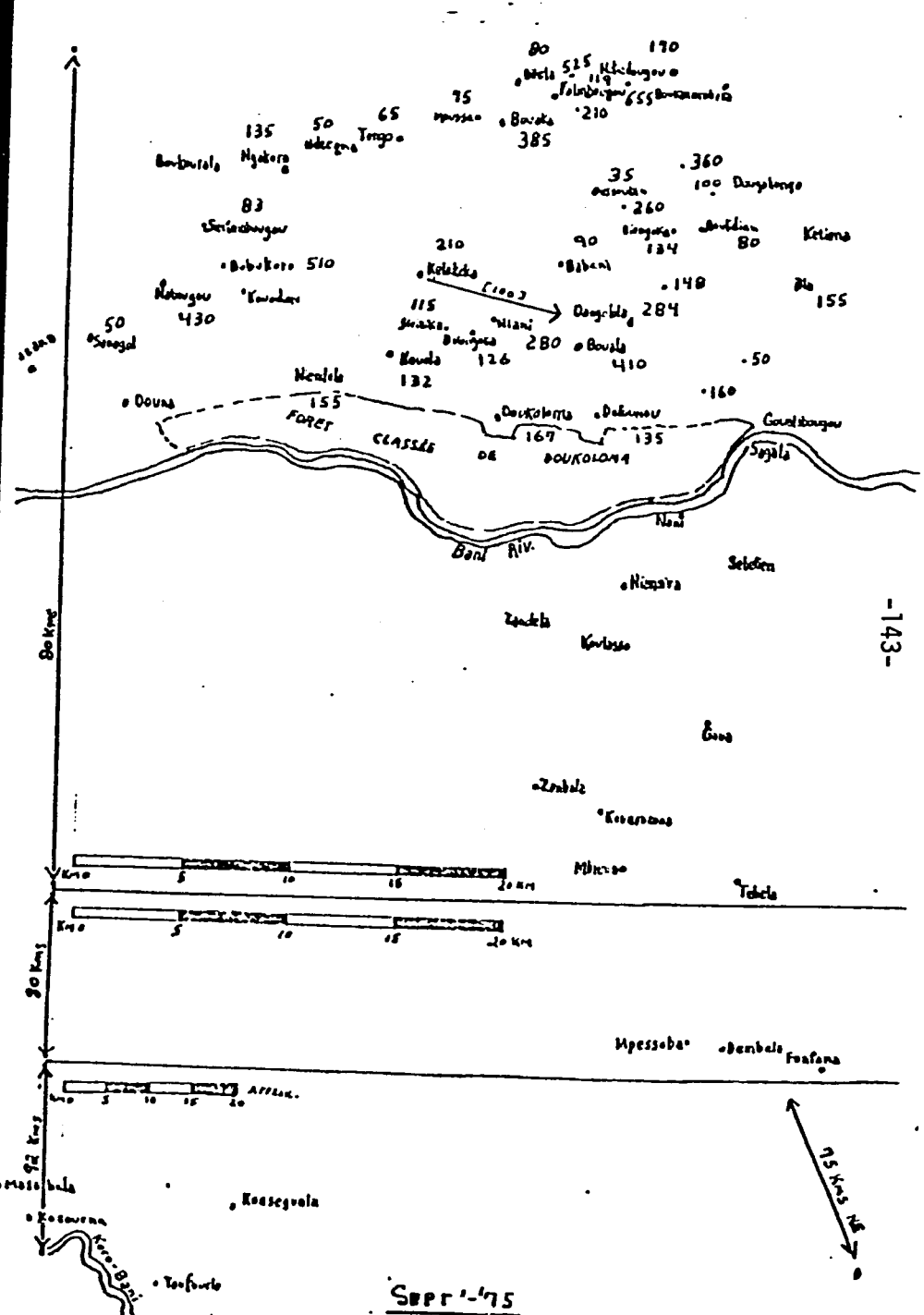


Plate XIV



AUG-'75

Plate XV



SEPT'-'75

Plate XVI

Rainfall Statistics Douna 1975

Date	Millimeters
March:	
25	1.01
April:	
10	.05
May:	
7	47.00
9	6.50
22	11.00
23	25.00
June:	
4	5.70
9	14.50
11	43.00
17	11.00
18	3.00
20	3.50
25	10.90
July:	
4	4.60
5	1.00
7	20.00
12	7.00
16	9.00(AM) 5.70(PM).
18	36.30
21	2.00
23	27.00
24	4.00
25	6.00
27	77.00
28	10.50
29	15.90
30	15.60

Date	Millimeters
August:	
5	24.50
7	11.00
10	11.30
11	5.00
14	15.50
18	31.00
22	16.00(AM) 3.30(PM)
24	50.00
26	21.00
28	11.00(AM) 11.00(PM)
30	5.00
31 8	2.00
September:	
4	5.00
7	2.00(AM) 3.00(PM)
9	32.00
10	25.00
14	15.00
17	8.00
21	10.00
23	13.00
October:	
5	8.50

.....

Monthly Totals: March 1.01 April .05 May 89.50 June 91.60 July 241.60 August 217.60 September 113 October 8.50

Seasonal Total: 762.85

Plate XVII

Consistency and Variation in Cattle Raising

As indicated by the recorded cattle movements of 1974-75, significant variation exists within two predominant patterns: that of sedentarized herding, where cattle are kept within close proximity of the owner's village; and that of the transhumance, where the herd seasonally voyages to distant areas. Since all cattle move about, the dividing line between the two is as much qualitative as quantitative.

Sedentary Versus Migratory Herding. - The Basic Choice

For purposes of this paper, a herd is considered within close proximity of the owner's village if communications between the two is possible on a daily basis. Conversely, the transhumance begins when the herder moves to an area sufficiently distant that significant effort must be made for information to be conyeyed to the home community. In the Doukoloma area, the presence of the Bani simplifies the differentiation.

Within the area north of the river as shown on Plate II, inter-village communication is simple and regular. People often make one day round trips between Falinbougou and Doukoloma or Zinzana and, usually, you can find without difficulty someone already on his way to wherever you wish a message sent. In contrast, the river presents a significant barrier to movement. Traversing it requires the assistance of a canoe from Nani, and a wait of an hour or two is not unusual, if people are away elsewhere. From there, one must proceed further south to the major communities. While a round trip in a single day is possible, except for market day, it is rarely attempted.

Geographic realities contribute to the more intense personal and economic relations between villages on the same side of the river. There a man is still at home sleeping or eating at a

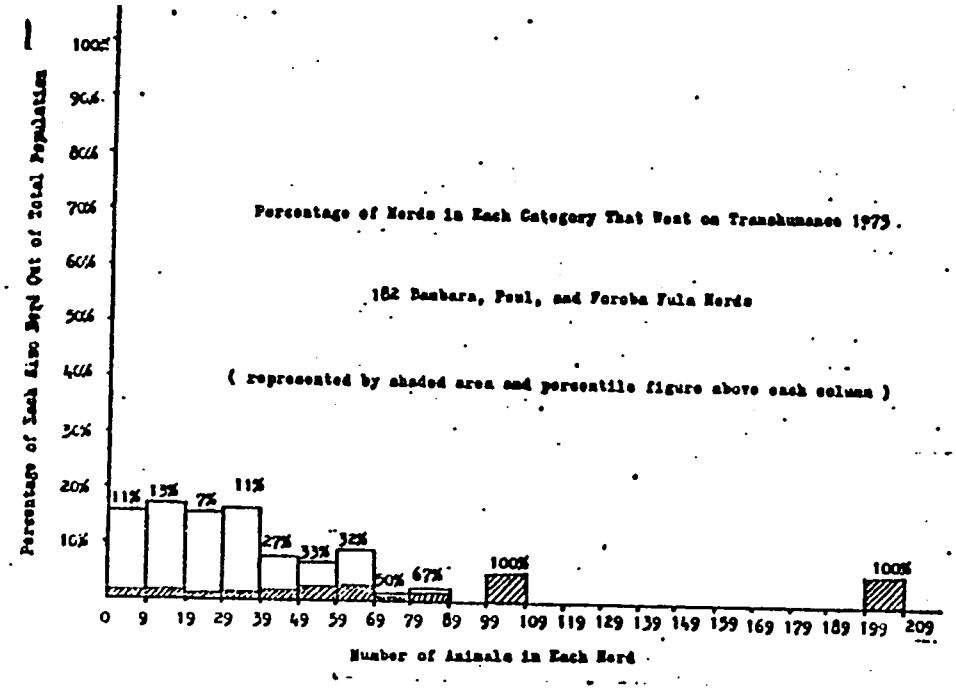
friend's house, while hospitality across the river is more formal and, therefore, represents an emotional as well as physical separation from home. Generally a Peul is more willing to make such a break than a Bambara, whose personal identity is more closely tied to his own land and community.

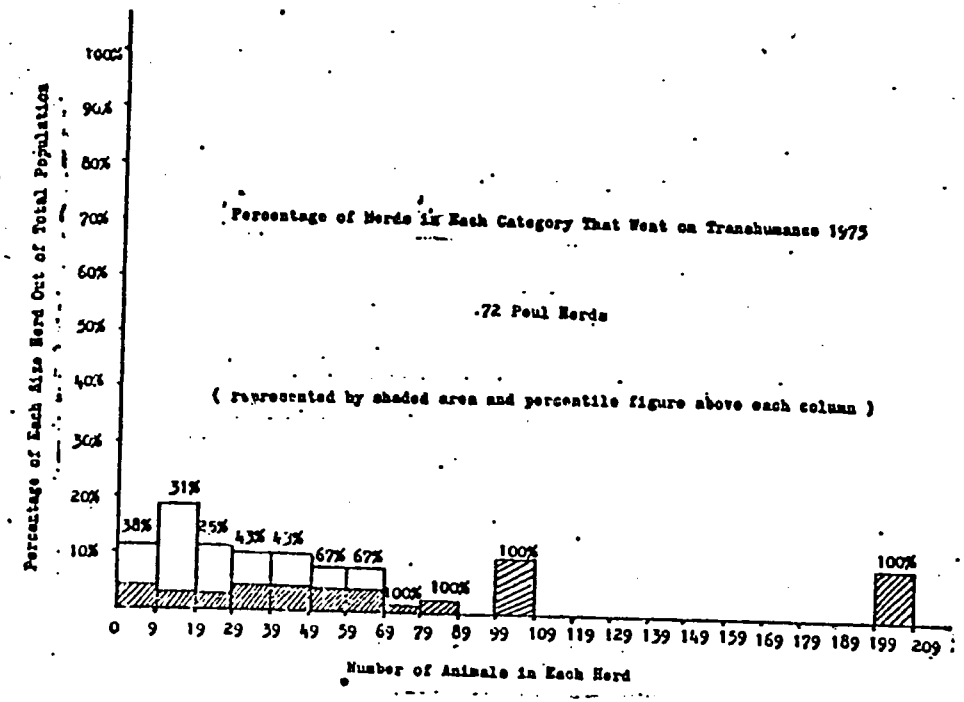
Of course Bambaras travel, often as far as the Ivory Coast, but usually to some other community where a relative, friend, or at least friend of friend, is to be found. This is not to be equated with the quite solitary life of a migrant herder, who, even when he attaches himself to a strange village, fundamentally lives and sleeps in the bush with his herd.

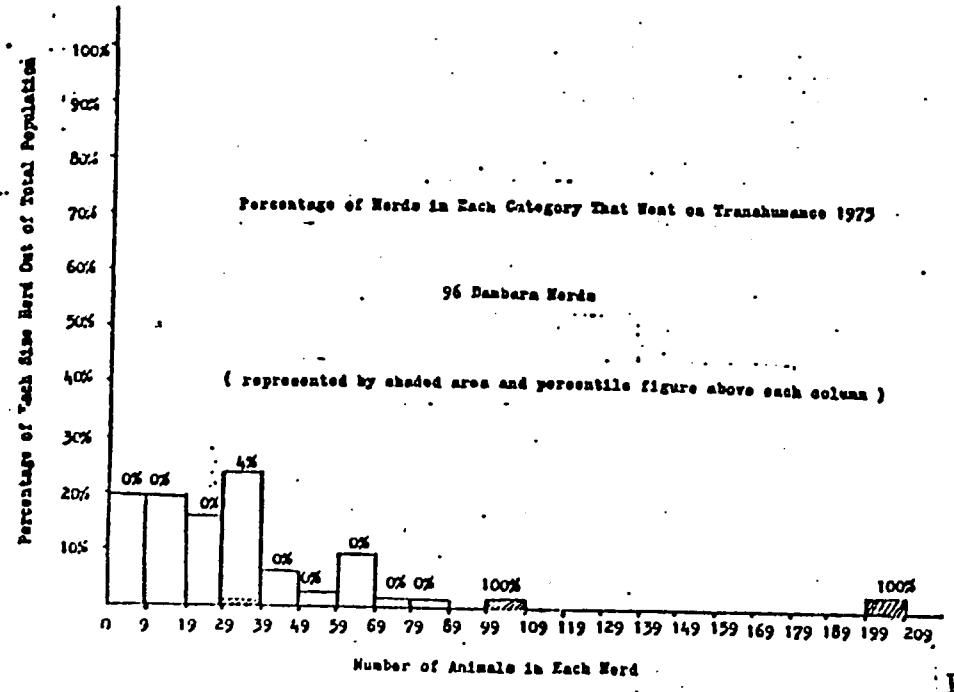
"Crossing the river" is a well established symbol for Peul patoralists and, prior to the decimations of the drought, signalled the return of the animals and a time for celebration. It is both a convenient and culturally consistent criterion for establishing the occurance of a transhumance and, at the same time, an important factor in determining whether or not to actually undertake it.

Plate XVIII indicates the percentage of herds in different size categories, that went on the transhumance in 1975. As already noted, 100 head is the normal limit for a single grazing unit. During the day a sole herder can graze this number, though his task is generally made easier since calves being weaned are left to wander on their own in a different direction. For the transhumance, itself, an assistant to share work is required, with whom 200 head can be managed. Occassionally seen herds of 400 are composites, with sufficient man power always present to split them for local grazing, as usually occurs. The total number of herds is not synonymous with the total number of owners, since some people have more than one herd, while other herds contain the animals of several friends or relatives.

As can be seen by Plate XVIII, the number of herds migrating varies greatly according to the owner's ethnic identity. The disinclination of a Bambara to partake in a semi-nomadic life


Percentage of Herds in Each Category That Went on Transhumance 1975
182 Bambara, Poul, and Foroba Fula Herds
(represented by shaded area and percentile figure above each column)
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd


Percentage of Herds in Each Category That Went on Transhumance 1975
72 Poul Herds
(represented by shaded area and percentile figure above each column)
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd


Percentage of Herds in Each Category That Went on Transhumance 1975
96 Bambara Herds
(represented by shaded area and percentile figure above each column)
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd

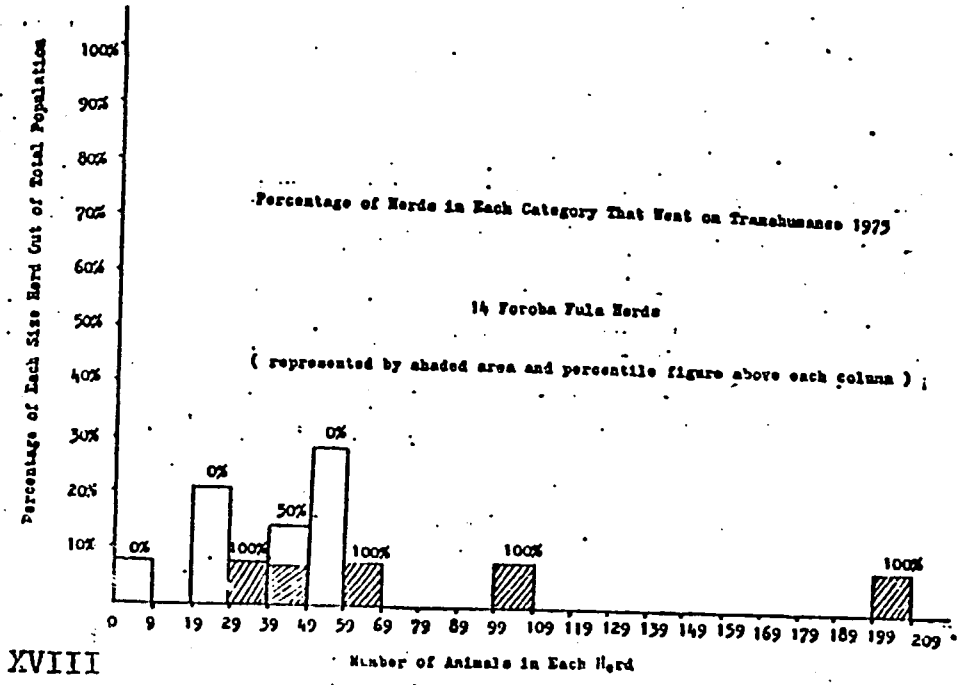

Percentage of Herds in Each Category That Went on Transhumance 1975
14 Foroba Fula Herds
(represented by shaded area and percentile figure above each column)
Percentage of Each Size Herd Out of Total Population
Number of Animals in Each Herd

Plate XVIII

has been mentioned. However, the situation is partially one of definition. Any Bambara who was willing to do so, would actually be opting for the Peul way of life. There are, in fact, two cattle owners in the area, though not in the sample, who though originally Bambara, have adopted the prevalent Peul name of Diallo.

Most Bambaras, however, reject such a solution, and if they decide to send their animals across the river, entrust them to a Peul. Unfortunately, those who did so in the past claim they suffered higher than normal losses, implying that some animals had been misappropriated. The result, as Plate XVIII demonstrates, is that most have discontinued the practice.

The "100 Plus" Head Threshold

At approximately 100 head, an owner's problems qualitatively change. The guarding of his herd is now a full time job and usually too large to combine with others. This, added to those problems that increase directly with size, such as the searching for sufficient pastures, the difficulty of drawing well water, and the not be be minimized growing jealousy of other villages, make it expedient for the owner to find a particular individual to be charged with caring and moving with the herd.

For Bambaras, one solution is to find a Peul from outside the area who may actually settle in the village. One such relationship between a Peul family and a large herd owning Bambara household has been in existence almost 20 years.

The availability of such "stranger Peuls" is largely the consequence of the acute status consciousness of Peul society, and the general high status afforded being Peul by all ethnic groups. Non-Peuls, including not only other ethnic groups, but casted and slave members of traditional Peul society, naturally find it easier establishing a new identity in a region where they aren't known. In addition, the actual Peul word for "Peul" is "Pullo" (plural: "Fulbe") and really means a free man. Consequently,

it is considered a disgrace for a "Pullo" to be a paid laborer of another, and as a result, if one must work, he prefers to do so far away, among strangers. What results is the ironic situation that Peul, as well as Bambara, families, have hired stranger herders, at the same time that a neighboring Peul has gone to another region seeking similar work. The situation is not, however, economically irrational since the near total dependency of such strangers on their host is seen as condusive to the conscientious fulfillment of their duties.

Cattle As Savings Vs. Cattle As Investment

While the "100 plus" cattle threshold would also apply to Peul and Foroba Fula herds, in practice the decision to go on the transhumance is made well before this limit. (c.f. Plate XVIII). This divergence in practice is best understood by accepting as fundamentally different, the economic orientation towards cattle of the various ethnic groups.

As will be demonstrated, to the Bambara a herd of cattle is a savings account; a place to guard surplus funds for either special future outlays or unforeseen circumstances. Since it yields some interest in the form of offspring and is less fluid than cash, and therefore less easily spent, it is preferrable to keeping money under the bed.

For the Peul, cattle are capital, like stocks; something to be carefully watched and manipulated in the hope of accumulating sufficient wealth to live off the dividends. What exactly represents "sufficient wealth" is somewhat relative. As a general rule, Peuls in the Doukoloma area would say 40-50 head is the beginning of a herd, called "hoore"; less than this is called a "sewre" and is just a beginning. "One hundred plus" cattle is required for a man to really be considered a significant owner, and, as a rule of thumb, 8-10 animals per family member is required to begin living off the herd. (The average Peul family unit in a typical Peul hamlet had 8.5 family members - see Plate XIX).

COMPARISION OF ANIMAL OWNERSHIP 2 NEIGHBORING VILLAGES

Village #1 - Peul -Pop.. 94 - 11 Family Units - Average Family Size 8.5
Village #2 - Bambara - Pop. 147 - 16 Family Units - Aver. Family Size 9.3

Number of Animals Per Capita

	Goats	Sheep	Cattle
Village #1	2.8	.71	6.4
Village #2	1.7	.53	.87

Male - Female Ownership

	Goats	Sheep	Cattle
Village #1			
Number of Male Owners	14	6	*
Average Number Owned	6.7	7.4	*
Range of Herd Size	2-15	3-16	*
Number of Female Owners	19	3	*
Average Number Owned	9.3	7.7	*
Range of Herd Size	1-33	4-12	*
Village #2			
Number of Male Owners	29	17	*
Average Number Owner	4.8	4	*
Range of Herd Size	2-11	1-12	*
Number of Female Owners	12	3	*
Average Number Owned	9.7	3.3	*
Range of Herd Size	2-36	1-7	*

*SEE PAGE 37-39

Plate XIX

The Peuls see the transhumance as beneficial to the herd, both as far as growth, mortality, and calving rate. My own sampling, shown on Plate XX., reveals only small deviations from the over-all average of a 52.7 % calving rate and a 24.3% mortality rate during the first year of life. The differences indicate slightly better survival and calving rate for Peul over Bambara herds. However the birth rate of animals on the transhumance is below the general average. One possibility is that these figures are for four years, three of which were during the drought. At that time all the herds still went to Sebetian, where, especially during 1973, conditions were poor, and losses were high; thus indicating how the transhumance, per se, is not always beneficial, but is only a strategic option to be considered. As evidenced in the sample, some Peul owners decided not to send their animals, and seemingly benefited by this decision.

Ultimatley such suggestions are merely speculative. Given the sample size, the deviations shown are not statistically relevant and in reality show no appreciable difference in any of the categories between ethnic groups, or migratory versus non-migratory herds. Based on my own observations, I am inclined to feel that this is an accurate indication of reality.

The Peuls are more successful, not because their animals migrate annually, but because they are more concerned about their animals. The fattened condition of the animals that return from the south in June is reward enough, for the yearly effort. However, ultimately this concern, including a willingness to uproot oneself at the spur of the moment, can be crucial. That this crucial point has not been reached in the Doukoloma area, is because the land is not yet so overgrazed that on a daily basis, animals have begun to starve. However, under present conditions, such a situation seems not that distant in the future, at which time., those cattle who migrate, will survive, and those who don't will suffer.

RECORDED BIRTH AND DEATH RATES FOR CALVES 1971-1975

Random Sample of 19 Herds

I All 19 Herds
II 10 Bambara Herds
III 9 Peul Herds
IV 11 No Transhumance Herds
V 8 On Transhumance Herds

	I	II	III	IV	V
Average Birth Rate	52.7%	51%	55%	55%	50%
Average Death Rate 1st year of life	24.3%	27.5%	22.2%	25%	23.7%

Plate XX

COMPARISION OF ESTIMATED HERD COMPOSITION IN DOUKOULOUMBA AND DILLY REGIONS

	All *	Bambara *	Peul 0-99 head *	Peul 100+ head *	Dilly **
FEMALES					
Cows	29.9%	27%	31.2%	34%	36%
Heifers 1-4 yrs.	30.5%	29%	30.3%	32%	22.5%
Calves	9%	9%	12.5%	7.5%	7.3%
MALES					
Bulls	2%	2%	2%	1.5%	3.6%
Males 1-5 yrs & Steers	23%	26%	19%	19.5%	24.6%
Calves	6%	7%	5%	5.5%	6%

* Doukouloumba Region Sample Plate XXI

** Dilly Region - Source IBRD-IDI - Mali Livestock Grant Proposal

Grant Proposal 1/10/75 page 2

Thus the Peul inclination to transhumance is a result of long term experience during which, at critical moments, it has saved him, not only from the decimations of nature, but, perhaps even more often, the ravages of the plundering conqueror, and his heir, the tax collector. The Peul is,in a way,prejudiced towards the transhumance and, in contrast to the Bambara, the question is to determine under what conditions he isn't willing to make this annual migration.

To begin with,, everyone agrees that life on the transhumance is physically hard. A man may therefore feel he is too old to undertake it, and not have any sons of suitable age, not any friends or relatives he trusts, to assume the responsibility. Usually, however, the final decision not to go is based on countervailling economic pressures which in the Doukoloma area consist of one of two possibilities. Firstly, since all the Peuls farm, and since they don't rotate fields as do the Bambara, they are dependent on large amounts of manure for fertilizer. Therefore, they will, occasionally, decide to keep their animals at home for the year to thoroughly enrich their fields. Secondly, the large cattle market at Busan (Bosse) affords several men with significant weekly earnings based both on speculative buying and selling,and by acting as agents for Bambaras, either by just bringing an animal to the market for 500 FM, or by also acting as broker for 1,000 FM. However, as Plate XVIII reveals, at around "70 plus" animals, the economic value of the herd seems to preempt all other considerations that might mitigate the assumed advantages of seasonal migration. Not surprisingly, based on an average 8,5 members per family unit, (Plate XIX.), this number conforms to the 8-10 head per family member (68-85 head per family) quoted by the Peul as necessarey to begin "living off the herd".

As regards the Foroba-Fula, statistically, (c.f. Plate XVIII), their decision to go or not to go on the transhumance fails midway between that of the Bambara and the Peul. Unfortunately the sample size is reflective of their small presence in the local population. Logically, however, such an outcome seems quite understandable.

Given their extreme minority position, there is no inherent advantage in possessing this ethnic identity. Those without cattle, therefore, rapidly assume Bambara identity. Those who attempt to imitate Peul ways remain Foroba Fula to the extent that established Peuls make a point of noting the difference. However, those truly successful in the Peul way of life can work towards erasing the distinction. For example, the two largest Foroba Fula cattle owners in the area have already united their families to more established Peuls through marriage. The Peuls' rationale for consenting to such a marriage will be expanded upon later, but clearly, once it occurs, they wish to conveniently forget their new relative's old identity. Thus he who is a Foroba Fula is a social, as well as statistical, middleman.

The Family Milk Herd

There is, however, another phenomenon that is hidden amidst the graphed information in Plate XVIII. By the time a man has a really significant number of animals- i.e. 150-200, he often begins to feel capable of taking some luxuries with his herd. Mostly to please his wives who sell milk for income, he will leave some animals behind while the majority cross the river. Plate XXII. records precisely how this occurred in two instances. The luxury itself is rather minor, since, as indicated, these herds leave the homestead area when the dry season becomes more advanced.

Acquisition and Ownership of Cattle

Returning to the polar positions: Bambara vs. Peul, it can be shown that the already discussed dichotomy: Bambara cattle equals savings, Peul cattle equal investment, is applicable not only to an understanding of decision making vis-a-vis the transhumance, but as an ever present orientation that influences all cultural activities of which cattle are a part, including their acquisition, ownership, exploitation and divestiture.

There are six fundamental ways cattle are acquired by members

COMPARISION IN 2 PEUL HERDS OF ANIMALS SENT ON TRANSHUMANCE EARLY IN THE SEASON AND THOSE KEPT NEAR HOME VILLAGE TILL LATER IN THE DRY SEASON

	Herd of 211 Animals		Herd of 185 Animals	
	Those leaving village region in		Those leaving village region in	
	December	March	December	April
FEMALES				
Kecheni	2	6	1	6
Jakoro	28	0	23	0
Gnele	25	12	24	0
Missigre	25	0	16	0
Hange	50	12	49	11
Flungoro	0	0	0	1
MALES				
Kecheni	0	5	1	5
Jakoro	17	0	13	0
Twaboro	13	0	9	0
San4/6tura	6	0	5	1
Jetura	2	1	2	1
Foroba	2	0	2	0
Mbujiri	5	0	15	0
TOTAL	175	36	160	25

Plate XXII

of Peul society:

1. At birth, the father and often the mother's brother will give a cow ("nagge binge") to the child.

2. When a girl marries, she receives from the groom several animals ("futte") which provide her with an independent financial base. A typical "futte" given in my village consisted of: one large bull- 5 years, one young bull- 2 years; three cows-5-6 years; and 2 calves.

3. Someone in need of animals may receive a loan, usually milk cows and usually from his mother's brother. Occasionally, a man may lend another a large bull, an act which is considered a sign of wealth and honor.

4. In return for being another's herder, one or two animals, 1-2 years of age, will be given annually.

5. Animals may be purchased with money obtained through any means.

6. One may inherit cattle. Sometimes it is the owner himself who determines the heirs, by either actually giving the animals away as he gets old; or verbally passing them on but retaining physical control till he dies; or nowadays, he may even have a written will. Those animals left upon a man's death are distributed by a third party and, while, in theory, a Marabout is preferred, and the dictates of Islam quoted, it is often a family member who is not himself an heir, who performs the function, with a great deal of discretion. For example, one herd of 27 animals was divided by a deceased man's brother as follows:

To a 24 year old son - 5 animals - (3 cows, 1 small bull, 1 small cow)- "Because he had spent years herding the animals, and was ready to benefit from them"

To a 21 year old son - 5 animals - (2 cows, 2 young cows, 1 small bull) - for the same reasons as the oldest son.

To a 13 year old son - 2 animals - (1 cow, 1 young cow) - "because he had not herded the animals and by the time he was as old as the first two sons, G-d willing, his would multiply to at least equal the number the others had received."

To an 11 year old son - 2 animals - (1 cow, 1 young cow) - same reason as for the 13 year old.

To a 6 year old son - 2 animals - (2 young cows) - same as last two.

To the first wife - 8 animals, of which 5 (2 cows, 2 young cows and 1 bull) were her original "futte", and 3 (1 cow, 1 young cow, 1 small bull) were her husband's.

To the second wife - 3 animals - (1 cow, 1 young cow, 1 small bull), since she had received no futte, because she had been previously married.

Common to all six means of acquisition, and demonstrated in the preceding example of how an inheritance was divided, is the personal nature of cattle as property. Even a 6 year old son has his own cattle, and a father can theoretically be poorer in animals than his young children. However, there are certain qualifications on the nature of private ownership of cattle.

Firstly, while those animals given the mother as "futte" are her's, unless sold, they and their off-spring are automatically inherited by children, and, should she leave her husband without cause, they revert to him, in trust for the children. Basically, the rule seems to function primarily as a mechanism for protecting the childrens' rights; and the forfeiture for desertion is not as much a limitation on property as a confiscation of property in revenge for a wrong.

Secondly, a father with no animals can sell one of his children's animals in the way that any adult can usually siphon off the inheritance of a minor child. However, a youth can also, and frequently does, steal one of his relative's animals and quickly sell it for cash. Husbands are also known to occasionally partake of what is rightfully their wives. Such behavior, again, is not so much a limitation on ownership as an expropriation against which the injured party is hampered in seeking legal redress because of close kin ties. This does, however, lead to heated family arguments and, mostly significantly, a Peul will often entrust his animals to a friend or stranger rather than a relative because

compensation can be sought from such a third party, if he causes the owner an unjustifiable loss.

Lastly, a true hazing of property rights exists where a family's animals are all herded together and where no prior clear delineation of ownership has been made. An outstanding example of this existed in one village, in the case of a large family in which the first wife of the "chef de famille" died 28 years ago, leaving some animals. However, it was not until last year, 27 years later, and after the father had sold 7 animals that his children felt were theirs, that they called upon the deceased mother's brother to divide the inheritance. The division was as follows:

3 brothers received 5 animals each.

1 brother received 4 animals "Because he had already sold 2 from the herd."

1 brother received 4 animals "Because he had already accumulated 16 animals as a herder and was therefore much richer than the others."

1 (the only) sister received 2 animals, based on the formula:

$$\text{a daughter's share} = \frac{1}{\text{Number of Sisters}} \times \left[\frac{\frac{\text{entire herd}}{\text{number of brothers}}}{2} \right]$$

At present, the family still lives together and the herd usually moves together, but a previous state of limbo as to property rights in specific animals has been erased. However, such a state of limbo exists within many herds and therefore creates a problem if one wishes to specify which individual rather than which family owns how many cattle.

Among the Bambara, acquisition is appreciably different. While occasional gifts may occur, there is no standardized practice of giving animals to a child, or to a bride, or for lending them to a friend or nephew. For the Bambara, the two established means of acquiring cattle are: 1) Purchase, and 2) Inheritance, but both take forms somewhat different from that existant among the Peuls. For example,

the five herd owners in one Bambara village gave the origin of their cattle as follows:

1. The "chef de famille's" father bought cattle with money he had earned selling baobab leaves and tamarind at Diouro.

2. The owner hunted and brought cattle with his profits from selling meat and skins.

3. A bride-to-be's family reneged on a marriage agreement and the groom's family decided to buy cattle with the returned bride price.

4. The owner bought animals with money earned as a laborer in the city.

5. With money from millet sales, the family invested in goats and sheep, which eventually became so numerous, that some were sold for cattle.

It is noteworthy that in four of the five preceding examples, the money for purchasing cattle came from secondary sources of income and not from millet production which is the foundation of Bambara life and the major economic activity of all these men. Even in one case where millet was indirectly involved, the immediate source of capital is the surplus of sheep and goats. Thus, in contrast to the Peul, for whom the acquisition of cattle is intrinsically interwoven with basic cultural institutions; for the Bambara, it is a side product of extraneous accumulated surplus, and is neither to be derived from nor confused with the fundemental productive activity of the group as millet growers, except in the most tenuous fashion.

If the animals, especially plow oxen, are purchased by family resources, i.e. the returned bride price or the sale of family grown millet, they are held for the household in the name of the "chef de famille". When the animal is bought with money clearly earned by an individual, himself, it is considered his. Even here, however, private property is an extremely limited concept within the context of the communally oriented Bambara family, and an individual can rarely preserve personal wealth in the face of need by the household.

In matters of inheritance, cattle are generally passed to brothers in their role of "chef de famille". Thus, if a man dies, the new chef de famille inherits the herd. If the family has split, the herd will be split and each new family head given his share. This procedure sharply contrasts with Peul inheritance, where the wealth is dispersed and the number of individual owners increased. In fact, Bambara inheritance tends to level differences in wealth by converting much personal property upon its owner's death to the somewhat less personal property of a "chef de famille".

The Exploitation and Divestiture of Cattle

Plates XXIV through XXVIII compare the specific composition of 21 Peul and Bambara herds. A few methodological explanations are needed to aid in the interpretation of this data. While in Plate XXII, I have attempted to provide an estimate of herd composition that could be compared to another source, (i.e. Herd composition in the Dilly Region), in actual practice, asking herders to break down their animals by age proved unsatisfactory, even given their good intentions.

The cultural custom is to ascribe both animals and people a status according to stages in their lives. These, of course, roughly correspond to certain ages which I have provided in rough translation on Plates XXIII to XXVI . They are, however, at best, approximations. Thus young bulls are castrated around 3-4 years of age; cows give birth when they are between 3-5 years old; calves are weaned approximately 6-8 months after birth. However, despite this inherent variation, for inter-herd comparision, local terminology seems preferrable to artifically manipulated age categories.

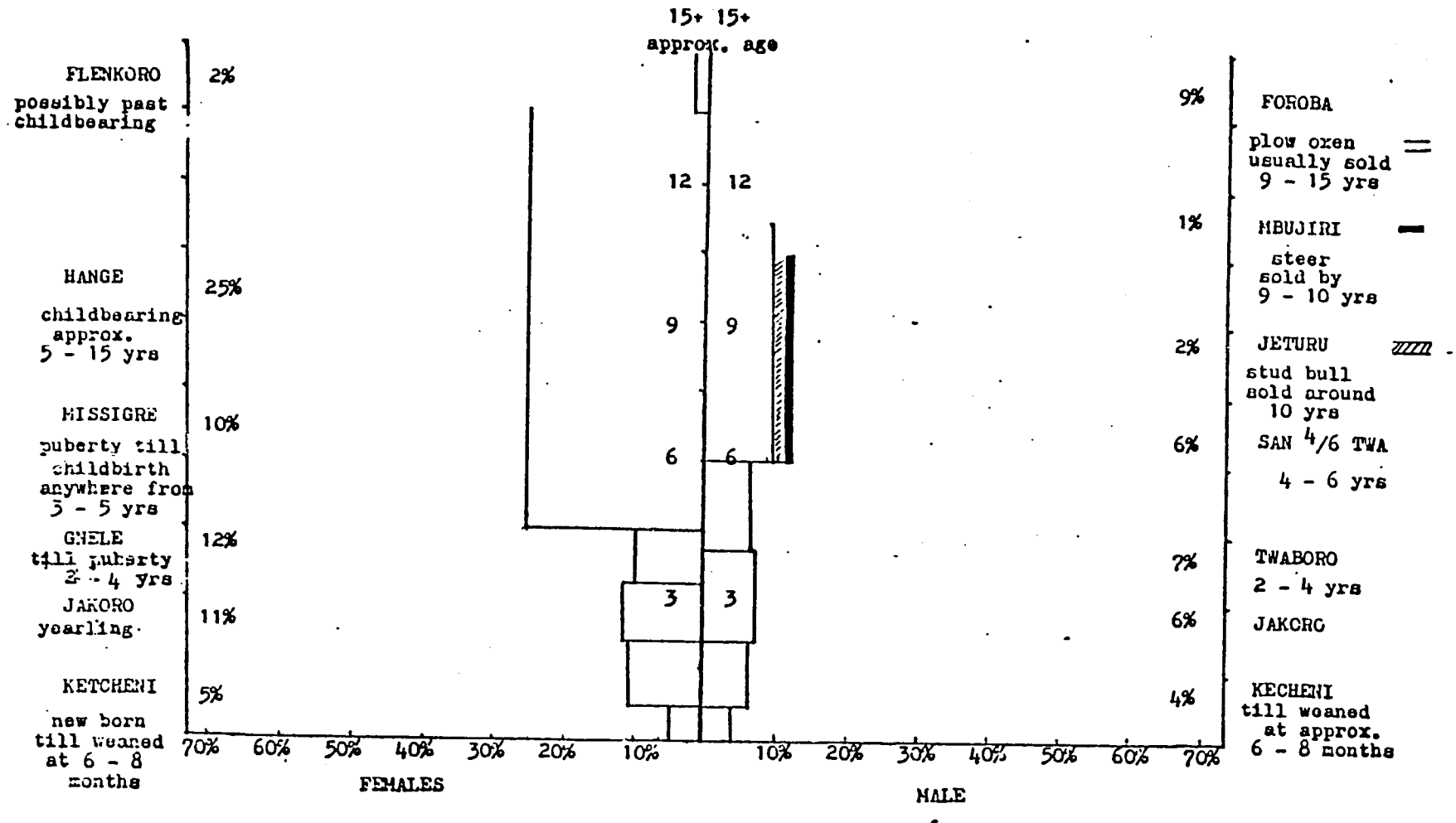
The terms chosen are a mixture of Peul and Bambara, but all are commonly used by both groups. The greatest vagueness involves the terms "Gnele" and "Twaboro", since some people ignore the status "Jakoro". Therefore, for more precise comparisons, the total percentage of animals in the first three female categories and first four male categories, is a more accurate reflection of reality than

HERD COMPOSITION

	24 Bambara Herds																	3 Foroba Fula Herds*			5 Peul Herds					2 Large Peul Herds	
FEMALE																											
Kecheni	1	0	1	0	2	0	5	1	3	1	4	1	3	3	2	1	3	5	3	3	1	1	8	7
Djakoro	5	2	4	4	1	2	6	0	7	4	10	3	5	5	5	2	5	5	14	1	1	2	28	23
Gnele	6	4	5	6	2	2	10	0	5	3	6	2	3	10	3	3	7	5	3	2	0	0	37	24
Missigre	2	4	4	2	3	1	3	1	10	2	5	1	7	5	4	1	5	10	4	3	1	2	25	16
Hange	5	6	7	5	3	5	10	3	14	10	15	6	10	30	8	5	6	20	18	9	2	3	62	60
Flungoro	1	3	3	2	0	1	0	0	0	0	0	0	1	0	0	1	2	0	0	1	2	0	0	1
MALES																											
Kecheni	1	0	1	0	0	0	3	2	5	1	3	0	2	2	1	1	3	2	0	2	0	1	5	6
Djakoro	2	1	1	1	1	2	3	0	6	1	4	1	4	5	2	1	0	3	4	1	0	2	17	13
Tasboro	0	0	2	3	0	1	6	0	6	1	3	2	4	10	3	1	4	2	5	3	0	0	13	9
San 4/6 tura.	0	1	1	1	1	4	6	0	4	0	2	2	2	9	2	5	3	2	2	0	0	2	6	6
Jeture	0	1	1	0	0	0	1	0	1	0	2	0	2	2	1	1	2	1	2	1	0	0	3	3
Forobo	2	5	2	4	4	2	4	0	10	3	4	2	4	3	2	2	3	0	4	0	1	1	2	2
Mbujiri	0	0	0	0	0	0	3	0	0	0	2	0	0	2	0	0	0	0	2	0	0	0	5	15
TOTAL	25	27	32	28	17	20	60	7	71	26	60	20	47	86	33	24	43	55	61	26	8	14	211	185

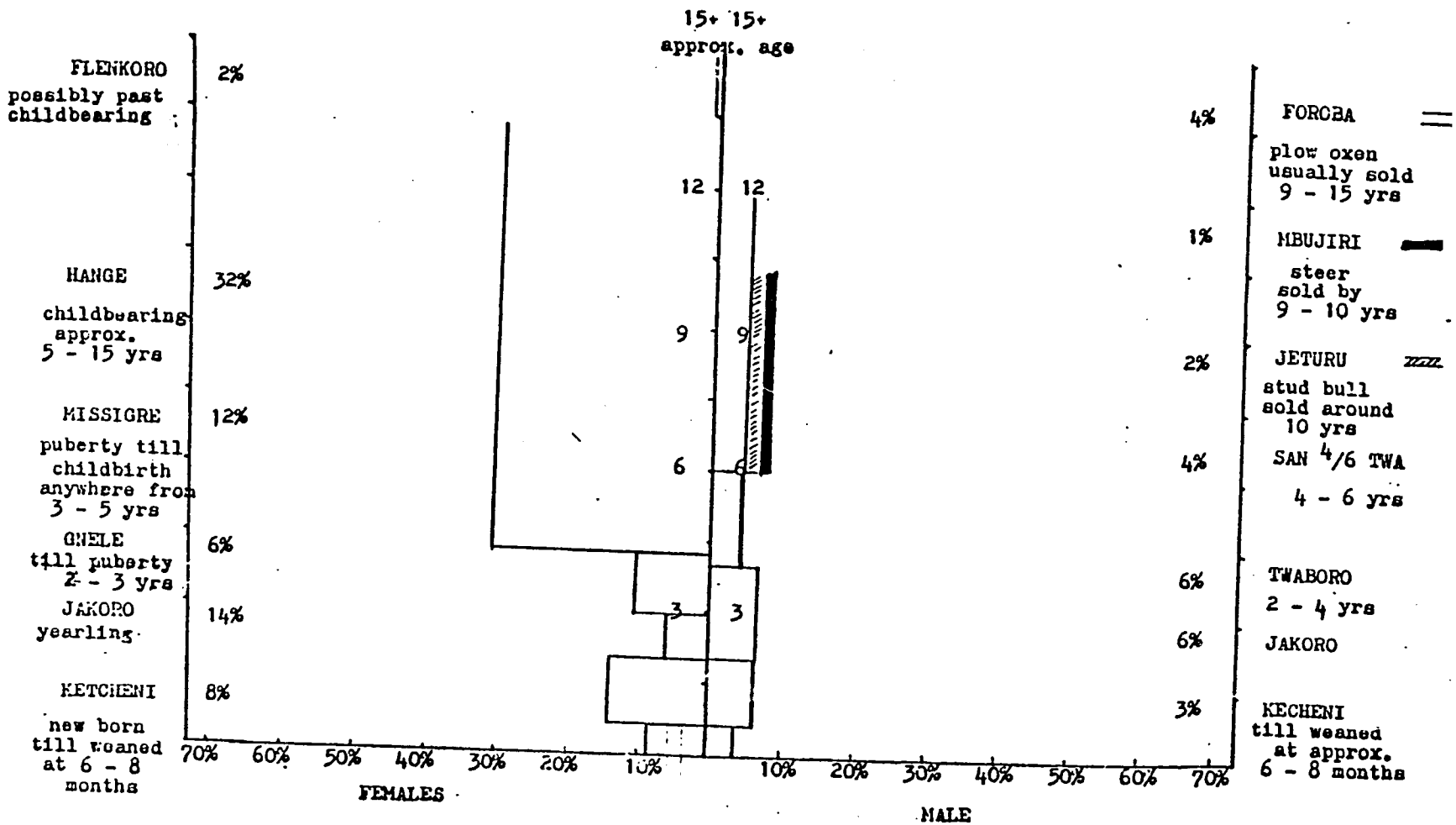
* note: 2 of these herds were on transhumance and therefore do not include possible milk cows left in home village

Plate XXIII



FEMALE - MALE RATIO IN 14 BAMBARA HERDS
Total population 526 head
Herd size range 7 - 86 head

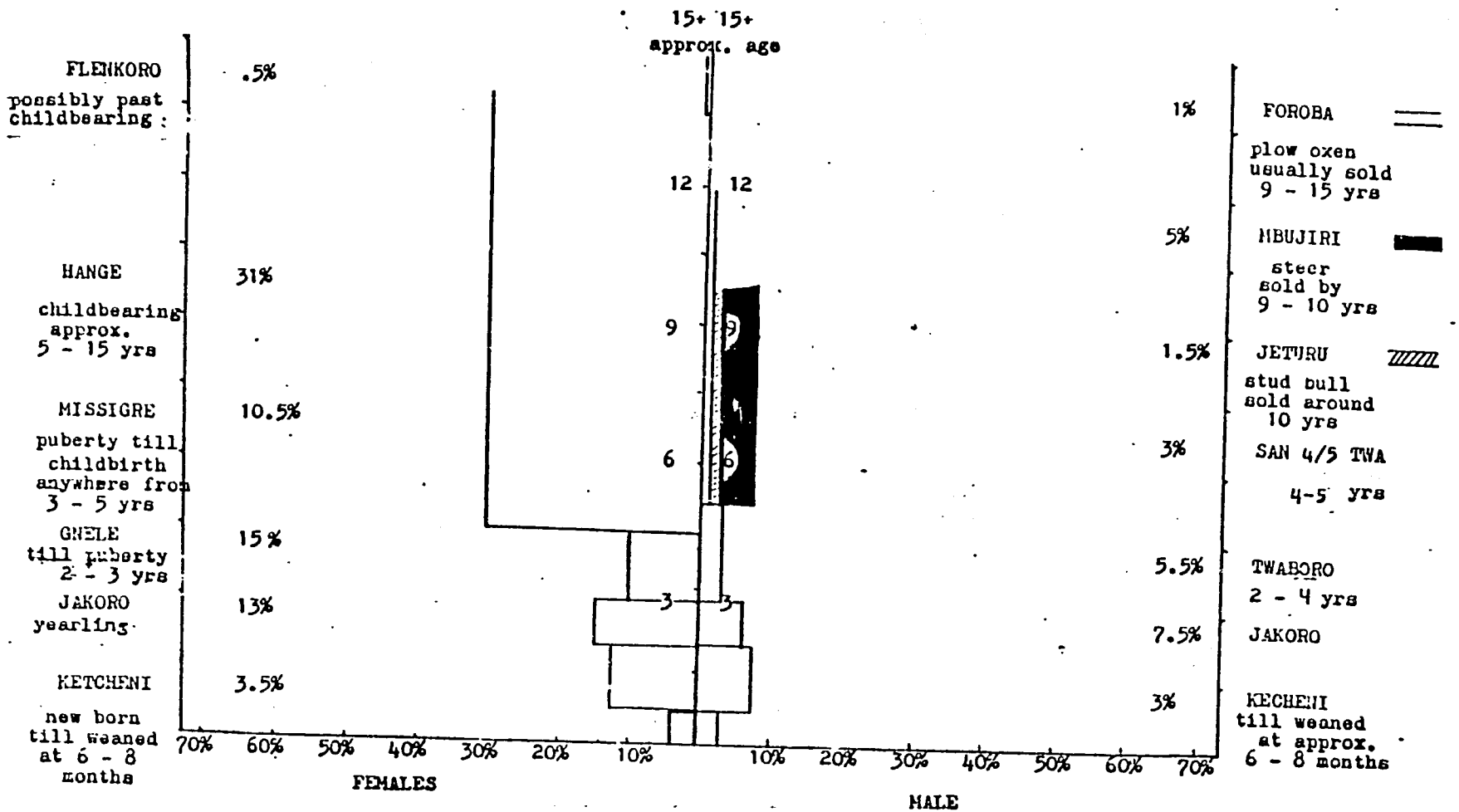
Plate XXIV



FEMALE - MALE RATIO IN 5 PEUL HERDS

Total population 164 head
Herd size range 8 - 55 head

Plate XXV



FEMALE - MALE RATIO IN 2 LARGE PEUL HERDS

Total population 396 head
Herd size 185 head, 211 head

Plate XXVI

the smaller sub-divisions there-in. All the animals were counted at one time in the presence of the owners, except for the two large Peul herds whose composition could only be obtained piecemeal, both by counting and through the reports of others.

Given the above qualifications, the most significant difference between herds is in the percentage and type of adult males:

Bambara Herds - 7-88 head - 12% adult males (9% plow oxen, 1% steers, 2% bulls) - Plate XXIV .

Peul Herds - 8-55 head - 7% adult males (4% plow oxen, 1% steer, 2% bulls) - Plate XXV .

Peul Herds - 185-211 head - 7.5% adult males, (1% plow oxen, 5% steer, 1.5% bulls) - Plate XXVI .

Clearly evidenced is the emphasis on agricultural productive plow oxen in Bambara herds, while the Peuls' more limited agricultural involvement, is reflected in a more limited number of draught animals and a corresponding increase in steers destined to be sold for cash. This is particularly true of large herd owning Peuls, who do not increase their agricultural productivity much beyond that of many smaller herd owners. In contrast, cattle rich Bambaras will often prefer to amass a surplus of plow oxen rather than steers and rent these to others for 5,000 FM each a season, or 2,000 FM for 10 days.

Commercial Sale and Social Obligations

Some causes and consequences of these divergent practices are seen in Plate XXVII, which details the "take-off rate", both as to numbers and types of cattle, in 8 Peul and 10 Bambara herds. The "take-off rate" is indicative of those animals sold for cash plus those given as "Jaka", the annual Moslem tithe. While many agriculturalists give a tithe of their millet, usually it is only the wealthy Peuls who give from their herds. While the millet tithe is spread among religious figures, the poor, the old, and visiting social scientists who are incapable of growing their own,

SALE OF CATTLE, NUMBER AND TYPE, IN 8 PEUL AND 10 BAMBARA HERDS

	Sold between Jan. & Dec. '75 = 12mos.										Oct.74 to Sept.75 = 12mos.							
Size of Herd	50	211	50	15	185	50	60	60	30	60	20	32	25	15	10	27	25	15
Owner's Ethnic Identity	P	P	P	P	P	P	B	B	B	B	B	B	B	B	B	B	P	P
FEMALE																		
Kecheni																		
Jakoro																		
Gnele		4	2	4	1	1	1		1	1								
Missigre	1		2		1			2			1		1					
Hange	1	1	3		1		1	3		2							1	
Flungoro										1	1			1				
MALES																		
Kecheni																		
Jakoro		1																
Twaboro	2	2	2		2	2	2			1	1	1						
San4/6tura						2				1		1	1		1			
Jetura		1										1						
Foroba	1	1	1		1		1		2									
Mtujiri					6	2								1				
Recorded Total	5	10	10	4	12	7	5	5	3	6	3	3	2	2	1	0	1	0
Percentage of Herd Sold	10%	4.7%	20%	26.7%	6.5%	14%	8.4%	8.4%	10%	10%	15%	9.3%	8%	13.3%	10%	0%	4%	0%
JAKA *																		
Gnele - female		1	1		1													
Jakoro - male		1			1													
Twaboro - male		1			1													
Total Yearly Take - off Rate																		
Total Number	5	13	11	4	15	7	5	5	3	6	3	3	2	2	1	0	1	0
Percentage of Herd	10%	6.2%	22%	26.2%	8.1%	14%	8.4%	8.4%	10%	10%	15%	9.3%	8%	13.3%	10%	0%	4%	0%

Average: Take-off Rate	
All Herds Sampled 86 out of 940 Head	9.1%
All Peul Herds 56 out of 601 Head	9.3%
All Bambara Herds 30 out of 339 Head	8.8%
All Peul Herds 100+ Head 28 out of 396 Head	7.1%
All Peul Herds 0-99 Head 28 out of 205 Head	13.7%
All Bambara Herds 0-99 Head 30 out of 339 Head	8.8%
All Herds 0-99 Head 58 out of 544 Head	10.7%

Estimate Miscellaneous Take-offs **	1%
Estimated % of Total-off Recirculated into other Herds ***	20%

FOR FURTHER EXPLANATION SEE: * page 44
** page 46
*** page 46

Plate XXVII

the cattle tithe goes to representatives of important marabouts, who later sell it for cash.

As shown on Plate XXVII, there is an additional irregular "miscellaneous take-off" which I estimate to be approximately 1% a year. These would include gifts to important guests or griots; the futte; the occasional use of cattle as a substitute for monetary payment; and those animals secretly taken by stranger or kin and sold on what is commonly called the "clandestine market". Also important to note is that not all those animals"taken off"are destined for slaughter. Some, mainly young plow oxen, young bulls, and young cows,are bought by others for incorporation into their herds. (Plate XXVII "recirculation rate"). Lastly, one should be aware that the year studied, 1974-1975, was one of high cattle price (c.f. J.Grayzel, "Report on Bussan Market"), in contrast to the preceding several years when, because of the drought and the corresponding poor condition of animals, high risk of ownership, and lack of cash, prices were severely depressed. As a result, cattle selling may have experienced an abnormal burst of activity.

Within this given context, the average take-off rate of the entire sample was 9.1% annually. This, itself, breaks down to three distinct categories:

1. Bambara herds under 99 animals - 8.8% annual take-off
2. Peul herds under 99 animals - 13.7% annual take-off
3. Peul herds over 100 animals - 7.1% annual take-off

The first indication of importance is that among Peul and Bambara owners with comparative size herds, Peuls sell a significantly greater number of animals: 13.7% versus 8.8%. Once again an explanation presents itself in the dichotomy of Bambara cattle = savings, versus Peul cattle = investments.

As savings, the Bambara draw upon their cattle wealth mainly to meet occasional major family expenditures that exceed their normal income. This would include bride price, taxes, and emergency food

purchases after a poor harvest. The Peuls share all these expenses but, in addition, will attempt to use the dividends of their investment in cattle to increase their personal enjoyment of life, by purchasing such materially costly items as quality bicycles, mobylettes, radios, and cassette tape recorders, and through the pursuit of women for both long and short term liaisons. Of course any of us, including a Bambara, finds any of the preceding, equally as desirable as does the Peul. However, (as more preceisely explained in the Doukaloma field reports of J. Lewis), among Bambaras the dependency upon family and community cooperation and, concomitantly, the fear of arousing jealousy among one's peers, serves as a brake on most forms of conspicuous consumption. In contrast, the Peuls, coming from a more competitive, individually oriented situation, see wealth as an important factor determining one's status, and are not immune from the temptation of flaunting it before others.

However, when one looks at the second indicator: namely the 13.7% take-off rate of small Peul herd owners versus 7.1% annual take-off rate of the larger Peul owners, we encounter an example of the important limitation on rural economic productivity caused by the limited needs of the rural inhabitant for cash.

Even given the willingness to spend, little opportunity exists to do so beyond a limited level, and thereafter, profits are continuously poured back into capital by increasing the number of animals owned. That the problem is in many cases mainly due to the lack of availability of goods is exemplieifed by the perpetual difficulty herders have procurring salt for their animals, even at inflated prices of 5,000 FM for 25 kilos.

The Dynamics of Cattle Ownership and Individual Variations

Perhaps more important than averages, for understanding the individual decision making process, are the specific "take-off rate" for each owner , (recorded in Plate XXVIII). These range from a base low of 0%, which bespeaks an owner rapidly increasing his herd, to an annual high of 26.6%, which forewarns a herd destined to

disappear. The extent of variance shown is far from unusual and emphasizes the fallacy in portraying a process as some form of standardized behavior. In reality, a dynamic situation exists, comprised of a spectrum of strategies and consequences, ranging from conservative cattle owners who carefully guard their wealth, to newly enriched heirs already wasting their inheritences.

For example, in one typical Peul hamlet, three out of eleven "chefs de famille" have no cattle, though they once had, and though, through relatives, they are still part of a cattle economy. In all three cases, excessive spending on women was the commonly attributed cause of their losses. One, as a teenager, had inherited approximately 60 head, only two of which remained 7 years later. A somewhat similar possibility is that occurring in the herd listed with a 26.6 % take-off rate.

The Peul herd with a reported 22% take-off rate provides a different, but culturally enlightening example. Here a 10 year old feud has been going on with another Peul from another area who claims he was cheated out of an inheritance due him. As revenge, he has resorted to protracted litigation, not with any expectation of recovering any animals, but to force his adversaries to deplete their herd in order to pay the extensive costs of a legal defense. During 1974-1975, the case went as far as Bamako, required the hiring of an attorney, and cost 300,000 FM, not including the Jaka given a religious figure whose assistance was sought. Illness in the family, that required a major operation, added another 165,000 FM to the expenses of a single year for the household.

In the neighboring Bambara village, where there are at present 5 herd owners, there are at least 6 others who had cattle, but no longer do. Their explanations for the loss of their herds were as follows:

#1: 7 animals; all used for bride price for family members

#2: 4 animals: 2 sold for medicine, 2 for food.

#3: 3 animals: 1 died, 1 lost, 1 sold for taxes

#4: 18 animals: a few sold for taxes, the rest for bride price.

#5: 5 animals: 3 sold for bride price, 1 lost, the last one sold after the "bourrgide" (a form of dividing through line drawings), said it was wrong for him to have cattle.

This last instance is particularly poignant in demonstrating an underlying Bambara suspicion that cattle and the Bambara way of life may not always be compatible. It is unimaginable that a Peul would ever express a similar belief vis-a-vis being a Peul.

Reasons for Success

Yet, given the higher Peul take-off rates, it might seem puzzling why they, and not the Bambaras, are the largest and most extensive cattle owners. While these are not, I'm sure, the only reasons, there are four fundamental explanations I would advance, all of which act together, in favor of the Peul.

1. Previous attention was drawn to the general willingness of the Peul to migrate for his herd's sake, while the Bambara is more attached to his land and community. No doubt many times in the past, faced with a severe environmental or political threat, a quick escape has saved many a herd.

2. The Peul take better care of their animals. For example, while the Peul always herd their animals and round them up at night, many Bambara let theirs wander alone during the height of the dry season, when the extensive distances the cattle cover in search of food makes following them most arduous. Such owners rely on the animals returning to the village to drink at the well. In May, however, when occasional rains create temporary watering holes, an animal may disappear for a week or two, and occasionally forever. Thus 2 out of 5 of the "previous" cattle owners quoted, had simply lost some of their animals.

3. Because of the Bambara concentration on agriculture, a greater percentage of males are retained as plow oxen, thereby reducing the relative number of cows in Bambara herds as compared to Peul herds (c.f. Plate XXIII-XXII) Thus Peul herds, produce more calves per year, than Bambara herds of comparative size.

4. Indications are that most Bambara herds are depleted when unavoidable family demands are made that exceed reasonable yearly take-off rate. Of these, the most common is bride price (now often 150,000-200,000 FM) plus other wedding expenses. In a close knit cooperative kin group such family obligations are more important

than the accumulation of surplus wealth. For a Bambara father to be without cattle is of no great significance; for him to be unable to provide wives for his sons is a disgrace.

A Peul, too, must obtain wives for his sons, but he is provided, due to his membership in a high status group, with a mechanism to escape a truly ruinous burden. Repeated instances exist in the Doukoloma area of Peuls avoiding heavy marriage costs by contracting an otherwise socially disadvantaged match with a wealthy family, such as a ForobaFula claiming Peul identity. Such a union may not only avoid forcing the family to exhaust its limited means, but may also provide an infusion of new economic resources to regenerate the herd.

Summation

In the area surrounding the Doukoloma Classified Forest, there exists a complex system of cultural practices, economic activities, and environmental realities that all exert an influence on the acquisition and exploitation of cattle by the local population. The purpose of this report has been to focus on some of the more significant factors, and to provide some background from which the actions and decisions of future potential project participants might be better anticipated and understood in light of their particular situation.

My specific conclusions and recommendations vis-a-vis the proposed managed grazing land are found at the commencement of this report. A broader and extremely generalized summation is as follows:

To the extent cattle owners in the Doukoloma area are already dependent on the forest, they will be pressured to adapt to its new regulation as a private grazing land. As an innovation, however, the Bambara agriculturalizts will resist it to the extent that it threatens their agricultural production based on close family and community ties, or requires the investment of large sums of money as a financial speculation. In contrast, the Peuls are economically more capable of participating, but their greater mobility provides them with more freedom of choice, and they will be attracted only if it offers them a significantly greater financial benefit than that to be gained by not cooperating. Both groups will require

considerable time to observe and judge the possibilities before reaching any final decision.

The attitude of the small number of Foroba Fula in the area will fall somewhere between the Bambara and Peul, and, as such, they might well represent the most flexible population for initial trial participation.

FIELD REPORT
DOGON CEREALS PROJECT: HEALTH CONDITIONS AT THE VILLAGE LEVEL

Riitta K. Eskelinen, R.N.

February 10, 1977

The observations presented here arise from ongoing field work among the Dogon peoples of the Bandiagara Plateau in the Mali Republic. For details of the physical environment, social organization, and subsistence methods not included here, the reader is referred to the preliminary field report of October 10, 1976.

As observed by Taylor and Hall (1967), "no problem in international health is as important or as poorly understood as the complex interrelationship between health, population growth, and general economic development."[1]

The following qualitative and quantitative data are illustrative of health conditions at the village level in the Dogon milieu.

A. Introductory Overview.

Dogon country lies between N 14° and N 15° and W 1° 30' and W 4° in the semi-arid Sahel. Seasonal variation includes a cool season (December-February), a hot, dry season (March-May), and a rainy season which may begin as early as April and continue as late as November. Annual rainfall ranges from 500-600 mm.

The study area is situated in the District of Bandiagara in central Mali. The Bandiagara Plateau runs northeast-southwest for some 200 km and ranges from 75-100 km wide; it terminates to the east in a series of 300-350 m (and in places higher) escarpments and is abutted by the Séno Plain. The terrain of the plateau is rugged and can be described as rocky hill country with scattered tree cover, deep gorges, valleys, and large eroded sandstone outcrops. To travel the 25 km from the town of Bandiagara to the study village at the edge of the plateau takes one and one-half hours by road.

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[1] Carl E. Taylor and Marie-Françoise Hall, "Health, Population and Economic Development," 1967, Science 157, p. 650.

B. The Village Setting.

Plateau villages are located on rocky outcrops, leaving all soil areas free for cultivation. An estimated 14,248 people live in 31 villages in an area of 409 km^2 (density 34.8/km^2); 68% of villages have populations of 500 inhabitants or less. In the village of Dourou, an estimated population of 1,381 people live within an area of approximately one square kilometer.

Household compounds are encircled by stone or mud brick walls, and compounds are contiguous without space between them except for the narrow paths which wind, maze-like, among the walled compounds. House construction is of stone chinked with mud (newer houses are partially plastered with mud); roof construction is of logs supporting a mud layer over the stone walls. Houses are windowless, having only a smoke hole in the roof. Husbands and wives occupy separate rooms (cooking is done inside the woman's room), and small children sleep with the woman, while adolescent children sleep communally, by sex, in separate houses in the village.

Animals kept in the courtyards of the households include donkeys, sheep, goats, chickens, dogs, cats, and, on occasion, calves or horses. The accumulated manure of these animals is applied to fields as a fertilizer and is utterly essential to the agricultural systems of the Dogon.

Household rodent populations are large and aggressively voracious. Lizards are a common feature of houses as are scorpions. Snakes are very prevalent. Particularly during the rainy season, clouds of flies (including unidentified biting flies) are everywhere, the air sometimes seeming to be black with them. Mosquitoes heavily infest the plateau as every depression in the rock surface provides a possible breeding site during the rains. Apparently the toads that live in every house are attracted by the large numbers of insects in the area. The fauna of the area include the curious woodchuck-like rock dassie which lives in and among

the rocks (and is hunted by the people for its meat), monkeys (which are a scourge to farmers), squirrels, seasonal water fowl and other birds, and crocodiles which inhabit several so-called "sacred areas" where they are protected. Fruit bats make nightly sorties when fruits are in abundance on the plateau.

C. Water Sources.

Water is obtained for village consumption from a number of sources. Most common of these are a series of open faults or fracture lines in the rock surface of the plateau; here rain water pools to a depth of 4 m or more. At their upper eroded margins, these faults may be as long as 20 m and 3 m to 4 m wide. A large surface area, therefore, is exposed to evaporation; water surfaces often are algae-covered. In some low-lying valley areas, dug holes tap a subsurface water source; in other areas water collects in small caves or trickles out from between rock layers where it is collected by the people.

During the rainy season, seasonal streams flow through valleys and are exploited by the people for bathing, drinking, clothes washing, as well as for agricultural purposes--for example, growing rice.

Water is clearly at a premium. Understandably, people will use any water anywhere, though the Dogon strictly maintain certain faults for drinking water and others for bathing and laundry. After a rain, women and children can be seen bathing and washing clothes in shallow puddles on the rock surface. Cattle, sheep, and goats are watered at sources distant from the village (donkeys descend into the faults to drink), though as the water in the faults successively dries up, animals are allowed to drink the village water. During the hot, dry season, women are obliged in some areas to walk long distances to find water. In the village of Dourou, one dug "well," which taps some subsurface reservoir (and was inadvertently discovered by villagers digging up clayey soil for making mud bricks) provides

water through the dry season.

D. Foods Available.

Primarily millet farmers, the Dogon of the plateau also grow sorghum, fonio (Digitaria exilis), and, in limited amounts, rice and corn. Given the rocky terrain and limited soil areas of the plateau, grain production is insufficient for year-round consumption. Consequently, during the cool season which follows the rains, Dogons grow small white onions as a cash crop. With the proceeds from onion sales, the people are able to pay their taxes and to purchase grain from farmers on the neighboring Séno Plain.

In addition, Dogons grow sesame, groundnuts, Bambara nuts (Voandzia subterranea), cowpeas (Vigna unguiculata), and sorrel (Hibiscus sabadariffa). Other vegetable products grown to a lesser degree in the area (and available through the market) include tomatoes, nightshade (Solam aethiopicum), hot pepper, sweet potatoes, okra, and squash. Farmers frequently plant small patches of melons, including water-melons, at the fringes of millet fields.

Dogons also raise mango, guava, papaya, lemon, and banana trees though total numbers of fruit trees as small. Baobab (Adansonia digitata) seedlings are transplanted and raised as well, though baobabs commonly grow wild.

Gathered wild fruits are a significant addition to the diet particularly when cultivated fruits are not in season. Many are dried and stored throughout the year. Among these are the grape-like fruit of the Lannea acida tree, tamarind (Dialium guineense), African locust bean (Parkia biglobosa), shea tree fruit (Butyrospernum parkii), blackplum (Vitex cuneata), fruit and root sprouts of the African fan palm (Borassus aethiapicum), desert date (Balanites aegyptiaca), yellow mombin (Spondias mombin), and the fruit of Fandolphia florida. Of gathered foodstuffs, however, baobab tree leaves (though the fruit is consumed as well) are the

most important, providing the basic sauce which accompanies millet paste--the day-to-day staple of the Dogon diet.

Dried fish, rice, salt, and manioc are imported from outside the region. Meat consumption is insignificant except on market days when large amounts are consumed by men, women being unable to afford it.

E. Sanitation and Hygiene.

At the village level no latrines exist. In some quartiers, defecation takes place within 10 m of houses, the village having expanded almost to the physical limits of the rock form upon which the village is constructed (the margin of the rock in some places is marked by a sheer drop of 30 m). In other quartiers, adults defecate at a distance of 50 m or more from the village, but the elderly, the ill, and children do not venture far.

Handwashing is not an important feature of village life. Soap is a decided luxury[2] and is more often used for washing clothes than for personal bathing. Food is eaten with the right hand though observation shows that young children eat with whichever hand is more convenient and oral-anal contamination (through scratching, etc.) appears common. Children beyond 5-6 years of age are essentially responsible for their own hygiene, and as children elsewhere who are left to their own devices, they are not infrequently covered with several layers of dirt. Much of the population goes barefooted though both men and women own rudimentaty sandals or plastic shoes; these are worn on market day primarily.

In household compounds not much attention is paid to accumulated dirt and refuse. Spitting is common, and takes place inside houses as well as outside. People--adults and children--cough freely in the faces of others, do not

[2] Locally processed soap costs 50MF (ca. 10¢ US) which, e.g., could buy 10 piles of baobab leaves for sauce or 5-6 dried fish. The least expensive imported toilet soap costs 100 MF, a cake of brown soap, 150 MF.

turn their heads to sneeze, and wipe nasal discharges on the interior and exterior walls of houses or on the soles of their feet (using the left hand). Infants are propped on their mothers' feet to defecate on the floor of the house or on the ground of the courtyard; the fecal matter is later covered with dirt and scraped up. Garments inadvertently soiled with fecal matter continue to be used, and may, in fact, be used to wrap infants as they sleep. Women's bracelets are sometimes used to scrape feces off an infant's buttocks and off clothing, and handwashing is not practiced after these procedures.

Prepared food is indifferently protected from flies, and water jars are uncovered. Chickens are allowed to gambol inside mortars (where millet is pounded) and on the surface of grinding stones (which are visited also by flies and bare-bottomed children).

F. Common Illnesses and Health Services.

One dispensary exists in the sub-district of Dourou (31 villages). The building, itself, constructed in the last year has yet to be occupied. Staffed by one male nurse's aid, the dispensary office is currently located in the adjoining maternity building (which is staffed by a rural midwife who has had several months' training in Bandiagara). The maternity building boasts a wooden office table, two rickety chairs, several filthy mattresses on the floor, and a concrete slab which serves as the delivery table. Otherwise, the building is devoid of materials; my last visit revealed a pair of soiled forceps and some metal suture clamps in an equally soiled kidney basin, a syringe and several needles in a rusty box filled with water, and a bottle of methylene blue. There is no water at the maternity building (though there is a clay water jar in one corner), and the dispensary has never been known to have bandage materials. Medicines sent by the government health service appear to disappear enroute (although the dispensary

attendant offers medicines for sale, as does the administrator of the sub-district). The nurse's aid and midwife are "on duty" little of the time, and the building is usually closed. The Regional Grand Epidemic Service has not visited the sub-district for some two years. In contrast, the Veterinary Service has vaccinated and paid several visits to the 100 head of cattle in the area. It can be said that the population is largely unaffected by the advent of modern medicine.

It is with reservation that I present the following figures as I have strong reason to believe that they are falsifications, submitted to satisfy job requirements; however, they are followed by statistics of my own. Calculations are mine, based on raw figures supplied by the dispensary attendant.

Table 1

Diseases and Injuries Reported, 1976, Medical Post of Dourou.
N=832

1. Diarrhea 17%
2. Conjunctivitis 16%
3. Malaria 15%
4. Bronchitis 10%
5. Accident 10%
6. Undetermined illness 7%
7. Otitis 6%
8. Wounds & sores 6%
9. Rheumatism 5%
10. Skin infection 4%
11. Syphilis 2%
12. Gonorrhea 1%
13. Schistosomiasis 1%

Total = 100%

Table 2

Population Reporting Disease or Injury by Age and Sex, 1976, Medical Post of Dourou.
N=832

Age	Male	Female	Totals
0-1	4%	4%	8%
1-4	8%	10%	18%
5-14	18%	11%	29%
Adult	24%	21%	45%
Totals	54%	46%	100%

Table 3

Diseases and Injuries Reported, August 1976, Medical Post of Dourou. N=64	
1. Accidents 28% (includes wounds & sores)	
2. Diarrhea 19%	
3. Malaria 16%	
4. Conjunctivitis 12%	
5. Rheumatism 11%	
6. Bronchitis 8%	
7. Syphilis 6%	Total = 100%

Table 4

Population Reporting Disease or Injury by Age and Sex, August 1976, Medical Post of Dourou.
N=64

Age	Male	Female	Totals
0-1	-	-	-
1-4	-	-	-
5-14	20%	14%	34%
Adults	41%	25%	66%
Totals	61%	39%	100%

Despite their probable inaccuracy, the data contained in the preceding tables do touch upon what appear from observation to be the major health problems on the plateau: fevers (probably malarial in origin for the most part); eye, ear, and skin infections (including phagic ulcers); diarrheas; work-related injuries (especially axe cuts of the feet and legs); and respiratory infections.

The data in the following tables are illustrative of health problems expressed by the population during the same month, August 1976. In what is a convenience sample, I recorded all illnesses and injuries that became known to me over this time period. Age determinations were made on the basis of inquiry, subjective visual evaluation, and, in the case of infants, on the basis of dental eruption. The sample, of itself, has no statistical significance but is interesting

for its comparative value.

Table 5

Health Probelms Reported, August 1976, Dourou.
N=166

Rank	Health Problem	# Cases	Percentage
1	Eye infection	56	34%
2	Fever or fever & headache	24	14%
3	Injury	18	11%
4	Skin Sores or infection or phagic ulcer	17	10%
5	Ear infections or earache & fever	13	8%
6	Headache	11	7%
7	Diarrhea or fever & diarrhea	8	5%
8	Cough	4	2%
9	Toothache	4	2%
10	Miscellaneous & combinations of symptoms (common cold, abdominal pain, fever & vomiting, etc.)	10	7% (each category 1% or <1%)
	Totals	166	100%

Table 6

Incidence of Health Probelms by Age & Sex, August 1976, Dourou.

1. Eye Infection N=56				2. Fever N=24		
Age	M	F	Totals	M	F	Totals
<1	9%	9%	18%	8%	21%	29%
1-4	9%	12%	21%	-	8%	8%
5-9	5%	16%	21%	8%	4%	12%
10-14	4%	4%	8%	-	4%	4%
>14	11%	21%	32%	34%	13%	47%
Totals	38%	62%	100%	50%	50%	100%

Table 6 Cont'd.

3. Injury N=18				4. Skin infection N=17		
Age	M	F	Totals	M	F	Totals
<1	-	-	-	-	6%	6%
1-4	-	-	-	23%	-	23%
5-9	22%	11%	33%	12%	23%	35%
10-14	11%	-	11%	18%	6%	24%
>14	39%	17%	56%	6%	6%	12%
Totals	72%	28%	100%	59%	41%	100%

5. Ear infection N=13				6. Headache N=11		
Age	M	F	Totals	M	F	Totals
< 1	8%	23%	31%	-	-	-
1-4	-	8%	8%	-	9%	9%
5-9	-	23%	23%	-	-	-
10-14	-	-	-	-	-	-
> 14	23%	15%	38%	64%	27%	91%
Totals	31%	69%	100%	64%	36%	100%

7. Diarrhea N=8				8. Cough N=4		
Age	M	F	Totals	M	F	Totals
< 1	-	25%	25%	25%	-	25%
1-4	50%	12.5%	62.5%	-	-	-
5-9	-	-	-	25%	25%	50%
10-14	-	-	-	-	-	-
>14	-	12.5%	12.5%	-	25%	25%
Totals	50%	50%	100%	50%	50%	100%

Table 6 Cont'd.

Incidence of Health Problems by Age & Sex, August 1976, Dourou.

9. Toothache N=4

Age	M	F	Totals
1	-	-	-
1-4	-	-	-
5-9	-	-	-
10-14	-	-	-
14	-	100%	100%
Totals	-	100%	100%

Health problems not reflected in Tables 5 and 6 include Guinea worm (dracontiasis), schistosomiasis, venereal disease, and leprosy. Guinea worm is very prevalent in some plateau villages; a recent epidemiological study of schistosomiasis on the plateau, for example, reports as an incidental finding that "more than half" of the village of Dobolo (population 389) suffers from dracontiasis.[3] Ten kilometers away, in the village of Dourou, I have observed 6 cases of Guinea worm, and it is the rare villager, who does not bear scars from this painful affliction which is said to have been much more prevalent in the past. Persons suffering from Guinea worm are barely able to hobble (the parasite generally attacks the lower limbs), let alone work, and the economic drain of such a disease is obvious.

Schistosomiasis is a significant health problem on the plateau where numerous dams have been built, but its prevalence is variable (and dependent on the presence of the intermediary host, the snail, in the body of water). A study of eight villages on the plateau reports an incidence of 15.6% to 95.6% of village

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[3] M. Bakary Pleah, "Etat Actuel de l'Endémie Bilharzienne à Schistosoma haematobium dans le Cercle de Bandiagara," Thèse, Ecole Nationale de Medicine et de Pharmacie du Mali, November 30, 1976, pp. 16-19.

populations having eggs of Schistosoma haematobium in their urine.[4] The gardening which provides the livelihood of many Dogons necessitates working in and around bodies of water; this very work may be conducive to disease, which, in turn, debilitates the farmer and diminishes future production (not to mention economic loss if he must pay for treatment).

Dogons are fond of observing that "debauchery" does not exist in the Dogon milieu, and, in fact, prostitution is unheard-of at the village level. In reality, however, sexual exposure begins in early adolescence, and premarital and extramarital liaisons are frequent as well as remunerative. The fact that outsiders are excluded from sexual favors may be somewhat protective in terms of venereal disease; however, migration patterns of young men undoubtedly lead to the introduction of syphilis and gonorrhea when the travelers return to the village. Venereal disease is not a subject people discuss freely, but there is no reason to suspect that it is not an important public health problem.

Leprosy exists on the plateau and in the neighboring escarpment villages. The number of cases appears small; none are know in Dourou. Although a small leper colony exists in the sub-district of Sangha, no treatment program exists for the 31 villages in the Dourou area.

In addition, Tables 5 and 6 do not reflect the extremely poor dental health that exists among the villagers. People of all ages have carious teeth--some of them loose, others blackened and literally rotted away to the gum line and below. People suffer frequently from severe toothaches, and many individuals have lost many of their teeth by their early 30s. Women's teeth are particularly carious, undoubtedly from a differential diet as compared to men and from the nutritional demands of repeated pregnancies (up to 20 per woman) and lactation. Calcium-rich

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4 M. Bakary Pleah, "Etat Actuel de l'Endemie Bilharzienne a Schistosoma haematobium dans le Cercle de Bandiagara," These, Ecole Nationale de Medicine et de Pharmacie du Mali, November 30, 1976, pp. 16-19.

foods are not an important part of the diet (cows and goats are kept but milk is not consumed except by young shepherds). The food that is eaten is, without exception, soft in consistency, unabrasive, and tenacious, and dental hygiene is all but non-existent (occasionally people can be seen scraping their teeth with sticks), the teeth being coated more or less constantly with food residues. It is a given fact that dental health can affect general bodily well-being, and inability to chew foods (e.g., meat) may affect nutrition, which, in turn, may lower resistance to disease. It is likely that dental health will grow worse as refined sugar comes into wider use, replacing the traditional flavorings such as tamarind pods and baobab fruit pulp.[5]

Malaria is endemic on the plateau. It is probable that most fevers are malarial in origin. In Table 5, it may be inaccurate to separate the categories, "fever" and "headache," as it is likely that some of these headaches are variant subclinical forms of malaria. The topography of the area is such that it would be impossible to eliminate all possible breeding sites for mosquitoes; in fact, every standing pool of water is of use to the population. Mosquito nets are non-existent at the village level (and prohibitively expensive), and no "nivaquinization" (malarial suppression) program exists, though attempts have been made in the past to distribute the drug, "Nivaquine," to children (however, only on an ineffective one-time basis).

G. Local Medical Practices and Practitioners

In various Dogon villages on the plateau, local healers tend to maladies; however, they do not appear to be full-time specialists but, rather, individuals who are know as skilled herbalists or who have demonstrated skills in setting

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[5] Refined sugar is generally bought by the cube (2 cubes/5 MF, or one cent US); 1 kg costs the equivalent of about $1 US.

broken bones, for example (these are invariably men). Individual Dogons have a remarkable knowledge of plants, and leaves and barks boiling on the fire for medicinal purposes are common household sights.

Household remedies include smearing anything that hurts with oil extracted from the seeds of the Lannea acida tree (this is also reputed to be an abortifacient), covering Guinea worms with leaves tied on with vines or string, and packing wounds with pulverized tobacco. Infected sores are drained of pus with sticks (little children drain each other's sores).

Dogons do not appear to be aware of ways to achieve hemostasis in the event of bleeding. On the road once I came upon a man who had sustained a severe axe cut to the calf of his leg while working; he had walked about 10 km, bleeding the whole way, to get back to his village. A similar situation occurred with a man who was kicked by his donkey (though he was able to ride the donkey to the dispensary). In a similar vein, at childbirth Dogon women do not ligate the severed umbilical cord of the infant; as the cord dries up, they may tie it in a knot.

Other negative medical practices include not giving water to dehydrated infants and not washing the eyes if they are draining purulent matter. I have observed infants with eyes so crusted and gummed up that it was doubtful at midmorning that they had yet seen the light of day.

Surgical procedures include circumcision for boys and clitoridectomy (removal of the clitoris) for girls, practices which are universal for all children in the Dogon area (and, I am told, even among urban elites in other areas of Mali).

Cosmetic procedures include scarification of the abdomen and piercing (with thorns) the terminal end of the nasal septum, the sides of the nostrils, the lower lip, and the ear lobe and cartilage (in as many as a dozen places). Men, as well as women, sport pierced ear lobes.

Disease causation is frequently attributed to "the wind." which does from season to season blow rain, cold air, sand, and dust across the plateau. Pernicious attacks of malaria (the classic French acces pernicieux) among children are characteristically described as "the bird" (in French, c'est l'oiseau) on the basis of bird-like cries emitted by the child. Children who have died are sometimes said to have been "eaten" by supernatural spirits.

Western pharmaceuticals (vials of injectable drugs, eye ointments, and aspirin) are sold by traders. Those who can afford it buy these drugs--often on faith, as the product names on vials have rubbed off and tablets are in unlabeled plastic bags (but this happens in pharmacies in large towns as well)--and later come to dispensaries to ask what the drugs can be used for.

H. Summary and Conclusions

Viewed by Malian national standards, Dogon health is relatively good. There is no evidence, for example, of severe childhood malnutrition or outright lack of adequate food as is the case in other regions of Mali. In human and economic terms, however, the infectious and parasitic diseases which afflict the population take their toll. Women, it seems, bear a disproportionate share of the burden of ill health. They experience years of repeated pregnancies and child loss, and, in the Dogon milieu, childhood nutrition (as well as maternal nutrition) is entirely dependent on the woman's individual capacity to purchase with her petty trading foodstuffs other than millet for her family. The number of children a woman must feed obviously determines their nutritional status and, to some degree, their health. The physiological demands of repeated pregnancies in women with marginal diets undoubtedly take their toll not only on the woemn, themselves, but also on succeeding infants and their chances of survivorship.

The implications for development programs are clear. Among the

Dogon, for example, programs to increase production and to increase income from onion sales have absolutely no effect on improved living standards for the family. Cash crop income is retained by males, and money is never given to women for any purpose (men are incredulous that I should even ask and say that a man who would give money to his wife would be "a fool").

Until women, themselves, can be directly involved in economically profitable ways in the society, health standards will continue at their low level and population will undoubtedly continue to grow (incomplete field data suggest a crude birth rate of 43 and a crude death rate of 19). Until men and women perceive that adequate numbers of children will survive, longer birth spacing or any notion of family planning will be likely to be viewed dimly.

It is no new idea that health is both an objective of and an instrument for development (see, e.g., Hall and Taylor 1967). In the case of the Dogon, it can be seen that environment, cultural practices, nutrition, natality, and productive activities interrelate in multiple ways to influence health. In turn, health in numerous feedback interactions influences some of these same factors, including general economic development.

FIELD REPORT
DOGON CEREALS PROJECT: MARKET GARDENING ON THE BANDIAGARA PLATEAU

Riitta K. Eskelinen, R.N.

February 16, 1977

This report, as the preceding reports of October 10, 1976 and February 10, 1977 (which detailed the physical encironment, social organization, subsistence emthods, and health conditions), is based on ongoing field work among the Dogon peoples of the Bandiagara Plateau of central Mali.

A. Introduction

The windswept sandstone Bandiagara Plateau is an example of a harsh Sahelian environment: much of the surface is bare rock, covered in places with thin soil layers and gravel. Valley systems lying in north-south directions on the plateau provide seasonal streambeds and the only substantial soil areas for cultivation. To insure a yield of grains, Dogons employ a number of strategies, including manuring, intercropping, crop rotation, and bush fallow farming (the latter of which is practiced on the adjoining Séno Plain by villages bordering the edge of the plateau and villages at the base of the contiguous escarpments. The area cultivated on the plain lies in an uninhabited, partially sand-duned stretch of land measuring roughly 25 km by 20 km which is located to the east of the plateau).

Despite these laborious efforts, farmers are unable to produce sufficient quantities of grain--primarily bulrush millet, but including sorghum, fonio (Digitaria exilis), and very small amounts of rice--for year-round household consumption. Dogons, therefore, consume a portion of the harvested grain (the poorer quality heads) and seal the rest away in lineage communal granaries, where the grain, unthrashed, remains until the following year. With the coming of the rains

and the millet planting season, the granaries are opened (having been sealed with mud), and the lineage household group (which since the harvest had been dispersed into separate hearths or eating groups) is reassembled not only for agricultural work, but also for communally-prepared meals. At this time, too, young males who have migrated to urban areas after the harvest return to the lineage group in the village.

During the remainder of the year, Dogons of the plateau purchase millet through the market system from the Dogons of the plain (whose large field areas yield enough grain to fill banks of granaries, the sight of which dominates most village scenes).[1] The cash for such purchases is obtained through market gardening.

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[1] Under threat of prison, plateau dwellers must participate in the governmental millet commercialization program (grain is bought by the government at a low price for redistribution to grain-short areas of the country) and must purchase grain from the plain to fill their quota. The commercialization program is, ironically, financed by such agencies as AID which otherwise seek to increase production and to improve the general well-being of the population.

Figure 1.
MALI REPUBLIC
WEST AFRICA

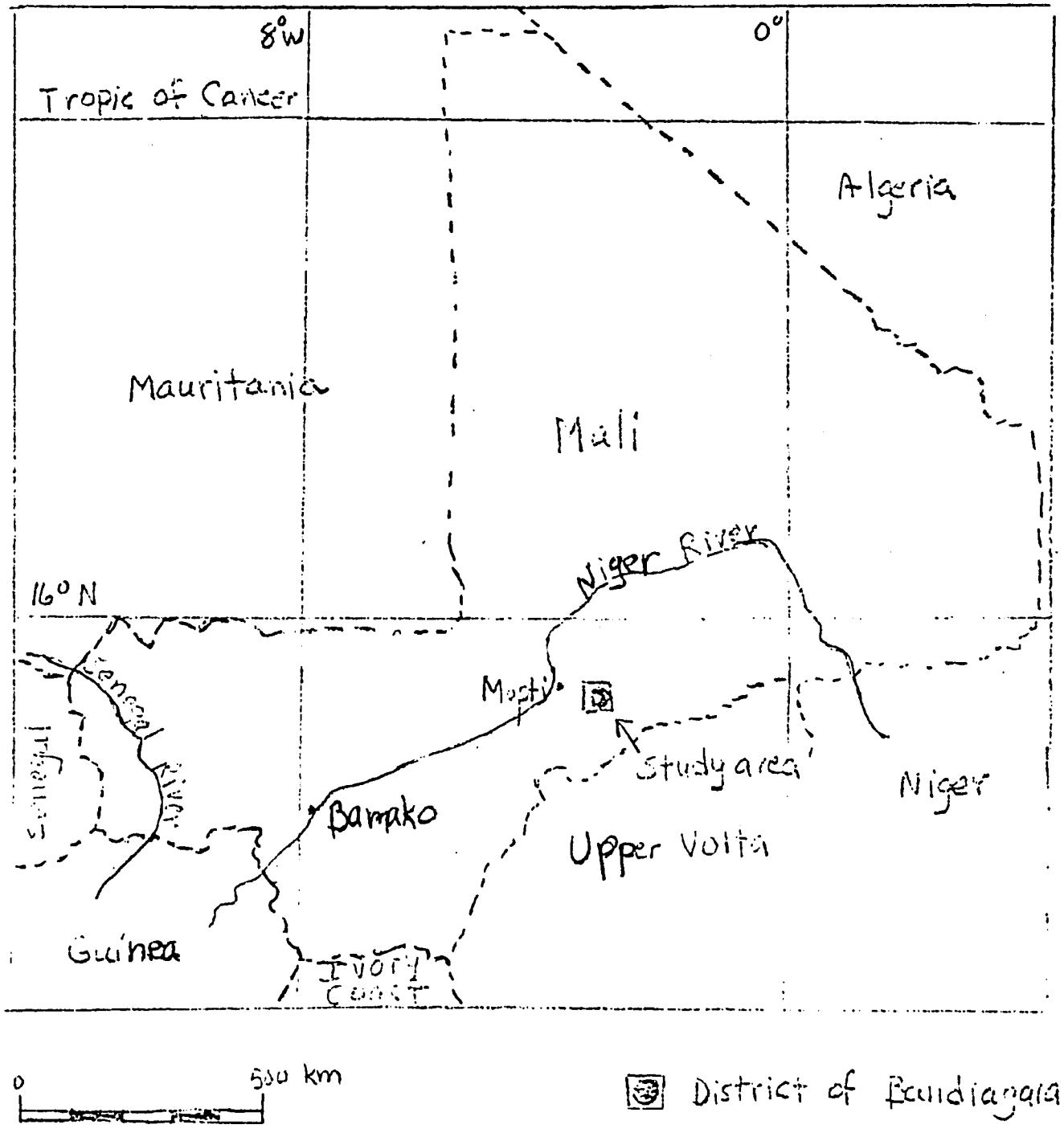
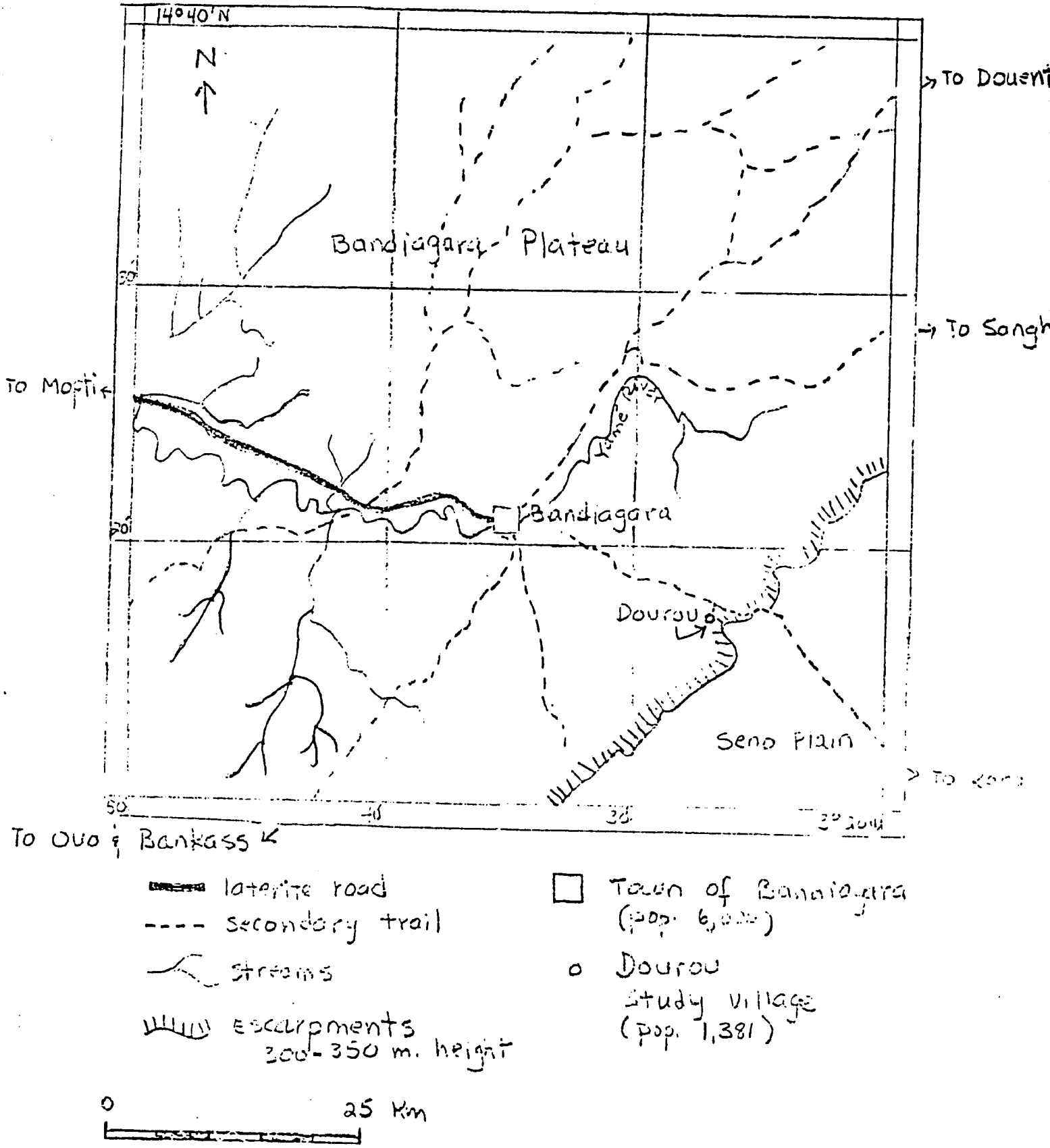


Figure 2.
DISTRICT OF BANDIAGARA
MALI REPUBLIC



B. Garden Locations

For all its barrenness, the plateau offers a surprising variety of microenvironments which the Dogon exploit with remarkable ingenuity to grow their vegetable products. The common denominator of all these ventures is the presence of some water source. As the rock plateau has no water table, rain water running in seasonal streams, trapped in fracture lines (or faults) in the rock, or caught behind cement and rock dams (financed and built by outside agencies, not the Dogon, themselves) is cardinal to the whole operation.

Gardens are constructed on a number of differing sites depending on the topography surrounding water sources; these include terraced soil banks, flat soil surfaces, rock inclines, margins of streambeds, flat rock surfaces, and recession areas of dams and streams. Garden sizes and shapes vary from site to site; they range from tiny, 30 cm by 30 cm egg carton-like recessed plots to triangular shapes of various dimensions. In the area of Dourou, for example, single plots (bordered on all sides by stone walkways) can be from 1 m by 1 m, or smaller, to 4 m by 9 m, though this is exceptional in size. Plots average about 1 m by 2 m, and plots are continuous--separated only by stone walkways or, in places, by packed soil walkways--for all gardeners in any given area. That is, it is impossible merely by looking to know where one set of plots ends for one gardener and where a second gardener's plots begin. In addition, gardeners may have plots in several different gardening areas. In one exceptional case, a gardener has plots approximately 1.5 km apart; most gardens at the study site lie within 600 m long area.

Figure 3.

Diagram of Garden Plots

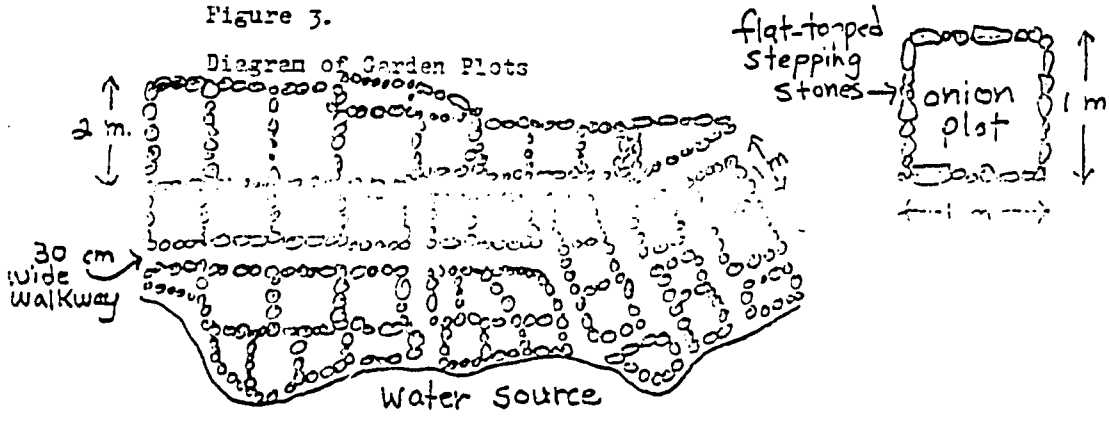
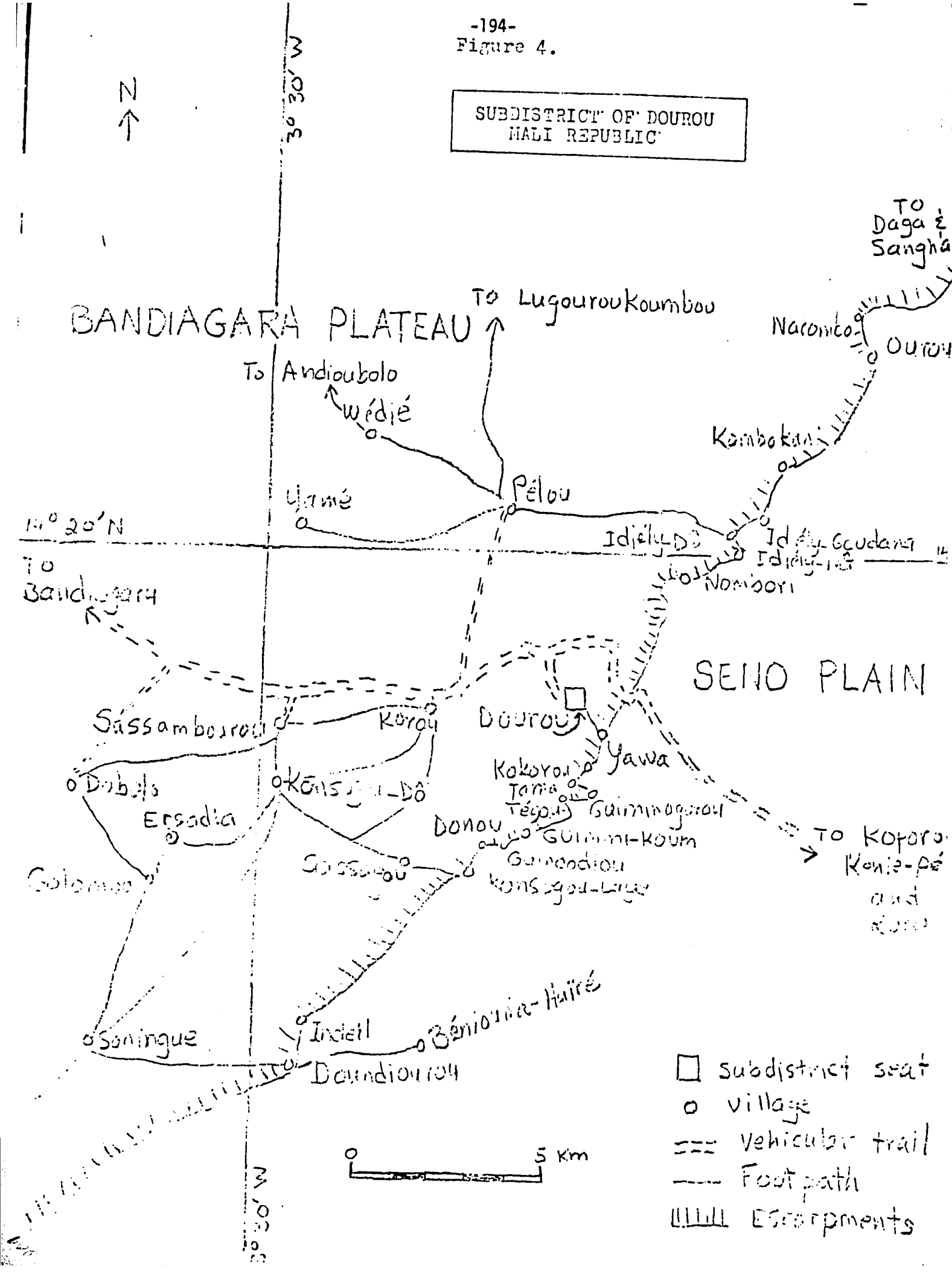


Figure 4.


SUBDISTRICT OF DOUROU
MALI REPUBLIC
N
3° 30' W
BANDIAGARA PLATEAU
To Lugouroukoumbou
To Andioubolo
Wédié
Yamé
Pélou
14° 20' N
To Bandiagara
Idiélu-Dô
Idiélu-Goudana
Idiélu-Ké
Nombori
Naromboo
Ourou
To Daga & Sangha
Kombokani
SENO PLAIN
Sassambourou
Korou
Dourou
Yawa
Kokoroni
Tama
Téguu
Guimmogorou
Guimmi-koum
Gurandiou
Konsogou-Lage
Dobels
Konsogou-Dô
Ersadia
Donou
Sassou
Golomo
To Koporo
Konie-pé
and Kono
Soningue
Indeil
Béniorma-Haïré
Daundiouroi
0
5 km
3° 30' W
subdistrict seat
village
vehicular trail
Foot path
Escarpments

As garden sites are clustered around the existing water sources (which are necessary for the hand-watering of vegetables), they may be located at any distance from villages. In the village of Konsougou, for example, gardens are located in a valley bottom adjacent to the village (less than 30 m); the valley is cultivated for a distance of approximately 2 km, and gardens are watered by hand as well as with the assistance of six hand-operated pumps[2] from a series of 3-4 m deep faults in the valley floor. Other garden areas are located several kilometers (a 35 minute walk) to the west of the village where gardens have been constructed by carrying soil from other areas and placing it on bare, flat rock surfaces adjacent to faults. At this site, villagers exploit natural subsurface channeling to direct water selectively from the source to an area some 25 m distant (water is thrown up and out of the fault by someone standing in it onto the flat rock surface. When a small hole in the rock is unplugged, water flows into it and emerges in a shallow pool 25 m away, ready to be transferred with calabashes to the garden, itself).

In the village of Pelou, soil areas are unusually bountiful, and water can be reached in many areas merely by digging large holes in the ground; here, no particular garden construction is necessary--plants are sown and watered as in any ordinary garden. Although a dam was constructed at Pelou two years ago, it holds no water, and villagers (who had requested another site for the dam) continue to garden at the village perimeter and along deep pools which have water lilies and, it is said, fish. One of these pools, not even 2 m wide, provides village drinking water throughout the year as well as garden water.

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[2] Obtained on credit from the Catholic Mission in Bandiagara for approximately 33,000 MF (about $70 US). Pumps are not loaned or rented by the owners.

Half a kilometer from the village of Yawa in an extremely rocky low-lying area between massive rock outcrops, multi-leveled terraced gardens border a seasonal stream which flows at first from south to north; reaching the garden site which stands amidst thick underbrush and brambles, the stream flows under the rock foundation of the gardens, emerging dramatically several meters away, having changed direction to flow from north to south.

At the base of the plateau and the cliffs which border it, gardening takes place along two seasonal streams, fed by water flowing off the plateau in falls at Nombori and Guimini. Deep sandy soil characterizes these sites which lie in the basin-like areas between the dunes and the cliffs. As stream water recedes, holes are dug in the sand and are progressively deepened.

In summary, garden sites can range from the spectacularly dramatic--as at Daga (in the area of Sangha) where a narrow dammed gorge 20 meters deep is surrounded by elaborate terracing--to the very mundane, a few garden squares on flat ground by the side of the road at Korou.

C. Vegetables Grown

The most important vegetable grown by the Dogon is the small white onion, *Allium cepa*. It has been written that onions are "one of the oldest cultivated crops" and that they probably once grew wild somewhere between western China and the deserts lying east of the Caspian Sea (Jones and Mann, 1963).[3] When and how they were adopted into the Dogon milieu is not clear; Dogon myth makes no mention of onions (though cereal grains, for example, play a prominent part in myth). However, it appears that onions have a long history on the plateau; literary accounts

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3 Henry A. Jones and Louis K. Mann, 1963, *Onions and Their Allies: Botany, Cultivation, and Utilization*, New York: Interscience Publications, Inc., p. 98.

from the turn of the century mention Dogons carrying onions to market, and informants of mine state that their "fathers' fathers" grew onions. People in their mid-fifties recall walking to Mopti (about 90 km) as young children to sell basketloads of onions for their fathers.

The only other vegetable exported outside the area is the tomato, which is grown primarily in villages within about 5 km of Bandiagara, the largest town in the area. For local consumption (and for the export of perhaps one crate per market day--which is once every five days), the village of Nombori produces tomatoes. Perhaps more important as an export are the seeds of the plant, sorrel (Hibiscus sabadariffa), which are fermented and widely used as a seasoning in sauces.

At the Dourou market (one of the major markets in the Dogon region), the vegetables available--with seasonal variation--are nightshade (Solanum aethiopicum) or as it is commonly called in French, aubergine indigène or tomate locale, hot pepper (Capsicum frutescens), sweet potato (Ipomaea batatas), and winter squash (Cucurbita pepo).[4]

D. Seasonal Calendar

During the rainy season (ca. May-October), in addition to grain cultivation, Dogons grow (rainfed) tobacco for pipes, occasional melons, calabashes, and hot peppers. Toward the end of the rains, onions, sweet potatoes, nightshade, and other vegetables (including more peppers, are planted). Hand-watered tobacco (for snuff) commonly succeeds onions.

In this area of 500-600 mm average annual rainfall, Dogons without an assured water supply must carefully gauge the propitious moment to sow their

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4 In my own garden I have successfully grown radishes, lettuce, cabbage, leeks, carrots, and tomatoes and have been besieged by requests for seeds which are never available at the village level and only occasionally in the regional capital, Mopti.

major cash crop, onions. For the individual gardener, to sow early to reap a harvest when onion prices are still at a high; to sow too early in the face of continuing rains (which may cause water-logging of gardens and plant damage) is to face a possibly disastrous financial loss. Moreover, not to sow early enough in the season may preclude the maturation of the second crop (average growing time: 2 1/2 months per crop) as water supplies become short, as well as diminishing the chances of obtaining a good crop of onion sets for planting the next year.

In the village of Dourou, for example, villagers with garden sites along a stream and a series of faults about a half a kilometer north of the village, noting the lackadaisical rains of August 1976 (50.5 mm), began to put out onion sets during the week of August 29. The month of September, however, brought 100.8 mm, and the rains continued to fall until the end of November. Initially, some garden plots were flooded; freshly planted sets (i.e., the day before) were recovered from the mud and replanted but established plants yellowed at the tips and were later said to have given poor yields. In contrast, those villagers with gardens near the dam at Dourou were able to delay planting by almost a month as their water supply was more assured though still subject to eventual drying up.

The gardening season, then, is variable depending on the supply of water available. In the subdistrict of Dourou, gardening this growing season was well under way by September; by the end of October, the first harvests came to market (at 100 MF/kg, or ca. 20¢ US) and by November 5, great piles of onions clogged the marketplace, driving the price down to 60 MF/kg. At the same time, in the subdistrict of Sangha the onion season was barely under way as water supplies do not run out as rapidly, if at all in some places.

Seasonal work load for Dogons who farm millet on the plateau as well as on the plain is heavy from June to August; men, women, and children are occupied in the fields from morning until dusk. Distances are so great that people

working on the plain do not return to the village every night but sleep in straw huts erected in the fields. Just as the second weeding of millet is completed, it is time to begin planting onions; when planting is finished, little time remains before the millet must be cut and stacked in the fields for drying. At this period, farmers must divide their time between onions and millet (at a time when onions need fertilization, weeding, and more water than at the start of the growing season). During November and December, millet is carried on foot or by donkey to the village, one or two bundles at a time. A farmer, for example, may water his onion garden half a kilometer from the village at 6 AM; finishing this, he will an hour later return to his house and prepare to walk or ride his donkey 12-20 km down off the plateau to the Seno Plain to carry back what millet he can, returning before nightfall. He may be accompanied by other household members, especially young males. Transporting millet is perhaps the most tedious and time-consuming of the farmer's tasks; each bundle (which contains from about 300 to 900 heads of millet) must be meticulously assembled and fastened with fresh strips of bark (which must be gathered and cut each time) to withstand the trip to the village. This aspect of farming work is not usually completed before January. As attached bundles are first put on rooftops for further drying, grain is not all in the granaries even by February. Meanwhile, onions are at their peak, requiring harvesting as well as watering of the remaining plots with every dwindling water supplies. Late in the onion season, faults which are 4 meters deep may have as little as 3-4 cm of water in them at times; later, water trickles into the muddy bottoms again from subsurface sources and there may be up to 20 cm or more periodically. At this time, gardeners literally spend all day at the gardens, eking out as much water as they can for their remaining onions.

Following the onion season, men occupy their time with basket-making. The sturdy Dogon baskets, made of reeds, leaves, bark, and tree roots,

are essential household and farm items (and sell for 500-600 MF apiece at the market--ca. $1. US) throughout the region. By late April or May, the millet planting season is again at hand.

Women work in the millet fields for their husbands and their husbands' lineages; women do not have the right of ownership of land. In return for their labor, they receive one bundle of millet from the harvest which they process into such things as millet cakes or millet beer to be sold at the market. In the subdistrict of Dourou, women do not garden; in the subdistrict of Sangha, they do. The reasons for this difference are as yet unclear; however, the availability of water and the subsequent land areas which can be exploited appear to be a prime factor. Women in Dourou say that they couldn't possibly take on gardening in addition to all their other responsibilities--gathering firewood at distances of 2-10 km (sometimes a 3-4 hour trek), pounding and preparing millet for two meals a day, carrying water, laundry (although, interestingly, Dogon men wash their own clothes), processing foodstuffs for market trading, and child care. One village (male) councilor, when asked about the possibility of women gardening, stated that if new garden areas could be created (by the construction of a dam proposed by the villagers), "it would be good" for both men and women to have cash incomes. But, he added, it would be necessary to do something about "eating." Currently, people do not eat a breakfast before going off to the fields or gardens. The first meal of the day is eaten when the woman has finished pounding and cooking about 10 or 11 AM. If the menfolk are off in the fields, women carry the food to them--unless they are down on the plain, in which case men have taken ground millet to mix with water with them. It is clear that women could not prepare food as it is presently done as well as tend to gardening in the early mornings. At the same time, with a cash income, a woman could purchase wood from others (wood is offered for sale on a limited basis at individual houses) and would not need to spend her time scouring

the bush for wild foodstuffs to process into market goods so that she can buy food for her family.

From the ecological point of view, it should be noted that a large part (if not the largest part) of wood consumption is not for household food preparation but for market-related preparation of millet beer, local "couscous" (steamed ground millet and peanuts), millet cakes and so forth--activities which are necessary for the individual woman as she has no other cash income.

It is forbidden by law to cut fresh wood in Mali, but the village level is far removed from the administrative eye. Observation shows that although women do gather dry, dead wood in the bush, they also chop living brushwood which provides ground cover on the Séno Plain. Moreover, men chop branches and saplings to bring back to the household compound for animal consumption during the night; the leaves of some of these trees and bushes are prepared as compost for onion gardens.

E. Onion Gardening

In the Dogon area, all land is under lineage control, even rock surfaces. As onion gardening can only take place near water sources, use rights are accorded by the land owners to the population at large; however, during the rainy season, it is only the owner who plants millet in areas where onions will later be planted. General use rights appear to have been established for a very long time in Dourou--that is, the same borrowed land has been used by the same lineage perhaps for some generations. At the same time, use rights to the borrowed land can be extended to a second party--hence the fragmented nature of garden holdings. Use rights can, therefore, be permanent or temporary but ownership is unaffected.

In the study population, every adult male (except those too infirm)

gardens in addition to farming millet; some males also have part time activities (e.g., on market day once every five days) such as trading imported commercial goods, butchering, repairing rubber sandals or bicycles, making and repairing wire sieves, weaving, and working as "middlemen" in the onion trade. Juvenile males may also have their own onion gardens.

Gardening, itself, is carried on by the male members of a kinship group; a man, his soms, and his grandsons (from about age 8 onward) work communally to put out onion sets, weed, water, and harvest. Each individual, however, has "his" personal onion plots from which he keeps the proceeds. Total garden areas in cultivation vary throughout the season--gardens are sown in stages and harvested in stages; one garden area may be abandoned in mid-season (usually due to lack of water), half of a garden site may be resown, or a totally different site may be sown for the second crop. After harvesting one area, a gardener may plant tobacco instead of a second onion crop in the same spot. An initial survey of total holdings yielded a range from about 25m^2 (usually children) to as high as 700 m^2. Computations are incomplete, but most holdings appear to be less than 200 m^{2}per individual; however, as indicated above, surface areas may be augmented or decreased as the season progresses.

In the area of Dourou, labor is not hired to work in gardens, but in the area of Sangha, where garden areas are larger, labor is sometimes hired.

F. The Cultivation of Onions

In preparation for planting, the garden plot soil is hoed. Then, onion sets--by definition, "any small dry onion bulb, usually less than 1 inch in diameter" (Jones and Mann, 1963, p. 108) are pressed into the loose soil, leaving the neck of the small bulb exposed. By the time a plot is fully planted, it is dotted with bulbs in a random pattern, and bulbs are spaced about 5 cm apart.

Soil depth in plots constructed on rock surfaces can vary from 8 cm to 15 cm, or more.

With rainfall or light watering, the onion bulb puts out its first sprout--the so-called "loop stage"-- in three days. At about the 15th day (farmers keep track of time by the five day market week), compost[5] is added around the base of the plants as a type of mulch. Depending on plant growth, more mulch, or in some cases, chemical fertilizer, may be added later.

Onions are hand watered with large calabashes (in other areas, two gourds--one held in each hand--or clay water jars are used) which hold from 7 to 25 liters of water (most hold about 15 liters). Water is dipped from the water source, and the open calabash is held with both hands (some farmers have refined their calabashes by adding wooden side grips to the edges for easier carrying) as the farmer traverses the distance--sometimes up to 40 m--from water source to garden. As the onions grow, farmers increase the amount of water applied to each plot. Random counts of plant populations in five widely separated areas yielded an average of 91.2 plants/m^2. As plants mature, garden plots are completely covered with onion tops--no soil areas are visible outwardly--and garden areas become expanses of dark green.

Weeds are removed during the early growth stages, and the soil areas around the bulb are aerated by hoeing with a narrow implement with a straight blade about 1 cm wide. Weed overgrowth is attributed by farmers as being due to "too much" compost applied around the plants.

The onions grown appear to be remarkably disease resistant. In

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5 Compost is a mixture of animal manures, decomposed leaves and straw, human and animal urine, and ashes. Specific (as yet unidentified) leaves are sought out for composting, and bat manure as well as the manure of the rock dassie are sought but are in short supply.

other years, onions have been attacked by small (unidentified) "green worms," according to the people; these worms are said to attack the leaves and kill the plants. Other pests include rats, which cause damage in the gardens, eating hot peppers as well as onions (gardeners set out traps to catch them) and the local sheep, goats, and cattle which browse in the gardens whenever they have a chance. After the millet harvest, sheep and goats are allowed to roam free without shepherds; although young boys take daily turns watching the gardens, they are not always vigilant. Dogon cattle are herded by one local Dogon family, but at least on one occasion, they were left to roam unattended and trampled as well as consumed part of one garden area (no compensation was sought as both parties were relatives).

People complain most often about the damage caused by the rains. Some farmers attribute the yellowed leaves thus caused to rainwater running over the hot rock surfaces of garden areas; the hot water is said to "burn" root structures of onions in shallow soil. One farmer states that he is going to augment the soil depth of his gardens next year to avoid this problem. It is possible that the yellowing of tops is, in fact, due to too much water; Jones and Mann (1963, p. 129) observe that "the foliage of over-irrigated plants has an unhealthy yellowish color" and that over-watering (as well as under-watering) may lower yields of onions. It is also a possibility that leaching of minerals may occur during the rains. Nitrogen deficiency, for example, may cause yellowed or greenish yellow onion leaves "if the season is exceptionally wet, the soils poorly drained... symptoms are more likely to develop where plants are crowded" (ibid, p. 131).

When onions are mature--that is, the tops fall over--Dogons cut and stack the onion tops. Piles of onion leaves are then pounded with stout, club-like tree branches to break down their leaf structure. Afterwards, the leaves are manually formed into 20-25 cm balls (about the size of an orange), the green liquid

fraction being expressed and allowed to run off along the surrounding rocks (cattle may later lick up the dried juice). Onion balls so formed are dried in the sun for about 10 days and sold at market.

A day or so after the tops are cut (usually the day before market), onion bulbs are dug up with a small hoe and piled at the edges of gardens. They are then carried to market in sacks or baskets and sold by weight. Alternatively, especially if the onions are very small (e.g., having been pulled up before maturity due to lack of water supplies), bulbs may be pounded in a mortar and made into tiny dried balls. In addition, both leaves and bulbs can be pounded together and dried in either of two sizes. Dried onion balls are sold by the piece.

The onion bulbs grown by Dogons are notably prolific. The onions, which resemble shallots (the exact variety is as yet unidentified), are composed of numerous cloves. For each original onion set planted (some farmers separate the cloves before planting and others don't), 3 to 27 cloves (5-6 average) may be harvested. Dogons in the village of Nombori grow a different, larger variety of onions from seed. In translation, these are called "white people's onions," as are other Allium varieties such as garlic. Dogons are well aware of the use of seeds and seedbeds, but prefer the shorter growing time afforded by sets (about 4 months for seeds and 2 1/2 months for sets), although sets are more expensive than seeds. By using the asexually propagated sets, Dogons avoid the often thorny problems of onion seed multiplication.

G. Conclusion

In many ways, Dogons have learned through practice what scientific inquiry confirms. The onion, for example, has one of the most limited root systems among the vegetable crops and "fills the soil poorly because of its sparse branching" (op. cit., pp. 51-52), making it a most perfect plant for the limited soil

areas of Dogon gardens. Environmental factors which strongly affect the development of the onion plant--temperature interacting with day-length (or photoperiod)--are opportune at the latitude north of the equator where the Dogon are settled (ibid, p. 99).

Such Dogon agricultural practices as the close spacing of onions allow Dogons to exploit their marginal water resources to the maximum within a very tight time frame, while, at the same time, allowing them to maximize yields. It has been found, for example, that "onion plants start bulbing sooner and mature 3-4 weeks earlier when they are grown crowded in the row...than when they are spaced for the production of large onions" (ibid, p. 103). Trials have shown that for growing (large) onions, the best spacing is 3-4 inches in the row; "for each increase in spacing, there was almost always a decrease in yield per acre" (ibid, p. 125). Whether these data are applicable to the Dogon variety (which, for one thing, is not grown spaced in rows) is not known. Nevertheless, the notable success of onions in the region suggests that fortuitously or otherwise, Dogons have hit upon just the right plant for their environment. Moreover for economic purposes, they have a vegetable product that stores well and which can be successfully dehydrated for even longer storage--an absolute necessity considering the extremely poor road conditions and the distances that onions are shipped (dried onion balls are shipped as far away as the coastal countries of West Africa). Dogon onion products are noted for their pungency, and although advertising has not yet come to the Bandiagara Plateau, it cannot be overlooked that onion balls are marvelously convenient to use; no peeling or cutting is necessary, only as much as is desired need be used at a time, and the onions can be directly pounded--as is the Malian custom--in a mortar with the other sauce ingredients prior to cooking.

The success of the Dogon onion venture, though another facet of the ingenuity and sheer tenacity of the Dogons, is based purely and simply on economic

need. The limited soil areas of this harsh Sahelian environment severely restrict grain production capacities. Dogons of the plateau have no other recourse to feed their numbers but to continue to do what they have done so well for generations--to grow onions so that they might buy millet.

DOGON CEREALS PROJECT: THE MARKET SYSTEM

Riitta K. Eskelinen

February 20, 1977

The Dogon, subsistence farmers of central Mali, occupy the rocky plateau and cliff areas of the region of Bandiagara and the adjoining sandy Séno Plain. A symbiotic relationship between the two geographical areas is reflected in the marketing system; however, the Dogon also participate in a larger national and international trade network. This report, based on observations in the area, discusses details of the market activities.

The Market System

As indicated by Figures 1 and 2 and Table 1, market products[1] flow within regional spheres. In the study area on the eastern edge of the Bandiagara Plateau, for example, two major village markets--Dourou and Sangha--are foci for regional as well as local trade. In the plateau area, markets rotate on a five-day basis,[2] and on any given market day, an estimated 1800-3000 people[3] will attend one of these two markets. In addition, numerous small local markets are held, again in rotation, in villages on the plateau and at the base of the cliff or escarpment areas. The number of people attending these markets may range from 20-100 people, the prime purpose being to provide millet beer and the accompanying meat for males. Women may drink millet beer at these markets, but usually come

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1 Lists of market products can be found in the annexes.

2 The market rotation is calculated on the basis of the Dogon five day week; a market held on Wednesday, e.g., will next be held on the following Monday and so forth.

3 Market attendance varies with seasonal work load and the coincidence of various markets on the plateau and the plain.

Figure 1.

MARKET SPHERES

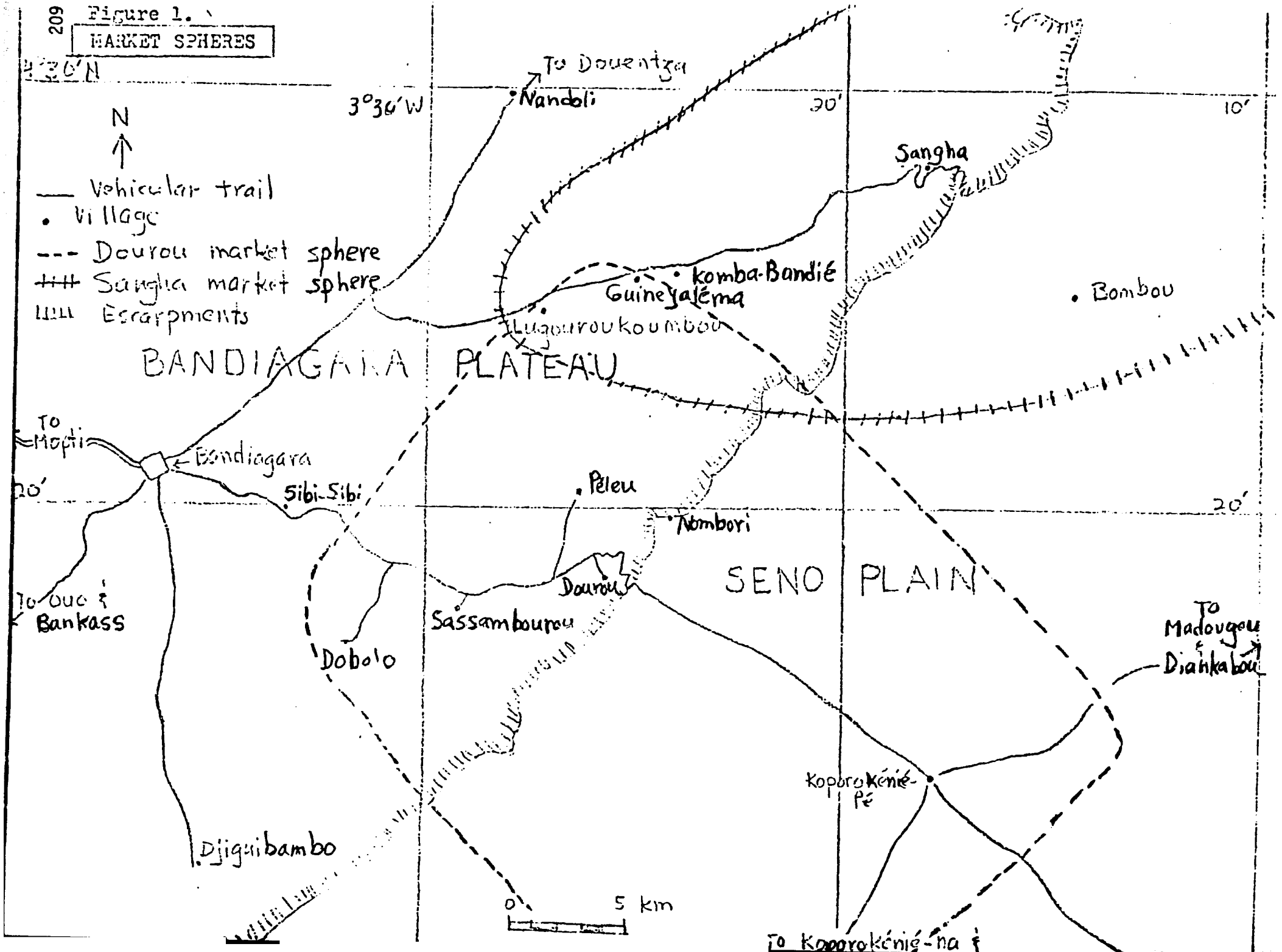


Table 1.

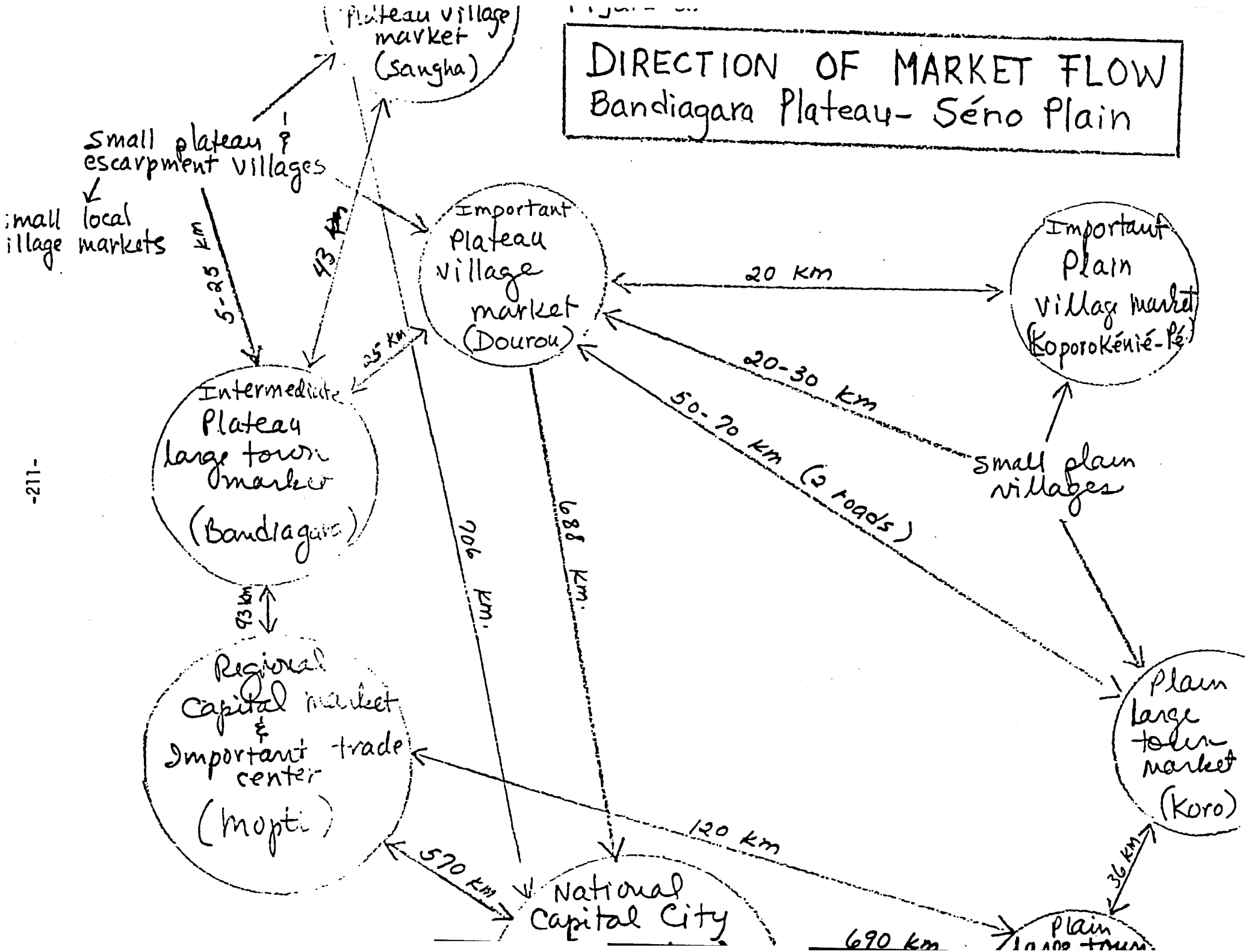
Direction of Market Flow, Subdistrict of Dourou

Plateau: 5 day rotating markets (except Bandiagara--fixed market Monday and Friday).

Plain: Fixed market days

Exports		Mode of Transport
1. Plateau Village (Dourou) Capital (Mopti)	→ Plateau Town (Bandiagara) and Regional	
	Onions (fresh and dried) Sorrel grains Tomatoes (minor export) Tree pitch " "	Market truck Mobylette
2. Plateau Village	→ Plain Villages and Towns	
	Onions Other vegetables Tobacco Dried fish	Foot Donkey Bicycle
3. Plateau Village	→ National Capital (Bamako)	
	Onions	Rented truck

Imports		
1. Regional Capital	→ Plateau Town and Village	
	Dried fish Rice Sea salt Slabs of desert salt Kola nuts Manioc Citrus fruit Industrial goods Kerosene/gasoline/oil	Market truck Mobylette Bicycle
2. Plain	→ Plateau Village	
	Millet Sorghum Pulses Industrial goods (via Upper Volta)	Foot Donkey Bicycle


DIRECTION OF MARKET FLOW
Bandiagara Plateau- Séno Plain
Plateau village market (Sangha)
small plateau & escarpment villages
small local village markets
5-25 km
43 km
Important Plateau village market (Dourou)
20 km
Important Plain village market (Koporokénié-Pé)
25 km
20-30 km
50-70 km (2 roads)
small plain villages
Intermediate Plateau large town market (Bandiagara)
93 km
706 km.
688 km.
Regional capital market & Important trade center (Mopti)
Plain large town market (Koro)
120 km
570 km
36 km
National Capital City
690 km
Plain

to trade gathered fruits, grains, and whatever vegetables might be in season. There are few industrial products at these local markets other than the ubiquitous paper-wrapped Malian candies (which taste like mentholated cough drops), matches, and brown soap. Some so-called "markets," in fact, are merely assemblages of drinking and meat-eating males at which one or two sheep or goats have been slaughtered. In the area of Dourou, such local markets are held at Nombori, Guimini, Pelou, Korou, Konsougou, and Doundiourou.

The town of Bandiagara (population 6,000) provides a third market sphere in this area of the plateau; other important market towns (e.g., Douentza) exist to the north. Not only does local trade from surrounding villages flow into Bandiagara on the fixed market days of Monday and Friday, but Bandiagara is also an intermediary stop in the market flow between the Dourou and Sangha markets and the regional capital of Mopti, which is the terminus for trade from other important areas of Mali such as Bamako, Ségou, and Sikasso.

In addition to the regional trade networks, Dogons of the plateau, who raise onions as a cash crop, take their product directly to the national capital, Bamako, where a specific unloading area and lodgings are maintained for onion traders from Dourou and Sangha.

The Marketplace

The marketplaces of Dourou and Sangha closely resemble each other; both are located on rock outcrops adjacent to village areas. In Dourou, the market place lies immediately to the south of the quartier of Dourou-Nâ, one of three village quartiers separated by valley systems. Footpaths lead to the market area from surrounding villages and from the Séno Plain. Some of these trails involve an ascent of some 300-350 m from rock to rock along fracture lines of the cliffs, including the climbing of notched log ladders from rock surface to rock

surface. The one road leading to Dourou (and continuing down off the plateau to the plain below) from Bandiagara is, at best, an agreed-upon track across bare rock surfaces; by Land Rover, the 25 km distance takes 1 1/2 hours, by market truck, even longer, as all the passengers of the vehicle must descend at each grade. Although the road, constructed in 1953, is said to have opened up the area to trade, it can be said that trade takes place in spite of the road, which is one of the worst imaginable.

The marketplace, itself, is laid on an irregular, bare rock surface without shade. There are no market pavilions or structures of any sort other than a few leaf and straw covered shelters used by male traders; women sit in the open sun on rocks or small wooden stools to trade their goods, often nursing their babies at the same time. At the height of the market day--about 1-2 PM--the marketplace is markedly crowded; one must literally elbow oneself through the throngs of people crowding every space. Fruit pits and peels litter the rock surface; people spit and children wail and cry; emaciated dogs, tails between their legs, wander about sniffing for any morsel of food; sheep and goats make periodic passes at baskets of grains and onions, only to be soundly thrashed with sticks by the women; and the next day, vultures will pick away at the accumulated refuse.

Most goods are carried to market on foot; where there are burdens to be borne, women or donkeys bear them. Men commonly send their grains and vegetable produce to market on the heads of their wives and daughters and await the proceeds while refreshing themselves with millet beer, barbecued meat, and the companionship of their fellow men. From the Séno Plain, donkeys carry loads of millet and sorghum in its thrashed form in indigenous, tube-like sacks of coarse-woven cotton (three of which weigh 100 kg). One ancient 10 (metric) ton market truck wheezes its way to the Dourou market from Mopti, carrying passengers (at

1000 MF per head[4]) and dried fish, among other things.

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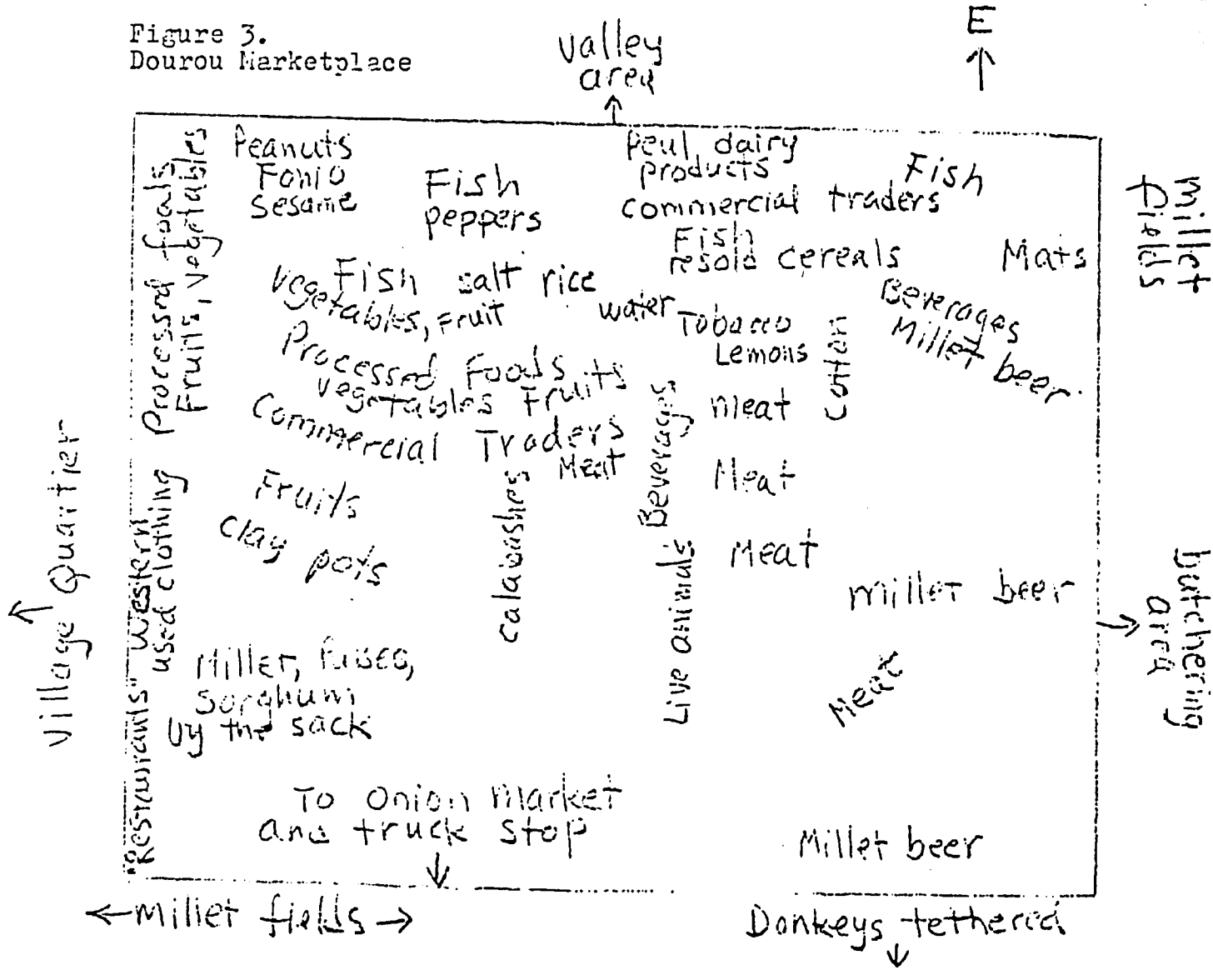
Figure 3.
Dourou Marketplace



Distinct market areas are indicated by Figure 3. A separate area some 100 m to the west of the regular marketplace is reserved for the onion and

4 The fare from Mopte-Bandiagara is 600 MF; from Bandiagara-Dourou, 400 MF (450-500 MF=$1 US).

general export trade. Here, traders from Bandiagara man about a dozen scales on market day to weigh onions, sorrel grains, and, on occasion, tree pitch (which is used in Mopti for sealing the seams of boats that ply the Niger River). The traders come from Bandiagara on "mobylettes" (motorized bicycles) or on the market truck and return the same night.

Two "restaurants" are operated in buildings adjoining the marketplace on the day of the market. For those with the money to spend, a plate of rice with meat sauce (or chicken) can be had for 100 MF.

Sellers and Buyers

As indicated by Table 2, men, women, children, and artisan caste groups sell items at market. Children begin early--by ages 5-8--to participate in the market system. Young girls carry water for sale in their miniature water jars; they are paid 5 MF[5] for a small calabashful, or, alternatively, they receive a small portion of whatever product the person buying the water has for sale (e.g., a few peanuts or tamarind pods). With their proceeds, girls buy little snacks of prepared foods, and they may donate a portion of their accumulated goods to their mothers. As girls approach adolescence, they begin to process foods for market sale, again donating part of the proceeds to their mother.[6] Young boys gather grass and hay for the sometimes up to eighty donkeys which are tethered at the base of the rock housing the marketplace and buy and resell pieces of candy, little "biscuits" (produced commercially in Mali, they resemble hard "oyster crackers"), citrus fruit, and articles of clothing. Boys keep (and reinvest) their profits.

Women carry on petty trading of gathered foods (e.g., wild fruits

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[5] In Malian currency, there is no smaller unit than five francs.

[6] Women in Dogon society are responsible for clothing and otherwise outfitting their female children; makes take care of male children.

Table 2.

Products Sold at Market by Sex, Age, and Caste Group.

(* indicates product sold on behalf of men by women; + indicates item imported from outside the region)

Males	Females	Males & Females	Children (Ages 5-10)
Live animals Meat Tobacco Rope Calabashes Cotton Woven cotton cloth Woven mats Flints Goatskin bags + Rubber sandals + Sieves + Industrial goods + Western-style clothes + Kola nut + Dates	* Vegetables * Fruits Seed oils Processed foods Beverages Wild fruits * Baskets + Rice * Pulses + Oranges	+ Dried fish + Salt * Millet * Lemons * Onions * Sorghum * Hot peppers * Fonio * Sesame + Manioc	Water (F) Grass/hay for donkeys (M) + Candy + Biscuits + Oranges + Clothing (M)

Artisan Caste Groups	Products Purchased and Resold by Females
Carved wooden bowls (M) Indigo-dyed cloth (F) Blacksmith items (M) Clay cooking and water pots (F) Leather goods (M)	Millet Sorghum Fonio Sesame Pulses

or seed pods) and processed foods--that is basic gathered or cultivated foods that have in some way been transformed (e.g., by drying, cooking, or peeling) into a more convenient form or into a directly edible form. These "fast foods" allow people who have walked for many kilometers to eat at the marketplace (most people spend up to 6 hours at the marketplace) and, moreover, provide variety and added nutrients to the overall diet of the population once every five days. People ordinarily eat a steady diet of millet paste with baobab leaf and dried fish sauce or simply ground millet mixed with water and tamarind flavoring. Vegetables, for example, are not a part of the daily diet. Male gardeners sell their produce rather than giving it to the family, and market prices of such things as tomatoes may preclude women from purchasing them for family consumption. Prepared market foods are a boon especially for women--who cannot usually afford meat for themselves and their children--as prices per unit of processed foods are seldom more than 5 MF, but profits are equally low.

In addition to trading gathered and processed foods, women also buy and resell grains and pulses as well as such imported foods as dried fish, rice, and salt.

Table 2 lists the products sold by men, which, for the most part, are also the products bought by men. However, women do purchase calabashes, rubber (old tire inner tube) sandals, sieves, and lengths of printed cotton cloth. Dogon women's standard garb--an indigo-dyed cotton cloth wrapped as a skirt--is sold by an artisan caste,[7] as are the essential household products, wooden bowls and clay pots.

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[7] A recent indigo shortage in the area appears to have been caused by the British manufacturer's dwindling supply due, according to radio accounts, to an unprecented British demand for denim clothes. Caste groups in the Dogon area were forced to revert to using wild indigo gathered by Dogon women and, finally, to cease dyeing operations altogether until more commercial indigo arrived. In the meantime, caste women were without income to feed their families.

In addition to Dogons, approximately five Peul (Fulani) women regularly sell a type of buttermilk and butter balls at the marketplace. Peuls keep cattle and inhabit areas of the Séno Plain but have few dealings with Dogons of the plateau.

Prices

Market prices vary little from month to month for most products, although seasonal variation in grain prices reflects supply and demand. At harvest time, 100 kg of millet can sell for 3,000 MF (market prices are subject to bargaining), while during the hot season, the same amount might cost up to 4,500 MF. Similarly, in October, for example, 100 kg of fonio may sell for 1500 MF; during the dry season, 2800 MF. Grains at the market are frequently sold by small calabash measures; the price is always 5 MF per measure but depending on the quantity of grain at market, the seller uses either a smaller or larger calabash.[8]

Everything from sesame to cowpeas is also 5 MF per measure, the only exception being imported rice--definitely a luxury food--which costs 25-50 MF per varying size measures.

Processed foods are also 5 MF per pile, slice, or piece. Vegetable products, however, tend to be more costly. Representative items follow:

2 ears corn/25 MF (cooked -- 1 ear/15 MF)
4 sweet potatoes/25-50 MF
4 tomatoes/25 MF
1 manioc/25-40 MF
4 nightshades/25 MF

Gathered fruits cost 5 MF per pile, the number varying with the quantity at market. An imported orange, on the other hand, costs 20-25 MF, while locally grown papayas cost 50-200 MF. Three bananas of local origin cost 25 MF.

Beverages of all sorts cost 5 MF per liquid measure.

Meat is far and above more expensive than any other food item. The

[8] It has not yet been possible to weigh various unit items due to lack of an appropriate scale.

least expensive meat is a stew of odd parts (innards, etc.) which costs 50 MF per small measure. A barbecued leg of lamb can cost 600-800 MF; a side and ribs, 600-1300. A small chunk of beef with scraps of fat costs 100 MF (uncooked).

Prices for some industrial goods are included in the annexes.

The Onion Trade

The onion trade dominates commerce on the plateau. The directions of market flow are indicated in Table 1. As mentioned earlier, traders come to the Dourou market from Bandiagara and Mopti to buy onions. Permanent scales are set up in the onion-selling area of the market; fresh onions are bought by the kilo, while dried onions are bought by the piece.

By 1 PM of a typical market day, the onion market is crowded with up to 700 people, and huge piles of onions cover the ground. Women and some men carry onions in baskets or sacks from the surrounding villages--all the onions, however, belong to men (women receive a small portion of the produce they sell as compensation or else some other needed product, such as a basket, at some later time). The onion traders employ local villagers as permanent "middlemen;" these individuals circulate among the crowd, drawing people to one trader's specific area and scale. Middlemen are given cash by the onion trader in the morning; with this money, middlemen pay the onion sellers directly. The price paid per kilo varies from individual to individual, depending on what the middleman thinks the market will bear, and price changes throughout the day. The onion market is so congested that sellers have little opportunity to "shop around" for the highest price; moreover, women cannot spend too long at the onion market as they must also carry on their own trading and make their own purchases. In addition, sellers tend to go to the same middleman as it is someone they know. At the same time, the trader, himself, weighs and pays for onions as people approach his scale.

The onion basket is placed on the scale; the buyer subtracts what he wishes to compensate for the weight of the container and then calls out the number of kilos and the price he will pay for the whole lot;[9] the seller may accept or reject the price but no bargaining occurs--if the seller refuses, thinking the price is too low, he or she simply picks up the basket and moves on.

At the end of the selling day before the market truck leaves for Bandiagara and Mopti, an "official" onion price is agreed upon by the onion traders on the basis of the total volume of onions bought that day. The middleman's profit, then, is the difference between the official price and the various amounts paid per kilo during the day. The middlemen at the Dourou onion market are from the village of Dourou, itself. Accordingly, farmers from Dourou reap the benefits of kinship amd amity; although they may have sold their onions in the morning, they are not paid until late afternoon when the official price is set, and they receive the higher price per kilo.

Onion prices vary from market day to market day as well as seasonally. In September 1976, for example, a kilo of dried onion sets cost 150 MF (no fresh onions were available at this time). In

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[9] It goes without saying that villagers, especially women, cannot often read scales and must accept what they are told. On one occasion, a trader was observed to call out a weight 5 kg less than what showed on the scale, and middlemen in their more candid moments admit to increasing their own profits by this method.

Annex I

Products Available at Market

Grains and Food Grain Legumes (Pulses)

Millet
Sorghum
Fonio
Corn (only in season in limited quantities)
Cowpeas
Groundnuts
Bambara nuts
Sesame

Cultivated Vegetables and Fruits (in season)

Onions
Sorrel
Nightshade
Hot pepper
Tomatoes
Okra
Garlic
Sweet potatoes
Squash
Melons
Papyas
Mangos
Guavas
Bananas

Wild Fruits, Seed Pods, Nuts, and Leaves (seasonal variation)

Parkia biglobosa, African locust bean
Lannea acida, *sã*, *pegué*
Dialium guineense, tamarind
Fandolphia florida, *fausse liane*
Adansonia digitata, baobab
Balanites aegyptiaca, desert date
Spondias mombin, yellow mombin
Vitex cuneata, blackplum
Diospyros mespiliformis, custard apple
Combretum aculeatum, *bi*
Borassus aethiopicum, African fan palm
Butyrospernum parkii, shea

Imported Food Items

Dried fish
Rice
Manioc
Sugar
Citrus fruits (occasionally)
Salt

Annex II

Processed Foods Sold by Women at Market

1. Millet beer
2. Wild "grape" juice (fermented and nonfremented)
3. Ground peanuts and cooked sorrel leaves
4. Round millet cake fried in oil
5. Oblong millet flour cake
6. Cracked Bambara nuts
7. Boiled Bambara nuts
8. Cooked millet flour balls
9. Local "couscous" (ground peanuts and millet with oil)
10. Fermented sorrel grain balls
11. Locust bean flour fritters
12. Fermented locust bean balls
13. Peanut oil (hand-expressed)
14. Sesame oil " "
15. Boiled fan palm fruit slices (only in season)
16. Boiled sweet potatoes " " "
17. Boiled winter squash slices " " "
18. Peeled tamarind pods
19. Locust bean flour
20. Dried wild "grapes"
21. Dried baobab leaves
22. Boiled corn on the cob (only in season)
23. "Potassium" lumps from burned millet stalk and fonio hay ashes
24. Local soap (nonOedible)
25. Shea butter

Annex III

Prices of Some Industrial Products Available at Market

	Mali Francs (450-500 MF=$1 US)
Small kerosene lamp	1100
Kerosene	225liter
Flashlight w/2 batteries	1200
Matches	20/box
Soap	150/bar
Plastic thong sandals	1000
Envelope	5
Pen	75
Pencil	50
Batteries	125-150/ a piece
Cigarettes	150-250/pack
Razor w/mirror	200
Bicycle tire	2600
Tire patching glue	150/tube
Inner tube	1000
Razor blade	10
Safety pins	10/3 pins
Sunglasses	1200-1300
Length of printed cotton cloth	1200
Socks (nylon)	175
Head scarf	500
Sewing needle	25
Colored bead necklace	150
Insecticide (unlabeled ? DDT)	25/small packet
Sugar 2 cubes/5;	500/kg
Candy	10/3 pieces
Biscuits	110/package
Instant coffee (Nescafe)	350/50 g
Transistor radio	10,000
Rubber inner tube sandals	125

DOGON AGRICULTURAL SYSTEMS: SOCIOLOGICAL ASPECTS RELATING TO DEVELOPMENT INTERVENTIONS

by

Riitta K. Eskelinen

June 1977

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Figure 1.
MALI REPUBLIC
WEST AFRICA

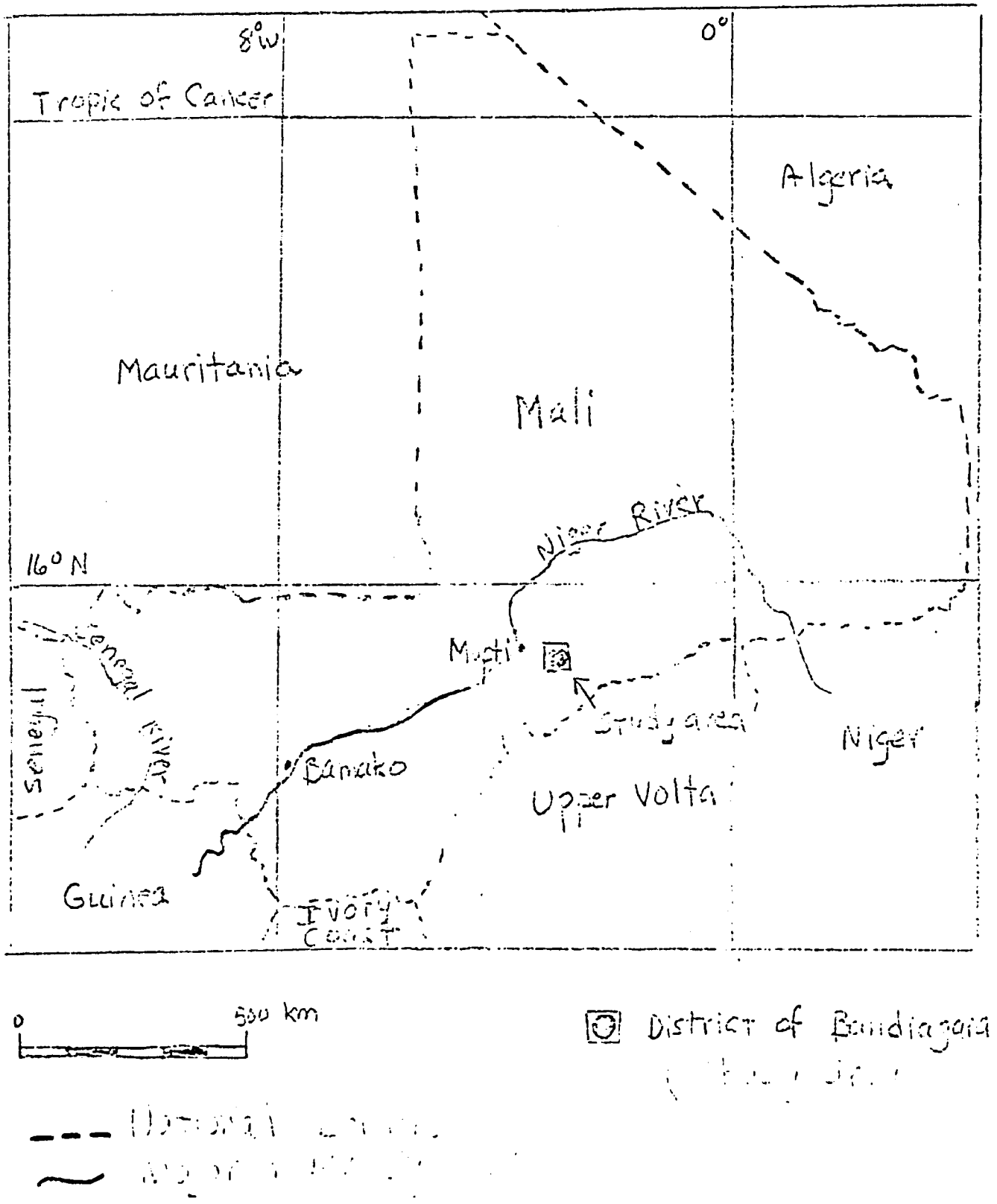
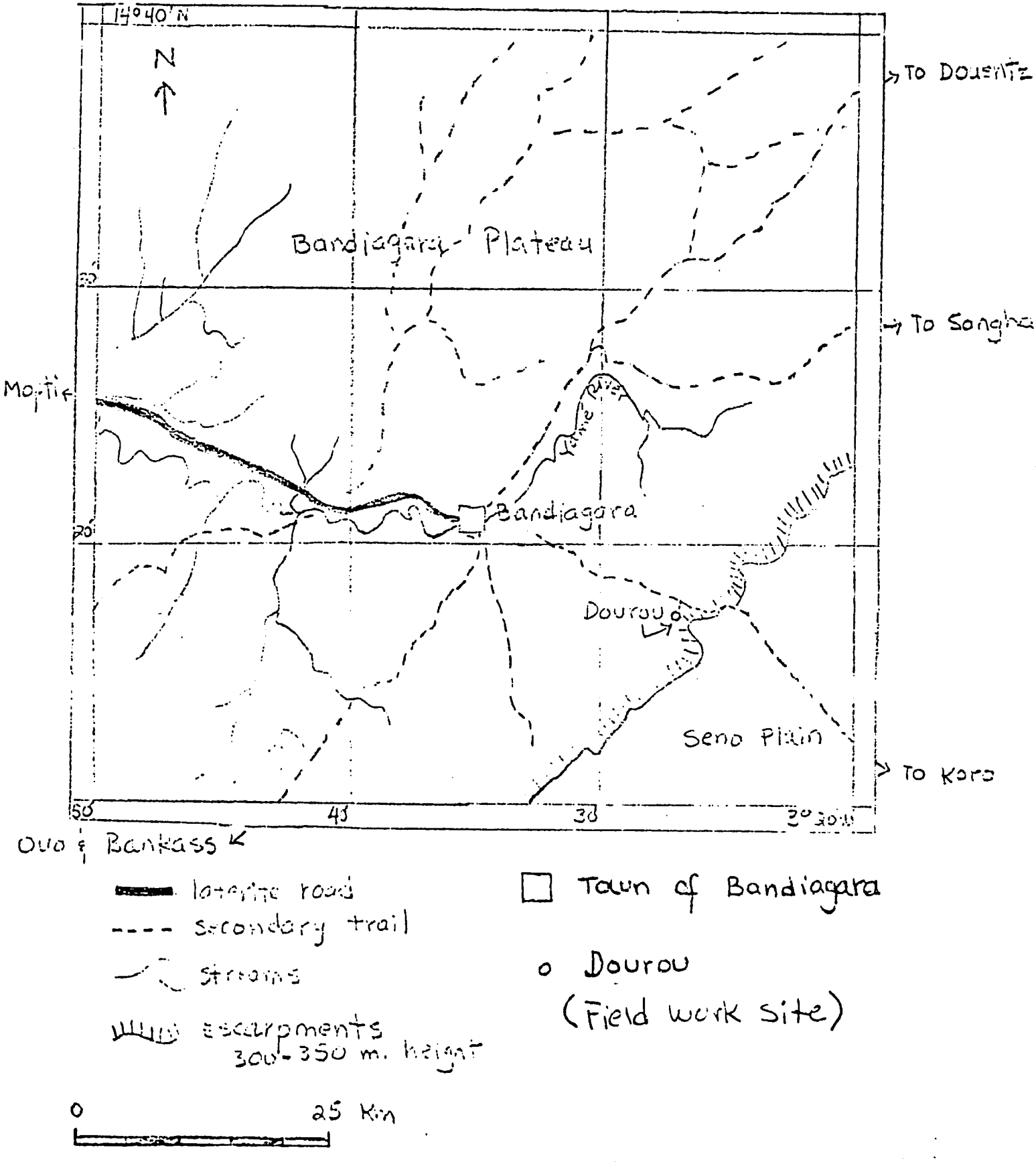


Figure 2.
DISTRICT OF BANDIAGARA
MALI REPUBLIC



Dogon Agricultural Systems

1. Introduction

This report, as those preceding it,[1] represents the sociological phase of an interdisciplinary research project on the agricultural systems of the Dogon peoples of the Republic of Mali. Originally designed as a team effort between an agricultural economist and a sociologist-anthropologist, the project as envisioned was unavoidably and regrettably delayed. Field work, therefore, began with the sociological phase alone.

The kind assistance of many individuals who helped in various ways during the period of field work is gratefully acknowledged here.[2] I especially wish to thank Dr. Michael M. Horowitz of the Department of Anthropology, State University of New York at Binghamton, who acted as Project Director.

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1 The description and details of the physical environment, social organization, nutritional and health status, market gardening, the market system, and demography which were presented in the preceding five field reports will not be repeated here except in the briefest sketch where pertinent.

2 I wish to thank M. Moriba Sissoko, Directeur de Cabinet, Ministère du Développement Rural; M. Sidi Kinta, Commandant de Cercle, Bandiagara; M. Amadou Traoré, Chef d'arrondissement, Dourou; M. Lassana Soumaré and M. Amadou Touré, Directeurs de l'Opération Mils-Mopti; M. Tiemalo Bouaré, Directeur de l'Action Culture Maraîchère, Bandiagara; M. Mory Danioko, Adjoint au Directeur de l'Opération Culture Maraîchère; M. Check Soumaré, Directeur de Génie Rural, Sevaré; and Mr. Ronald D. Levin, CDO, AID/Bamako and his staff. My personal thanks go to Samuel Guindo, Bourema Traoré, Jerry and Leslie Johnson, Hans Guggenheim, and Rosalie Fanale. Without revealing their identities, I wish to thank finally, but perhaps most importantly, the many good and kind Dogons who took me into their lives.

1.1. Research Objectives

The areas to which this final report addresses itself include discussions of the following problems:

(1) What are the strategies of production, distribution, marketing, and consumption that farmers employ in rainfed agriculture and in hand-irrigated gardening?

(2) Comparisons of measured yields of grains and vegetable products to previous estimations.

(3) What incentives and constraints exist to the expansion and diffusion of market gardening?

(4) What development interventions would be appropriate? What are the social implications of existing development projects?

(5) Could Dogon gardening techniques be practicable elsewhere?

1.2. Applicability of Research Findings

The information recorded here is oriented toward development workers and others interested in African rural producers. The approach is that of cultural ecology which studies populations in terms of their interrelationships with their environments.

The data presented here are of direct relevance to two development efforts, joint programs of the Malian government and USAID, which are currently underway in the Fifth Region of Mali: Opération Mils, which seeks to increase millet production, and Action Culture Maraîchère, which seeks to improve

market gardening on the Bandiagara Plateau.

This series of reports is based on observations made while living in a plateau village in close proximity to the cliffs and the Seno Plain. In this area, farming takes place on both the plateau and the plain. It is important to emphasize, however, that extremely diverse social and agricultural conditions exist; all observations made are not necessarily applicable to other areas of the plateau and plain.

2. The Agricultural Systems

The Dogon have long endured the rigors of living in a never certain Sahelian environment. Rainfall is irregular and unsure from year to year. Over time, some field areas are denuded and others are built up under the influence of water and wind. Dogons have come to understand the land as a changing, never static entity.

2.1. Rainfed Agriculture

In their dryland agricultural system of growing millet and sorghum, Dogons sow the grains immediately following the first substantial rain of the season. In the first of many strategies they employ to maximize production and to counter the vagaries of the climate, Dogons plant even if the rain seems premature. Less loss is perceived even if all the seedlings die, necessitating replanting, than if the risk is not taken and the rains become well-established without a guarantee of their duration.

In the traditional system of rainfed agriculture, grains are sown on hills which contain decaying organic matter from the weeding operations of the previous year.[3] Plant spacing on the plateau (where manuring is possible and soils are said to hold nutrients better) is very close; on the plain and in certain similarly sandy areas of the plateau, plant spacing is much wider, and farmers state that plants will not develop if they are too crowded.

Farmers observe the leaf cover of trees and the stage of development of the Lannea acida fruit to schedule such farming operations as carrying manure and compost to the fields prior to the rains. Sometimes, however, as in the spring of 1977, the first rain can catch the population unprepared with seed millet unpounded, grain bins still under construction and unthatched, and mud house roofs not yet reinforced against heavy rains.[4]

Dogons attempt to retard erosion on the plateau and on the talus slopes of the cliffs by partitioning fields with stones and, in some cases, terracing steep slopes and valley bottoms.

Other strategies of production include the use of crop mix, interplanting, crop rotation, fallow periods, and the green manuring, regular manuring, and composting referred to earlier.

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3 If during the previous year the land has been planted with fonio, a rice-like dryland grain, the soil is cultivated prior to sowing millet. If the land has been in fallow, underbrush and weeds are gathered into small piles throughout the field and are burned. The first year crop of cowpeas is planted among the ashes, and with weeding, hills of "green manure" are formed for the following year's millet.

4 The large numbers of dead birds visible following the rain storm were another indication of the untimeliness of the rain.

In addition, Dogons preserve the tree cover in their fields, a practice thought to enhance the fertility of soils.[5]

Farmers state that growing a mixture of crops--millet, sorghum, and fonio--provides variety in the diet and is a hedge against total crop loss if the rains fail. According to Dogon farmers, differential amounts of water are needed by these crops as individual grains are forming, but sorghum and fonio will survive drier conditions than will millet, increasing the likelihood of at least some yield.

The use of interplanting, crop rotation, and fallow periods[6] balances maximal land use with cycles of replenishment.

2.1.1. Importance of Livestock

The keeping of livestock--sheep, goats, cattle, and donkeys--is an important adjunct to the strategies of production employed by Dogon farmers. The manure of these animals is mixed with composted household refuse[7] and carried to the fields of the plateau. Obviously, farmers who keep a number of animals are at an advantage

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5 See, e.g., Jean Gallais, "Le paysan dogon," Cahiers d'Outre-Mer, 1965, Vol. 18, pp. 126-127.

6 On the Seno Plain, a fallow period of 8-10 years is followed by a crop rotation beginning with cowpeas (1 year), millet interplanted with cowpeas and/or sorrel (2-4 years), and fonio (1 year), after which the land returns to fallow again. The plateau crop rotation is of millet interplanted with sorghum and/or cowpeas (1-3 years) followed by fonio (1 year); the land is generally under continuous cultivation with the help of manuring.

7 This consists primarily of human and animal urine-soaked straw, poultry droppings, and household ashes. Given the conditions of scarcity of village life, there is no food refuse. Vegetables (with the exception of onions as flavoring) are not consumed as a part of household meals, so vegetables peels, etc., are seldom a part of compost. Fruits are consumed where they are found in the bush or at the market; peels are dropped in and around the village and are eaten by animals rather than being composted. Millet chaff is also eaten by animals and poultry but some may be added to compost. No use is made of night soil.

when it comes to manuring fields. However, animals are not penned in the household compound except at night due to lack of forage. A goodly amount of manure, then, is scattered about the village and its perimeters as animals roam at will, seeking food where they can find it. This manure is gathered by anyone wishing to do so.[8]

2.2. Gardening

The Dogon system of gardening is nothing so much as a reduced and refined version of the dryland agricultural system. Dogons have brought their keen knowledge of environmental conditions to bear on problems of soil management and water resource utilization associated with vegetable production. The methods of erosion control, terracing, and soil enrichment which Dogons have long employed in growing rainfed grain crops have been adapted to a smaller scale. Individual garden plots are generally small squares measuring about 1 m by 1 m, although garden sizes and shapes vary. Gardens are constructed on a number of differing sites depending on the topography surrounding water sources[9] and are hand watered. The most important vegetable crop is that of small, many-cloved onions which appear to be of a local shallot

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8 Children are often sent out to gather manure but it is gathered also by adults. Women gather dried cow manure to use as cooking fuel.

9 Gardens are constructed on flat soil or rock surfaces, on rock inclines, along the margins of streambeds and dams, and on terraced soil banks. As the rock plateau has no water table, rain water is the sole water source; it is collected from seasonal streams, fissures in the rock, dug holes in the soil, and dam reservoirs.

variety.[10]

2.2.1. History of Gardening

It is not known exactly when or how gardening began on the Bandiagara Plateau. Colonial accounts indicate that onions were a trade item in Bandiagara in the 1890s.[11] Elderly villagers state that their grandfathers cultivated onions; linguistic evidence suggests that onions predate the colonial era when many vegetable trials were conducted in the Bandiagara area.[12]

It is interesting to note that the Dogon are not the only peoples of Mali to grow onions in small, hand-watered square plots or to dry them for export. An agricultural report of 1905 describes these very same practices in Bobo villages of Fakala and adds that these onion gardens provide the principal wealth of the area.[13] In present day Mali, similar gardens exist among Bobo peoples between Ségou and Mopti. As informants state that onion holdings in the early part of the century were very limited on the Bandiagara Plateau--perhaps four to five garden plots per

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10 Other vegetables grown are tomatoes, aubergine indigène, or nightshade (Solam aethiopicum), hot peppers, sweet potatoes, sorrel (Hibiscus sabadariffa), and in very limited quantities, winter squash and okra. Dogons also grow sesame, groundnuts, and Bambara nuts (Voandzia subterranea) in some areas, as well as raising fruit trees, cotton, and tobacco.

11 "Mercuriale indiquant les prix des Aeurés et objets existant sur le marché de Bandiagara," Oct. 1, 1897, Soudan Français. Unpublished report in the National Archives, Bamako.

12 "Bulletin Agricole et Commercial, Poste de Bandiagara," 1893-1905, Soudan Français. Unpublished reports in the National Archives, Bamako.

13 "Rapport Agricole," Sept.30, 1905, Soudan Français. Unpublished report in the National Archives, Bamako.

farmer, the equivalent of 4-5 square meters--it could be surmised that information about gardening diffused from one area to another, perhaps during historical migrations, but that expansion of gardening was unfeasible on the plateau until later times. Colonial taxation undoubtedly was a stimulus to production. Informants state that environmental factors played a role in increasing onion production; following a severe drought prior to 1920, farmers are said to have begun planting more onions so that they might buy millet.

The construction of the first concrete dam on the plateau, in the area of Sangha, in the late 1940s was an important landmark in the diffusion of gardening. Being the best known of Dogon areas, Sangha profited early from a road and a school and exposure to a larger world. The remarkable gardens that grew up in Sangha showed other Dogons the possibilities of cash cropping in their areas, and the expansion of the road system in the 1950s stimulated a growth of gardening which continues throughout the region today. The construction of more than 20 small dams on the plateau has contributed to this growth.

The availability of markets for produce as an incentive to production cannot be overlooked. Historically, marketing in the Dogon area has been a case of buyers coming to the crop rather than the crop being sent to market. The Mossi peoples of Upper Volta, for example, had long come to the Bandiagara Plateau to trade[14] and, according to villagers, to take back donkey loads

of dried onions. Such trade is now largely restricted by the Malian government. Current market practice involves buyers coming to buy onions in larger village marketplaces on the plateau or at intermediary points on the road; onions are then shipped to urban areas by truck. An innovation of recent times is that of farmers, themselves, banding together with larger traders to rent space on trucks to ship their own onions to the capital city where they can sell them at higher prices. However, as the distance to the capital city is some 600 km, trade of this sort is not possible for farmers on a regular basis.

Market demand for onion products has increased on a national and even on an international scale. Moreover, it appears that the nationalizing influence of the state religion, Islam, which Dogons are increasingly adopting, is in part responsible for the direct participation of long-isolated Dogons in a wider market system.

3. Social Organization and Land Allocation

The Dogon are organized into patrilineal groups which are exogamous, and residence is patrilocal. All land, including rock surfaces, is owned by lineages, and ownership crosscuts village boundaries. Disproportionate land areas are controlled by some lineages but usufructuary rights are available to all farmers merely for the asking. Use rights may be permanent or temporary, and aside from verbal thanks, no recompense is paid for land use.

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14 "Bulletin Agricole et Commercial, Poste de Bandiagara," June 1893. Unpublished report, National Archives, Bamako.

On the plateau, inheritance and control of rainfed cropland is mediated through the ginna, or "great house" system of Dogon society. Elder males who occupy the "great house" of each lineage control land ownership and the redistribution of land rights among lineage males. The general consensus of farmers is that they have enough land to farm. Those farmers controlling large areas they cannot possibly exploit are under no compulsion to lend it all out to other farmers. A survey of the total land holdings of 26 farmers indicated that on the plateau, 89% of the land surveyed was under cultivation while 11% was in fallow; on the Séno Plain, 37% of the land surveyed was under cultivation while 63% was in fallow.

For subsistence grain crops, the land tenure system is not a constraint to increased production; inherited land is secure and usufructuary rights are easily obtainable without cost.[15-16]

3.1. Land and Water Rights in Gardening

As onion gardening can only take place near water sources, land tenure in gardening takes on the added dimension of water rights in some areas. In garden areas of the plateau, land use rights are accorded by the owner on a temporary or a permanent basis but only for the gardening season; the owner retains use

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15 Women participate in agricultural work but have no rights in land ownership or inheritance.

16 There is no evidence here of the practice of land inheritance reported elsewhere on the plateau in which all the land of a deceased male is kept by the individual's brother, forcing male children to leave the village in search of land elsewhere, usually on the Séno Plain.

of the land for planting rainy season millet. In the village studied, access to gardening land at the dam site was on the basis of geographical proximity and historical land use; farmers from the closer of the two major village quartiers gardened at the dam site where they had always had their gardens, while farmers in the more distant quartier--essentially a separate village--gardened along a stream and a series of faults.

Along dam sites and flowing water sources, water rights are communal. At sites where water holes have been dug or sub-surface water has been located in rock fissures and walk-in wells have been created, water rights belong to the individual or the group responsible for exploiting the source. During periods of water shortage when some wells are dry and other wells continue to receive water through seepage, water rights are stringently guarded and other farmers are refused access to this water for watering their gardens. Village drinking water supplies, however, are exempted from such policies.

The major constraint to the expansion of gardening is said by farmers to be the inadequate water supply; access to land is not an important consideration in itself. Under present conditions at the two major gardening areas identified above, 79% of all males age 15 and above (N=309) are active in gardening.[17]

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17 Women in this area of the plateau are not active in gardening as they are elsewhere where water supplies are more ample.

4. Organization of Work

Rainfed grain crops are cultivated by communal work groups composed of closely related households (e.g., a father, his sons, and their respective households or an uncle and his nephew) directed by the oldest male as well as by individual household units (i.e., a male and the women and children in his household).

In the communal system, households join together during the rainy season when agricultural work begins. During this period, the households concerned also prepare food at a single hearth, and the millet for this purpose comes from granaries where previous communal harvests are stored under the control of the oldest male. In addition to working in collective fields, younger farmers and their wives and children maintain smaller fields of their own; the harvest from these fields is retained by the individual household unit.

Individual farming units evolve as elders die, leaving a single son as a survivor (or if other sons have migrated), or as adult sons split off from the communal group to farm alone. In the village studied, communal agricultural groups were composed of two or three households but not more-even though an elder had additional sons in the village who conceivably could have been part of the communal group. Villagers attribute the splitting off of older sons from the communal group to personal disputes between father and son or among wives, but demographic evidence suggests that the reasons may be related to the total

numbers of people involved. A young farmer with more than one wife and a growing number of children not only is a drain on communal grain stores but also cannot hope to produce enough grain in his own small field to feed his household during the rest of the year; hence, the social mechanism of splitting off from the communal agricultural group.

4.1. Strategies of Production, Storage, and Consumption

The social organization of work reflects important strategies of production, storage, and consumption among the Dogon. These same strategies also relate to the maintenance of social control through the authority of the elders, an important consideration in terms of development interventions.

Strategies of production include farming millet in two disparate locales--the plateau and the plain. Under communal farming arrangements, older farmers can tend fields on the plateau close to the village while sending their sons to farm the distant fields on the Séno Plain, thereby decreasing risk of total crop failure while taking into account limitations of age. Elders, nevertheless, retain control of production, and the grain harvested is stored in their granaries.[18]

Seasonal agricultural work is accompanied by sharing of communal grain stores; during the rest of the year, each individual household provides its own grains. Millet stored in communal granaries is not consumed or the granaries even opened

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18 At harvest, one or two bundles of millet are distributed to each adult worker and to religious functionaries if the group is Muslim. Traditionally, women receive rights to the cowpeas which are interplanted with millet.

if it can possibly be avoided until the following rainy season. Stored grain, then, represents neither prodigious yields nor an actual society-wide surplus above and beyond the consumption needs of the population; stored grain is just another of many agricultural strategies mediated through the social system which seeks to diminish risk--in this case, the risk of famine.

Aside from communal stores, the amount of grain that can be carried over from year to year by individual farmers[19] is dependent on a number of factors, among them yields of the farmers, themselves, and yields of other producers from whom they seek to buy millet to augment their own supplies; in drought years, prices may be prohibitive. Yields, in general, are of course dependent on environmental factors (e.g., distribution and amount of rainfall, land fertility, crop depredations) as well as on demographic factors such as how much labor can be mobilized for agricultural work. The amount of grain that can be carried over is directly related to the availability of cash during the year to purchase millet. One farmer summarized the situation succinctly, stating "If you have cash, you buy millet; if you don't, you eat what is in the granary."

In addition, combined strategies of production and con-

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19 Of a group of 84 farmers, just over half (52%) farmed alone with their wives and children and were not affiliated with a communal agricultural group.

consumption include growing fonio, a much underestimated grain,[20] and cowpeas, the bases of two important local dishes, which farmers say serve to extend the household millet supply.

4.2. Organization of Gardening

In contrast to the growing of grain crops, gardening is an individual pursuit; in the geographical area studied, it is solely a male pursuit, women being excluded due to inadequate water supplies and, secondarily, to the patriarchal system which assumes that economic gain is rightfully the prerogative of males.

In gardening, work may be shared, but proceeds are strictly individual. A group of friends or relatives (brothers, father and son, etc.) may work together planting onion sets for each member of the group, for example, and such activities as watering gardens and pounding onion tops may be jointly undertaken. Male children provide a portion of the labor; boys 14-15 years of age begin to establish their own garden plots.

4.3. Implications of Social Organization and Work Organization

Dogon society is essentially nonstratified, one Dogon existing as precariously on the edge of subsistence as another. Few social and economic differences are apparent, and political power is diffused rather than concentrated. This grand societal design, however, denies the important contradictions and tensions

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20 Some observers suggest that fonio (Digitaria exilis) continues to be cultivated as it is the basis of historical rituals (Gallais, op. cit., p. 142). This view overlooks the fact that fonio will grow in poor soils which will not support millet (and so is planted during the final year of crop rotation before fallow) and is said to be more drought resistent than millet. In addition to being a delicious food, fonio provides a percentage of protein equivalent to an equal volume of polished rice or milled millet. It also provides more calcium than millet, sorghum, or rice and more iron than rice or maize. See, e.g., Toury et al, Aliments de l'Ouest Africain, O.R.A.N.A., Dakar, 1967.

which underlie Dogon society; at the root of these problems is perhaps the fact that hunger is an ever present fear. People ostensibly ha.e enough food for subsistence, but hunger is never far from the surface of consciousness and appears to manifest itself in social relations.

The contradiction in the society is that any gain made by an individual is likely to be countered with jealousy and bitterness on the part of others--even fathers are jealous of sons and vice versa. Such tensions would seem to have as their origin deep-seated anxieties regarding one's own ability to procure what ultimately is reducible to food; on a number of levels this is intertwined with tensions between young and old, between lineage authority and impulses toward individualism, and between those felt to have more material wealth and those without.

On the one hand, Dogon society dictates that one should be scrupulously egalitarian, meaning that one should not demonstrate one's wealth if only to escape social censure, yet the circumstances of scarcity dictate that one must try to acquire personal gain in any way possible. In the Dogon milieu, the egalitarian concept is one of form rather than content.

These tensions are reflected in the farming systems as farmers balance participation in collective labor groups with their own subsistence grain farming and cash cropping activities. The communal work groups that exist are far from the close-knit community effort that the term would imply. Collective work is a strictly regulated affair more often than not characterized by

tense interpersonal relations, extreme envy, and begrudging deference to age.

In terms of development interventions, it can be said that although communal work groups exist, they do not represent co-operative community efforts. Villagers, in fact, appear to be reluctant to perform cooperative labor as in road maintenance, for example, even though it is clearly in the local population's best interests to keep the road in some semblance of repair to keep the onion trade moving. In some villages where dams have been built, the dams have become partially or totally silted in, and communities have not acted to remove the silt which would be to their advantage. The reasons for this are unclear as villagers readily proclaim themselves prepared to work on any proposed dam building projects on the plateau. Undoubtedly, the anticipated wages involved play a part in this seeming contradiction, but it appears also that some of the explanation lies in the colonial overtones of the relationship between villagers and the governmental administration which oversees and, in fact, decrees such work as road maintenance.[21] There is also the simple lack of community organization needed to coordinate such work.

There is, however, the added dimension that Dogons tend to have what might be called a deus ex machina view of European intervention--that their difficulties and problems will be, and somehow should be, solved without much involvement on their part.

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21 Villagers are regularly called upon to provide free goods and services to civil servants. In exchange for their taxes, Dogons receive little in the way of services. Villagers subsidize the visits of all health teams and official delegations to the area and are harassed at their own local markets by police from distant administrative posts.

This attitude is perhaps as much a remnant of the colonial experience as it is a by-product of increased exposure to Europeans (and their very obvious material wealth and technological wizardry) through migration, increased tourism in the area, and the dam building projects which have been seen on the plateau.

Dogons have not survived their history without being shrewd and pragmatic tacticians. It would be to underestimate the Dogon as a people to conclude that their lack of concern about road and dam maintenance, for example, is a measure of their capacity for change and dynamic involvement in agricultural innovation and community development. It is more likely that Dogons have never seriously been included as communities in these sorts of projects and do not conceive of them as their responsibility. Moreover, the historical experience of forced labor, as in the road building projects, has not been forgotten by the people.

4.3.1. Existing Village Resources and Information Networks

In the village setting, existing resource persons and groups that could be approached while planning development projects include the village chief, the village councilors in each *quartier*, the *ginna*, or "great house" occupants who wield lineage authority, and mosque and church membership groups. Women are excluded from all village decision-making and political processes, and they are, of course, barred from the mosque. Local women's groups do exist under the auspices of the National Women's Organization, but they are poorly organized in rural areas and have no

activities other than those designated by local governmental officials. Women are best approached initially through their husbands in the mosque and church groups.

Information networks are wide-flung among the Dogon. Extensive travel takes place in the region; villagers travel to distant markets as well as to the regional capital of Mopti--some make periodic trips to the national capital.

Farmers are well aware of farming practices in other areas. They hear, for example, how rainfall has been or how the millet is coming along in other areas of the plateau or the plain, and they are keenly aware of market prices--even of commodities they would never buy, themselves. Farmers know the details of irrigation channelling in the unique topographical sites where it is practiced,[22] even though it is not practicable in their own village settings. Farmers know all about the hand-operated pumps available through the Catholic Mission in the town of Bandiagara[23] and are even attuned to agricultural trials conducted at the IRAT station at Koporokénié-Pé on the Seno Plain.

Moreover, Dogon farmers are interested in agricultural innovation--a finding which runs counter to "traditional knowledge" about the conservatism and resistance to change which supposedly

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22 The village of Kassa, located in a northern area of the falaise, is particularly well-known for its abundant water sources and gravity-fed water channels from which gardens are hand watered. Very minor and site-specific irrigation schemes can be found in other areas.

23 In the village studied, farmers are of the opinion that water supplies are inadequate to justify the purchase of a pump; the one farmer with a pump, who is also the local catechist for the Mission, abandonned its use after part of a season and plans to sell it in another village where water supplies are greater.

characterize subsistence farmers. They are tremendously interested in seeds and the possibility of growing new varieties of vegetables and fruits and say that they would certainly raise more were it not for the limited water supplies. Onions, however they may have been introduced into the area, just happen to be perfectly adapted to local conditions as they exist.[24]

It has often been remarked that agriculture represents one of the longest standing human experiments, and, in fact, farmers do experiment. Examples include the farmer who had heard of other farmers along the falaise replanting freshly harvested onions after only minimal drying and who decided to try it for himself (and with good success). Other farmers were known to experiment with fertilizers they had obtained through the market system, varying the amounts and determining the associated water needs; farmers also experiment with compost and vary the ingredients for rainfed crops and garden crops.[25]

These and many other accounts attest to the skill, resourcefulness, and ingenuity that Dogons bring to farming. If through accumulated wisdom more "scientific" methods can be introduced to the Dogon, there is no reason to expect that they will not be tried

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24 The growing of fruit trees is an example of the innovativeness of the Dogon; most have been introduced to the area by Dogons returning from migrations to other countries where papayas, bananas, oranges, lemons, guavas, and mangoes were more abundant. Many fruit trees, however, were lost during the drought years.

25 Farmers are not accustomed to working with fertilizers; one farmer was observed applying phosphate fertilizer to millet plants in the same manner as compost is applied--as a mulch, rather than working it into the soil at the root level. Farmers rank animal manures, considering sheep manure the best (other than bat manure which is hard to get), but avoid heavy manuring of garden soils as opposed to millet fields, preferring a lighter soil texture. Certain wild leaves are dried and added to garden compost.

and, if proven successful, accepted. But it would be to underestimate the Dogon to conclude that change and agricultural innovation can only come through development interventions.

5. Livestock Production

In the Dogon milieu, the raising of livestock is an important complement to farming. The strategies of livestock production relate to environmental and economic factors. As elsewhere in the Sahel, animal keeping, itself, raises important environmental issues.

The animals raised are sheep of the long-legged West African Fulani type,[26] goats of a similar long-legged desert ecotype, Zebu or humped cattle, and donkeys. Small numbers of chickens are also kept.

Sheep and goats provide meat for market consumption and ceremonial purposes (regular home consumption is nonexistent) and, of course, manure; they also represent an investment and a source of cash when it is needed. Local beef consumption is extremely low; cattle are primarily an investment and a source of manure. Donkeys are utilized as riding and pack animals.

The numbers of animals that Dogons keep on the plateau is one of the more closely guarded secrets of the society. Animals are taxable, and villagers are quite unwilling to reveal the numbers they own. Moreover, for reasons discussed earlier, Dogons do not care to make public what wealth they might possess.

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26 George B. McLeroy, personal communication. See also McLeroy, "The Sheep of Sudan: Ecotypes and Tribal Breeds," The Sudan Journal of Veterinary Science and Animal Husbandry, Vol. 2, No. 2., 1961.

It appears that some farmers have their animals, particularly cattle, kept in other villages; informants suggest that a man will not even reveal this information to his wife, let alone other villagers--as he grows older, he will confide the information to a son.

Counting animals is difficult as they are not penned and have free run of the village and its environs, spending only the night in the household courtyard. In the phase of field work which engendered the most ill will, accurate counts of the livestock in 29 households were obtained. The households could not be chosen randomly but are felt to be representative of the village.

Table 1.
Mean Numbers of Livestock per Household, Dourou, 1977.
N=29

Sheep	Goats	Cattle	Donkeys	Chickens
3.4	5.1	1.9	0.7	2.5

In the course of a demographic survey, villagers were asked how many animals they kept (with all due assurances of anonymity). As anticipated, the responses were of questionable accuracy with seeming underreporting the rule, the exception being that the numbers of donkeys reported appeared quite accurate. Of 240 households surveyed, 68% reported that they kept livestock and 32% stated that they had no animals. Some respondents were unwilling to differentiate between numbers of sheep and numbers of goats, so combined figures are presented here. However, goats outnumber

sheep where they are differentiated.

Table 2.
Mean Numbers of Livestock per Household as Reported by the Population, Dourou, 1977.
N=240

Combined Sheep & Goats	Cattle	Donkeys	Horses
3.7	0.6	0.5	0.01

It must be assumed that some error from underreporting exists in Table 2. At the same time, some error is likely in Table 1 due to the small sample size.

A rough estimation of the ratio of livestock to humans can be made by comparing the two sets of data collected. Raw survey data and extrapolation of data from Table 1 using actual population figures yield the following ratios.

Table 3.
Ratio of Livestock to Humans, Dourou, 1977.

	Reported by Population	Computed from Sample
Sheep & Goats	0.8:1	1.2:1
Cattle	0.1:1	0.3:1
Donkeys	0.1:1	0.1:1
Horses	0.003:1	-

The numbers of animals are subject to seasonal fluctuation, especially with regard to sheep and goats. The dry season figures reported here are likely to be lower than rainy season figures. Most lambs and kids appear to be born during the rainy season, and more forage exists for animals at this time. Assuming a range of not more than 4 km^2 for all village animals, approximate

animal densities can be estimated on the basis of combined data as follows.

Table 4.
Animal Density per Square Kilometer by Species, Dourou, 1977.

	Density/km^2
Sheep & Goats	288
Cattle	58
Donkeys	29
Horses	0.9

5.1. Strategies of Raising Livestock

Animal production on the plateau is limited by lack of adequate forage and, to a lesser degree, inadequate water supplies. Disease causes periodic animal loss (although sick and dying animals are consumed) and is particularly important in terms of poultry.[27]

Dogon strategies of raising livestock relate directly to environmental factors and are centered around the scarcity of forage for animals. Cattle are herded year-round,[28] but the more numerous sheep and goats are herded by children only during the millet growing season to prevent incursions into fields. However, it is also during this season that the majority of new animals are born; the young herders who are responsible for an entire

27 Village chicken populations are regularly wiped out by disease (and some are lost to the ever watchful chicken hawks). Although eggs are never consumed, chickens are a more accessible source of protein to women and children, an important consideration in improving women's health and infant mortality. The meat of sheep and goats is consumed primarily by men as they can afford to buy it whereas women cannot.

28 As village houses are tightly clustered on rock outcrops with no space between compounds, there is little room for cattle. They are bedded in corrals outside the village and tended by one household. Individual animals and calves, however, are kept in household compounds as are donkeys.

quartier's animals are kept busy caring for the newborns, often hand carrying them back to the village at the end of the day. In this way, Dogons can keep animals at sufficient distances from the village and the adjoining fields while safeguarding the new animals.

Following the growing season, animals are allowed to browse at will on stalks and other crop residue in the fields. The direct beneficial effect of manure dropped in the fields by grazing animals, however, appears minimal as the manure is gathered for shredding and inclusion in compost and sometimes for cooking fuel. What manure is left dries up in the sun, leaving its organic matter resting on top of the hard-baked soil.

During the cool and dry seasons which follow the rainy season, animals roam free, eating any available ground cover, leaves, fallen fruits, tree pods, and tender twigs. Animals suffer a great deal at this time, many becoming emaciated and too weak to stand. At the same time as the ground cover has been stripped by animal grazing and the effects of the intense sun, the dry season winds blow the dry soil in great clouds of dust.

Dogons have little recourse but to allow their animals to consume what they can find in the sparse environment. Farmers provide what fodder they can from crop residues and gather leaves and dry grasses for animals to eat while they are confined in the compost area of the household compound at night. During the dry season, household members gather pods of the Acacia tree

species to feed to animals which may play a role in animal nutrition related to reproduction.[29] In addition, farmers conserve the piles of fonio hay left over after threshing and feed this to animals,[30] further demonstrating the complementary nature of farming and animal husbandry.

In farming, the ability to keep animals is also important in terms of transport. A great deal of farming energy is expended in traveling to distant and fragmented fields and in transporting the harvest to the village; a donkey makes the work load significantly lighter. The timing of farming operations on the plateau requires a farmer to divide his energies between grain crops and garden crops at peak work periods. A means of transport (which also conveniently provides manure) facilitates the coordination of these two activities. Donkey transport is also useful in marketing produce and in carrying on trade of other sorts.

It is likely that population growth (currently estimated to be approximately 3% per year) has increased the numbers of animals kept by the Dogon on the plateau. The environmental degradation associated with the keeping of large numbers of animals--

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29 McLeroy, op. cit., p. 115, suggests that for sheep of the desert ecotype whose main breeding season is at the middle of the dry season, conception and prenatal lamb development may be significantly influenced by the consumption of leaves and seed pods of the leguminous Acacia species. Dry season pasture is low in both protein and vital vitamin A, nutrients which are pointed out as being essential to conception and development; both are probably obtained from Acacia species.

30 Fonio hay is also burned to provide potash for cooking and local soap. The hay is used also as a binder in mud bricks and plaster used in house and granary construction, and it is an important component of household compost, absorbing liquid wastes. As indicated earlier, fonio's very practical role in the society should not be overlooked.

especially goats which Dogons keep in larger numbers than any other animal--cannot be overlooked.

At the same time, it should be observed that the ability to purchase and to keep increased numbers of animals without having to sell them has probably been enhanced by the cash obtained from onion sales. In this sense, expanded cash cropping in the absence of other forms of saving or investment than animal purchase raises the possibility of further environmental degradation and the obvious repercussions for agriculture in general.[31]

6. Population Active in Agriculture

Demographic data indicate that of the total village population, excluding nonlocal administrative personnel (N=1234), 50% are active in the cultivation of rainfed grain crops. Of the total population age 15 and above (N=680), 82% are active in subsistence farming; totals by sex are shown in Table 5.

Table 5.
Population Age 15+ Active in Subsistence Farming by Sex, Dourou, 1977.

	Active	Not Active	Total
Males	280 (91%)	29 (9%)	309 (100%)
Females	276 (74%)	95 (26%)	371 (100%)
Total	556 (82%)	124 (18%)	680 (100%)

31 Dogons are increasingly adopting Islam. A corollary of this is that the Islamic religion requires more ritual sacrifices of animals than the Animist tradition. Each Muslim baptism, e.g., requires an animal sacrifice. As demographic evidence suggests an association between Islam and higher birth rates per woman, it would seem to follow that increased numbers of animals would be required society-wide but also that a steady turnover of animals would occur.

Of the total population active in farming (N=620), 78% work on both the plateau and the plain, 21% work only on the plateau, and 1% works only on the plain.

6.1 Participation in Gardening

In the area studied, it is only males who garden; active gardeners represent 20% of the total population. Of all males in the village (N=591), 42% garden. Of males age 15 and above (N=309), 79% are active in gardening.

In general, all males garden except the artisan caste groups represented in the village and those who are too infirm.

7. Areas Cultivated and Crop Yields

The total land holdings on both the plateau and the plain were measured for 26 farmers. On the plateau, 89% of the area surveyed was found to be cultivated and 11% was in fallow. On the plain, 37% of the land surveyed was under cultivation while 63% was in fallow. The results of the survey are tabulated below.

Table 6.
Average Area in Hectares Cultivated per Farmer by Crop, Bandiagara Plateau, 1976.
N=26

Millet or Millet/Sorgum	Sorghum only	Fonio	Rice	Sesame	Total Cultivated Area	Non-Cultivated
0.7	0.006	0.2	0.004	0.0005	0.9	0.1
(69%)	(<1%)	(18%)	(<1%)	(<1%)	(89%)	(11%)

Table 7.
Average Area in Hectares Cultivated per Farmer by Crop, Seno Plain, 1976.
N=26

Millet	Fonio	Cowpeas	Sorrel	Total Cultivated Area	Noncultivated Area
1.6	0.3	0.2	0.01	2.1	3.5
(28%)	(5%)	(4%)	(<1%)	(37%)	(63%)

Between plateau and plain, then, an average farmer might have approximately 3 hectares of land under cultivation, of which approximately 2 ha would be in millet and sorghum. Table 7 indicates that 4% of the land cultivated was planted in cowpeas, indicating that this land had come out of fallow this crop year. Similarly, 5% of the land surveyed was planted in fonio, indicating that this was the final year of the crop rotation before the land was returned to fallow. This low rate of land turnover in the bush fallow system and the relatively large proportion of noncultivated land on the Séno Plain would seem to confirm farmers' statements that they do not lack for land but are more constrained by lack of adequate labor.

These figures, however, must be treated with caution. Farmers who inhabit the plateau but descend to the plain as part of their farming activity exploit a perhaps atypical region of the vast Séno Plain. Largely uninhabited, the band of the Séno which runs along the falaise is not typical of the more populous areas which surround towns in other regions of the plain. Satellite imagery, in fact, suggests that areas of the plain may be

seriously overcultivated.[32]

The very fact that villagers farm on both the plateau and the plain is in itself environmentally protective of the plain, allowing continued fallow periods of adequate duration as long as a part of the food supply can be grown on the plateau. Population growth can only erode this important balance and will undoubtedly lead to further utilization of the plain. The importance of cash cropping is evident here--cash income can buy millet which would otherwise need to be grown to support a growing population. However, it is clear that cash cropping is only a short term solution; the land simply cannot support unlimited human growth.

7.1. Millet Yields

Millet yields were calculated on the basis of actual counts of millet by basketload and by tied bundle for 30 farmers on the plateau and 22 farmers on the plain. It was not possible to select these farmers randomly, but on the basis of rankings of millet producers by village elders, the farmers represented here are a cross-section of large, average, and small producers of varying ages.

In each case, the exact land area from which the grain was harvested was measured. It was not possible to weigh the basketloads and bundles at the time they were counted, and farmers and their wives were understandably unwilling to thresh such extensive

32 See Rosalie A. Fanale, "Utilization of ERTS-1 Imagery in the Analysis of Settlement and Land Use of the Dogon of Mali," unpublished dissertation for the M.A., Catholic University, 1974.

amounts of grain which are ordinarily stored on the head in grain bins to protect against insect infestation. Random counts of the numbers of millet heads per basketload and bundle revealed a pattern of uniformity despite the varying sizes of individual baskets and bundles. Over a period of months, then, women were asked to allow us to weigh with a hanging scale the millet they threshed by pounding in a mortar. In general, millet of the plateau is transported in baskets and piled on rooftops for drying; grain from the plain is transported in bundles tied with fresh tree bark and is left attached in the bundles as it dries. Women, therefore, were asked to pound the loose plateau grain heads by basketloads typical of those carried from the fields. Access to bundles while they were still attached before being put in grain bins was accomplished by weighing the women's share of the harvest which is in every way identical to the rest of the harvest, but which is not stored but processed for market trading. In addition, an arrangement with one of the Muslim religious functionaries allowed us access to a wide variety of village grain contributed as a tithe. While the possibility exists that these millet heads were of poorer quality and quantity, the bundles did not appear atypical.

For 37 basketloads, the weight of the threshed grain was found to average 15 kg in rounded figures; for 35 bundles, the average rounded weight was 16 kg.

Calculated on the basis of these weights, the average yield on the plateau is 630 kg per hectare, or 0.6 metric tons/ha.

On the plain, the average millet yield is 342 kg per hectare, or 0.3 metric tons/ha.

The distribution of yields is as follows.

Table 8.
Distribution of Millet Yields in Kilograms per Hectare by Farmer on the Plateau and the Plain, Dourou, 1976.

	0-500 kg/ha	501-799	800+	Total
Plateau (N=30)	37%	50%	13%	100%
Plain (N=22)	77%	18%	5%	100%

The same figures indicate that the individual farmer cultivated an average area of 0.5 ha on the plateau and harvested an average of 312 kg of millet; on the plain, the average area cultivated was 1.7 ha with an average harvest of 583 kg per farmer. Had the two samples been the same, the average farmer would have realized 895 kg of grain as a total.

In comparison, mean yields per hectare if combined with data on mean areas cultivated in Tables 6 and 7 would give harvest figures of 441 kg per farmer on the plateau and 547 kg per farmer on the plain, totaling 988 kg of millet. In either case, total yield per farmer is less than one metric ton.

Estimates of yields by agricultural personnel working in the region and by Opération-Mils range from 500-650 kg/ha for

the plain; other estimates place the yield at 400-500 kg/ha. Estimates for the plateau range from 600-700 kg/ha.[33] The productivity of different areas is undoubtedly variable, but for the plain, yields would appear to be overestimated. A study conducted in 1967 states that the Séno is known, whether rightly or wrongly, as the "breadbasket" of Mali, but that yields barely attain 500 kg/ha.[34] In light of the data gathered, even the figure of 500 kg seems unrealistically high.

7.1.1. Storage Capacities

On the plateau, it does not appear that vast stores of grain exist. Elders may have larger stores in reserve, but the quantity is variable from year to year and is dependent on the careful strategies of production and consumption which the Dogon employ. Accumulated grain does not represent an actual surplus after the subsistence needs of the population have been met, but, rather, represents an agricultural strategy which has as its objective the staving off of possible famine.

Younger, individual farmers who do not take part in communal storage arrangements have little grain left in their granaries as the new crop year approaches.

Households do not have more than 1 to 2 granaries of the large size (see Plate 12 in the appendix) in which millet is stored; elders may have 2 or 3 granaries. Smaller granaries are used for the

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33 Personal communications, agricultural reports on file at SDR office, Bandiagara, and H.L. Turlin, "Opération Régionale du Pays Dogon, IIIa," unpublished report, Institut d'Economie Rurale, Bamako, 1967, p. 30.

34 Turlin, op. cit., "Document de Synthèse," p. 6.

storage of threshed fonio, sorghum, cowpeas, and nonfood items; other "granaries" hold ritual objects and have no agricultural significance.

Farmers state that the large granaries where millet is stored on the head can hold from 60-80 bundles of grain, the equivalent of 960-1280 kg of threshed grain. In an exceptional year, a communal group might be able to fill 3 large granaries--2 from the plateau and 1 from the plain.

According to farmers, millet heads from the plateau can safely be stored for 5-6 years as the individual grains in these heads are smaller and harder and resist insect damage better than the larger grains which form on the sandy soils of the plain. It is said that millet from the plain can only be stored for 3-4 years.

Worms are said to cause damage to grains in granaries, but cleaning of the granaries prior to the storage of new millet is minimal. Farmers say that a layer of ash in the bottom of the grain bin is useful as an insecticide, but nothing more than a cursory sweeping has been observed. Sorghum mixed with ashes is said to last up to 10 years, and ashes (sometimes mixed with hot pepper) are applied to the leaves of the few squash plants grown around the village. Cowpeas are buried in red sand for storage (this is one of several types of sand in the area). The small granaries are partitioned inside--usually into four parts with an upper trough-like shelf--for the storage of these various foods.

When millet heads are finally ready for storage in grain bins, few perfect heads remain. In the fields, millet is attacked

by smut, borer-like worms, birds, monkeys, and diseases which transform the head into other shapes and forms. Transport from distant fields and the mere act of attaching the bundles with tree bark strips further damages the heads. While the grain is drying, it is subject to incursions by rodents, domestic animals, and more birds.

Once inside the granary, however, the grain is relatively secure. The entrances to the granary are sealed with mud, and granary design is such that the bin is raised off the ground, preventing waterlogging. The molded walls are impenetrable by gnawing rodents, and the roof is convex, obviating the need for roof beams as well as providing air space for interior circulation and facilitating water runoff under the straw thatch.

8. Gardening Areas and Yields

The garden areas studied were located along natural water sources. The scarcity of water at these sites obligates farmers to plant very early; in 1976, onion gardens were planted as early as late August as the rainy season waned. Some heavy rains inundated several poorly drained gardens. Farmers at these sites set out their onions in a staggered order, so that it is not so much one or two distinct crops as it is a continuous 60-70 day cycle of planting and replanting. The major constraint is the inavailability of water. In the area studied, onions were the only vegetables grown with the exception of a very few hot peppers.

A survey conducted at the beginning of the gardening period indicated that for 75 farmers whose total garden holdings were

measured, the average size was 166 m^2. The distribution of garden areas is shown in Table 9.

Table 9.
Distribution of Onion Garden Areas in Square Meters, Dourou, 1976.
N=75

$<100m^2$	$100-199m^2$	$200-299m^2$	$300+ m^2$	Total
36%	35%	20%	9%	100%

To calculate onion yields, each of 139 individual garden areas were measured at the time of harvest; weights were obtained at the marketplace as the onions were sold. Owing to the propensity of onion merchants to maximize their profits at the expense of the farmer, some weights were undoubtedly understated, and the volume of sales taking place simultaneously at some 15 different standing scales and assorted hanging scales precluded verification of each individual weight. However, figures are believed to be reasonably accurate.

Mean onion yields were found to be 2.4 kg/m^2, or 24 metric tons/ha.

Onion tops are also sold in the form of balls measuring 20-25 cm in circumference. The average number of leaf balls produced was 6.5 per square meter, or approximately 65,122 per hectare.

Yields have previously been estimated at 12.5 ± 3 tons/ha[35]

35 Turlin, op. cit., IIIa, p. 28.

and at 25 tons/ha.[36] Projections made by Action Culture Maraîchère which is a sub-activity of Opération-Mils, assume a baseline yield of 30 tons/ha in the Dourou area which can be increased by the introduction of "modern methods" to 60 tons/ha by the third year of the operation which began in 1976.[37]

Such projections would appear to be based more on optimism than on actual measured yields. At the time of this study, no known empirical measurements of onion yields existed. In a cogent analysis of the development problems involved in expanding onion production, Johnson (1977) observes that "there is no trick of modern agriculture that can be immediately implemented by local agriculture agents that will result in greater productivity."[38]

8.1. Watering Requirements

Central to the issue of increasing onion production on the plateau is the quantity of water required by the crop. Discussion has centered around Turlin's observation (1967) that water usage on the plateau is excessive and wasteful; Turlin estimates a seasonal water use for onions of 22,000 m^3/ha, assuming an 80 day growing period and application of 27 liters of water per day.[39]

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36 Hans Guggenheim and Rosalie Fanale, Guggenheim 1975 Mali Project, The Wunderman Foundation, 1975, p. 106.

37 Direction Opération-Mils-Mopti, "Aspect Economique du Projet de Développement de la Culture Maraîchère sur le Plateau Dogon," no date, p. 2.

38 Jerry J. Johnson, "Market Gardening on the Dogon Plateau: Action Culture Maraîchère, An Analysis," report to USAID/Mali, 1977, p. 13.

39 Turlin, op. cit., IIIa, p. 23.

The 1975 study by Guggenheim and Fanale estimates seasonal water use at 15,000 m^3/ha, based on a 70 day growing period and varying daily doses of water.[40] In 1965, Gallais estimated water use at 4-5 l/m^2, or the equivalent of 50 m^3/ha at the maximum;[41] this daily application multiplied by the 80 days of Turlin's computations would yield a seasonal figure of 4,000 m^3/ha.

An F.A.O. horticulturalist working in Senegal calculated the water requirements of a different variety of onion (140-170 growing days) as 6440-8100 m^3/ha under obviously different environmental conditions and using sprinkler irrigation.[42]

In the course of field work, it was possible to observe and measure precisely 74 separate applications of water by 27 gardeners. The exact garden areas were known, and the exact capacity of each gardener's watering calabash had been measured. For 64 calabashes measured, the average capacity was 14 liters. In the occasional instance that a farmer broke his calabash and borrowed someone else's which could not easily be tracked down for measuring or that passersby stopped to give a hand with watering while chatting with the farmer and their calabash capacities were not known, the figure of 14 liters was used in calculations. Obviously, some

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40 Guggenheim and Fanale, op. cit., p. 102.

41 Gallais, op. cit., p. 136. Although published in 1965, this report is based on field observations made in 1958.

42 W.C. Baudoin, "Considérations sur l'Irrigation des cultures maraîchères au Sénégal, Tome I," Centre pour le Développement de l'Horticulture, Camberene, Sénégal, 1975, quoted in Johnson, op. cit., p. 8.

spillage occurs as farmers carry the heavy calabashes from the water source to the gardens--in the area studied, a distance of up to 40 meters, some of it moderately inclined--but no workable solution was found for this problem.

The average amount of water applied to onion gardens per watering was 9.4 liters/m^2, or 94 m^3/ha. Depending on water supplies, gardens were watered once or twice a day.

Calculated on the basis of 80 days for comparison with Turlin's data, one watering per day would yield a figure of 7,520 m^3/ha; two waterings a day would yield a total of 15,040 m^3/ha per season. However, the growing period is more on the order of 120 days in the area studied; calculated on this basis, the total water requirement for two crops would range from 11,280-22,560 m^3/ha and would average 16,920 m^3/ha.

In the absence of other comparative data, little conclusion can be drawn from these figures. Observers suggest that water usage by the Dogon is overly high, but horticulturalists observe that high consumption of water per unit area may be necessary due to the shallow soil depth of many gardens which does not permit the accumulation of a reserve of water in the soil.[43] It is clearly an area which merits further empirical research.

8.2. Gardening Revenues

On the basis of figures presented here, the average gross income from onion gardening might be calculated as follows. Assuming an average garden area of 166 m^2 and a mean yield of

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43 Johnson, op. cit., p. 9.

2.4 kg/m^2, a harvest of 398.4 kg would result. At the average local selling price of 80 MF,[44] this would give the farmer approximately 31,875 MF. The sale of leaf balls (6.5 balls/m^2 X 166 m^2 = 1079) at the average selling price of 4.4 MF per piece would add an additional 4,750 MF for a total gross income per crop of 36,625 MF, or approximately $81.39.

Although farmers try to achieve a second crop, it would be hasty, for reasons which will be discussed here, to assume that the figures presented above can merely be doubled to determine gross seasonal income.

How much of the second crop actually gets to market is dependent on water supplies, weather conditions (how hot or overcast it has been), and the farmer's financial status (i.e., how much immediate cash he needs). Environmental conditions may leave the farmer no choice-lack of water or lack of access to what water remains means that some onion plots will have to be harvested before maturity; some farmers choose not to plant a late-maturing crop at all. A strategy employed by farmers at this time is to pound and dry the immature bulbs and, if possible, to defer sale until dried onion prices are higher later in the year. If farmers can afford to defer profits, they may dry a portion of the harvest they would ordinarily sell as fresh onions. One such farmer took his harvest to the marketplace, had it weighed, and then decided not to sell; the 52 kg of fresh onions, when dried, yielded 8 kg. Sold at 500 MF/kg, the dried onions netted the farmer 4,000 MF.

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[44] Approximately 450 Mali francs (MF) equal $1 U.S. All figures are rounded to the next whole 5 francs as no 1 franc piece exists in Malian currency.

Had the farmer sold the fresh onions at the offered price of 75 MF/kg, he would have earned slightly less, or 3,900 MF; on the other hand, had he waited until later in the year (e.g., July), he might have gained about 1,000 MF additional profit by selling the dried onions at 600+ MF/kg.

Some portion of the second crop is often retained by the farmer for consumption and for seed bulbs for the following crop year. The scarcity of water precludes farmers from planting onions from seed which would be less expensive and which is done in some villages. Similarly, the scarcity of water precludes farmers from producing enough onion sets to suffice for the next year, so farmers must purchase the e on the market.

The primary cost in gardening is the price of seed bulbs purchased.[45] Farmers try to buy onion sets the year before when prices are still relatively low. During the crop year as growing conditions can be assessed, farmers buy more sets according to their needs. Expenditures during the onion season must be balanced in terms of how yields have been, what market prices have been, and the amount of millet that must be purchased simultaneously (when prices are lowest) to augment granary stores.

The sale of animals during the rainy season when animals are at their best weight and the best prices can be obtained

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45 The cost of onion sets for 16 farmers interviewed ranged from 3100 to 34,000 MF, or on the average, 14,785 MF, but it was impossible to verify these figures, purchases having largely occurred the year before. Moreover, farmers were in many cases unable to recall exact figures or how the sets had been allocated over the growing season.

appears to be an important adjunct to gardening strategies. Gardening begins toward the end of the rainy season, and millet is harvested sometime thereafter. With the cash obtained from animal sales [46] and early onion sales, farmers can judge conditions and buy additional onion sets as well as grain.

The marketing strategy is to get onions to market as early in the season as possible to take advantage of the higher prices at this time. During the 1976-77 season, this strategy was adopted by so many farmers in the region that the market was absolutely glutted, driving prices down.

Additional costs of gardening include any fertilizer purchased, tools and equipment (hoes, knives, sledgehammers, wedges, calabashes, baskets, sacks), and costs of transport if the onions are shipped to cities by the farmers, themselves, rather than being sold locally. Hired labor is not a feature of gardening in the area studied.

During the gardening season, also, farmers must pay their taxes[47] and sell a quota of their grain to the government program of commercialization which redistributes the grain to other areas of Mali. Many farmers on the plateau attempt to purchase this grain from other Dogon farmers on the plain rather than jeopardizing their own subsistence base by giving up their

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46 Generally the male animals are sold while the females are kept for reproductive purposes. A goat might be sold for 6,000-10,000 MF, a sheep for about 12,000 MF.

47 Current taxes are about 2,000 MF per person age 14-59. Women with 4 or more living children are not taxable, nor are those who are blind, leprous, disabled, or incurably ill.

stored grain. As market prices are generally higher than the price paid by the government for millet,[48] farmers attempt to buy grain in November when it is at its lowest price; the commercialization period occurs some months later. If farmers do not have sufficient cash on hand at this crucial period in November--which coincides with the need to purchase additional onion sets for the second crop as well as grain for personal consumption--they end up selling their grain to the government at a loss.

9. Women's Participation in Agriculture

Of all women in the population age 15 and over, 74% are active in the cultivation of subsistence grain crops; women's labor contributes importantly to agricultural activities. In Dogon society, however, women are denied rights of land ownership and rights to inheritance of any kind; they are, furthermore excluded from all economic decision-making and from any political participation, including election of village officials. Indigenous women's organizations have been outlawed by the national government in favor of the National Women's Organization.

Accounts of Dogon women being "economically independent" belie the fact that although they participate in the market system (often by marketing their husbands' produce, not neces-

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48 The market price of millet in November 1976, e.g., was 3600 MF/100 kg; by March 1977, the price was 4400 MF/100 kg. At the same time, the price paid by the government was 32 MF/kg, or 3200 MF/100 kg, the same price that had been paid the year before as well.

sarily their own), they are the poorest segment of the society.

Women have no control over the millet they have helped to produce, not even access to the granaries where it is stored; granaries are kept locked, and men dole out portions of millet as needed for women to pound and prepare. For their participation in agricultural work, wives are accorded one bundle of millet from the total harvest.

As women are excluded from inheritance in the patrilineal system, widows without surviving male children to care for them exist in extreme poverty in old age. Women too old to bear children are not considered worthy of remarriage and are virtually discarded by the deceased husband's lineage. Elderly widows farm their own millet fields (the land is loaned to them) for as long as they can walk to the fields to work. Surviving female children, having married into other lineages, cannot assume responsibility for their mothers. In extreme old age, widows without male children return to their natal villages to have a modicum of security from their fathers' lineages.

In contrast, elderly males, widowed or not, are at the peak of their influence in the society. They are accorded respect and their granaries are filled with the products of the agricultural labor of their children, even when they, themselves, are no longer able to work.

In addition to the elderly women who farm alone (sometimes with the help of children), young women whose husbands have migrated for extended periods to coastal countries cultivate their

own fields as well as participating in communal agricultural labor. For 3 women (2 old and 1 young) whose land holdings were measured, the average size of their holdings was 0.2 ha.

9.1. Implications of Differential Economic Status

Women participate in agricultural activities where it is of economic advantage to men and to patrilineages for them to do so. Where women's labor is not needed, as in gardening, they are excluded from participation while boys as young as 14 years of age are allotted their own garden space. As women do not participate in gardening activities, men feel no responsibility to share their proceeds with their wives or children.

The differential economic status of males and females is reflected in access to food which, symbolically, is the most important item in the society. Meat is the desired food, and meat eating is possible only with money, as evidenced by the curt appraisal of someone: "He has money--he eats meat." Men consume large portions of grilled meat on every market day possible (once every five days), but women can seldom afford meat for themselves or for their children.

As it is wholly incumbent on women to provide all other foodstuffs other than grain for their children and themselves, women's and children's diets and their attendant health status are directly related to women's economic position in the society. It is also the responsibility of women to provide for the entire household the ingredients for the sauce which accompanies the dry, cooked millet paste which is the staple diet. Women achieve

this economic contribution to the household through a combination of gathering wild products and petty market trading, but they are by no means "economically independent."[49]

The poorer diet of women and children is based on economics and traditional asymmetrical sex roles in the society. It is also a function of dietary ignorance; there is no knowledge of the importance of protein, minerals, and vitamins for pregnant and lactating women and developing children. In the patrilineal system, men are assumed to be more important and thus to deserve the better portion of any food.

Women's prime role in Dogon society is considered to be childbearing. Children are valued for providing labor and old age security and for perpetuating the lineage structure, but children are considered to be women's affair and women's responsibility. Ironically, the social mechanisms which confer different status on males and females act to diminish the chances of survivorship of the infants which are so desired. The implications for development interventions are the continuing nature of the cycle of undernutrition, ill health, and infant and child mortality and the depletion of women's health through continual childbearing. Without long-term education and fundamental social change, women's and children's diets and health can only be improved by improving women's own economic status.

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49 In areas of the plateau where women do have their own gardens their economic contribution to the household is accordingly increased; they must buy grain for half of the year, provide the sauce and other foods for children for the whole year, and work in the fields to help produce the grain which is stored in the granaries.

9.2. Impact on Women of Development Programs

Current development projects in the Dogon area address themselves to men, but recent inquiries have been conducted into the possibilities of involving women in development.[50] Clearly, it is a difficult and challenging proposition to involve women--who in their own societies are so overlooked--in important ways in the development effort.

In the Dogon milieu, it cannot be assumed that the betterment of males' economic status will automatically benefit the entire household.

Whenever possible, women must be included in the dissemination of information about new agricultural methods and in the accompanying adult literacy programs. Every effort must be made to increase the numbers of girls entering and remaining in school.[51] It would seem an appropriate condition of financing dam building projects, for example, that some garden areas be reserved for women with training programs to teach women the necessary methods. It would seem entirely feasible, at the same time, to provide simple milling devices to diminish the household burdens of these women. Perhaps women, themselves, could be organized to operate small milling concerns at the village level.

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50 See e.g., the survey by Barbara Skapa-Spicer (1977) on involving women in community development in the Fifth Region of Mali. The final report to USAID was unavailable at this writing.

51 Opened 5 years ago, the primary school at Dourou had an enrollment of 244 students for the school year 1976-77; 12% of the pupils were female and 88% were male.

To improve the health of their children, women also need to be instructed in hygiene and preventive health care, but they can do little--even to obtain such a simple item as soap--without being involved in economically remunerative ways in the society.

Development efforts to raise the income of farmers are laudable from any perspective, but it is important not to overlook the point that Dogon males do not necessarily use their cash income to increase the household standard of living. As a general rule, Dogon males do not give their wives money. Market gardening may be booming, but women are still struggling to trade a few francs' worth of wild fruit or dried baobab leaves so that they can feed their children.

10. Potentials for Expanding Market Gardening

Beyond the immediate questions of increasing productivity and production of vegetables on the plateau, it has been pondered by some observers that if Dogons can so successfully grow vegetables during the dry season, why would it not be equally possible to grow them during the rainy season on both the plateau and the plain? Turlin (1967), for example, suggests that over the long term, Dogons may adopt gardening as their principal rainy season activity if their millet needs can be obtained through the market system.[52]

Dogons, for their part, are of the opinion that their

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52 Turlin, op. cit., "Document de Synthèse," p. 15.

onions do not grow well during the rains; one of the major crop problems reported by farmers is a yellowing, or tip-burning, of the onion tops and stunted growth said to be caused by rain falling on the plants. Johnson (1977) observes the same symptoms but suggests on the basis of preliminary laboratory analysis that a fungus may be responsible.[53]

It is not known if onion growing during the rains would succeed under existing conditions. As it is, farmers attempt to plant at the earliest possible moment, and the occasional late rains invariably cause crop damage in one form or another.

Under the soil conditions which exist in many areas of the plateau--that is, soil depths of as little as 8-15 cm--it is questionable whether other vegetables with more extensive root systems than the onion could be grown. Certainly some limited quantities are grown at the present time but only in certain favorable spots. Further consideration would need to include the feasibility of storage and transport of other vegetables in quantities as large or larger than the present volume of onions[54] and assurance of a market for them. Vegetable consumption in Mali, except for tomatoes and onions in cooked sauces, appears to be low except among the more affluent.

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53 Johnson, op. cit., p. 21.

54 The present volume of trade is unknown. In 1972, it was estimated at 4,000 tons (Ibid, p. 2.); however, assuming 500 ha of gardens on the plateau (Ibid, p. 15.) and a mean yield of 24 tons/ha (although yields, of course, will vary), the total tonnage would be 12,000. Export, then, could be expected to exceed the 1972 estimate.

Currently, Dogons on the plateau plant some millet in garden areas during the rainy season; as the grain is harvested, onions are planted (each crop seemingly profiting from any residual effects of manure, compost, or fertilizer applied to the preceding crop). Garden land, therefore, is not necessarily lying unused during the rainy season.

Most important to the question of the possibility of rainy season gardening, however, is the fact that Dogons on the plateau already depend on their cash crop revenues to purchase a portion of the grain required for subsistence needs (and to allow a slight margin of reserve). Were they to abandon millet farming altogether in favor of market gardening, Dogon farmers would not only have to increase their vegetable production substantially merely to meet current grain requirement levels, without regard to the effects of population growth over time, but also expose themselves to all the hazards of monocropping in an already unsure environment.

All Dogon agricultural strategies are directed toward minimizing risk in the unstable and fragile environments of the plateau and plain while, at the same time, trying to maximize whatever returns are possible. Were Dogons to adopt market gardening as their primary agricultural activity, it would seem that they would be exposing themselves to greater risks and a vulnerability far exceeding that of their present situation.

By way of illustration, gardening, whether in the rainy season or the dry season, is dependent on secure rainfall, there

being no water table on the plateau. No technological advance can yet assure rainfall in the Sahel, let alone its amount and distribution. Considering that surface water and seepage through rock strata are the only sources of water, irrigation schemes in case of rainfall failure are unlikely solutions. Just one year's crop failure due to drought--which would inevitably affect the market supply and price of grain as well--would raise the question of how people could feed themselves. The present agricultural strategies of interplanting and crop mix as well as growing cash crops act to mitigate the effects of all but the most severe droughts, and there is no denying that drought in varying forms of severity is a recurrent phenomenon in this geographical area.

It is not known, furthermore, what insects or plant diseases might come to be associated with new vegetable varieties. Similarly, the long-term effects of the fungicides, insecticides, and chemical fertilizers which are now making their appearance on the plateau cannot be known. A disturbing aspect of this is that no baseline data of any kind exist for monitoring the long-term environmental effects of these products. To the present date, not a single soil analysis has been conducted in the areas where agricultural interventions are underway on the plateau and the plain.

10.1. Possibilities of Gardening on the Séno Plain

The same problems which were discussed in relation to the possibility of rainy season gardening on the plateau are appli-

cable to the Séno Plain; however, the water problems are somewhat different. The water table on the plain can be as deep as 60 meters, which under present technology (hand drawing of water with well buckets and ropes) makes watering of gardens an impossible task in most villages. Rainfed tobacco gardens, however, are common and are carefully protected with thorny hedges against the large numbers of domestic animals.

Extensive gardening does take place on what is technically the Séno but what is really a separate and different environment--the "valleys of the piedmont."[53] These distinct areas occur at places along the falaise where rainwater from the plateau runs off to form seasonal streams (see Plate 3 in the aprendix). In places, dunes separate these areas from the mo typical Seno Plain. Soils, temperature, and even vegetation are fferent in these microenvironments. Crops grown in these areas include onions (including large Bermuda-type onions), tomatoes, nightshade (Solam aethiopicum), cotton, and fruits. As on the plateau, millet is planted in the garden areas during the rains; vegetables are started in seed beds in the millet fields before the grain is harvested.

As to whether market gardening could take place on a large scale on the Séno Plain, Turlin (1967) suggests that if millet yields could be raised to 1000 kg/ha using chemical fertilizers, one-tenth of the cereal-producing area, or 6,000 hectares, could

53 Turlin, op. cit., II, p. 8.

be allocated for market gardening; elsewhere, Turlin comments on the "problems of water" and "degradation of soils" on the plain.[54] It appears highly unlikely that yields of 1000 kg/ha will be attained on the plain at any time in the near future and even more unlikely that millet areas will be converted to market gardening areas in any foreseeable future. For better or worse, the Séno is increasingly depended upon to provide grain for a rapidly growing Malian population through the commercialization program as well as for the Dogon, themselves. Under present circumstances, which are far beyond the control of the Dogon producers, it appears improbable that rainy season market gardening will be undertaken on the plain.

Until the water problems which plague most areas of the plain can be solved, little attention can be focused on the dry season horticultural possibilities of the area. Soil studies and horticultural trials are also needed to judge the suitability of the plain for large scale gardening operations.

11. Practicability of Dogon Gardening System Elsewhere

The success of the Dogon onion venture leads to the question of whether such a gardening system could be transferable to other geographical areas. A number of factors would seem to militate against the success of such a transfer. The highly specific natural environment and conditions of soil (and locally devised means of soil management), temperature, humidity, and day length which are characteristic of the plateau and to which local varieties of

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54 Turlin, op. cit., "Document de Synthèse," p. 6 and p. 15.

vegetables are adapted would be conditions difficult to reproduce elsewhere. If environmental conditions were different elsewhere, as they are most likely to be, there would be no need to adopt such a system as the Dogon one.

The use of certain elements of the Dogon system, such as manuring or composting, for example, might be transferable but would be dependent on other factors. Environmental and economic circumstances elsewhere would have to allow animal keeping. Cultural factors would also intervene, such as experience with raising animals and handling human and animal wastes. The Dogon system also makes use of wild animal manures and plant products for composting which are highly specific elements that would be difficult to duplicate. However, such practices as drying vegetables for storage and transport could be adopted anywhere.

The success of Dogon gardening--aside from market demand, road expansion, and the like--is based on history. The cultivation of onions--as the basis for cultivation of other vegetables and for the expansion of gardening--was not introduced, in any modern sense, from the outside. Dogons had had long familiarity with the crop before it became a "cash crop." In addition to historical experience, the Dogon of the plateau have the economic incentive of needing cash crop revenues to buy grain to supplement their own grain production.

12. Existing Agricultural Interventions

Two programs of agricultural intervention are under way in the Dogon region. The first of these, Operation-Mils (OM),

focuses on the Séno Plain, seeking to introduce animal traction, field preparation prior to seeding, new millet varieties, in-line seeding, closer plant spacing, timely weeding, improved composting, and chemical fertilizers and pesticides. The possibilities of different crop rotations (e.g., a crop sequence of millet, groundnuts, and cowpeas) are also being studied.[55]

The field strategy of OM has been to choose a number of pilot farmers, or paysans pilotes, to whom credit is extended to invest in animals, plows, and animal-drawn carts. A pilot farmer plants millet according to the new methods in demonstration plots; the end results are visible to other farmers who, it is hoped, will emulate the methods of the pilot farmers.

The second program of agricultural intervention, Action Culture Maraîchère (ACM), seeks to improve vegetable production on the plateau, but the exact methods by which this is to be achieved are as yet unspecified. Preliminary interest appears to lie in providing farmers with metal watering cans to replace the indigenous calabashes, gourds, and clay pots now used. The improvement of water supplies on the plateau is of prime importance to market gardening; some 65 appropriate sites for dam construction have been identified.[56] Although yields have not yet been determined, there is interest at the government level in forming cooperatives of onion producers who would sell their products to a government monopoly.

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55 OM also coordinates the commercialization of millet for the government. Eventual associated activities of OM will include road improvement, well digging, and adult literacy and health programs.

56 Johnson, op. cit., p. 11.

12.1. Social Aspects of Development Interventions

From a social perspective, the existing agricultural programs have as their limitation the fact that they overlook the involvement of women, who, in the Dogon milieu, contribute roughly half of the agricultural labor. In addition, women are traditionally the groundnut farmers on the plain--an important consideration as agricultural programs experiment with changing crop rotations to include a cycle of groundnuts--and in some areas of the plateau, women have their own vegetable gardens and are as much in need of agricultural assistance as male farmers.

While it is true that in subsistence farming, Dogon women have no decision-making power, are denied rights in land ownership and inheritance, and have no control over the millet once it is produced, they are, nevertheless, a vital link in the development process. The numerous interrelationships that exist among the natural environment, agricultural and economic activities, nutrition, health, population growth, and development are mediated through the social system. "Women's role" in the society directly affects--and, in some cases, determines--many of these variables and the "feedback mechanisms" which operate among them. As the need to include whole communities in the development process is increasingly understood,[57] the importance of considering women's roles in societies will beome self-evident.

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57 See, e.g., Ted Owens, "Brief Reflections on a Quick Trip to Mali," report to CDC, AID/Mali, 1975.

As discussed earlier in this report (see pp. 15-17), village organization is lacking in the Dogon region; villagers have no experience with "working together" toward community goals despite their participation in collective work groups. Interpersonal relationships are tense; gain on the part of one villager is resented rather than admired by others. What effect this might have on the pilot farmer approach in disseminating agricultural innovations is not known but should be considered in any evaluation of the program. As it is, the pilot farmers already chosen appear to be among the richer farmers in the villages, who, among other things, can better afford the necessary investments. How these pilot farmers are viewed by the rest of the farmers would be something to be determined.

Villages need to be organized whether to undertake agricultural programs or other community development programs. The agricultural agents currently stationed in villages are in a direct position to work with village groups, but many of them are handicapped by the problem of being of different ethnic groups and not speaking the local language; very few farmers speak French, although some speak Peul, and more and more appear to be learning Bambara. Agricultural agents are further handicapped by their lack of training in working with people, especially in the field situation; they dress and comport themselves in the manner of civil servants (including keeping the hours of civil servants in rural areas where agricultural work and life, in general, do not run by the clock) and set themselves off

from the local populace, engendering a fair amount of distrust.

Agricultural agents need to be trained to work more effectively with farmers--and farmers of both sexes. Agricultural agents, themselves, in spite of their educations, are not free of the influences and customary ways of thinking of the larger society which ignores women. As a long-term goal, it would seem appropriate to train more Dogons as agricultural agents to work in their own region and to train women as agricultural agents.

The inclusion of both men and women in all community development programs, whether village sanitation, improvement of water supplies, preventive health care, nutritional teaching, adult literacy, or agricultural innovation, seems vital to the success of such programs and to the continuation of them by the community, itself.

13. Approaches to Development and Recommendations

In theory, rural development has as its goal the linking of the village to the national economy and the eventual conversion of villagers from low level self-sufficiency to almost total dependence on the goods and services of the larger world through the market system.[58]

At the present time, it would seem vital that the Dogon, despite their participation in the market system, not give up the security they have in producing at least a part of their own subsistence needs. The strength of the Dogon as rural producers lies in their keen knowledge of their natural environment

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58 Owens, op. cit., p. 4.

and in their agricultural strategies which act to minimize risk and to assure a food supply even in the worst of times, a promise the national economy cannot yet make.

Development interventions, however well-intentioned, introduce "new technologies" to rural peoples only at a certain risk to these people. Among the Dogon, this could apply to the introduction of animal traction, plowing, and chemical fertilizers and pesticides. Rural peoples, as the Dogon, should be assisted in every way possible to improve their conditions of life, but it is of paramount importance that new technologies not render villagers dependent on nonlocal and nonrenewable products or leave them more vulnerable in the end to the existing circumstances of their lives. Unfortunately, many "unknowns" exist. The vagaries of politics and economics cannot always be foreseen; the termination of funding for projects can leave people at the village level exactly where they have always been. On another level, the ecological costs of new technologies, such as plowing in fragile soils or the long-term use of fertilizers and pesticides under Sahelian conditions, simply are not yet known.

Certain questions can be asked about the introduction of new technology to rural peoples. Miller (1977), for example, asks the following questions:

> (1) What are the intrinsic attributes of the new technology? What can it do, and how is it superior to the old? (2) What new constraints are associated with these attributes? (3) Who controls the application of the technology, and for whose benefit?[59]

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59 Frank C. Miller, "Knowledge and Power: Anthropology, Policy Research, and the Green Revolution," American Ethnologist 4 (1), 1977, p. 196.

Development interventions obviously have many dimensions to them. Reasoned approaches which take into account both immediate and long-term environmental, economic, and social effects offer the best hope for success.

Development efforts, of course, extend far beyond the mere provision of technology, as relatively easy, glamorous, and desired as it is in rural areas. The most profound and lasting effects of development are probably those of education and organization of communities to understand and to deal with their own specific problems.

With these points in mind, some recommendations for the plateau area of the Dogon region are offered here.

13.1. Recommendations for the Plateau

The general orientation of the following recommendations is an emphasis on small scale technology, or what has come to be known as "intermediate technology."[60] With the exception of dam building, which is a more extensive undertaking (although some of the most successful dams on the plateau are small, measuring 30 meters, or less, in length--see Plate 18 in the appendix), improvements in Dogon life could be brought about by decreasing energy expenditure levels by very simple means. But, again, technological "wizardry," regardless of scale, could conceivably be introduced and reintroduced for the next hundred years without any appreciable change in the conditions of village life if the people, themselves, are not convinced of the

60 The term arises from the work of E.F. Schumacher and the Intermediate Technology Development Group in England; a division is now based in Menlo Park, California, as well.

need and not involved in the process.

In view of the world energy situation, it would be short-sighted to depend on the continuing availability of petroleum products and by-products in as remote an area as the one inhabited by the Dogon. However, in the eventuality that market trucks, for example, could no longer be operated profitably, the market system could still operate satisfactorily, if somewhat more slowly, with donkey transport. Similarly, if fertilizers were unavailable, farmers could still manure, compost, and green manure their fields and gardens as they always have.

Specific recommendations are as follows:

(1) Emphasize the utilization of renewable energy sources to provide cooking fuel and mechanical power. Exploitation of the abundant solar and wind power on the plateau for domestic and agricultural use has important possibilities and would protect the area from progressive deforestation. Plant native tree species in the area and devise effective fencing against animal encroachments; Dogons have experience with transplanting trees (e.g., baobabs).

(2) Improve water supplies through continued building of small dams and repair of defective dams (or their replacement if repair is impossible). Provide assistance to local groups in dredging out rock faults where wells might be established. Organize village programs of well and dam maintenance, including removal of aquatic plants, if indicated, and finding ways to decrease surface evaporation. Rig pulley systems for drawing water where applicable.

(3) Institute public health programs through village committees.[61] Special emphasis should be placed on maternal and child health, nutritional teaching (men particularly need to be made aware of the nutritional requirements of pregnant and lactating women and of children), hygiene, and village sanitation. Malarial suppression programs are needed; the topography of the plateau does not easily lend itself to mosquito eradication. Fly control is especially needed as eye infections and other fly-borne diseases are very prevalent. Methods of covering, composting, or otherwise disposing of human fecal matter must be found as the digging of latrines is not feasible on the rock surface of the plateau. Village monitoring of dam sites for snail infestation (which is conducive to the schistosomiasis, or bilharziasis, cycle), and village education on the transmission of Guinea worm, or dracontiasis, especially through the walk-in wells so common to the plateau, are also needed.

(4) Increase productivity and production of vegetables on the plateau.[62] Involve women in market gardening and in any other activities which will increase their economic status. Investigate irrigation possibilities for gardening (e.g., simple, inexpensive indigenous methods used in other African societies such as those employing the counter weight principle

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61 See, e.g., Owens, op. cit., and Raymond B. Isely and Jean F. Martin, "Le comité de santé de village: Point de départ du développement rural," Chronique OMS, 31, 1977.

62 For an exhaustive treatment of this topic, see Johnson, op. cit.

to raise water to the garden level in large calabashes).

(5) Improve work implements (see present tool inventory in Plate 7 and the Dogon basket, the primary implement used in farming activities, in Plate 13). Devise easier ways to process onions and onion tops for drying (see Plate 25)--possibly a roller mechanism or press of some kind. Introduce simple milling devices for grain (more elaborate models might be wind-powered or animal-powered). Farmers on the plateau,who currently must head carry individual basketloads of manure and head loads of hay, wood, and agricultural produce (this, of course, applies to both males and females), might particularly benefit from large capacity hand carts (see commercial illustration in Figure 3 in the appendix). Such carts (which could probably be constructed in the Dogon region) could be maneuvered along inclines and irregular surfaces and in other areas generally inaccessible to the more unwieldy animal-drawn carts used on the plain.

(6) Balance livestock production with environmental conditions. Improve animal health and explore possibilities of other animal fodders. Decrease the numbers of goats in herds if economically feasible to do so (sheep are more expensive to purchase). Involve women in ownership and production of animals (a very few women currently own 1 or 2 sheep or goats), especially in poultry production, which would make high-quality protein more accessible to women and children. If laying hens were raised in sufficient numbers, egg production and consump-

tion might be possible. If both animal production and women's economic status were improved, it might be possible to provide children with milk.

(7) Explore investment possibilities other than animal purchase. Extend credit to both male and female farmers. Women need to be provided with the means to obtain a mode of transportation. Donkeys and bicycles are owned only by males, and only men's energy conservation needs are served at the present time.

(8) Facilitate transfer of information. Organize farmers' discussion groups and include women. If possible, increase radio broadcast time in Dogon dialects (currently one brief broadcast of news once a week). Attempt to make radio listening a household or quartier event where everyone can listen; generally it is a "walking around" activity of young males who carry their radios around with them. Encourage school attendance of both male and female children. Involve both males and females in adult literacy programs.

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* * * * * * * * * *

Appendix

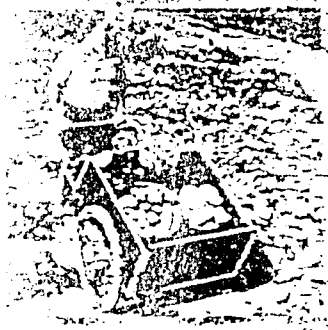
Figure 3. Commercial Illustration of Hand Cart

Plates 1-26

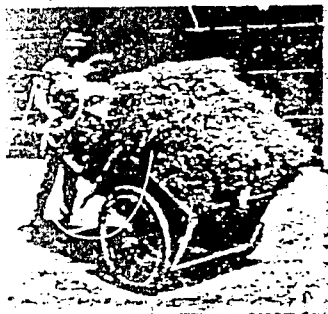
Figure 3.

How do you handle these loads now?

GARDEN VEGETABLES



GARDEN HARVESTS

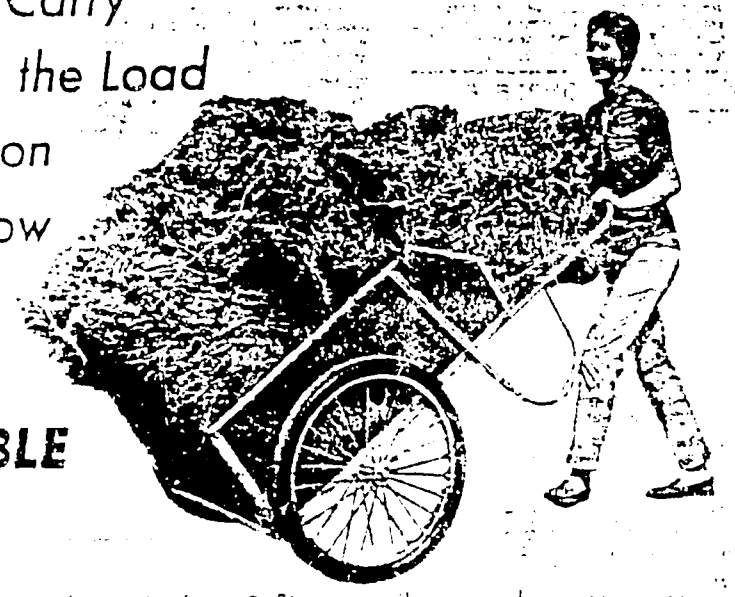


KAILEY

BUSHELS & BUSHELS OF LEAVES

If you handle any of the above loads (or carry others heavier or bulkier) please by return or write today for complete cost or your wheelbarrow — please send postcard for your FREE Cart Catalog, describing cart complete, kit or your own labor saving cart.

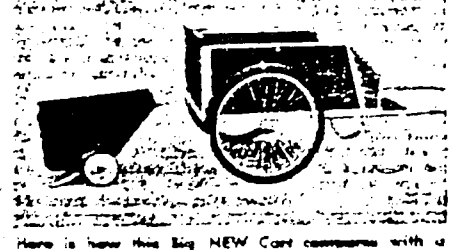
NOW... Carry TEN TIMES the Load of a Common Wheelbarrow or Cart with INCREDIBLE EASE!



This Big NEW Jumbo sized cart is the culmination of 20 years of cart research! It has the largest load carrying ability of any cart or wheelbarrow available for home and business use!

- Carries 10 times the load of a common wheelbarrow!
- Saves time and steps—make one trip instead of ten!
- So easy to handle, so perfectly balanced you can guide it with JUST ONE HAND!
- Actually feels lighter when it's fully loaded!
- Loads won't fall out forward.
- Carries 5 bales of hay, 5 trash cans!
- Tips down to take on heavy loads without lifting!
- Rolls up steps and down with ease.
- Open end lets you load long handled tools, even long extension ladders and lumber.
- Two wheels instead of one keeps loads from tipping sideways.
- Big 26" diameter easy roll pneumatic wheels with ball bearings. Special wide hubs to handle heavy loads.

All models available complete or in Money-Saving KIT FORM!



Here is how this Big NEW Cart compares with a very sturdy sold Cart (with tiny wheels and almost no load space). Our "Jumbo" Cart will carry 15 times the load of this little cart.

- Stores easily on end, saves space.
- Special stand straddles rows in the garden, without damage to plants.
- Rust resistant steel parts and durable weather-proof plywood for years and years of service.
- No need to keep indoors—turn over and this cart becomes its own garage.
- Just so useful, you'll wonder how you ever did without it.
- Not sold in stores.
- At last—the perfect cart for lawn, garden and countless other uses.
- Order for and charge to your business. Borrow to use at home. Soon you will be ordering another to keep home all the time!
- Several smaller models of same unique design also available.
- Please send for FREE CATALOG with all the specifications, sizes and prices.

Garden Way Research
Charlotte, Vermont 05445

GARDEN WAY RESEARCH
Dept. 70021
Charlotte, Vermont 05445

Please send your FREE CART CATALOG, including details on the inexpensive Build-it-yourself KIT FORM.

Name _____

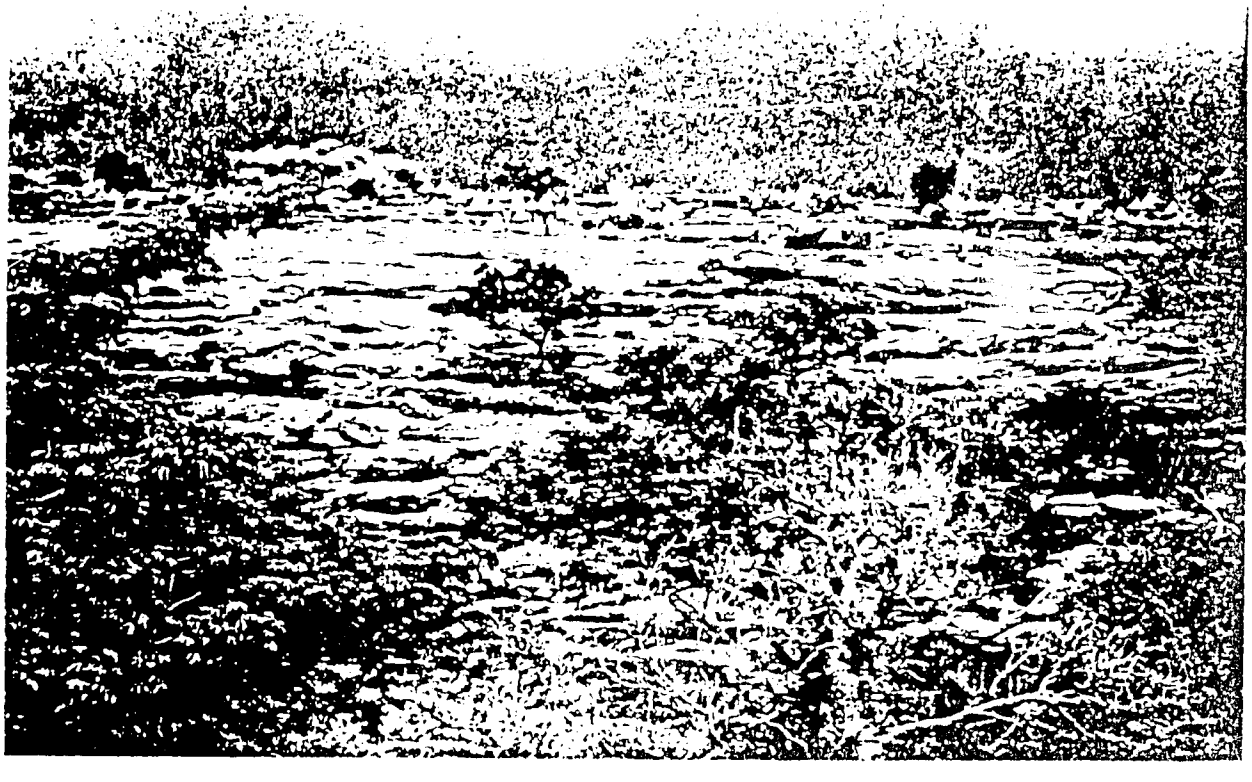
Address _____

City _____

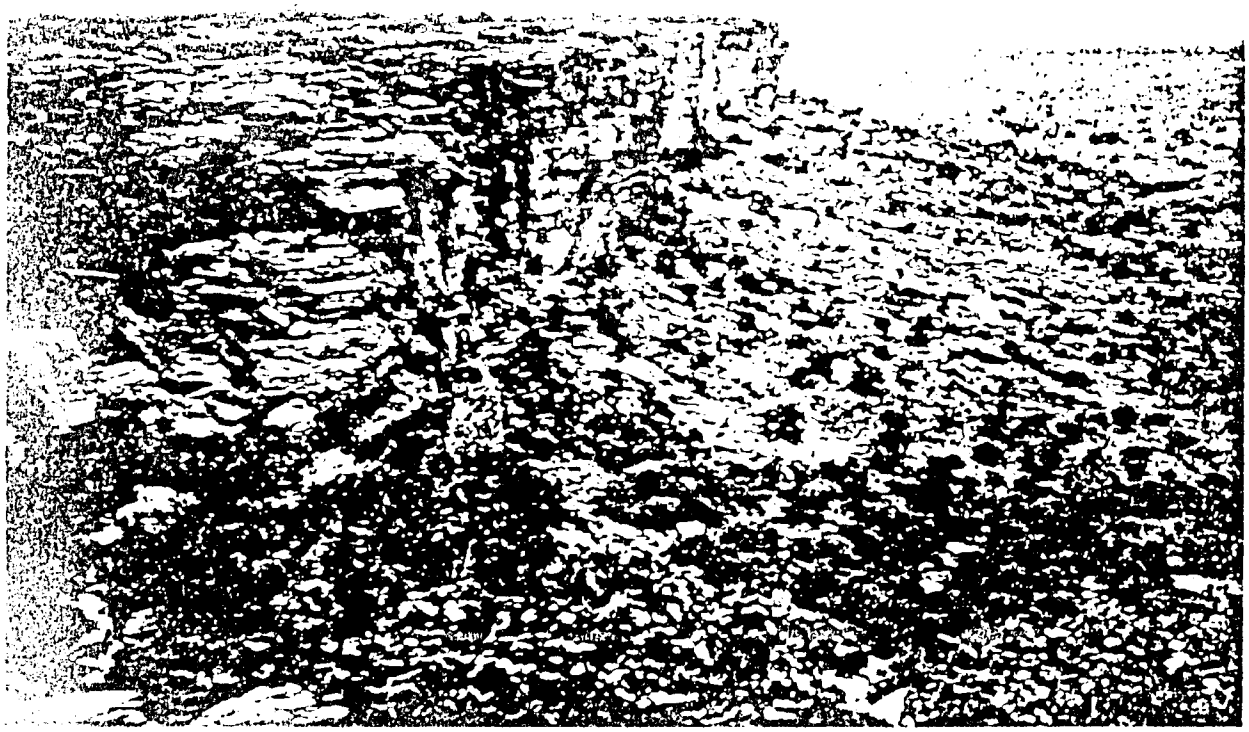
State _____ Zip _____

NOTE: If you prefer not to cut this page, you may order on a separate piece of paper.

Plate 1.



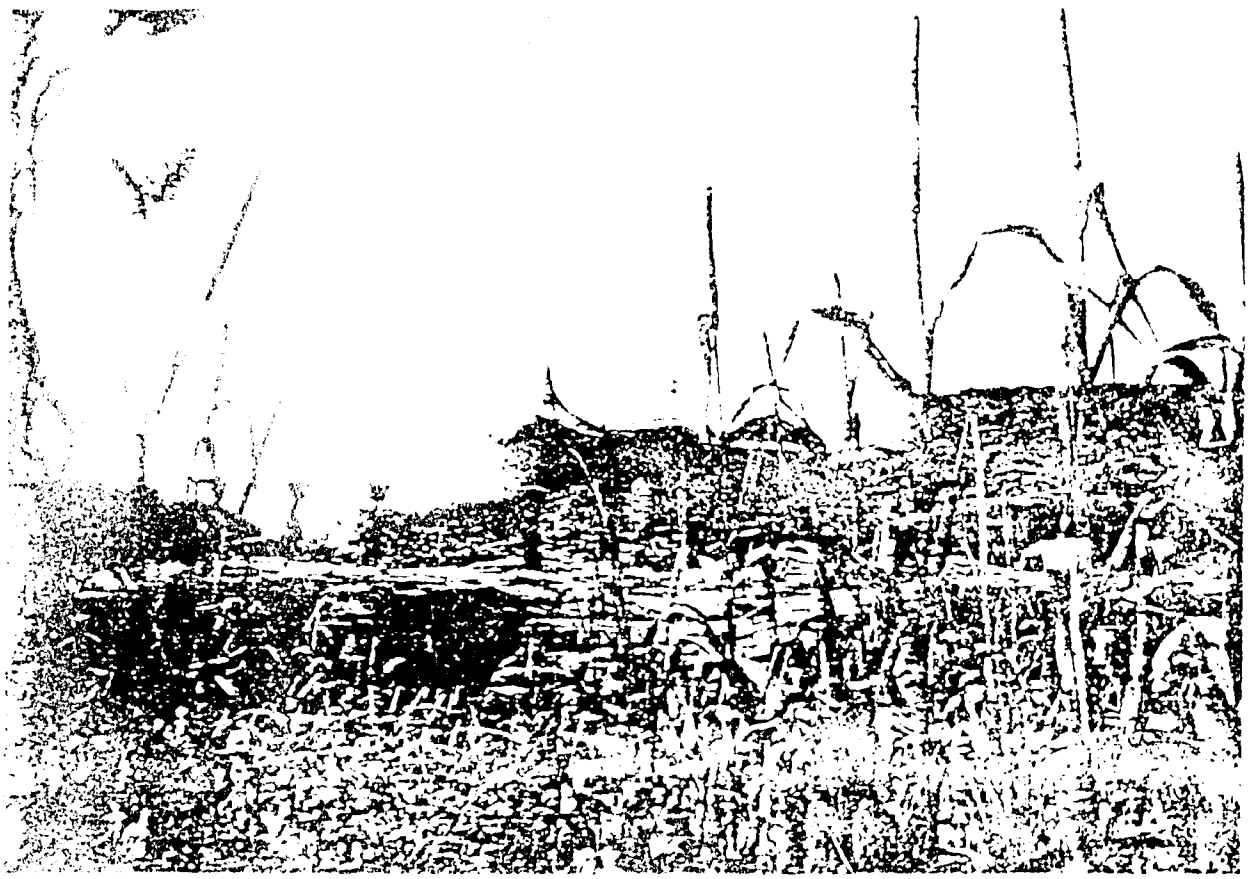
A quartier of Dourou, the field site on the Bandiagara Plateau. A woman (center) ascends a path which leads through fonio. Millet grows among trees in the valley below and on the edge of the village (upper right).



The [illegible] cliffs (300 meters plus), overlook the Dend Plain. The village of Nombori (arrow) is built on a talus slope.

Plate 3.

Overflow [illegible] from the [illegible] a seasonal stream (upper [illegible]) formed by runoff from the plateau allows dry season gardening on the margins.



Millet and sorghum interplanted in a valley area between village quarters.

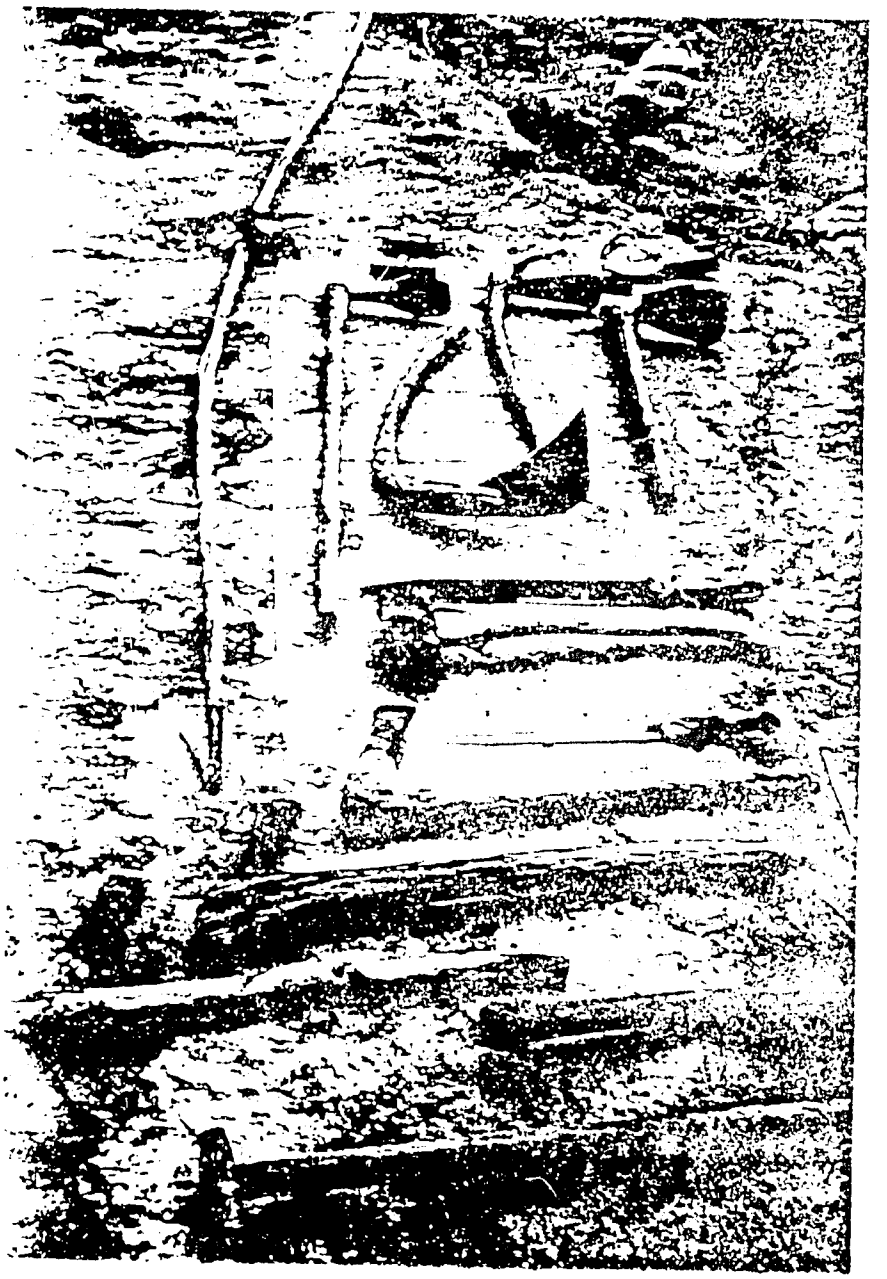
Plate 5.

A Dogon farmer cultivates his millet plants in a rock crevice on the plateau.

Plate 6.

[illegible] Large concretions in of stone [illegible] in [illegible] Lines above floor (left) [illegible] wall [illegible] cm. [illegible] wall filled by primary (first) partition [illegible] Materials items include milestones, wooden [illegible], clay [illegible] and water pots, mortar and pestle, and [illegible]. Irregular notches for ladder provide access to roof [illegible]. Similar ledges are in place along the cliffs, facilitating the climbing of rock surfaces.

Plate 7.



Dogon tool inventory (1 meter reference): cutting blades for millet, sickles for harvesting *fonio*, various hoes, long-handled cutting hook for tree leaves and fruits, and axes. European sledgehammer, machete-type knife, and shovel (not visible, handle in foreground) are less common items.

Sowing after the first rain. A Dogon farmer drops millet and sorghum seeds randomly into hills of "green manure" he has opened with one chop of his long-handled hoe. Unopened hills formed during the weeding operation of the previous year are visible in the background.

Plate 9.

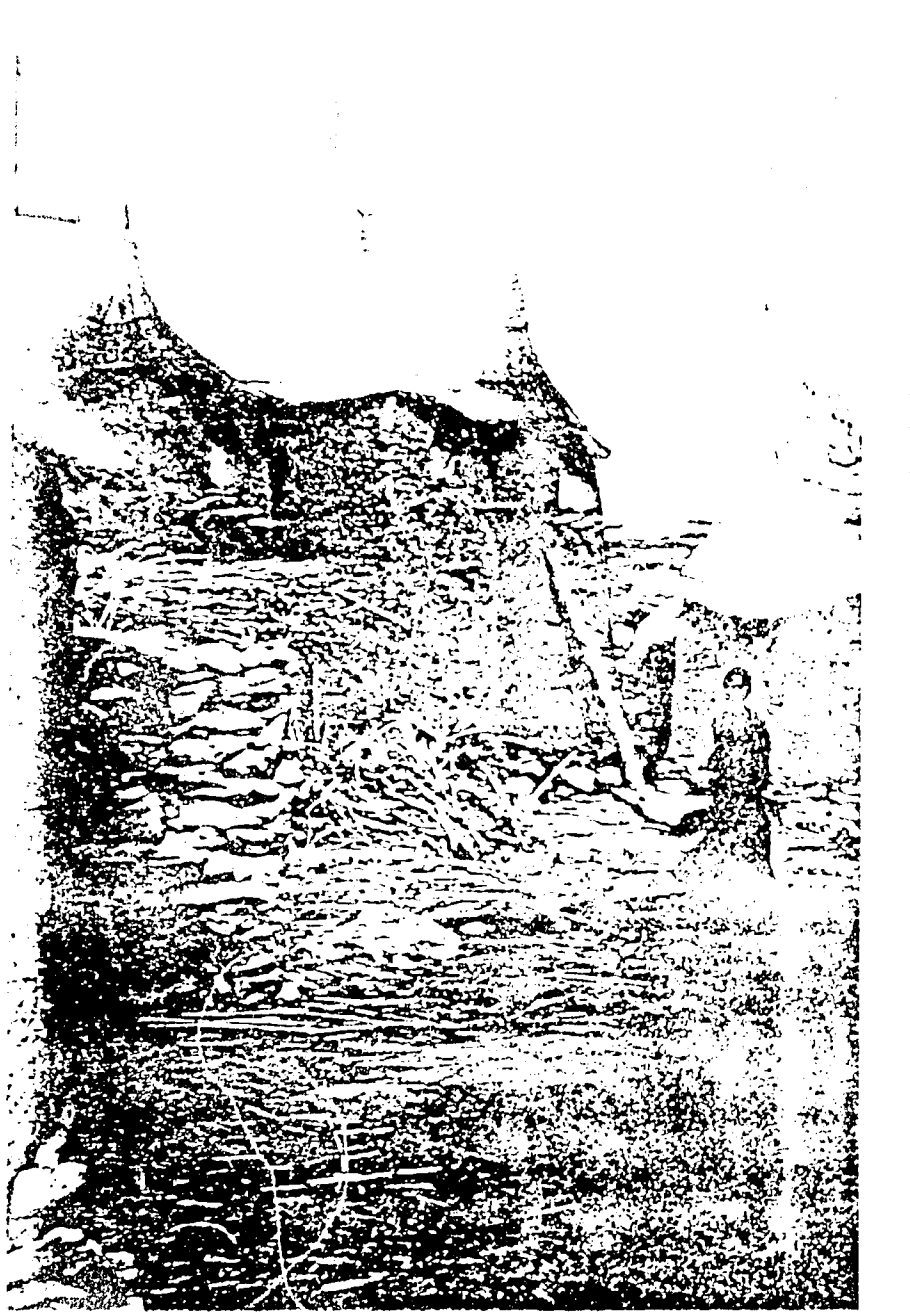
Millet field on the Seno Plain. Dogons from the plateau descend to the plain to cultivate millet, living for a week at a time in seasonal huts in the fields. Light tree cover characterizes these fields.

Plate 10.

A Dogon woman prepares a meal among growing millet plants on the Seno Plain. Dogons working on the plain must transport water to drink from the plateau or walk long distances to hamlets on the plain to draw water from wells that are up to 60 meters deep.

Plate 11.

Bundles of millet attached with strips of tree bark have been dried on roof tops and are now assembled to be put in earthen grain bins (see Plate 12). Children wear the flowering seed stalks of onion plants as necklaces, reflecting seasonal agricultural work divided between grain crops and garden crops.

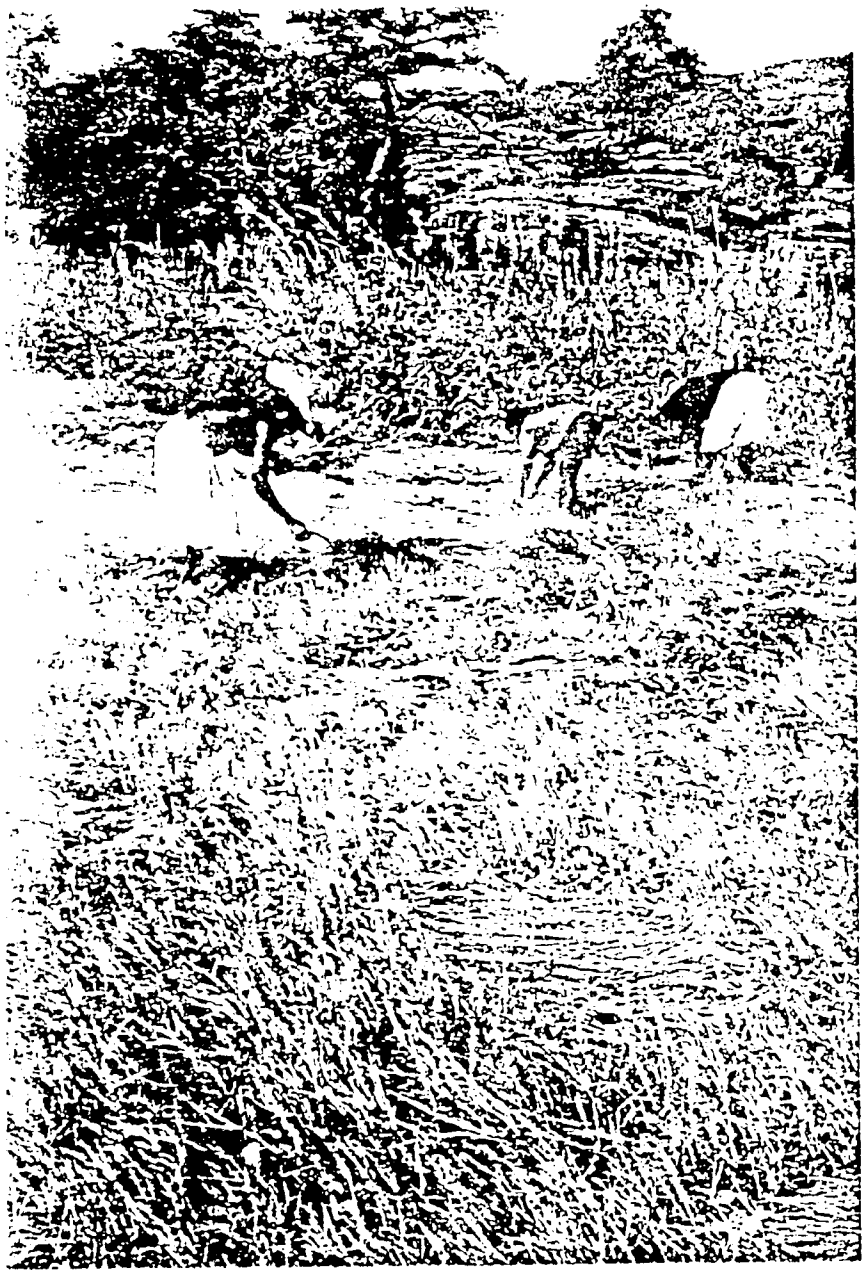


Earthen [illegible] filled with [illegible] painted rocks in a [illegible] [illegible]. Within [illegible] the [illegible] is [illegible] in the large [illegible] [illegible], in size, average [illegible] x 1.[illegible] x [illegible] and hold [illegible] [illegible]. Smaller remaining [illegible] are [illegible] "[illegible] [illegible]" and [illegible] [illegible] of [illegible] [illegible], [illegible], [illegible], and other [illegible] [illegible]. Other remaining [illegible] [illegible] ritual objects and have no [illegible] [illegible].

Plate 13.

In their "off hours," Zomba males fabricate baskets which are a trade item as well as an essential household and farm item. In Zomba baskets, seedlings are started, manure is carried to the fields, harvests of grains and vegetables are transported, wild foods and wood are gathered, goods are carried to and from market, and household items are stored.

Plate 14.



Males harvest fonio in a valley of the plateau. A stand of millet grows next to the fonio. A small seasonal stream (not visible) runs beside the millet and is planted with rice.

A Doron woman carrying her child gathers out fonio for drying and eventual threshing.

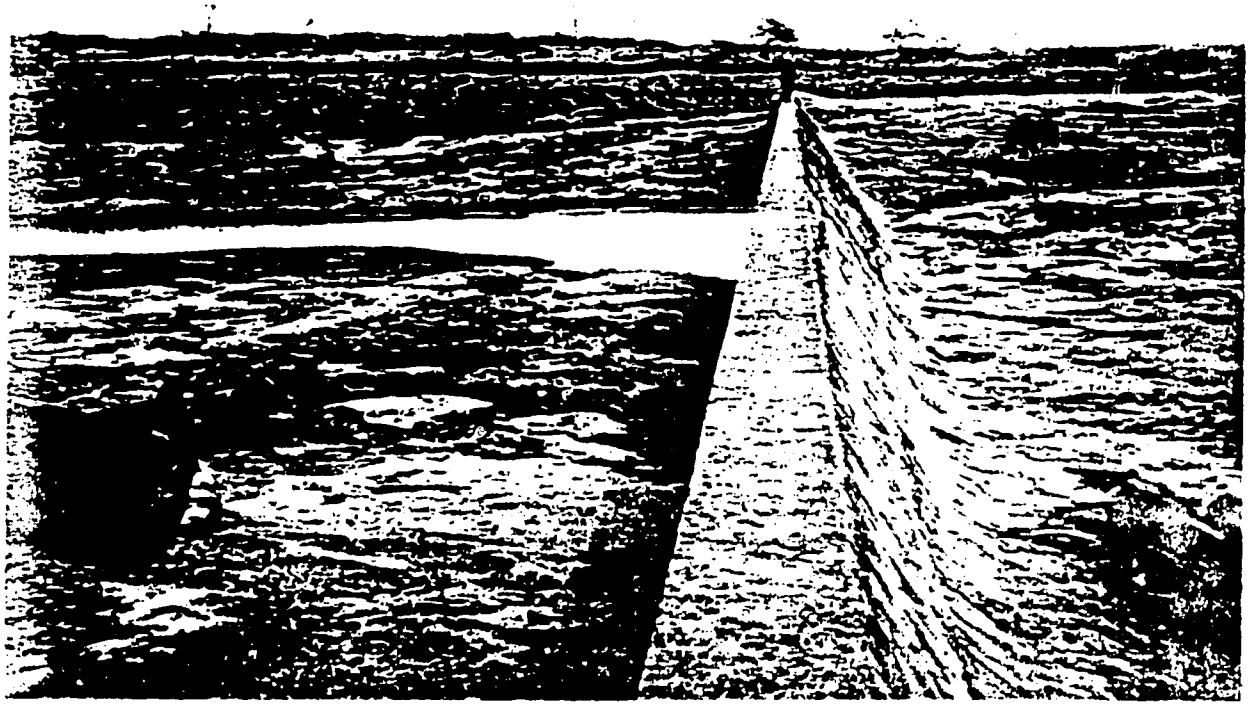
Plate 16.

One of many different types of Dogon garden sites. Small onions grow in terraced plots around a water source.

Plate 17.

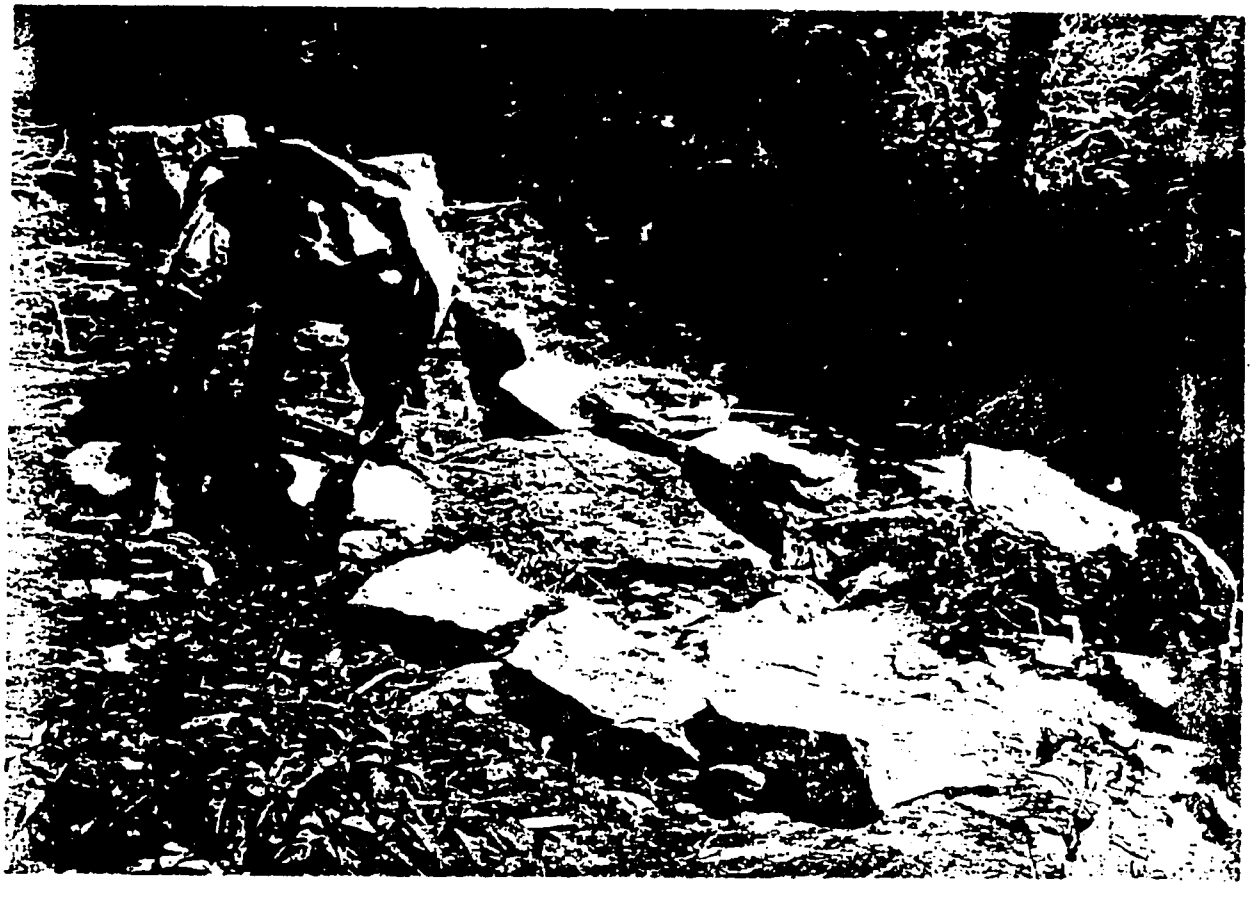
A cluster of small gardens built on bare rock outcrops. Maize and tomatoes are tightly interplanted and are hand watered from the pooled rainwater in the foreground.

Plate 18.



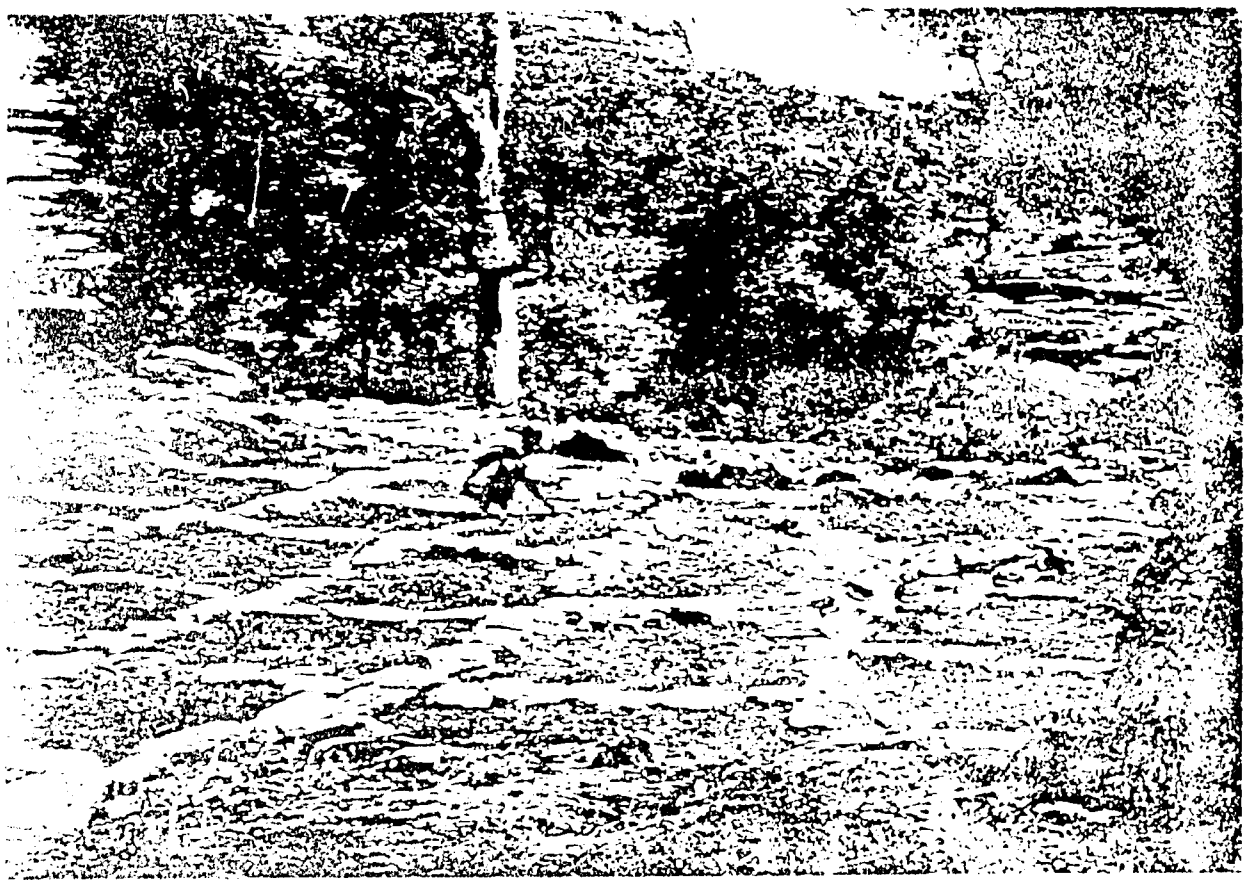
Small dams such as this one at Dourou built in 1965 allow more extensive gardening and a longer growing period. Approximately 30m long and 4m high at the central, deepest point, the dam is constructed of stone and concrete. During the rainy season the entire area shown here, including a part of the garden area visible in the background, is flooded with just one rain. In the absence of floodgates, however, silt buildup is an unresolved problem; deep silt borders the water shown in this picture and is not removed by the population.

Plate 19.



A Dogon farmer prepares the foundation for a new garden plot. Sledgehammers are used to break up large rock outcrops into appropriately-sized pieces.

Plate 20.

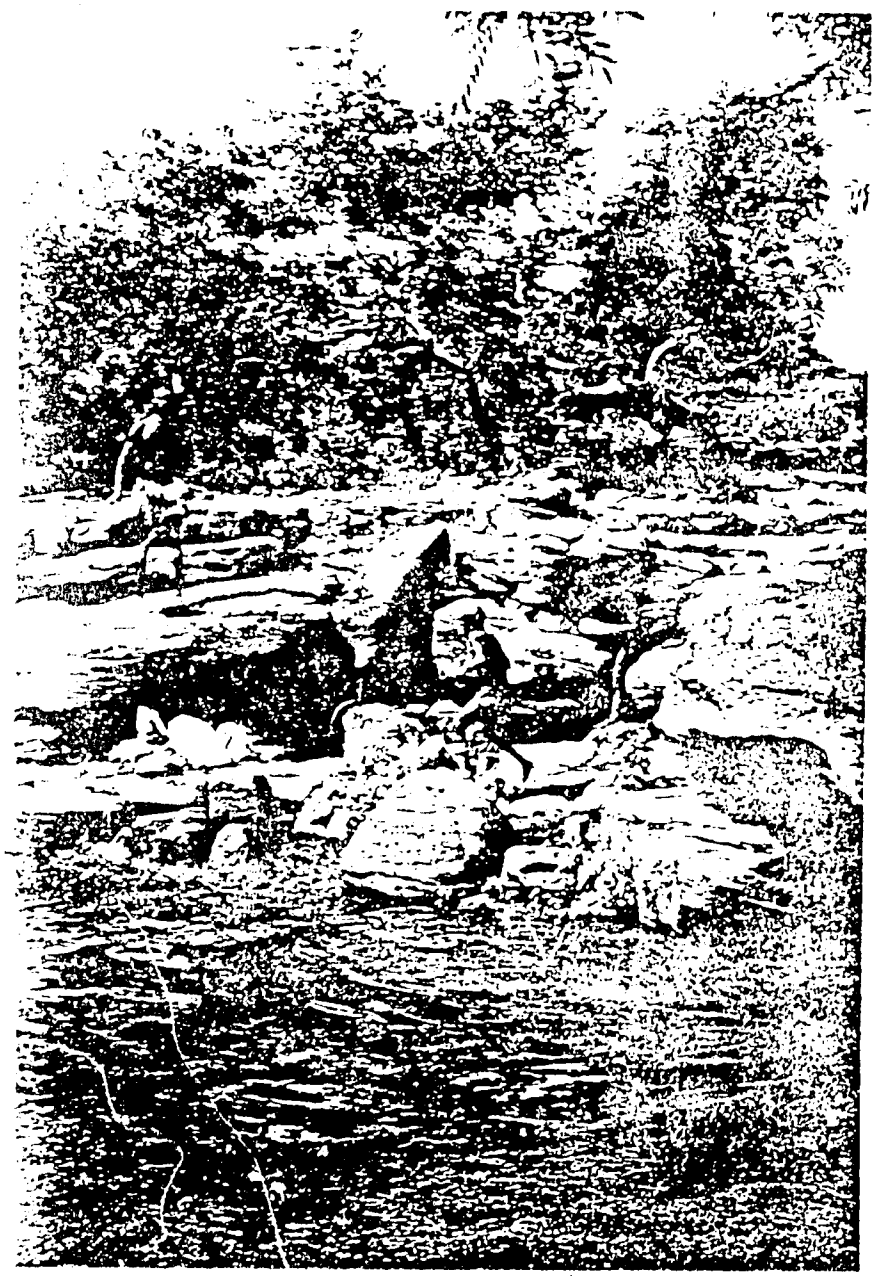


Farmers tend their onion crops. Within three days of planting, onion sets sprout; within 50-60 days onions can be harvested if growing conditions have been good.

Plate 21.

A late rain has flooded this farmer's onion garden. The farmer attempts to recover the onion sets he had planted the day before. As the sets were not yet established, they can be replanted. Had the rain come two days later, the farmer would have lost his entire investment in seed onions.

Plate 20.



Gardens are hand watered with calabashes from a seasonal pool of rainwater. Calabashes vary in capacity but generally hold about 15 liters of water.

Fissures, or faults, such as this one are common on the plateau, providing walk-in wells for drinking or irrigation purposes. This particular one provides village drinking water and is also a watering hole for animals; it measures 27m long, 5m wide, and 8m deep.

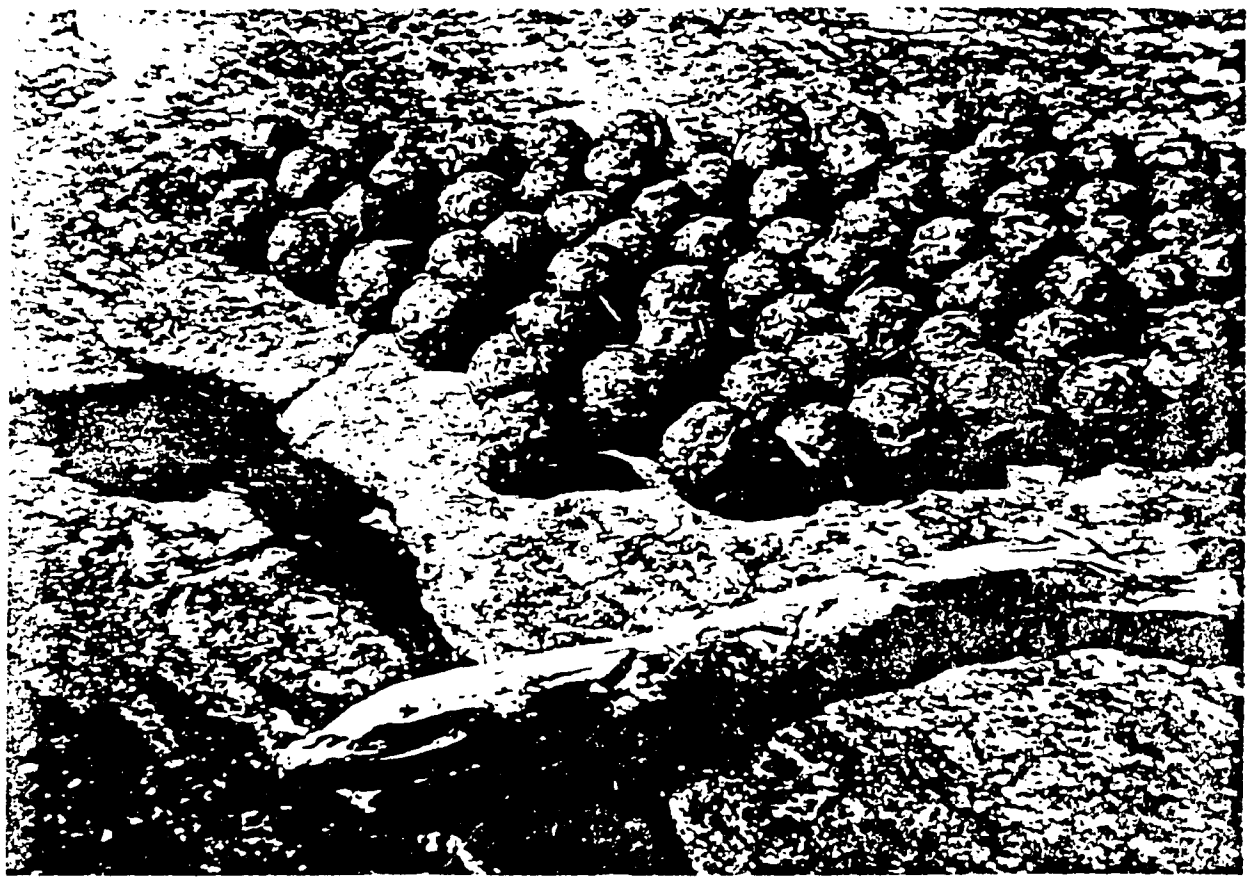
Plate 24.

The onion harvest. First the green tops are cut off with a knife and processed into leaf balls (see Plates 25-26). On the day following, usually a market day, the bulbs are dug up with a hoe. The small, many-cloved shallot-like onions lose moisture content rapidly, so storage is kept to a minimum. If not sold shortly after harvesting, the onions are pounded in a mortar and dried in balls for later sale.

Plate 25.

The onion tops are pounded with heavy sticks to break down the leaf structure. Handfuls of the resulting mass are formed into balls and as much of the liquid component as possible is squeezed out.

Plate 26.



Onion leaf balls, 20-25cm in circumference, are left to dry on rock surfaces for approximately 10 days before they are marketed.

FIELD REPORT
DOGON CEREALS PROJECT: DEMOGRAPHIC VARIABLES IN A VILLAGE POPULATION

Riitta K. Eskelinen, R.N.

August 21, 1977

This fifth in a series of field reports on the Dogon peoples of the Bandiagara Plateau of the Mali Republic addresses itself to an analysis of demographic variables. Based on field observations and data collection over a 15 month period, the results tabulated here illustrate demographic conditions in a Sahelian population inhabiting an extremely marginal habitat.

Poor of soils and receiving only some 500-600 mm of annual rainfall concentrated in 3-4 months of the year, the Bandiagara Plateau offers a subsistence of the harshest sort to Dogon millet and sorghum farmers. Agricultural work is carried out wholly by labor intensive hand-hoeing methods. Limited soil areas on the rocky plateau lead farmers to practice bush fallow farming on the adjacent Seno Plain at distances of up to 20 km from the village. In addition, Dogons grow a post-rainy season cash crop of shallot-like onions requiring labor inputs at a time which coincides with peak work loads revolving around the harvest and transport of millet. The labor of many hands, young and old, is needed for the timely soil preparation, sowing, cultivation, harvest, transport, and storage necessary to assure a food supply for the coming year.

In the study village (population 1274), 91% of males age 15 and older participate in farming activities, 74% of females age 15 and older contribute agricultural labor, and 11% of combined males and females under the age of 15 are engaged in farming activities. These statistics do not speak to the additional labor performed by women and girls: gathering (wild foodstuffs, wood for cooking fuel, and water), lengthy daily food preparation, and child care.

It is no surprise, then, that village attitudes are pronatalist. To eke out a living in this harsh environment requires a great expenditure of energy; every child born offers the hope of an additional worker, if he or she survives. Moreover, for the long term, children are the only buttress against the infirmities of old age.

For the Dogon, as for other Third World peoples, the complexities of the population problem are manifold. There can be no argument that balanced population growth is an important component of economic development, but what does this mean in terms of the day-to-day realities of subsistence agriculturalists such as the Dogon? The dilemma is clear: without a certain (undetermined) number of children, Dogons cannot exploit the widely distant micro-environments which are essential to their livelihood. Hired labor is unavailable, and the feasibility of mechanization in most of these areas is very limited. At the same time, medical services are all but non-existent, and infant and child mortality is high. In a sample of 108 females who had ever given birth to a live child, 87% had experienced infant/child loss. In addition, repeated childbirth drains the health of the female portion of the farming population as well as diminishing the chances of survivorship of subsequent infants. On the other hand, too much population growth risks exhausting the already fragile land and depleting the environment of such resources as tree cover with all too evident consequences for the population.

It is within this ecologic, economic, and social framework that the following demographic data are presented.

A. A Note on Methodology

For those familiar with population survey work in rural Africa, it is not necessary to comment on the numerous pitfalls which one may encounter in

the field. For other researchers and development workers, a few words may be instructive. In the Dogon milieu, one collecting any information will immediately be confronted with problems of (1) unique identification of individuals, (2) delimitation of household affiliation, and (3) age determination. In addition, the vast majority of the population is nonliterate and non-French-speaking; moreover, some nine distinct dialects, some of which are not mutually intelligible except for salutations, are spoken in the region.

In the study village, as in other parts of Mali, one must uniquely identify individuals when practically everyone has the same surname and a limited range of first names, commonly based on birth order. One solution--omitting the surname and using the first name and the name of the individual's father--was an effective stopgap measure until individuals were known personally. However, this approach, too, can have its pitfalls if more than one person is recording data. As people convert to Islam--a dominant trend on the Bandiagara Plateau--they adopt Muslim names; at one point in my field work, I realized that three individuals for whom I had varied data were, in fact, one and the same individual who had quite innocently given different names on several occasions. Verifying census data can be time-consuming when other individuals (e.g., Animist parents) refer to people by other names than the ones they, themselves, have adopted.

Dogon villages are laid out as mazes seemingly for historical reasons of security. In older quartiers, two meter high walls surround household compounds and form unbroken walls along narrow passageways among the rocks upon which all plateau villages are constructed. While working in quartiers with which I was less familiar, I would lose my way from time to time much to the amusement of ever watchful Dogons on rooftops who would guide me back to my destination (passages through which even children would unerringly guide me without flashlights in the dead of night). Having once located a household, however, was only part of the

problem. Given patrilocal residence patterns (the rule of taking up residence with or near the parents of the male partner in a marriage) and the practice of naming the eldest male (e.g., for tax purposes) as the household head of a large, extended kin group which was actually dispersed in separate dwellings, it was necessary to delimit more precisely actual consumption and reproductive units. This could not be done on the basis of food-sharing groups as some, but not all, kin groups ate together from communal grain stores during a part of the year and separately for the rest of the year. For demographic purposes, it was decided to survey households merely on the basis of sleeping arrangements. To some degree, this is inaccurate as teen-agers, for example, and some younger children sleep apart in separate houses although their daytime affiliation is to a specific household, though not necessarily that of their biological parents. Of 240 households surveyed, mean household size was 4.3; however, this reflects very little of actual social life and is no indication of numbers of children per biological parents, for children are not necessarily raised by their own parents but are redistributed among maternal and paternal kin.

Age determinations in a nonliterate population are difficult at best. Among the Dogon, people do not keep track of ages in years but have a general sense of age at certain life passages. Ages were estimated on the basis of various factors; for example, individuals' own perception of their ages (for males especially, ages seemed to be exaggerated due, undoubtedly, to the respect accorded older males in the society), age-matching with other villagers, coincidence of certain life events with a local event calendar (e.g., a major drought, a well-known battle against colonial invaders, the building of the road, the year of enlistment or return from French military service of certain individuals), and, in the case of infants, on the basis of dentition.

Age determinations for women were much more difficult than for men.

Many women come from other villages making age-matching with peers difficult. I found women to be much poorer informants than men, the reason in part being that so little value is placed on women's lives. Males who could remember five generations of their patrilineage could not tell me the name of their grandmothers. A village elder I was once questioning about the age of his wife (and one who had listened to me on various occasions trying to elicit information on women's genealogies from older males) blurted out quite hostilely, "we aren't interested in women or women's ages. When we want a woman, we ask 'can she prepare millet, can she carry water, can she work?' We don't need to ask how old she is."

By governmental decree, all Malian males must obtain an identity card; on another form families are listed for purposes of taxation (women with 4 living children, incidentally, are not taxable). I did not find these documents accurate or useful; however, some individuals in rural areas are now obtaining birth certificates for infants which will prove invaluable for the future. In Mali as a whole, it is estimated by the World Health Organization Regional Office for Africa that 15% of births are currently recorded.

B. Population Composition

The total population of the study village is 1274. Ethnic composition is Dogon with 2 Mossi households and representatives of two artisan caste groups--a blacksmith and dependents (7 individuals) and indigo cloth dyers, leather workers (75 individuals). Administrative personnel, including school teachers, health workers, and agricultural agents of nonlocal origin, and their dependents number 40.

The population pyramid (age-sex distributions) is shown in Figure 1 indicating a young population in which 45% of individuals are under 15 years of age. The sex ratio, or number of males per 100 females is 94.

Dependency ratios (dependents per 100 population 20-64 years of age) are shown in Table 1.

Table 1

Dependency Ratios, Dourou, 1977.

Youth Dependency Under 20	Aged Dependency 65+	Total Dependency Ratio
136.9	14.4	151.3

C. Population Distribution and Density

The settlement pattern is highly localized. Household compounds are honeycombed together atop rock outcrops. Two major quartiers (subdivided into 10 minor ones) are separated by a valley system and deep gorges. The 1274 inhabitants live within an approximate one square kilometer area.

The total land area exploited by the population in cultivation and gathering of foodstuffs, the collection of water and wood and miscellaneous leaves, roots, barks, and wild animal manures is estimated at the very maximum to be 120 km^2, yielding a density of 10.6. However, some of this area is jointly exploited by other villages.

D. Vital Rates

The Crude Birth Rate (live births per 1000 persons living) is 46 for the year 1976-77. The Crude Death Rate is 27. Total deaths by age and sex are shown in Table 2.

Figure 1.

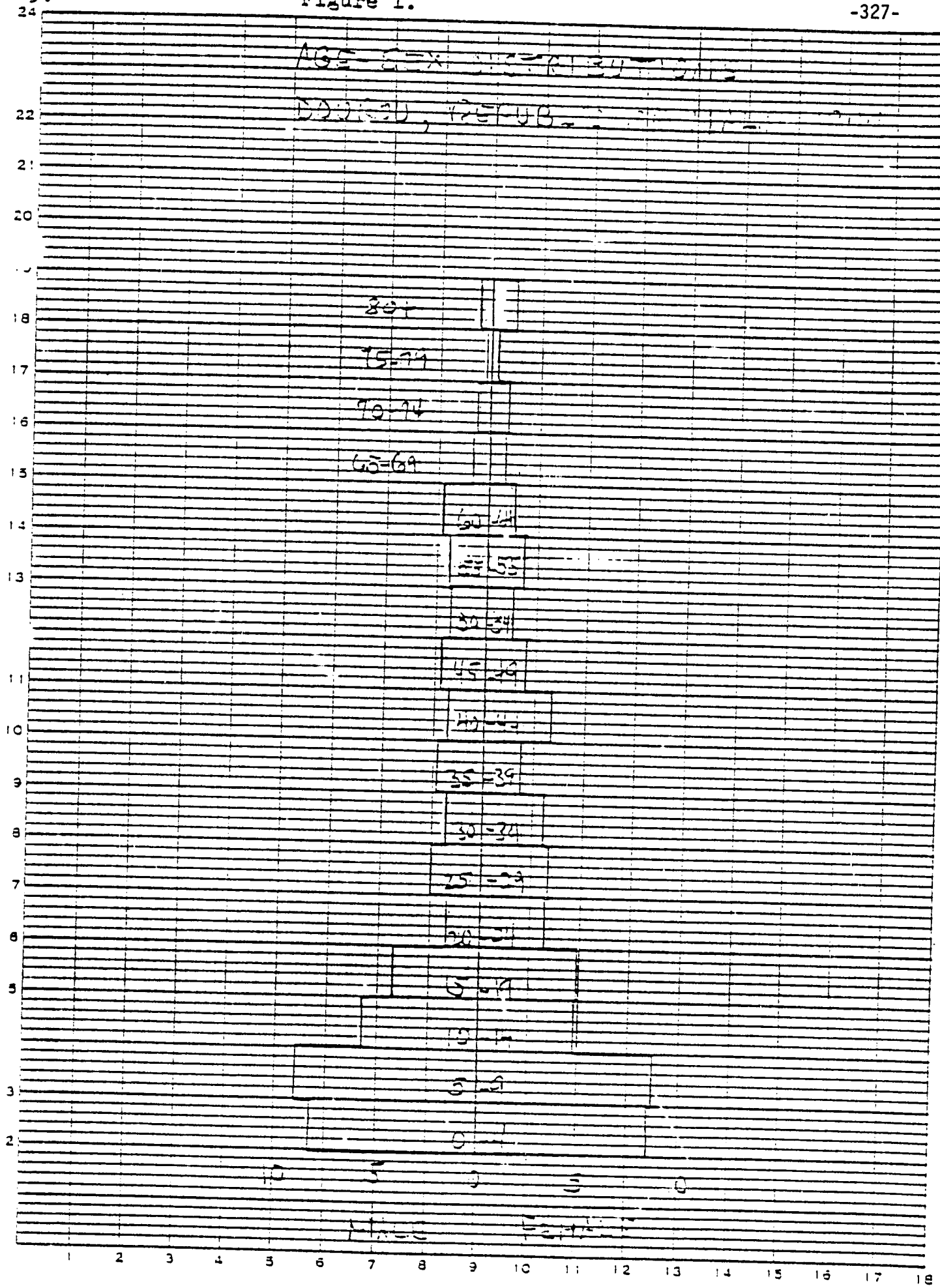


Table 2

Total Deaths, 1976-77, By Age and Sex, Dourou. N=34			
Age	Male	Female	Total
0-4	15 (44%)	13 (38%)	28 (82%)
5-59	-	-	-
60-79	3 (9%)	3 (9%)	6 (18%)
80+	-	-	-
Total	18 (53%)	16 (47%)	34 (100%)

The General Fertility Rate (total number of births during the year per total number of women of childbearing age) is 200. The Child-Woman Ratio, or Fertility Ratio (number of children under 5 years per 1000 women ages 20-49) is 991. Age-Specific Fertility Rates in Table 3 reflect relative fertility performance by 5-year age groups.

Table 3

Age-Specific Fertility Rate, Dourou, 1976-77 N-59			
Age	# Women	Births	ASFR
15-19	63	5	79.4
20-24	42	9	214.3
25-29	41	12	292.7
30-34	39	11	282.
35-39	25	8	320.
40-44	44	10	227.3
45-49	26	4	153.8
	280	59	1569.5

Of the 280 fecundable women in the village (22% of the total population), 41, or 15% of all women 15-49 were found to be currently pregnant.

Data on migration are incomplete; observation could not be conducted on an ongoing basis for the total population. For the quartier of residence (population 419), there were 5 in-migrants and 1 out-migrant in a 12 month period. Extrapolated to the total population, such figures would yield a hypothetical rate of 12 per thousand in-migration and 2 per thousand out-migration.

The growth rate based merely on births and deaths would be 1.9% per year With the hypothetical migration rates included, annual growth would be 2.9%, but it must be emphasized that this is a hypothetical construct, not a rate calculated from actual observations.

E. Natality Profiles

In addition to survey work, interviews were conducted with 130 females ages 15-80+ on their childbearing histories. The number of live births experienced by these women are tabulated in Table 4. Calculated also in Table 4 are mean number of live births by 5 year age cohorts and total cohort fertility profiles, which indicate total numbers of children born to women who have completed childbearing. In Table 5, total cohort fertility is controlled for religion. In the population as a whole, of 240 household heads surveyed, 39% designated themselves as Animists, 10% as Christians, and 51% as Muslims. Women unfailingly adopt the religion of their husbands. As a generality, older people tend to be Animists while younger people are turning to Islam. The pervasive influence of Islam is demonstrated by the phenomenon of elderly women whose Animist husbands have died converting to Islam, their rationale being that no one will be left to bury them when they, themselves, die. I found one elderly woman who had converted to Christianity despite the fact that her husband was a steadfast Animist.

Table 5

Total Fertility by Age and Religion, Dourou, 1977.
N-46

Age	Animist	Christian	Muslim
45-49	6.5	7.5	12.7
50-54	11	-	10
55-59	8.4	-	11
60-64	9.3	-	6
65+	8.2	6	8

Of 240 households surveyed, 20% were found to be polygynous, the maximum number of wives being three. Animists accounted for 12% of polygyny, Christians for 2%, and Muslims for 86%.

In the sample of women interviewed, of those who had ever given birth to a live child (N-108), 87% had experienced the loss of an infant or child; 6% had experienced spontaneous abortion and 5%, stillbirth. Every woman in the sample age 20 or older had given birth to at least one child; the one primigravida in the sample was 18 years of age.

F. Social Considerations

In demographic terms, marriage among the Dogon is an insignificant variable. Sexual exposure begins early in puberty and one or more births generally occur before a woman moves into the house of the man--the act which constitutes marriage in the Dogon milieu. There is no bride price or dowry and no ceremony or celebration of any kind. The woman is expected to bring her own clay pots and other cooking utensils with her.

By tradition, the first child of the union is given to the woman's parents to be raised. Subsequent children may also be distributed among members of the kin group; elderly widows and widowers living alone are commonly given young

Table 4.

Number of Live Births by Age of Mother, Lourou, 1977.
N=130

No.	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	
0	22	-	-	-	-	-	-	-	-	-	-	
1	3	6	1	-	-	-	-	-	-	-	-	
2	2	6	1	-	-	-	-	-	-	-	-	
3	-	1	3	-	-	1	1	-	-	-	2	
4	-	-	3	3	1	-	-	-	-	1	-	
5	-	-	1	3		-	-	-	-	-	-	
6	-	-	1	1	4	2	1	-	2	1	3	
7	-	-	-	1	3	1	2	-	-	-	3	
8	-	-	-	-	1	2	4	-	1	1	4	
9	-	-	-	-	-	4	1	1	-	-	1	
10	-	-	-	-	-	2	1	-	1	-	4	
11	-	-	-	-	-	3	-	3	1	-	2	
12	-	-	-	-	-	2	1	-	1	1	-	
13	-	-	-	-	-	-	-	-	-	1	1	
	27	13	10	8	9	17	11	4	6	5	20	Totals
	# Women=130											
	7	21	35	40	57	151	86	42	53	43	161	Totals
	# Children=696											
	.26	1.6	3.5	5	6.3	8.9	7.8	10.4	8.8	8.6	8	
	Mean number of live births by age of mother											
	Total Cohort Fertility						7.3	10.5	8.8	8.6	8	

children to raise.

Divorce is a relatively simple affair--the woman leaves the household of her husband either of her own volition or at the behest of her husband. Both partners are then free to seek other mates. The husband is entitled to claim all progeny of the union. Divorce, in its traditional form, appears to have allowed women an unusual degree of freedom to extricate themselves from undesirable conditions (this is perhaps related to their economic contributions to the household through agricultural labor and providing food through gathering and trading). Efforts are currently being made by the Malian government to convince the population to enter into civil marriages which cannot be dissolved without going through the judicial process (revenues are involved). Demographically, women who can remove themselves at will from a marital union conceivably could spend less time at risk to pregnancy over the span of their fecundable years than women who are more or less permanently married.

Other influences on natality include the changing relitious orientation of the population. Whereas Animist populations of the 1930s practiced postpartum abstinence for 2-3 years[1] combined with breastfeeding of infants, theoretically increasing child spacing and decreasing total numbers of children born per woman, current-day Islamic teaching requires resumption of sexual relations on the 40th day postpartum. In fact, the figures presented in Table 4 suggest that, for whatever reason, mean number of births per woman is increasing. Dogons began converting to Islam approximately 40 years ago. For the cohort 45-49 (who would have been entering puberty after this time), some differential natality by religion does seem apparent.

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[1] See, e.g., Denise Paulme, Organisation Sociale des Dogon, 1940, pp. 432-439.

Interestingly, the oldest woman interviewed, well into her 80s, had given birth to 3 children--all of whom survived to adulthood--and recounted birth intervals of 6-7 years. Current birth intervals are the order of 2 years.

Ages of spouses are not widely discrepant in the society particularly in the first marriage, but, again, age at marriage has little to do with childbearing patterns. Men may marry anywhere from their mid-twenties to early thirties; women tend to be in their late teens or early twenties. Older men who take a second wife may marry a much younger woman. In the event of death of the spouse, remarriage occurs for both sexes except in the case of post-menopausal females who do not remarry. (Menarche, incidentally, appears to occur about age 15).

In this population, education has no effect on natality as virtually no one of childbearing age has been to school. There are no alternative roles for women other than childbearing and domestic and agricultural labor.

G. Nutrition

Women in Dogon society eat a differential diet as compared to men in their own households. Men, having a cash crop income, can afford to consume meat at the marketplace while women seldom can. Women's diet during pregnancy and lactation is the same as it is during any other time. Women do state that they have a desire to "eat more" when they are pregnant. The high rate of infant loss among these women may be related to maternal nutritional status.

Children are universally breastfed; in the event of insufficient milk supply, "wet nurses' are employed until the mother can produce enough of her own milk. Bottle feeding is not known or practiced. Supplements to the infant diet begin at about 12 months; small tastes of food, however, are given as early as 3 months. There are no special foods for infants and children; they are given

the same ground millet mixed with water or cooked millet paste with sauce that is the adult staple diet (all of which is soft in consistency). Milk is not available for children.

Weaning is begun when signs of the next pregnancy become apparent and is a traumatic time for the child. Some children refuse to eat at this time and cling tearfully to their mothers' breasts. Women sometimes put pulverized hot pepper on their nipples to discourage breastfeeding. Many mothers are at their wit's end and long into their next pregnancy before weaning is achieved. One of the more indelible visions I have of the difficulties of the weaning period comes from witnessing the weaning process and ultimate death of a 2 year old boy I came to know. This child steadfastly rejected any nourishment (his mother was by then in her sixth month of pregnancy), became more and more dehydrated from a dysentary-like syndrome and died abruptly despite everyone's best efforts. I once observed a woman from another village breastfeeding a child of about 4 years of age; she related that a younger child she had been breastfeeding had died, so she gave her milk to the older child.

H. Natality Regulation

No evidence was found of the use of natality regulating methods such as contraception, abortion, or infanticide.[2] Women denied any knowledge of such methods but were not convincing in their denials. One woman I questioned about a plant abortifacient I had heard about in the area assured me quite authoritatively that I could drink "a calabash full" and it wouldn't have the slightest effect in inducing abortion.

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[2] One confirmed case of infanticide by strangling did come to my attention in another village but had nothing to do with population regulation as any issue. The individual--the grandmother of the newborn infant--was later seized by civil authorities and sent to jail.

Young males intimated that young, unmarried females know of certain plant products--"leaves"--which would prevent pregnancy or induce abortion. Some young people in the village felt that the anti-malarial drug, "Nivaquine," was effective in warding off pregnancy. Dogons believe that the days immediately following the menstrual period are the most fertile and the time when conception occurs. Informants stated that some young girls would refuse sexual relations during this time.

The veracity, or lack thereof, of these accounts is not as important as the fact that individuals of both sexes are aware that certain measures can possibly forestall pregnancy when it is advantageous to the parties involved. It is clear that young females wish to prolong their youthful days, but, at the same time, there is no other alternative for village women but marriage and childbearing and women must, in effect, demonstrate their fecundity before they marry. Nevertheless, the overwhelmingly pronatalist attitudes of the community need not be at odds with the view that longer birth spacing combined with improved nutrition, sanitation, and health care is a positive good for everyone involved.

Gender preference is for the male child. Questions about ideal family size invariably brought laughter and the response that "all that God provided" was the number they wanted. An older woman in a discussion with her daughter said that one should bear 8-10 children in order to have 4-5 survive. Two younger women candidly informed me the number of children they presently had--3 and 4 respectively (although both had had 4 pregnancies)--would suffice.

Sterility does not appear to be a health problem of consequence in the area; however, it is devastating to the individual woman as it is she who bears the blame unless the male is obviously impotent. I knew of one woman who left her marriage and the village due to her inability to conceive although she entered a second marriage elsewhere.

I. Summary and Conclusions

In the Dogon milieu, women enter into sexual unions early and remain in them until their non-fertile years. Women continue to bear children even as their own daughters begin their childbearing period. Short birth intervals are the rule and total fertility rates are high even by African standards.

Seasonal labor migration by young males is all but non-existent in the area studied, exposing females to a high risk of pregnancy throughout the year. The more characteristic long-term migration to the Ivory Coast or other distant areas by young males (some of whom are already married) may have a demographic effect of decreased natality during the peak fecundable years of the women involved.

The primary responsibility for raising children is not necessarily borne by the biological parents, and children are valued in the society for the labor they eventually provide and for perpetuating the lineage as well as providing old age security.

FIELD REPORT
DOGON CEREALS PROJECT: PHYSICAL AND SOCIAL MILIEUX

Hamadoun Sidibé

December 1, 1977

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Overview of Our Activities

Upon my arrival in Bamako, I was well-received by members of the USAID/Bamako Mission. They introduced me to the Director of the Service de l'Agriculture, who requested of the Director of the Opération Mils program that all necessary technical assistance be afforded me during my work. USAID also provided a Landrover for my transportation needs.

Opération Mils agents in Mopti were especially helpful, and introduced me to representatives of a number of governmental services there: Gouvernorat, Coopération, S.C.A.R. (Société de Crédit Agricole et de l'Equipement Rural), Génie Rural, O.D.E.M. (l'Opération de Developpement de l'Éelevage dans la Région de Mopti), and the Service de Topo; all were very interested in the study. Discussions with staff members of these government services enabled me to enhance what had been a heretofore rather superficial understanding of their functions.

After spending twelve days in Mopti, I left for Bandiagara, an important center and gateway to Dogon country. Following the contacts described above, as well as interviews with the Commandant de Cercle and the Chief du Secteur de Développement Rural (S.D.R.) at Bandiagara, I selected the village of Dourou as my headquarters and observation post. There were two basic reasons for my choice of Dourou. First, the Dourou Z.E.R. (Zone d'Expansion Rurale) is--according to the Bandiagara S.D.R.--the most important onion producer of all the Z.E.R.s in the Dogon region. Second, Riita Eskelinen had already worked there, and the inhabitants were more at ease with researchers. What is more, she had spoken with the people of the eventual arrival of her replacement. Both factors served to

pave the way, and I was enthusiastically welcomed by the Dourou villagers.

Two days after my arrival, I explained the reasons for my presence during a meeting with village counselors, the heads of the Dourou Z.E.R. and S.B. (Secteur de Base), and the Chief d'Arrondissement. The village councilors were very receptive, and Administration and Service de l'Agriculture officials assured me of their complete cooperation.

Beginning of Fieldwork

From September 27, 1977 to October 3, 1977 with the help of Dourou school students on vacation, we completed income and expenditure accounts for thirty-four families in Dourou Taga for the previous year (September 1976 to September 1977). Within this sample, agricultural activities (especially market-gardening) of sixty-five individuals were regularly observed. Activities of families of the Dourou Na quartier were also studied. The accounting sheets for income and out-go are still in rough-draft form, and will be submitted at a later date.

Also among our activities were measurements of millet production of Plateau and Séno fields. For other crops, production figures using local measurements were obtained, as well as the amount of labor-time spent during the last rainy season.

Observation of Dourou farmers was difficult due to the spread of cultivation activities over two ecological zones: the Plateau and the Séno; farmers work in both areas.

Only a few tournées were completed. The Landrover suffered frequent breakdowns, and these required trips to Mopti where days could easily be lost while awaiting repairs. In addition, observation of Dourou farmers, as it required our presence on the spot, reduced the number of field trips.

Upcoming Activities

- Resource inventory: tools, irrigation materials, and cattle.
- Population census.
- Land survey.
- Notation of farmer cash income and out-go for the October-November-December 1977 trimester.
- Study of Dourou marketing circuits as far as Bamako where middlemen will be studied as well.

Physical and Social Milieux

This is the first of several reports being prepared on Dogon agricultural systems based on field work of two and one-half months' duration. The field research has been sponsored by the Research Foundation of the State University of New York (RFSUNY) in order to gather information relevant to development actions in the Dogon region. On the basis of our observations, interviews with members of various occupational groups, and documentary research, we will look at the region through the physical and social frames within which all activities take place.

I. The Physical Environment

The Dogon inhabit the region east of Mopti, within the fifth administrative sector of the Republic of Mali, in the central part of West Africa. They are found within the administrative circles of Bandiagara, Bankass, Koro, and part of Douentza, and are distributed among three physically distinct but closely related zones. From West to East, these zones are the Bandiagara Plateau, the Escarpment (la falaise), and the Séno (la Plaine de sable). The Dogon are the second largest ethnic group in the region; the Peul being the largest.

A. The Bandiagara Plateau

Located on a north-east/south-west axis between the 14th and 15th degrees of northern latitude, the Bandiagara Plateau is an extremely rough sandstone mass upon which are found barren, sloped out-cropping. Emerging with a gentle slope from the banks of the Niger and Bani rivers, the Plateau reaches its greatest height in the east. The topography of the region varies greatly and does so within relatively short distances. Crags, often pointed and blackish, emerge from an break up the otherwise flat expanse of the Plateau. Crevices, faults, and steep ravines are found all about. On the Plateau are found several

valleys, rivers, and ponds whose beds are well-defined.

The infrequently flat rocky spaces to be found on the Plateau are occasionally covered with very thin gravelly soils with very little water-retention capacity. These poor soils make up the largest part of the Plateau's arable land. The ravines and faults contain substantial sedimentary deposits, well-decomposed with high agricultural value (good structure and texture, with a little humus). This type of soil is also to be found, not easily accessible, among the large pieces of rock on the Plateau.

B. The Escarpment

On the south-east side, the Plateau ends abruptly in a rectilinear slope, forming a wall of more than 200 meters in height which overhangs the sand dunes of the Séno (see diagram). At the foot of this wall are found numerous large fallen rocks and boulders. Forming angles of 120^{0} and more with the vertical wall, these fallen rocks eventually give way to clayey, sandy-clayey, or sandy soil which forms the bank of a stream which runs along the Plateau and which, at certain spots, resembles a river. This stream is the Golo.[1] The other, sandy bank, is bordered by the Séno dunes. At the Escarpment the physical aspect looks like V.

C. The Séno (Sandy plain)

The Séno begins with the dunes at the edge of the Golo. The dunes extend for about ten kilometers to the level of the yawa (the Dourou declivity), forming alternating crests and depressions until they become a flat sandy expanse called the Séno, a Peul word meaning "sandy plain." This wide plain runs along the Plateau and ends in clayey and then lateritic soils near the Upper Volta border. The following diagram presents the physical aspect of Dogon country in an easterly direction, that is, along the Bandiagara, Dourou, Koro axis.

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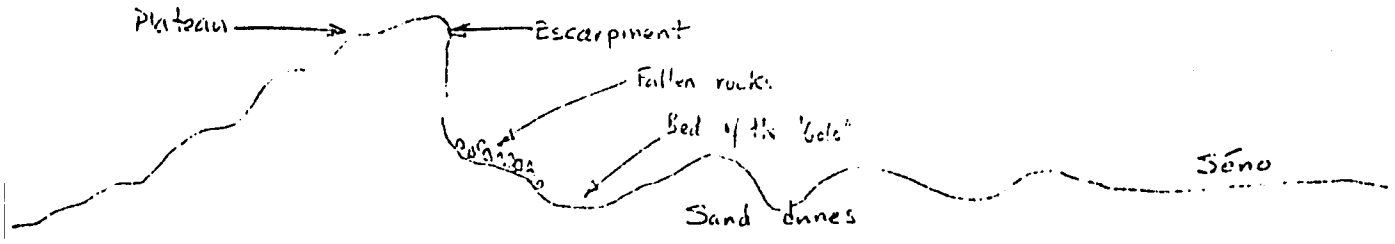
[1] The name given to the stream at the Tireli Level.



D. Climate

Dogon country is located within the Soudano-Sahelienne climate zone which is dominated by two seasons" a dry season from October to May, and a rainy season from June to September.

1. Vegetation

The vegetative cover is made up of trees and bushy herbaceous species scattered here and there depending on the characteristics of particular micro-environments. In the three Dogon zones as in many other Sudanian areas, one frequently finds the "segue" tree (Acadia albida). The density and frequency of its occurrence varies from one zone to another. It is denser on the Séno and the strip between Niger-Bani and the high mountains of the Plateau. Within the areas of the massif the acacias are found mostly in faults, crevices, or the infrequent sandy strips that border water courses. This tree is rare on the flat rocky spaces covered with gravelly soils.

"Ronier" palm trees "sin" (Borassus flabellifer) are found only on the Plateau. Denser on the sandy soils that border the rocks of the Plateau itself they are found in micro-environments conducive to acacia growth, i.e. valleys, faults, and crevices.

Other trees frequently found on the Plateau are the Pegou "Sa" (Lannea acida), the Karite "Mindjou" (Butyrospermun parkii), the tamarind, the baobab "Oro" (Adansonia digitata) and the "Biye" (Pourpartia birrea). Bambara call it "Gouna."

On the Escarpment, the tamarind is the second most frequent species. One also finds an occasional baobab and another spiny species, the wild-date tree, known locally as the Ménin.

The tree-cover of the Séno is not very diverse; after Acacia albida, Pourpartia birrea is the most common species. On the clayey soils at the end of the sandy plain, for example, along the Koro, more spiny species are found. The dune region of the Séno is covered by (fibrous) bushes among which are scattered large-leaf trees known among Dourou speakers as Kirin.

All these trees are used by members of the rural population and figure importantly in the economy of the region. They are well cared for by the farmers--especially the acacia and the Pégou which are found in the fields. The leaves and fruit of the acacia provide an additional source of forage for cattle and sheep. What's more, the fallen leaves and the woody debris add carbon, nitrogen, and humus to the soil. (This economic importance will be further discussed in the forthcoming study of family budgets.) The acacia is also a source of wood for fire and building, but is used only rarely for these purposes.

All parts of the Ronier palm are useful. The trunk, which is very strong, provides wood for construction. The leaf-stalks are used to make sieves; the limbs and ribs serve as basket-making materials. The Dogon use only the limbs in basket-making, while the Bambara in the Saye arrondissement use both limbs and ribs. The ronier fruits are the most important part of the tree. Before ripening they contain a liquid which is enveloped by a very sweet gelatinous substance. This mixture is used as food by the inhabitants of the Saye and Sarro

(Macina cercle) arrondissements, and is also used as a laxative. These uses are also known among the Dogon. When ripe, the gelatinous material and the liquid solidify to form a pit which, when planted, produces a tubercle called "dissi" by the Dogon and Peul. These tubercles are eaten in all areas where the Ronier is found. Cultivation of these tubercles is an important activity in the region. Several donkey-drivers leave the Séno daily and criss-cross the Plateau in search of the tubercles. One sees caravans of these donkeys along the roads to Dourou, Bandiagara, and Mopti. The pulp which surrounds the pit is also eaten. The Ronier-palm has been a life-saver during times of severe famine.

Seeds of the Pégou tree produce an oil which is used in ceremonial preparations; it is used as a pommade in women's hair as well as a fly repellent. Pégou fruit is used in the preparation of a sweet drink ("sadi") which is also fermented. Sadi is the local Coca-cola (especially among the women) The decoction of Pégou bark is used to tan goatskins and as a dye.

Fruit of the tamarind tree is used in the preparation of crème an important Dogon food. Tamarind branches are used to manufacture tool handles, but only infrequently due to the alimentary importance of the fruit.

Baobab bark is a source of fibers used in rope-making. Leaves of the tree are used as ingredients in two principal Dogon dishes, one a millet mush (called "oro-gna" in Dogon and "tòt" in Bambara), the other being crème.

The Karite produces kernels from which is extracted an oil widely used in the Sudanian zone of Mali.

The "Kirin" of the dune region figures in a variety of products. The wood is widely used in the construction of houses in the area near the Escarpment. It is also used to make pestles, mortars, and handles for hoes (daba) and axes. The Kirin tree is a major source of firewood; the leaves are much liked by cattle and sheep. The fruit of the "Podou" tree (Detarium microcarpium; "ntabacoumba" in Bambara and "konkodjé" in Peul) is also eaten.

The smaller flora of the region is made up of herbaceous and leguminous plants. The latter are commonly found on the Plateau where they grow among small cracks in the sandstone. These smaller species make up the main source of pasturage; local names of five in the Dourou region are the following:

Béridjin - a herbaceous creeper, like fonio.

Pélé-emé - the ear of which resembles sorghum.

Dédi djou - a high grass-attaining three meters--the stalks of which are used to make square-bottom baskets.

Sàbou - another grass.

Baguin-pourgou - a leguminous plant.

2. Winds

Throughout the country the winds are dry, blowing from the north-east to the south-west during the dry season, and from the east to the west during the rainy season. During the dry season the harmattan burns and dessicates the land and is accompanied by rising, swirling drafts which take up clouds of sand and dust. These winds cause some damage; they blow away organic material from the topsoil of those fields which have no vegetative ground cover. At seeding-time, the winds bury the young plants; this requires re-seeding. This kind of damage is common on the Séno, but less so on the Plateau because of the numerous obstacles found there: trees, stones, crags, and crevices. The winds provoke laying of millet during its filling-grain, at the end of the rainy season.

3. Rainfall

Rainfall varies from one ecological zone to another. An average of 450 mm has been recorded over the past ten years at the Bandiagara station, with annual variations from 329 mm to 624 mm. Recordings by P.A.R. (point d'appui de la recherche) at Koprokéne in the Séno show 541.8 mm and 569.5 mm for 1974 and 1975 respectively. Bandiagara received 527 mm and 569.5 mm for the same years;

thus the Plateau receives more rain than the Séno. The difference can be accounted for by differences in altitude.

4. Hydrography

The hydrographic network varies a great deal and is especially important in the Plateau and Escarpment areas. On the Plateau one finds--frequently and at various locations--the Yamé system--small water courses, ponds, and springs. These are all fed by rainwater and, with the exception of the springs, do not flow during the dry season. Appendix A provides a list of several water-courses. These hydrographic features contribute to the diversity of micro-enrivonments to be found on the Plateau.

The forms taken by the Golo creek which runs along the base of the Escarpment vary from river-like to a simple watercourse; in some cases there is continual water flow. For example, the Wédou de Diankabou dried up only once--in 1973--in many generations.

The hydrography of the Séno is non-existent. One finds only depressions which carry rainwater and then dry up with the end of the rainy season

During the past few years dams have been constructed in order to improve the situation for the region's inhabitants. These dams will be discussed in the next report.

Thus, in summary form, we have the natural framework within which the Dogon people are found.

II. The Social Frame

Legend tells us the Dogon came from Mandé; they were obliged to leave because of insufficient land and raids by other groups. They passed by Kani-Bonzo where they divided up in order to occupy the Bandiagara Plateau. With time they moved toward the Séno which was a forest full of all kinds of wild animals.

Settlement in the Seno occurred along a line running from Bandiagara to Sangham to Koro. The Dogon who settled in the Séno south of this line came from the Plateau south of the line; those from the north of Koro came via Pêtaga (near Douentza).

A. Settlement and Arrangement of Villages

Aside from the nature of the terrain itself, the physical arrangement of the villages is no doubt the most striking feature to the newly-arrived observer. Settlement varies from one (homogeneous) zone to another, but the village is always organized around a "palaver shed" (shelter), very similar to the "palaver tree" found among other Sudanian peoples, for example, the Bambara, Markas, etc.

Village origins are always related to a water source (ponds, rivulets, or springs in the case of the Plateau and the Escarpment; wells for the Séno) Discovery or tapping of a water source is a determining factor in village location.

Once a water source has been located and the palaver shed constructed, village founders build a women's menstrual house. All women in non-Muslim villages stay in the house during their menstrual period. Tradition has it that the menses destroy the power of certain fetishes.

On the Plateau most if not all of the villages are perched on the top of large crags and are accessible only on foot. Otherwise, they are found in pits or dark cavernes where the new moon is not seen until the third or the fifth day. This settlement pattern serves two purposes. First, it provides security; the village is able to defend itself from attacks by hostile outsiders and wild animals. Secondly, it is economical; the community is able to take full advantage of the cultivable areas found at the base of the crags.

Even more striking is the location of the Escarpment villages which are built upon the cliff itself, often at the point of steepest incline, amidst the fallen boulders.

Villages on the Séno are not so remarkable. Settlements there include Peul as well as Dogon who live side by side; their thatch huts are scattered here and there among the fields.

Another characteristic of Dogon settlement is the division of the villages into quartiers, often far from each other and separated by crevices and faults. The number of quartiers varies; Bamba has 32. Villages are rarely found not having several quartiers.

The quartiers are linked by kinship relations, and the inhabitants all bear the same family name. This complicates efforts to identify individuals. Kinship relations are also found between neighboring and even distant villages. For example, the villages of Dourou, Guimini, Yawa, Ibi, and Tenné all have a common ancestor. Their founders were brothers.

Most all of the villages of the dune-strip and those on the edge of the sandy plain have their origins in Escarpment villages, the result of a process which produces continued exchange between the two zones. The process is as follows. A family divides in two. The younger members (up to 45 years of age) settle on the Séno and cultivate millet. The older members remain on the Escarpment and are assisted there by younger members of the family (one per family). During the dry season some of those who settled on the Séno return to the Escarpment and stay there until the next rainy season. Those who return are few in number, for Séno settlement is permanent. In the case of death among the older family members, should the eldest child live in the Séno, he must, according to custom, return to the Escarpment to manage the material and spiritual resources

passed on by the deceased. (See remarks on family organization below.)

All along the Séno one finds a mixture of villages with Escarpment origins and cultivation hamlets belonging to Plateau villages.

This population movement is caused by the insufficient quantity and poor quality of cultivable land on the Plateau. Dogon settlements are most often found along the Escarpment.

B. Habitat

Plateau and Escarpment architecture is very different from forms to be found elsewhere in Mali, possibly due to the rocky character of the setting.

The houses, with low doors and facades perforated with small lodges for tools and utensils, are generally built of stone. They are rectangular in shape, and the foundations of the walls are made of stone torn from the crag upon which the houses are built by hammer blows or the use of traditional explosives. The wall of the facade is frequently made of banco; the interiors are always plastered with banco. Windowless, but always with a ceiling hole and supported by beams, the houses are built upon the same large rocks from which large chunks are torn to construct the walls.

Concession walls are assemblages of stones, carefully laid without the use of mortar. As in all African villages, the concessions are very close together, and the narrow, windy streets are strewn with pieces of rock.

In many villages (more than half), the giant clay granaries, well-built and covered with thatch, dominate and contrast strikingly--esthetically as well as in size--with the houses. When approaching a village the granaries are the first things to catch one's eye.

In some places, like Bamba and Tiogou, buildings have more than one level; the first level of the house is for the family, the second is used as a granary.

All houses in the Séno are made of banco except those of the Peul and in cultivation hamlets. In some villages which have undergone some outside influence, one notices better-quality construction: well plastered houses outfitted with doors and windows of galvanized metal.

Within the walls of the concession are found the toilets, the sheep and the goat pens. Outside, cattle are kept tied within a small enclosure.

Drinking water comes from marshes, pools, or springs (on rare occasions there are dams or wells) and, hygienically speaking, leaves much to be desired; it is muddy and contains numerous disease-causing micro-organisms, one of which is Guinea Worm.

C. Social Organization

Dogon society is a highly diversified, stratified society, with various decision-making centers. It is organized around a value system which is rather structured and complex.

1. Languages

A factor which serves to distinguish the Dogon from other ethnic groups of Mali is a plurality of dialects. Most every village or village grouping shares a dialect understood only by members of the village. It is a frequent occurrence for neighboring villages to speak mutually incomprehensible dialects. It is sometimes said that as many as forty or fifty dialects are found among the Dogon. Appendix B lists the dialects we identified.

The Dogon understand very little of the other languages spoken in Mali; many get by with Peul, especially those who inhabit the Séno and the edge of the Escarpment. The opening up of the region which has occurred during the past few years as well as increasing rural out-migration have both contributed to greater use of Bambara, though even it is certainly not widely-spoken.

This plurality and complexity of dialects has important implications

for development processed, for the result is a blockage of information flow and a reduction of the network and stream of communication in general. It hinders the efforts of development workers who find themselves in need of interpreters--often several different--as they go from one region to another.

2. Systems of Power and Authority

As opposed to oligarchical, aristocratic family systems in which power is passed from father to son, the Dogon system is a democratic one in which each individual eventually has the opportunity to rule, provided he is the eldest member of the village or clan.

The power and authority system is based upon spiritual knowledge. The supreme authority is that of the Hogon, the spiritual chief who assures the linkage between the invisible god Amma and the members of the village.... The Hogon worships Amma, guards his secret knowledge, and keeps the communal fetishes. He leads the village. Hogon means king; he is the king of the village. He can be anyone--young or old. His investiture and his funeral are the most important events in village life. Because of the importance of his functions, he lives apart from the village (with his family if he is married) in the Hogon house, a kind of palace outside the village which is passed on from one Hogon to the next. The Hogon is also subject to a number of prohibitions. He takes over the best fields the working of which is done communally with participation of the entire village.

The Hogon is assisted in his work by a council, frequently composed of village elders. The eldest of these usually has the administrative responsi bility within the village; he settles conflicts that occur among the various families of the village. The Hogon does not enter into these disputes unless asked to do so. Rather, the Hogon is particularly concerned with the settlement of disputes between his and other villages. He (the Hogon) always does good; he

is the supreme judge.

In some places, e.g., Guimini and Ende, one finds individuals known as "Lagan,"[2] who have authority over the Hogons of the district or neighboring villages; the Lagan is the Hogon of Hogons. There is no direct line of authority between the Lagan and the Hogon--the Lagan cannot dismiss a Hogon--but he may be appealed to in cases where the Hogon's judgement is disputed.

The selection or investiture of each of the individuals above--the members of the council of elders, the eldest among them, the Hogon and the Lagan--occurs on an individual basis. No one among them can appoint or dismiss another; they exercise their authority until their death.

Appendix C describes the characteristics and events (e.g., selection, enthronement, life and death) particular to the Hogon.

Other persons also play roles of power and authority among the Dogon; these are individuals who possess special knowledge (sorcerers, seers, witch-doctors, and "evil-doing fetishers").

3. The Family

The basic unit of social organization is the family. An understanding of the family is crucial for any socio-economic study, for it is within the family that decisions concerning the allocation of resources are made. The understanding of family organization is essential for identification of farm units.

Among the Dogon one finds extended families as well as smaller, nuclear families (father, mother, and children). The extended family includes all persons having a common ancestor. It constitutes an economic unit insofar as it is a consuming unit (meals shared in common). By means of the following example

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[2] The name given to the Hogon of Hogons at Ende. In this village the Lagan has power over all the Guindo of the district.

we will attempt to describe the essential characteristics of the Dogon family:

Family organizational processes and appropriation of land

- Suppose that "A" is a male villager.

- "A" has children named "a," "b," "c," "d," etc., with "a" as the first son, "b" as the second son, etc. They all work the land with their father; some of them care for "A's" animals should he own any.

- Circumcision takes place between 18 and 20 years of age.

- Three to four years following circumcision, the first son, "a," matures into manhood and begins to farm a piece of land on his own in order to acquire money necessary for marriage. Of course he continues to work with his brother on the family fields (those of the father).

- At a given age, "a" marries. "a" and his wife are now a part of "A's" family.

- "a's" mother has less work to do now that "a's" wife is present to help--a new worker.

- With the father's permission, "a" can increase the size of his field. The produce then belongs to "a."

- During the dry season following the harvest, once all the grain has been taken into the village, "a" and any other married brother consume the produce of "a's" harvest at "a's" house. If there was no harvest, "a" must purchase food. The young unmarried sons are included in the meals at "A's" house. "a's" wife works for herself and her husband alone. If "a's" mother becomes ill, his wife goes to the mother's house to help out. If collective work occurs during the dry season (involving "a," his father, and his brothers), meals are taken together at the expense of the father. This arrangement may last for several years.

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[3] This is the traditional circumcision age. In fact circumcision occurs between 10 and 12 years, or even younger.

- If "a" has many children, he can request economic independence from his father by means of cultivating separate fields, but such independence cannot take place before the marriage of one of his brothers.

- If "a's" request is granted, the father will give a parcel of farmland to "a" which will thenceforth become "a's" private property.

- From this moment on, "a" forms a separate family unit. One now speaks of "a" as a head-of-family.

- Let us suppose that after all this, "A" dies.

- After "A's" death, "a" returns to the extended family and becomes the head. His mother leaves the concession and is placed in another household, surrounded by small children. She is not abandoned; the situation lasts thus for three years.

- Three years after "A's" death, the funeral ceremonies take place.

- Division of the family inheritance occurs following the funeral. All possessions of the deceased, except for land and animals, are divided up. These latter are used for communal needs, and all family members are informed whenever the cattle are moved from place to place.

- Following the division of "A's" possessions, the children ("a" and his brothers) meet to discuss the possibilities of remaining together or of separation from each other.

- If they decide to separate, they divide the father's land among themselves. Each receives a portion of land sufficient for his needs, but not all of it is divided among the brothers. A portion will be shared in common by all the sons; the same applies to those fields that had never been farmed. If they decide to remain together, the father's fields will be cultivated in common by all the brothers.

- Each farms his own fields after separation.

- The eldest son ("a") will remain in "A's" house (then belonging to the

larger family) and will take over the first fields of the family, i.e., "A's" field. Thus "a" possesses his first field and the family's first field. If he cannot farm all his fields, he can loan them to his brothers.

- "A's" younger, unmarried children remain with the eldest ("a").

- Suppose that "a" dies.

- "b," "a's" brother, takes over the larger family ("A's" house, where "a" was staying) whose house was never empty.

- For "a's" eldest son, the larger family becomes the household where "a" stayed before "A's" death. "a's" first son takes this house.

- If all of "a's" sons die, the eldest grandson will take "A's" house and will assume the responsibilities of his father and grandfather. He becomes head (his family being extended by this time).

- No one assumes the functions of chief without the consent of the eldest member of the lineage. It is necessary for the eldest member to turn down these functions before another can take them over.

Here is the general outline of Dogon family organization as well as Dogon society, for almost all inhabitants of each village are relatives. This situation of relations is more readily understood once the organizational scheme is examined.

On the basis of this analysis, we define the Dogon farm as that whole made up of individuals and their resources (material and spiritual) who take their meals together during rainy season cultivation activities, and who cultivate their millet fields together.

The agricultural unit or the family--is composed of one or several households, a household being a man, his wife, and their children.

4. Divisions Within Society: Castes or Social Classes

Dogon society is differentiated on the basis of specialized craft activities each of which gives a particular social status to practitioners. The society is thus divided into five large groups apart from the Peul. In order of increasing importance, these groups are: the griots ("sagué"), the "kossodjo" ("djon"), cobblers ("gogoné"), smiths ("djembé"), and the Dogon. Each group perpetuates internally, according to particular traditions.

(a.) The griots - Dogon griots are woodcutters; wood-working is their main productive activity. They make mortars and pestles and farm only infrequently. Griots are found in all villages, sing the praise of others, especially the nobility, and are the least esteemed of all social classes.

(b.) The "Kossodjo" ("Djon") - In the past, the Kossodjo were leather workers. They made white-colored bags and women's belts--all very finely worked. In some areas (e.g., at De) they were weavers. They do little farming, but more than the griots. Their wives work as dressmakers and do indigo dyeing.

(c.) Cobblers - Like the Kossodjo, the cobblers also work with leather, but make different articles. The men specialize in the manufacture of knife-sheaths, amulets, and women's belts (the work is not as nice as that of the Kossodjo). Women cobblers make women's purses, (gourds) for clothing storage, and braid women's hair. In exchange they are given millet, fonio, or beans. Most all of their food supplies come from these exchanges; the men farm but rarely. This class is found especially in the larger villages.

(d.) Smichs - Smiths are the ironmasters. They manufacture all the tools needed for farming and hunting. Their wives make pots.

(e.) The Dogon - The Dogon make up a class of nobles, engaged in activities that render them rather independent of the other social classes. Their principal activity is farming--both men and women farm the land.

This noble class scorns--as noble classes are wont--all other classes as inferior, lazy, and unreserved. The Dogon learn to speak only infrequnetly.

Within the Dogon class are found two sub-divisions which do not reflect occupational specialization. This sub-class division is not readily apparent, nor is it widely recognized by outsiders. The first class is made up of pure Dogon--Dogon whose fathers and mothers are Dogon as far back as a tracing of ethnic origins will allow. The second class is made up of impure Dogon--descendents of a pure Dogon male and a woman of unknown origin (e.g., a slave from the slave era, or a person having come to the area during one of the severe famines).

This division was strictly observed during times past. Even today it is accorded some importance in many places, but the situation is not likely to continue thus. In those areas having contact with other ways of life one notices significant changes, especially concerning crafts and the status accorded them. This is especially striking among the Kossodjo who control business, and therefore the economic forces of the area. This fact affords them a certain importance. In addition, one notices the increased participation of Dogon in cattle-raising (something previously reserved for Peuls) and business activities; but they are not as shrewd at business affairs as the Kossodjo. Racism directed toward other groups continues to decline, and one may hope for its disappearance--at least in some places--in another generation.

D. Religious Institutions

One cannot remain in Dogon country long without being struck by the coexistence of rather different religious communities; these are animism (the traditional religion), Islam, and Christianity. One finds all three in a single village, and it is common to find a mosque, a church, and the women's menstruation hut close to one another.

Each religion passes on its values and ways.

1. Animism - the Traditional Religion

The persistence of animism in all villages is explained in part by the fact of prolonged isolation. Many villages remain untouched by new religious systems and carry on with traditional forms characterized by Amma and ancestral cults; this religion/philosophy provides for fetish worship. One finds a hierarchy of fetishes and cults among the Dogon. The cult of the supreme god Amma is led by the supreme earthly authority of the Hogon. The Hogon also leads cults of other gods (or fetishes) such as the rain god and the hunting god. Other, less powerful fetishes are worshipped by the various (large families) of the village.

Animism is a source of conflicts, for all sickness and other mishaps are looked at as being caused by individuals. Thus the individual accused of evildoing becomes stigmatized. Individuals live in constant and complete insecurity because they do not belong to the divine operation of the universe. They are continually seeking protection from the elders or sorcerers in order to gain, no matter how little, that spiritual energy which permits harmony of body and spirit. Those who have given up animism acknowledge the insecurity which dominates it.

The Dogon philosophy also influences agricultural activities. No new activities may begin without the Hogon's blessing--he authorizes everything. If he does not plant, nobody plants. If he does not harvest or does not taste of the new harvest, nobody harvests. He possesses particular evaluative criteria, and everything is judged by him. His actions can delay the activities of some productive units and fetter or slow their growth rhythms (a hypothesis to verify).

In a general sense, the traditional religion serves to unify the total system and reduces disorderly growth.

2. Islam

Thanks to the sheltering physical milieu in which the Dogon live, they were not much influenced by the Islamic invasions that occurred during the era of Islamic expansion in West Africa. It was not until the time of the successors of Sékou Amadou of Macina that Islam was able to penetrate Dogon country.

In spite of a variety of obstacles, Islam spread all about the Plateau. Opposed to the animist traditions, the beginnings were accompanied by conflicts within the villages, for Islam required the destruction of fetishes and the implantation of mosques. The animists were against this. We saw disputes over the proposed locations of mosques. This conflict persists in the village of Dourou. The last public fetish was destroyed this year, and the animists now make their sacrifices in their own homes.

3. Christianity

This religion, with its two branches--Catholicism and Protestantism--penetrated the region during the colonial era. Catholicism is the more popular and is engaged in extra-religious activities. The Catholic missions are involved in agriculture, cattle-raising, health programs, and the education of the baptized. This diversification has contributed to a large number of converts. Catholicism also imposes fewer restrictions than the Protestant religions. For example, baptized Dogon are not kept from drinking alcohol, nor are they forbidden certain meats. Many Dogon asserted to us that they remained Catholic because they are able to drink the local beer (dolo) and eat anything they wish; these actions are not allowed by Islam.

A few years ago, many Dogon were Christians. Today the majority has become Muslim. Most every day crowds flock to the Dourou arrondissement office in order to change their names (from animist or Christian to Muslim names).

The coexistence of these religions contributes to a certain confusion--

to difficulties in identifying people,[4] to family breakups, to a questioning of values which results in change in resource allocation, and pressures exerted upon the spirit. The situation is not an alarming one however; rather, it occurs in all cases of change in which a stable phase has not yet been attained.

E. Infrastructure

The rugged nature of Dogon country--characterized by large rocks/crags, faults, crevices and ravines, sand-dunes (occasionally mobile), an abrupt Escarpment with few passes, and continual erosion--is clearly the cause of the poor quality of its infrastructure: roads, agricultural installations, and wells.

1. Road Networks

The road network is very limited and of very poor quality. It is organized around two principal axes which enter the region: the Sévaré--Bandiagara--Dourou (Yawa)--Koro axis and the Sévaré--Bankass--Koro axis. Only the Bandiagara axis plys the Plateau, the Escarpment, and the Séno.

From Bandiagara there are five roads which permit a difficult crossing of the Plateau; they are:

(a.) The Bandiagara--Dourou (Yawa) road, built in 1953 for the purpose of transporting fish toward Mossi country;

(b.) The Bandiagara--Sangha road;

(c.) The Bandiagara--Kassa road, built around 1950;

(d.) The Bandiagara--Borko road, built in 1958; and

(e.) The Bandiagara--Wo road, built in 1953.

All roads are old and poorly maintained. When traveling on them, one struggles with holes, rocks strewn about, rises and gullies all along the way,

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[4] In less than a month and a half a farmer we observed changed his name three times.

such that the vertical and horizontal fluctuations along the road are accompanied by numerous violent shocks.

The 25 kilometer distance from Bandiagara to Dourou requires 1 1/2 hours by Landrover during the rainy season and four hours by larger transport trucks. These times are for one-way travel. During the dry season, after road repairs, the one-way trip takes one and three hours respectively.

The Bandiagara--Sangha road receives more maintenance owing to tourist traffic. It is the best road on the Plateau and speeds up to 45 km/hr are possible on it.

The Sevaré--Bankass--Koro axis is covered by very thick, occasionally shifting sand. The remainder of the area is strewn with paths connecting the different villages. On the Plateau these are passable only on foot. Road construction must be a component of any agricultural development within the area, especially those aimed at development of the market-gardening potential of the Plateau. Improvement of existing roads is a key element in the future development of the region as a whole. Since the completion of the Bandiagara--Dourou road, market-gardening has progressed quite a bit in the nearby villages, and changes have occurred in onion marketing technology.

2. Hydro-agricultural Installations

In the past there were no such installations in the proper sense of the term. For irrigation of market-garden crops, farmers obtained water from sumps, pools, and natural springs. By use of the latter, gravity-fed irrigation was possible. One rarely encounters wells used as irrigation water sources;[5] they are unreliable and very difficult to dig.

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[5] Dourou is the only village of many in the area to have a well Otherwise water is obtained from improved-upon holes or from run-off.

During the past few years dams have been constructed and wells have been dug. At the present time there are thirty dams in reasonably good condition, but they are barely sufficient to satisfy the needs of the local population. More details will be furnished on dams in another report.

F. Markets

In some of the larger villages one finds markets which meet once every five days. This varies from the pattern for the rest of Mali in which markets always occur on a fixed weekday. This variant feature of Dogon markets reflects the Dogon calendar system of five-day weeks. Within a given radius, the markets follow one another in such a fashion that a market meets (somewhere) every day.

This market system increases the number of contacts and exchanges as well as the number of expenditures. It satisfies those who drink enormous quantities of the local beer (dolo), considered to be an essential ingredient in their merry-making. All those who are not Muslim attend the markets in order to drink. The frequency and the number of markets in the Plateau region respond to a situation in which communication is otherwise difficult given the poor state of the roads. It is also suited to market-gardening whose produce is highly perishable and requires rapid turnover.

On the Séno the national administration has instituted fixed market days in order to synchronize the markets there with the rest of the country. In some parts of the Séno the fixed market day system is out of phase with the traditional Dogon system of the Plateau. In these cases some difficulties are encountered in the buying and selling of desired items. Trade links between the Séno and the Plateau are very close; the Séno produces millet, the Plateau produces

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[6] Weekdays do not have names such as Monday, Tuesday, etc. Instead, the Dogon speak of the market of a certain village, or of so many markets in a given village, etc.

market-garden crops.

Four large markets are found on the Plateau: Bandiagara (a fixed-day market), Dourou, Sangha, and Mingary. Séno markets are Bérélou, Madougou, Koro, Bankass, Koporokémé Pé, Diallassagou, etc.

Conclusion

For a long time Dogon country had remained geographically and culturally isolated. The rockiness of the environment facilitated shelter and defense from the onslaughts of other civilizations. To this must be added the cultural element, the highly structured Dogon philosophy. This has left deep imprints on the Dogon people, in part due to highly organized institutional structures which nonetheless allowed the individual a certain degree of freedom.

This isolation has progressively diminished. Pushed along by historical currents and world changes, Dogon country today has contact with new values, knowledge, and technologies which it will be obliged to integrate into its eventual development. Several institutions with particular modes of thought and organization infiltrate or thrive within the area. Their presence will certainly influence the setting which has already undergone some significant changes. Traditional elements coexist at all levels with those factors introduced by modern times, but not in all villages.

Appendix A

A list of some Plateau and Escarpment water courses.

Kind of water course	Name and Area (served)	Arrondissement
Small rivers (?)	Yamé	
	Gonan; Sangha	
	Douno; Kany-Gagouna, Ningary	
	Dourou; Dourou	
	Banani; Banani	
	Ourogordo	Central (Bandiagara)
Pools	Dan-Kassaga	
	Kori-Kori	Central (Bandiagara)
	Bandiougou	Goundaka
	Dari-Saré	"
	Ouroguero	"
	Boudji	"
	Dè	Ningary
	Kilo	"
	Sadégué	"
	Kany	"
	Mandoli	Ouo
	Diana	Ouo
	Tapou	Kendié
	Inogo	"
	Louga	"
	Wédou	Diankabou
	Mare de Bmaba	"
Springs	Borko (a series of ten springs)	"
	Sangha.	Sangha
	Gani-Ouro	Ouo
	Kégna	"
	Guinini	Dourou
	Endé	Diankabou
	Idjeli.	Dourou

Appendix B

Some Dogon dialects.

Name of Dialect	Corresponding Family Name	Region Where Dialect Is Spoken
Bonamine		-
Diamsaye	Niangalis	East of Koro
Dono	Timbely, Kadja, Banou	-
Guimini-Kan	Sagara	Dourou, Guimini
Igerou-Kan	Wodjou	Igerou (Dourou)
Nombori-Kan	Arou	Nambori (Dourou)
Oroboro-Ton	Arama	West of Bankass
Sangha-Kan	Dolo	Sangha
Tégou	Lougué, Guindo	-
Togo	Togo du Séno	Between Bankass and the West of Koro
Togo	Togo de la falaise (Kani-Banzo)	-
Ton	Téssougné	West of Bankass
Tonmo	Bamja, Anapili, Kérepili, Yalkoué	-

Appendix C

The Hogon at Ende

A. Election and Investiture

The Hogon always wears a necklace called "digué," made of metal, beads, perforated wood, and a fruit. All members of the Hogon's extended family search for the necklace. The future Hogon will be selected from among the immediate family of the person who finds the necklace. All members of this latter family--men, women, young and old--are elegible. Once the necklace is found, the villagers vote. The future king is selected on the basis of the number of votes (and a system of diffuse internal power). The person selected must accept the functions of the Hogon.

The new king goes to the palace (the Hogon house) where he is washed with flowing mountain water. The newly-found necklace is placed around his neck. He is given the forked Hogon staff which he must carry with him at all times--wherever he goes. After this a large festival takes place in the village; a bovid and a ram are sacrificed. Great quantities of "dolo" are prepared for the guests and dancing continues for three days. All the relatives of the Hogon--no matter where they may be--attend the festivities and are given a lot of money.

B. Life

After the festivities the Hogon remains in the house which becomes his residence. He does not walk about in the village. Several interdictions are applied to him: he may not eat fonio, grapes, or drink grape juice. He may not drink water from the public well; his drinking water must be carried in from the bush, far away where nobody else goes. Wherever he goes, he takes with him his calabash for eating and drinking and his forked staff. His meals are prepared by a young girl who has not yet begun to menstruate. He rings a small bell each morning at 5 AM. He has four large millet fields. Each year, around May--the

Appendix C, continued

time for seeding--a sacrificial festival is offered to him. Youth--boys and girls--dance for seven days. He delivers a speech and then chickens are killed.

C. Death

When the Hogon dies, his body may be removed from his house only during the night and even then only through a small hole in a back wall. Only his sons and brothers are permitted to see the body. A ram is killed and the blood is mixed with earth; this mixture is used to close the small holes in the wooden door of the Hogon's tomb which is attached to the side of the cliff. The Hogon's head rests upon the head of the ram. Within the tomb (a kind of house) are enclosed a living black cat and red cock both of whose legs have been broken; in addition, a small dog is placed within. Once these things are done, the family watches over the tomb for ten days and announces the Hogon's death by saying that he has disappeared.

The family offers sacrifices. The first consists of stabbing a he-goat (having no younger brothers) in the flank with a knife. The goat is then pulled to the place of sacrifice where his throat is cut. The meat is given to the sons and brothers of the Hogon. The second sacrifice consists of two cocks whose legs are cut off at the knee-joint and then killed in the same place. The flesh is given to the Hogon's nephews. Three years later a festival of masks is organized which lasts fifteen days. After all this, the election of the future Hogon occurs.

Time-table

August 2, 1977:	Arrive in Bamako
August 3-8:	Encounter[7] with USAID staff members: Myron Golden, Quincy Benbow, and Kent Hickman. Levin was away on a trip.
August 5:	Encounter with the Associate Director of the Service de l'Agriculture.
August 9-25:	Trip to my village of birth.
August 27 - September 1:	Landrover papers completed. Encounter with the planning unit of the I.E.R. (Institut d'Economie Rurale). Meeting with Levin, Golden, Benbow, and Hickman.
September 2:	One day of travel from Bamako to Mopti.
September 2:	Encounter with Drame Coulibaly, the Director of Opération Mils Mopti.
Spetember 5-11:	Encounter with cabinet member of the Gouvernorat, the Direction Régional du Plan et de la Statistique, Coopération, O.D.E.M. (Opération de Développement de l'Elévage de la Région de Mopti), Génie Rural, the Service de Topo, and the S.C.A.E.R. (Société de Crédit Agricole et d'Equipement Rural).
September 12:	Departure for Bandiagara; arrival in Bandiagara. Encounter with the head of the Secteur de Développement Rural (S.D.R.) and the Commandant de Cercle.
September 13:	Tournée to Dourou; encounter with the Dourou Arrondissement Chief and the Chief of the Secteur de Base-Central. Visit to dam.
September 14:	Trip to Mopti for purchase of equipment.
September 15:	Ramadan festival and holiday.
September 16-17:	Tournée to Sangha and Kondou. Encounter with the Arrondissement Chief, the Chief of Z.E.R., the village chief and his council. Visits to field and dams.
September 18:	Arrival at Dourou for settling-in. Meeting with the Dourou Arrondissement Chief, the heads of Z.E.R. and the S.B., the guardsman and three village councilors from Dourou.

[7] Recontre might be better rendered as a "brief meeting" than an "encounter;" in any event, it does not seem to have the same formality as reunion-- meeting--used elsewhere in the time-table. T.P.

Time-table, continued

September 24-26:	Arrangement of income/expenditure account study forms.
September 27 - October 3:	Set-up income/expenditure accounts.
October 3:	Localization of onion fields belonging to Dourou and Taga farmers; begin observation of agricultural activities.
October 4-10:	Reparation of Landrover in Mopti.
October 11:	Return to Dourou.
October 13-15:	Tournée to Diankabou. Visit to pools (mares) at Diankabou and Wédou, the Bamba Plain, and the springs at Nindé and Kilinba. Encounter with administrative and technical staff, farmers and herdsmen.
October 15:	Return to Dourou. Observation of onion cultivation activities.
October 21-26:	Trip to Mopti for welding of gasoline drum.
October 22-23:	Measurements of Plateau millet field yields.
October 29-31:	Tournée to Sangha.
November 3-4:	Participation in meetings held at the end of the harvest season and the beginning of the 1977-78 Opération Mils Mopti marketing season, held at Koro.
November 4:	Return to Dourou. Continued observation of market-gardening activities.
November 7-11:	Measurement of Séno millet field yields.
November 17:	Departure for Mopti: reparation of Landrover motormounts.
November 19-29:	Tournée to San. Encounter with the Génie Rural and the Opération Puits San. Continuation of agricultural observations.
[November ?] 3-9:	Trip to Mopti for reparation of Landrover starter.
17-18:	Tournée to Séno-Madougou.

DOGON CEREALS PROJECT: PRODUCTION SYSTEMS

Hamadoun Sidibé

February 20, 1978

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Activities Completed

Our activities during the period (December-February) were concerned with the following points:

- Collection of information concerning operations carried on in staple-crop fields during the 1977-78 campaign (the 1977 rainy season) in Dourou;
- Measurement of areas in Dourou planted in market-garden crops;
- Observation of gardeners (work-time, quantities of manure, fertilizer, and water used);
- Summary of the quantities of market-garden crops exported from the Dourou market;
- Study of commercial circuits;
- Summary of Dogon income and out-go accounts.

Upcoming Activities

- Measurement of areas in Dourou planted in staple-crops;
- Inventory of animal and equipment resources;
- Census of the Dourou population;
- Summary of observations of wives' activities.

The next report will deal with the destination of the various kinds of agricultural production.

DOGON CEREALS PROJECT: PRODUCTION SYSTEMS

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February 20, 1978

Production Systems

This report follows that of December 1, 1977 in which the physical and social milieux were described. Agricultural activities on the land are carried on by humans through the means of equipment, various plant and animal species, and water. The present report presents a qualitative description of these factors, based on our observations, so that a better understanding of the situation in Dogon country might be had.

After having been hunters and gatherers, the Dogon became cultivators, and working as cultivators, they developed techniques well-suited to their surroundings. Particular conditions are responded to by specific adaptations. As one moves from the Plateau to the Séno via the Escarpment, a variety of production modes and techniques is observed, for each ecological zone presents a unique situation. All Dogon farmers grow rainy season crops (grains and leguminous plants); but the Plateau and the Escarpment regions differ from the Séno in that dry season market-gardening is practiced there as a means of income. In the Séno, long fallow periods predominate. Fixed-field cultivation is found on the Plateau and the Escarpment. The Dogon farmer manages through a combination of cultivation and animal-raising.

The Production Apparatus

The production apparatus is composed of those factors in agricultural activities that are fixed, and include the human population, equipment, land, and hydro-agricultural installations.

A. The Population

Dogon agriculture revolves around humans--the central factors in the production process; all agricultural activity is based on human energy. Thus the total population, the number of workers, their motivations and organization are crucial variables to consider in any economic planning for the region, as they vitally influence agricultural production.

Unfortunately the total population size is not known. Population statistics are scattered, unreliable, and in some places, non-existent. Administrative boundaries do not reflect actual ethnic group distributions. Official census figures do not reveal the population size of Dogon country--official statistics misrepresent the reality of the situation. Under the head-tax, peasant cultivators are ill-inclined to declare all their family members. Studies carried on by Opération Mils Mopti in 1973-74 did not include the central part of the Bandiagara Plateau where most of the Dogon involved in market-gardening are located. According to studies, there are 213,356 Dogon in the administravite cercles of Bankass, Koro, Douentza, and the Wo and Goundaka Z.E.R.s (Zones d'expansion rurales). These are mostly Dogon areas. The Dogon cultivator is a careful, hard-working individual. These qualities are recognized by all, but the Dogon finds himself in a hostile natural environment in which life can be very difficult. The unfortunate combination of poor land and insufficient water resources weighs heavily upon the people. Those who have been exposed to other opportunities participate in seasonal, periodic, and permanent migratory movements. Thus the rural exodus has become a part of Dogon ways over the years. These movements occur throughout Dogon country, and their intensity varies according to particular ecological zones.

Seasonal movements occur during the dry-season; those who leave return to their villages at planting time--around June. They are more common among the younger people, from 18 to 35 years of age, and are most intense in the

Séno. According to some informants, all the younger people from the Séno participate in these seasonal migrations. During the dry-season there are no opportunities for employment in the Séno, and so the youth leave for the towns (Bandiagara, Sévaré, Mopti, and towns in Upper Volta) in search of any kind of work. The principal factor in these movements is the need for tax-money, the "bête noire" of all Mali peasants. During these seasonal migrations, the younger people do not travel very far from their home villages. From the first of December onward groups of five to ten Séno youth can be seen passing through Dourou on their way to Bandiagara and Mopti. During the week of December 7 to 15 (1977), we counted 200 such persons.

Many Escarpment villages are also affected by these movements, especially those villages where there is no market-gardening. Migration occurs on the Plateau also, but it is not as great, and begins later in the year, for the would-be migrants wait until the end of the onion harvest.

The second type of movement which we call periodic consists of a stay of from one to three years in a distant town in the interior or in one of the countries neighboring Mali. This type of movement is found throughout Dogon country and occurs at a fairly uniform rate with the exception of the Plateau where it is more frequent. The country of destination is often the Ivory Coast. The reasons for this movement are various: the quest for cash and tax money, the taste for adventure and the desire to be exposed to other life-styles, curiosity, better clothing, or the desire to learn other languages (especially Bambara). At Dourou, the youth who have participated in these movements stand out from the crowds on market days because of their colorful clothing, their parasols, colored or reflecting-glasses, scarves or serviettes around their necks, their hats and their neat, tightly laced shoes. They remain grouped together on the large rock overlooking the vendors. They present quite a spectacle which contrasts strikingly

with the rest of the market-goers, most of whom are dressed in black. The demonstration effect is apparent: village youth who have never gone away are dazzled and amazed, and wish to participate in the experience too.

The third kind of movement is emigration. Those who leave settle in Mali or in some other country. Some who are married take their wives with them; others leave them behind in the village. Most emigrate before marriage. For these persons the main reasons for leaving seem to be social in nature--oppressive family responsibilities. The plateau seems to produce the most emigrants. In Dourou Taga (a quartier in Dourou) we counted twenty-two persons who had emigrated to Ivory Coast, to Ségou, and to Sikasso during the past ten years.

The rural exodus does not affect women and girls. Men who participate in seasonal or periodic movements do not take their wives (many of whom are young) with them. When we asked for an explanation of this, we were told that once back, the wives would give their husbands a hard time because of their exposure to other life-styles. It is thus to avoid a liberation of women that the wives are left behind. Besides this, having the wives along increases moving expenses.

Out-migration of the population is due principally to socio-economic conditions: Independence of the young at a certain age,[1] insufficient employment opportunities, and low levels of labor remuneration which contribute to generally low earning levels within the system.

The rural exodus is often looked at negatively; however in Dogon country it is much more likely to be considered in a positive light. The development, and especially the diversification of market-garden crops is closely tied to the exodus. Young people from the Plateau who had spent time in other cities

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[1] The young husband feeds his family and himself; his father has no responsibility for the son during the dry-season from November to June.

and countries came back with new crops. Such is the case for orchard-crops: mango and banana cultivation began with the exodus. In the same way, large-bulb onions were introduced to the Escarpment by young migrants. In addition, a large part of the young people who go to Mopti work during the rice harvest. Thus Dogon country furnishes part of the labor needed for Delta rice production. Migrants also work in construction.

The health of the population is rather poor; this is especially true of the young. Most of the problems are caused by contaminated water. Cases of Guinea Worm are common on the Plateau during the rainy season. As a result, many persons remain unproductive for at least a month. From September to December 1, twenty-five cases of Guinea-worm were recorded in the two quartiers of Dourou. All of these were adults--the source of labor for agricultural production. Some were unable to care for their onion plots.

Skin infections (e.g., sores) are a constant occurrence. There are also many snake-bites and birth complications, not to mention malaria. (Using the landrover, we evacuated three snake-bite cases and four women with delivery complications from September to December 16.)

(1.) Work Organization

The organization of work (labor) takes place at the level of the agricultural production unit. The family makes up a consuming unit during the rainy season (see the section on family organization in the first report). The family-head is the head of the production unit and has responsibility for the management of the family's resources. Here, as elsewhere, there is a sexual division of labor, but the differences are not as great as elsewhere in Mali.

A distinction is made between field work and domestic work. The latter includes household work (cooking and cleaning) and household construction and maintenance. The organization of the family revolves around these activities.

Aside from construction work, Dogon women participate in all types of work. They take care of the fields like the men, and handle heavy household tasks among which the most difficult are millet threshing, firewood gathering, and water-carrying. Women participate in all agricultural chores, including gardening. In some villages (in the Sangha region), they have their own garden plots. In other places, like Dourou, they do not.

The men take care of field work, household construction and maintenance.

Working schedules vary with the seasons as well as by regions and particular families.

During the rainy season the head of the family must insure sufficient food for the entire family. All family members work for him. Young married members who have separate plots cultivate these on a certain day each week, every five days, or once they have finished their work in the family head's field. This arrangement continues until onion-planting time (October), or until all of the harvest has been completed. From this point on, each household takes care of itself and works to satisfy its own needs. Those younger family members who do not have their own fields must purchase grain to eat Onion-planting involves the whole family. In some places this is true of the onion harvest also. Irrigation however, is an individual affair; each person irrigates his own plot. Since Dourou women do not have their own plots, they irrigate for their husbands, though not all women irrigate. Women whose turn it is to cook, or only-wives, join the rest of the family in the fields once they have finished preparing the midday meal. As a rule, people go to the fields early in the morning without any breakfast. They wait to eat the midday meal between 10 and 11 AM if the cooks are quick, or between 12 and 1 PM if the cooks (wives) are slow. Children from four to ten years of age take care of the sheep and goats, but do not work in the fields.

In villages near or on the Escarpment, the larger families or parts of them move to the Séno during weeding and harvest-time; the husband returns to the village on market days. Most every day during the dry season, the wife begins looking for firewood very early in the morning and then returns to the house around 11 AM. In so doing she builds up a wood supply for the rainy season when the rains make wood-gathering difficult and when all family members are needed for field work. Following the millet harvest, cooking-fires are made by using millet stalks.

Produce from the harvest of staple crops goes to the family-head. In return for their work, he gives a small portion of the harvest to the women and the married son(s). The younger members receive nothing.

The youth of the villages form "ton" organizations of wage-earners. With their earnings they organize a festival which takes place once field work has ended.

Aside from the "ton" organizations, one does not find other forms of agricultural wage-labor, and the youthful groups are not available all the time.

The villages carry on certain agricultural activities (fonio-threshing and bean-gathering) and construction work communally. Such is the general organization of work among the Dogon.

The nature of the organization of work has implications for the production unit. In order to support themselves during the dry season, youth must leave in order to find the money necessary to feed themselves. This reduces the amount of labor available once they are gone. It also increases the work required (of the young), for if the young person has insufficient grain, then he must work during the dry season as well. It may contribute to the development of market-gardening in which women and younger people work together and keep the

returns for themselves, thus contributing to a kind of cooperative organization of production.

B. Water

Water is a crucial resource for humans. Without it there can be no well-being. The quantity and distribution of water influences the growth of crops and animals as well as its domestic uses. Its quality affects the general state of health.

The lack of sufficient water is a serious problem in Dogon country. In this part of Mali where rock dominates everything, rainfall is low and irregular, water absorption by the ground is negligible, evaporation is rapid, and wells risky, people live with a constant concern over adequate water supplies. Any improvements in living conditions will depend upon the availability of this crucial resource. Presently, needs are satisfied by means of pools, marigots, sumps, natural springs, wells, and dams. Water thus obtained is used for market-garden crops and for human and animal consumption. The amounts available vary from one ecological zone and village to another.

One finds all of the above sources on the plateau: marigots, pools, sumps, wells, springs and dams. Only a few villages have wells, springs, or dams. The majority get their water from marigots (which dry up quickly) and sumps. Of all the villages in the Dourou area, only Dourou has a well.

On the Escarpment there are only springs and sumps; there are no dams. The only water sources in the Séno are wells--often very deep. Men spend hours watering the animals which surround the wells.

The following remarks describe dams and sumps.

(1.) Dams

During the rainy season runoff water flows into the valleys and follows the courses of riverbeds or streams. Dams serve to block this flow by

means of an oblique wall, 1.7 meters to nine meters high, made of stones cemented together. The water is thus retained on the upstream side of the wall and cannot flow until it reaches the level of the top of the wall. Gardens are located on each side of the water level thus formed. Some dams are equipped with sluice gates.

On the Plateau there are thirty dams with capacities varying from 10,000 to 800,000 cubic meters. Many do not contain water all year long, for they dry up very soon after the end of the rainy season; leaks are rather common as well. Construction of dams has been financed through funds coming from a number of sources: the Federal Republic of Germany, the World Bank, USAID, the Malina government, and non-governmental organizations such as the Catholic missions.

Wells being the risky ventures they are, dam construction has been emphasized by various parties. The dams have contributed significantly to the improvement of conditions in the villages they serve--for irrigation, watering of animals, human consumption, and washing. Improved cleanliness among the peoples of the area has been noticed since the creation of dams.

Many dams become full of aquati plants, and dam-maintenance is insufficient. At present, dam management is not the responsibility of any one organization, but various governmental agencies contend for control. These are Coopération, Opération Mils Mopti, and Génie Rural. Each claims responsibility. In order to resolve the conflict, a meeting was held at the Mopti Gouvernorat in July of 1977, and Opération Mils Mopti was assigned the task of taking care of the dams for two years at which time the situation will be re-evaluated.

Other problems have arisen with the construction of dams. One of these is the problem of distributing the land around the water. Since no one organization exercises real responsibility for the dams, the peasants frequently disagree and argue over the location of garden plots; each wishing to have the

best location. Some dams were not used last year due to inadequate organization at either the governmental service or the farmer levels. For the moment, the cultivators are handling the allocation of plots around the dams themselves.

The new installations have aggravated disputes between villages located on the same water course. Those downstream complain of insufficient water caused by closure of the dam upstream. In order to retain the maximum quantity of water, upstream villages close the dams rather early--well before the end of the rainy season in August or early September. The water may overflow upstream and occasionally pours into the millet fields of adjacent villages, causing damage to the crops. We saw two villages complain to the Dourou Arrondissement of flooding in their millet fields caused by overlow from dams in the neighboring villages.

Other observers remark that the proliferation of dams has caused the silting-up of some water courses due to reduced flow. The Yamé of Bandiagara had never dried up previously. It is now drying up and the sand one sees there now--a permanent feature--used to be taken away by the current.

These findings indicate the need for greater attention being given to the height of the dams during their planning stages so as to insure water flow in a downstream direction. It will also be necessary to insure maintenance and rational management of the dams. These kinds of problems will increase as more dams are built. The peasants recognize the value of dams, and ask that more be built. The demand is large: it amounts to 120 for this year. The dams are sought after most of all because they make market-gardening (the only source of income for Plateau inhabitants) possible.

(2.) Sumps

Peasants have traditionally made use of sumps (large holes). Their location may or may not be in the bed of a water course which carries runoff

during the rainy season. Sumps located here amount to natural sources of water which have been deepened by the farmers who pursue the falling water level by clearing. Sumps located elsewhere are man-made. On the Plateau these begin with a small crack which collects runoff; these are enlarged by the farmer. After a thousand and one tries at moving pieces of rock, he eventually obtains a small reservoir of water often located between the synclinals of rocks. Or, he may not find any water. Digging begins during the dry season and may continue for years. Some sumps in Dourou required three years of digging. The hole may be deep and may fill to the top with rain water seepage. Water thus obtained is used for crops and various domestic uses including drinking. In some cases the sump does not dry up. On the Escarpment the peasants dig each year because of the sandiness of the soil.

Sumps dug in the beds of water courses are generally open for use by all. But when a sump is dug by an individual or a group of persons, it is considered private property. No one except the owner(s) is allowed to draw water from it. In Dourou Taga there are seventeen such sumps, owned either by individuals or groups.

Sump water supplies are linked to the amount of precipitation falling during a given rainy season. During a good year, rain water is available without clearing for relatively long periods of time--until the end of November. During a poor year the sumps dry up early. In Dourou Taga the farmers had to begin clearing as early as November 5th in order to obtain enough water for their onions. Last year, clearing began later.

In many villages the system of water storage does not provide enough water for crop needs. When onions begin to dry earlier than usual, they must be harvested before they are completely ripe; this reduces the yields severely. Many Dourou Taga farmers found themselves without sufficient water supplies this

year. This necessitated repeated clearing operations; whole days of work were needed in order to obtain even meager quantities of water which were exhausted after only three gardens had been watered. Their response to this problem was to water by rotation: each gardener had a turn to water. Seated near the sump, each awaited his turn. Those who were absent were immediately replaced. Many could not water all of their gardens: part was watered one day, another the next, and so on. Some of the gardeners spent the entire day and were not able to water more than three plots, for the flow of water into the sump was very weak.

Around October 15, the water course beds fill with water, an unimaginable quantity of water, given the lack of it during the entire dry season. But in as little as ten days the black rocks of the riverbed reappear and the water is gone. Even the water levels in the sumps drop substantially, and the gardeners must climb into them to draw water. It is difficult to appreciate how quickly the water disappears. A number of factors are involved in this: irrigating crops, evaporation, runoff, percolation, and the winds.

(3.) Natural Springs

Springs are common on the Escarpment. Springs or resurgences of ground water appear on the sides of rocks of the Escarpment and flow continuously downward along specific courses toward the lower elevations. The Dogon cultivate on either side of these streams. Springs--at least those we visited--do not dry up.

(4.) Rainfall and Precipitation

Rain influences human life and crops. Its quantity and distribution are agronomical factors of fundamental importance. This year the Bandiagara Plateau suffered from an early cessation of rains. In just a few days, marked changes could be seen in the crops. On October 10, along the Bandiagara-Dourou road, I noticed significant and alarming drying of the millet plants. The stalks

were yellow and resembled thatch. As I walked in the fields there were crackling sounds all around me--as one would hear among dry plants. Weakened by the dryness and a light wind, half of the stalks had fallen over. The ears, mostly empty, had dried up before ripening; some had dried up at the flowering stage. This unfortunate situation was the result of the rains having stopped prematurely--none had fallen in Dourou since September 23rd. Even the beans were beginning to dry up. One could not escape the conclusion as one looked about, that the harvest would be poor and that fields on the Plateau would fail. Eight days before (October 2nd) the fields had been green, the ears were in bloom, and the grain was promising. One couldn't help but smile at the sight. But here the sudden lack of water had brought about a yellowing, a drying, and weakening of the plants. Thus all the yield-predictions for Plateau fields (in higher places, away from valleys and crevices) were rendered false and were never attained.

Water is a limiting factor in Dogon country. It limits crop yields and limits living conditions. The insufficient cleanliness of the people and their wearing of dark, indigo-dyed clothing are reactions to the lack of water. The possibilities for storing more water should be enhanced.

C. The Soil

A basic factor in agriculture is the soil, the quality and extent of which are important factors in the growth of production units. We described the characteristics of the region's soils in the first report.

Soil on the Plateau is sparse and poor; only that found in depressions and faults is somewhat fertile. Rocks are everywhere, and the peasants cultivate wherever they can. The irregularly-shaped fields are broken up into islands and clumps. Retention and percolation of rain water in the gravelly soils is almost non-existent. Rapid runoff following rains causes erosion everywhere. The soil drys quickly and plants often wither.

Farmers must create their fields wherever they can because of the predominance of barren rock. They carry dirt over long distances in order to make plots for millet or gardens. The soils thus carried is placed atop the barren rock, and is mixed with an assortment of debris. "Squaring" of the plots helps to reduce erosion. Plateau fields, like the gardens, are small.

Because of the poor quality of soils, farmers living on the Plateau near the Escarpment and those on the Escarpment must cultivate in the Séno.

Escarpment soils, with the exception of those found at higher levels, on the cliff-wall, are better. At lower levels the soil is clayier and more suitable for cultivation, but these soils are scarce and so the peasants must prepare beds among the rocks in order to grow millet or cotton.

Soils in the Séno are sandy and low in organic content, nitrogen, and phosphorus. The fields there are large and long fallows are practiced.

D. Equipment

Cultivation equipment used by Dogon farmers consists mostly of locally-made tools. The equipment varies according to the specific crop in question--some tools are designed for use in grain cultivation, and others are made for use in the cultivation of market-garden crops. A list of equipment is given in Table 1.

(1.) Rainy Season Cultivation Equipment

The most important tool used in grain cultivation is the "daba"; it is used in all three ecological zones of Dogon country: the Plateau, the Escarpment, and the Séno. In addition, a variety of hoes and picks is used, all having narrow blades in order to penetrate deeply into the soil. The daba--whose blade is wider--is used mostly for shallow work, especially weeding. On the Escarpment where plots are cramped in among the narrowly separated rocks, a daba is used which has a narrower blade than found elsewhere.

Table 1. Agricultural Implements used in Dogon country

Name			Use
English	French	Dogon (Dourou)	
long-handled pick	pioche (longe-manche)	Leycoudjou	sowing of rainy-season crops
short-handled pick	pioche (manche-court)	Djéwéré	stump-removal; digging
hoe	houe (daba)	Coïn	weeding
harvesting knife	lame à recolter	Guerkémé	cutting millet ears
knife	couteau	Siné	cutting and mowing
hatchet	hâche	Gourou	felling of trees and shrubs
sickle	fancille	Coro	mowing
basket	panier	Togourou	transport of manure and agricultural produce
hammer	marteau	Marteau	breaking rocks
calabash	calebasse	Sadia-codjon	watering
jar	canari	Deyn	"
spherical gourd	gourde sphérique	Djogou	"
necked-gourd	gourde à cou	Saballe	"
dirt-stirrer	remueur de terre	Diaba-Warou	stir up soil in garden beds
onion-sickle	faucille à oignon	Goune-goro	mowing
digger	deterreur	Djévéré Diabo-goro	digging up onion bulbs
plow	charrue	—	weeding
seeder	sémoir	—	sowing
multicultivator	multiculteur	—	weeding
harrow	herse	—	harrowing
drawn -hoe	houe-attelée	—	weeding
cart	charette	—	transport

Since the creation of Opération Mils Mopti, new tools (plows, multicultivators, animal-drawn hoes, and harrows) have been introduced to the Séno, and their diffusion has been facilitated through a "model farmer" strategy. On these looser, sandy soils, the plow is not very useful.

The presence of large rocks in Plateau fields, as well as the general topography (slopes and crevices) of the area, preclude the use of traction equipment to any great extent.

(2.) Market-gardening Equipment

The type of equipment used by the Dogon for market-gardening varies according to the physical characteristics of the region and with the particular kind of work to be done.

Four kinds of work may be distinguished: garden-plot construction, sowing, watering, and harvest.

Aside from watering equipment, the same kinds of tools are used for these tasks throughout the different areas of the Plateau.

Watering is done with a hemispherical calabash, a spherical gourd, large water jars, pails, watering cans, and, infrequently, pumps. These variations reflect natural conditions, a lack of knowledge, and prices. The ground in Dourou is not very flat near water sources, yet it has few steep slopes. Under these conditions, the gardeners use calabashes which are purchased from their ancestral brothers at Guimini for small amounts of money. At Korou the land is flat and the plots are more distant from the water sources; here a spherical gourd is used for watering.

At Sangha the slopes are steep and the gardens are located above each other in a stair-like arrangement. Water is carried in jars balanced on the gardeners' heads. This makes it easier to climb up to the level of the desired plot. When the plot is near the water, a calabash is used to toss water onto the

soil.

The bucket, the sprinkling can, and the pump are recent introductions and are rarely used. Buckets are used mostly in Dobolo, and pumps are being tried in a few places.

The watering equipment used (calabash) has a limited capacity. This makes for an expenditure of a great deal of human energy due to the bending over necessary as the gardener carries the water. In addition, the watering process takes time. These factors place limits on the possibilities for increasing plot size, and are appreciated by the gardeners who would like to have equipment enabling them to increase the size of the plots while permitting reductions of unnecessary expenditures of energy. In Dourou there are some farmers who would like to use improved pumps.

In fact, there is a need to improve the watering equipment used. The plots are far from water sources, the distances to cover are large, the sumps are deep, the paths leading into them difficult, and water-carrying is fatiguing. At the Dourou Na dam, many gardeners are from fifty to a hundred meters from the water from November 10th on. At Dourou Taga where there is no dam, some gardeners begin using water jars as early as November 1st because of the distances to be walked.

There is an increasing tendency for gardeners to use watering equipment which reduces fatigue and thus allows for longer periods of work. Gradaully the calabash is being replaced by the spherical gourd and the pail. Several methods will be used by the same gardener during the season depending upon distances and the nature of the water supply.

For other gardening tasks, the following tools are used: dabas, hoes, picks [pics], hammers and sacks (for transporting manure and soil).

Aside from sprinkling cans, buckets and pumps, other equipment is

made by the local smiths. Most all tools are produced locally.

Beyond the Plateau animal-drawn carts are frequently used; their popularity has grown since the beginning of Opération Mils.

II. Types of Agricultural Production and Techniques Used

The Dogon engage in a variety of agricultural activities. They grow grains, leguminous plants, tubers, vegetables (market-garden crops), citrus fruits (orchards), and care for wild tree species. The raising of animals and poultry is widespread. Each region produces a range of different products depending upon the environmental and historical conditions and the availability of water. Millet is grown in all ecological zones.

The Séno is the area of greatest grain production, especially millet. Given the poor quality of the soils there, the variety of crops produced is greater than that found on the Plateau and the Escarpment. The Séno is also an area of leguminous cultivation, and extensive cattle-raising occurs there.

Market-gardening occurs on the Plateau and the Escarpment. Some also takes place at Dangaténé in the Séno.

The ensemble of cultivation techniques as well as techniques particular to a given crop vary from one area to another.

A. Plant Crops

Cultivation is the principal activity of the Dogon. Plant crops are either rainy or dry-season crops. Orchard production goes on all year long.

A greater integration of crop production is made possible through diversification. Each crop is thus linked up with the overall production.

(1.) Rainy Season Crops

Rainy season crops include millet, sorghum, fonio, beans, dah, peanuts, peas (Wandzou), sweet potatoes, rice, sesame, corn, and cotton (which is

perennial in some areas). These are grown alone [pure stands] or in association [mixed] with other plant varieties. Exceptions to this are potatoes, rice, and cotton, which are always grown alone. To the list of plant crops must be added squash, calabashes (especially during the dry season), melons, pastèques, and okra.

Preliminary results of socio-economic studies carried on by Opération Mils Mopti in 1973 and 1974 permit us to distinguish seventeen kinds of fields on the basis of the allocation of space to different crops. Farmers cultivate the crops alone or mixed with others, but pure stands are the most common. They account for 94.9% of the total cultivated area in the Bankass, Koro, Douentza, and Bandiagara (excepting the central Plateau) S.D.R.s.

Millet--whether grown alone or in mixtures--is the most important crop. It accounts for 79.22% of all pure stand cultivation area in the S.D.R., and for 4.36% of all mixed production. Beans are the plant preferred for association with millet. Sorghum and fonio rank second and third, accounting for 5.81% and 5.12% repsectively of all cultivated areas. These four crops are the major staple crops; the others are used to help ends meet during the next pre-harvest period.

Among mixed crops, combinations of millet-and-beans and sorghum-and-beans are the two most frequently encountered. Together, these associations occupy 8,742 hectares or 98% of all mixed fields. One finds these mixes in the Bankass (38.16%) and Bandiagara (55.8%) circles. The millet-and-beans combination is especially frequent in Bankass where it accounts for 3,264 hectares as opposed to 139 hectares for sorghum-and-beans. The situation can be explained in terms of soil conditions. Soil in the Z.E.R.s considered as part of the Bandiagara circle (Wo and Goundaka) are clayier and thus more suitable for sorghum as opposed to Bankass where the soils are very sandy.

In terms of geographical size, the Koro circle is the largest

producer. It occupies 81,619.4 hectares or 46.64% of the total cultivated area of the four circles. Bankass is second largest with 31.3%. The Central Z.E.R. is the largest cultivated area in the Koro circle; the same goes for Diallasagou in the Bankass circle. These are also the largest villages in their respective administrative circles.

(a.) Millet

Millet is the most important staple crop in Dogon country and in Mali. The 1972-73 agricultural research report of the Direction Nationale du Plan et de la Statistique, dated June 1975, gives us some idea of this importance.

Dogon farms are the largest millet producers in Mali. For Mali as a whole, pure stand millet cultivation covered 478,500 hectares in 1973. Some 46.83% of this total was located in the Mopti region. In the same year pure stand and mixed millet cultivation within the region covered 245,962 hectares, or 38.33% of the nation's surface area sown in millet (pure stands and mixed). Within the region millet took up 62.6% of the total area, and sorghum followed with 10.3%.

The aggregate figures of the report do not allow a description of the Dogon's share of national and regional areas cultivated in millet. At the regional level the Dogon area is the largest producer, especially in the Séno. Cultivated areas on the Plateau are small due to the rockiness of the terrain which limits if not impedes greater cultivation. The methods used to grow millet in Plateau fields differ from those used in the Séno. All methods may be classified as being of two kinds: Traditional methods or more modern methods introduced by Opération Mils Mopti.

(a.1.) Varieties of Millet

Different varieties of millet will be planted by Plateau farmers depending upon the characteristics of the particular area. The precocity of Escarpment varieties differs from that of Sangha and Dourou varieties. In the

main, three varieties are widely used. The first is Tronion, or "Dogourou-you." This is a 70-80 day early variety with large grains, and is grown by villagers along the Escarpment, such as Sangha and Dourou. The second is Tolobé-je. This is a ninety-day later variety, and is planted by the villages in the middle of the Plateau, west of the Soningué-Pellou-West Sangha line. The third is Niou-bobo, or "you," and is a 120 day late variety which is grown only rarely on the Plateau. This last variety is used on the Plateau when no other seeds are available. Tronion is the preferred variety, and its yield on the Plateau exceeds all others.

(a. 2.) Cultivation Methods used on the Plateau and the Escarpment

Millet cultivation is done in accordance with long-standing, traditional methods throughout the Bandiagara Plateau. On rare occasions modern methods are introduced, such as chemical fertilizers and fungicides. In general, the traditional methods are well-adapted to the soil conditions, and are especially well adapted to the economic situation of the farmers. Except for measures taken to prevent erosion, millet cultivation methods are the same as those found elsewhere in Mali.

The methods consist of a number of operations and the application of certain factors to the plants, all augmented by means of a well-defined rotation. These vary according to the proximity of the fields to the villages.

Fields surrounding the villages (called "lara") are cultivated continually without rotation. Millet is planted every year. The quality of the soil is improved some by the addition of manure and domestic waste (debris) which are taken to the fields during the dry season. The more distant fields may also receive some treatment. If the farmer owns cattle, they are stationed in the fields during the dry season. Some rotation does occur in the more distant fields and reflects the availability of land as well as the alarming degree to which soil

quality has dropped. Millet is grown for several years, followed by fonio for a year, and once harvested, manure is added. After this, millet is grown again for several years, and so on.

Millet fields on the Plateau and the Escarpment are rarely left fallow. They are continually cultivated. Only one Dourou farmer claimed to use a ten-year fallow.

Farmers supply their own millet seed; the seeds are stored on the ear in their granaries. Some select their seed-ears at harvest time; others wait until a few hours before sowing. The choice is always based on large, well-filled ears which have not been damaged by insects. With the arrival of the first good rain, the ears are threshed and the seeds are prepared for planting. Some farmers treat their seeds with fungicides, but most do not. All the family comes out for the sowing operation. Using a long-handled pick ("Leycoudjou"), seed-holes are made in the middle of the fertile mounds left from last year. The seeds are dropped in and the hole is closed with a touch of the foot. The farmers then wait for the seeds to sprout. If the result is satisfactory, then so much the better. If it is not, reseeding occurs with the next rain. The planters claim to have reseeded every year, with two reseedings being the maximum. The second reseeding does not produce much. Even when fungicides are used, not all the reseeded mounds produce plants. When the rains are good, results such as these suggest poor quality seeds. Another contributing factor on the Plateau is the heavy nature of the soil there which makes extrusion of the sprouts very difficult.

Other farmers use traditional treatments.

The struggle with weeds begins once the seeds have sprouted. This occurs during a series of weedings and hoeings during which fertile mounds are formed by use of the daba ("coïn"). These are the most difficult of all operations associated with millet cultivation. The first weeding-hoeing is essential. This

occurs two to three times depending on the size of the field and the availability of workers. In some regions, like Sangha, two weedings are necessary. Otherwise the weeds become established in the fields and cut down the yields. When there is sufficient rain, the first and second weedings may help to improve yields. Mounds containing organic matter are made following weeding and play a part once the millet has reached a certain height. They are made by burying weeds between the rows of millet plants. Decomposition of the weeds produces a [green] manure which will nourish next year's sprouts. Planting always occurs in these mounds containing decomposed weeds from the previous year.

The use of these mounds permits a kind of small-scale rotation within the fields from year to year. In Plateau fields the mounds are very close together, the plants are closely spaced, and are not thinned out. The average interplaning distance is 60 cm. Mounding is not used for millet grown either in fields located on Escarpment terraces or in garden plots.

Some farmers apply fertilizer. This is usually done after the first weeding, but always occurs before the mounds are formed. Near Sangha fertilizer is applied twice: first around the seed-hole, and then it is spread about by broadcasting. The value of the fertilizer is appreciated by farmers, but complaints are heard concerning its high price.

Once the millet plants have attained a certain height, fields located farther away from the villages are watched daily in order to keep monkeys from breaking the stalks and eating the unripe ears.

Harvesting methods vary with the distance of the fields from the village. Those near the village (lara) are the first to be harvested. Rather often the plants are uprooted and placed in rows, after which the ears are cut off by means of a harvesting blade or knife. Once the ears have been removed, the stalks are tied into bundles and taken to the house for use as animal forage or

for use in the construction of sun-shelters (hangars).

In Dourou, fields more than fifty meters away from the village are harvested by removing only the ears; the rest of the plant is left in place where it stands. Men cut off the ears and place them in carriers attached to their shoulders. Once these are full, the ears are unloaded at a spot nearby where the women use square-bottom baskets to take them to pre-drying areas. After several days there, the millet is taken to the village and dried on the rooftops. When the field is not too dense--which is normally the case--young boys unload the filled baskets. This method is used throughout the zone east of Bandiagara.

Once the ears have been removed, the stalks are uprooted and bundled. The bundles are placed atop large rocks or in trees as protection against animals that wander about during this period. The bundles are taken to the house and cut up for use as forage. After the harvest, these bundles of stalks can be seen in all the climbable trees and on the roofs of houses. Because of the pressing need for labor in other Séno fields and in the gardens, not all farmers are able to uproot all the millet plants in their fields. This leads to women going into the bush-fields in search of stalks for use in their cooking-fires.

The millet harvest begins in October. After 1 1/2-2 months of drying on the roofs, the ears are placed in giant granaries which have been soundly constructed of clay. Some farmers cover the inside walls of their granaries with DDT powder.

The Dogon fight erosion by means of a system of "squaring" which is used in one of two ways. Most often it consists of arranging stones side-by-side in such a manner as to form a small retaining-wall. The steeper the slope, the tighter the squaring becomes. When stones cannot be found, the daba is used to make ridges; this is the second method. Here again, the number of squares varies with the slope of the field. The squaring-method is unique to the Dogon and

distinguishes their cultivation practices from other types to be found in Mali.

At the foot of the Escarpment farmers construct terraces for millet cultivation. Each terrace or plot is bordered by stones in order to keep the thin layer of soil from being washed away. Owing to the slope of the Escarpment, cultivation occurs at different levels. Seeds are planted so close together that the effect is one of broadcast seeding.

On the Plateau millet is grown alone or mixed with niébé beans or sorghum.

Most of the Dourou millet fields contain poor-quality soils. This is most apparent at harvest-time. The plants are scattered and their stalks are stunted. The ears are small and lose their grains easily. The ears are handled during a lengthy process (from stalk--to itinerant areas--to basket--to drying area--to basket again--to rooftop--to granary), the grains are not well-attached to the ears, and so the losses are considerable. Some ears have already lost all their grain by the time they leave the fields. This is often the result of their being insufficiently ripe due to cessation of rainfall. Two measures might be taken to reduce grain losses prior to arrival at the granary. One is to reduce the total handling of the ears. The other is to assure that the ears have solid placentas which permit the seeds to remain attached to the spike.

Other fields do quite well; this is especially true of those fields which are manured on in which cattle are kept. Excluding fields found in crevices, these produce the best yields.

(a. 3.) Methods Used in the Séno

The varieties of millet grown and the methods used to grow them in the Séno differ little from those we've already seen on the plateau. It is noteworthy that Séno cultivators follow a well-defined crop rotation sequence and practice long fallows. The soil is sandy and the fields are large. There is no

necessity for squaring in order to combat erosion. Millet is always planted during the second, third, or fourth years following fallow. Peasants do not cultivate longer than this, but actual cases depend on soil fertility. Millet is generally grown for two years after which leguminous species (beans, peanuts, peas) always follow. After this, fonio or dah is grown. This may be a pure (un-mixed) crop or in association with beans and dah.

At the level of the "golo," the stream which runs along the base of the Escarpment, millet is grown on both banks during the rainy seasons. On the bank nearest the Escarpment, perennial cotton is grown in rotation with millet. But the most frequent pattern is the cultivation of market-garden crops which begins even before the millet harvest has ended. The cycle is as follows: millet until October/November, market-garden crops through March/April, and then millet during the rainy season. Methods used to plant, maintain soil fertility, and weed are the same as those used on the Plateau. Cattle belonging to Peulh and Dogon are kept in those fields where no gardening occurs. The millet ears are cut off after the stalks have been uprooted, and the stalks are used to construct protective hedges for the gardens. Methods used to transport the millet to the granaries as well as storage methods are the same as those found on the Plateau. In the area of the high dunes which run along the opposite bank of the "golo," the fields are treated differently. We mentioned in the first report that the strip almost ten kilometers wide running along the Plateau belongs to the villages located on the Escarpment-side as well as those near the Escarpment (e.g., Dourou, Sangha, etc.) which have no land on the Plateau or on the Escarpment itself. The methods used in these fields are very different from those found on the Plateau and even the Escarpment. Here the soils are sandy and the fallows long. Here, more than anywhere else, agricultural activities follow a particular dynamic, insufficient attention to which inevitably leads to failure for any given farmer, as well as

the researcher who focuses his study on the farmer and the farmer's milieu. Given the sandy nature of the soil and its generally poor organic composition, farmers must widely space their plants. When seeding is done in rows, distances of 1.6 meters may occur between seed-holes in the row as well as one meter between rows. According to the farmers, planting any closer than this produces low yields. In fact, very small ears can be observed in areas where sowing has been denser. After the first weeding, [green] manure mounds are made. The ears are cut from the stalks after uprooting. These fields are more easily cleaned during the dry season. After what few bushes may have appeared are cut and dried, the whole is burned.

Villages on the Escarpment and the Plateau near the Escarpment gather the ears together in large piles. Once the cutting is finished, the ears are tied into bundles by means of fibers from bushes or the millet stalks. The bundles are head-carried or loaded onto donkeys and taken to the houses. This is one if not the most burdensome task for farmers, as the distances to be traveled are long (from six to twenty kms), and the ascent to the Plateau difficult. Before the road was built, all millet was head-carried. Once at the house, the bundles are placed on the roofs for drying. After one or two months the bundles are opened and the ears are placed in the granary. Losses of grain inevitably occur during the lengthy handling process. These losses are very large during those years when the rains stop prematurely, for the ears easily lose their grain. One notices a lot of grain mixed with the sand at the storage places.

The harvest takes two forms in those villages located in the heart of the Séno (Koprokenié-Pè, Madougou, etc.): the ears may be cut from the stalks either before or after uprooting. In the fields near the village (lara), which contain some organic material, close-planting is practiced and no thinning is done. The stalks are small and so are the ears.

Throughout the Séno millet may be grown by itself, mixed with beans, or with dah and sorghum in clayey-sandy areas. With the exception of Tolobéjé, one finds the same millet varieties in the Séno as on the Plateau. Another variety, Niou-Kounion, is the most widely found in this zone of poor soils. With the shortening of the rainy seasons during the past few years, the farmers have been making greater use of early varieties like Tronion and Niou-Kounion.

(b.) Sorghum

According to socio-economic studies done by Opération Mils, sorghum is the second most important crop in terms of total surface area cultivated (5.81% in pure stands). It is grown either alone or mixed with beans (most often the case), millet, sesame, corn, or cotton (at Bamba).

Sorghum is grown especially in damper areas--low-lying places where water stands, and near water-courses. Sorghum prefers heavier, clay soils over looser, sandy soils. In the center of the Plateau, sorghum is more widespread in the Sangha Arrondissement than in Dourou due to these soil characteristics. Villages located on the side of the Escarpment grow the most sorghum, especially in the Bamba area where it is grown on the bank of the "golo" near the cliff and rotated with millet. In the Séno it is grown around the edges of low-areas. It is rather widespread on the clayey soils of Koro and between Koro and the Upper Volta border. Very little sorghum is cultivated in Dourou. Only occasionally will a few plants be found in the fields there.

The Bankass and Douentza S.D.R.s are the largest sorghum producers, with 4,061 and 4,076 hectares respectively grown in pure-stands.

Sorghum is used mostly to prepare dolo (the favorite alcoholic drink--prepared for sale, receptions, funeral and fetish ceremonies).

At least five varieties of sorghum are grown in Dogon country. A clearcut classification of [illegible]m is difficult, for the names vary regionally and

from one informant to the next. The following names are used in Dourou:

Emé-na - a late variety of sorghum with large grains;

Dîgré - has medium-sized grains;

Préguémerem - the earliest variety (2 months); the grains resemble rice somewhat;

Emé-Doro - a late variety (4 months);

Emé-Doumo - a large-grain variety grown especially for the préparation of dolo. Sometimes it is known as Emé-dolo.

Maka-Emé - a variety grown in Bamba.

Emé-Doro is the preferred variety. It has the highest yield and can be used in all food preparations. It may be eaten together with beans, millet, and fonio--a combination which is much liked by the Dogon.

Technical characteristics: water requirements, life-cycle, nutrient requirements, soil-preferences and yields are unknow; the same applies to varieties of millet.

Sorghum is grown in much the same way as millet except that no fertilizer is used.

(c.) Fonio

Fonio is grown throughout Dogon country. One can generalize that all farmers grow it. It requires little work to grow, but its preparation (pounding) is so fatiguing that wives sometimes refuse to go along with increases in the areas cultivated in the crop. It is grown on the poorer soils and is used to end a fallow cycle. It is grown mostly in association with dah.

Generally speaking, fonio is a "hungry-season" crop. It ripens after peas which are the first of the year's new produce. Totems and fetishes prohibit the consumption of fonio by some persons. In a family, this prohibition may concern only one person.

There are two local varieties of fonio.[2] One is Pogo-na, a late variety (ca. 3 months) grown in the Séno. The other is Pogo-téprou, an early variety (2 1/2 months), grown on the Plateau. Pogo-téprou is sown when the Dogon foresee that existing food supplies are likely to become exhausted before the new harvest of staples is completed. Thus Pogo-téprou is an input for the cultivation of other crops, for it is used to feed family members while the other crops are being cultivated. Farmers prefer the later-yielding variety (Pogo-Na) because it produces more per hectare, be it sown in the Séno or on the Plateau. The earlier variety is grown as a means of combatting hunger.

Fonio requires very little care. Sowing is by broadcasting during the dry season, and is the first thing done once the fields have been cleaned up. Using the daba, the seeds are covered with earth, and that is all there is to it; the rest is up to nature. The seeds germinate with moisture from the rains, and the plant continues to grow, requiring no further care until harvest-time. Because the soil in which fonio is planted is so poor, few weeds grow. Weed-growth can reduce yields however, and makes for dirty grain at harvest, so some weeding is done if enough workers are available.

When ripe the fonio stalks bend to the ground in the direction of the prevailing wind. Mowing then occurs. This is the first harvest operation of all the cultivated fields and occurs during the period of intense October sun. The mown plants are placed into small piles, and then taken to a storage area and arranged in a circular fashion with the ear-part of the plants hidden. This arrangement serves to generate heat which aids in the subsequent removal of the grains by beating or stomping. Beating is done only on the Plateau. A quantity of stalks is placed in a well-cleaned open space, and then men, women, and children thoroughly thrash the fonio using flails and sticks. Once all the grains have

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2 These names are those used in Dourou.

fallen onto the ground, the stalks are shaken and then discarded. The resultant product is then winnowed by the women in order to remove all dirt, etc., from the grains. Sacks and baskets are filled with the grain and taken home by donkey or are head-carried by both men and women.

Stomping occurs on the Plateau and in the Séno. It is the only method used to remove the grain in the Séno because the sandy soil makes beating very difficult. The ears are placed atop a mat or something else and are stomped until the grains fall off.

Once taken to the Dogon's house, fonio is stored in granaries awaiting eventual consumption, sale, or use during the next planting season.

(d.) Beans or niébé

Several varieties of beans are grown, and are distinguished by the color of the seed. Three of these are rather widely used; they are:

Dono bara-ni - having small seeds, it is grown on the Plateau and comes from Dono.

Kagua bana-ni - with black and white spotted seeds which are flat and larger than those of Dono bara-ni.

Kougounoukou-ni - with thin red seeds having white spots

The growth cycles of these varieties are nearly the same.

Beans are widely grown in Dogon country. They are grown by all cultivators, either alone or mixed with millet and sorghum. On the Plateau they are always grown in association; in the Séno they are grown alone or mixed. When planted with other crops, beans do not require much effort. Millet being the most important staple crop, beans planted in association with it benefit from any care it receives. At harvest-time women gather the pods, while the dried leaves and stems are rolled into bundles which are then placed in trees to protect them from cattle. The bundles are eventually taken to the village to be used as forage for

sheep and horses.

When grown alone beans are used to begin a rotation cycle; they always follow a fallow period. As leguminous plants they require very little nitrogen and thus contribute minimally to soil impoverishment. In fact they contribute nitrogen to the soil which will then be planted in millet. This is something the farmers have understood and practiced for a very long time.

In the Séno three methods are used to plant beans in pure stands:

1. sowing in holes on the barren ground,
2. sowing in holes dug into freshly prepared fertile mounds (made the same year),
3. broadcast-sowing.

Beans planted in fertile mounds yield more. The decomposition of the weeds buried within the mounds provides a manure which nourishes the bean plant. This method is wide-spread.

Once the beans have been sown, little work is required until harvest-time. The harvest consists of the women gathering the pods which are pounded in order to remove the seeds. The Séno variety, which is grown alone, stands erect and creeps very little.

(e.) Dah

Dah is a very important crop for the Dogon. It is used in most all cooking and serves as a spice which is well-liked in the towns of Mali. It is grown more in the Séno than on the Plateau. It is grown alone or mixed with millet or fonio. Grown alone it is used to end rotation cycles as fonio is when grown alone. When mixed with other crops, it is planted at all stages except the first following fallow. Dah, like fonio, is sown in widely-spaced rows.

Dah requires very little care and competes well with weeds. Given this characteristic and the poor nature of the soils on which it is planted, more

than one weeding does not occur. At harvest time the plants are uprooted and placed in large piles. After drying, the pods pop open and the seeds are then removed. This is done by taking the stalks and shaking them above some kind of container--the seeds fall quickly. For the most part this operation is done by women. Besides the seeds, the calyxes are much sought-after. They are cooked and used in many meal preparations. The stalks produce fibers which are used to make rope.

In general, three varieties of Dah are distinguished:

Agni-Na - This is the laurel. With red calyxes and black seeds, it is grown on the Plateau. The seeds are used to make a spice called Kama or Dahtou.[3]

Agni-Koro - This variety has beige-colored calyxes and white seeds. The calyxes are used in the preparation of sauces and Tougoussi.[4]

Agni-Pri - The plant resembles Agni-Na somewhat, but the calyxes are white. The seeds are larger than those of other varieties.

(f.) Rice

Rice (mountain and irrigated types) is grown on the Plateau and the Escarpment. In all the villages of these two areas, one will find at least one farmer who grows some rice. Rice does not occupy large surface-areas. It is propitious and is grown in places where water stands for the duration of its vegetative cycle. Thus one finds it planted in crevices, faults, and around ponds and dams. It is always the crop planted nearest the water. In some places it is marginal, in others it occupies significant areas; for example, in the Diankabou Arrondissement, especially in Bamba where rice was sold by O.P.A.M. during the

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[3] For details on the preparation of Kama, see the section on consumption.

[4] A mixture of Dah calyxes and peanuts.

drought. Bamba is now an important rice-producer and the valley has much potential. Sangha is the largest rice-growing area in the Central Plateau. Rice fields are found all along the Bandiagara-Sangha road, where many are large, with some attaining 0.15 hectares. For one Sangha farmer, rice is the most important crop he produces.

(g.) Peas

Pea-cultivation is widespread in the Séno. Peas are not grown much in the Central Plateau region because of the squirrels which dig them up--at least at Dourou. Peas are a "hungry-season" crop. They are the first crop to yield during the year, thus they help to compensate a bit for the lack of other grains during the pre-harvest period. Peas are grown alone or mixed with dah. When grown on a large scale, they are not mixed with other crops. As a leguminous plant, peas begin the fallow cycle as do beans. Three varieties are grown:

Erè-Pri- the white pea, which is grown on the Plateau and the Séno;

Erè-Guin - A black pea having a better taste and yield than the other varieties. It is the earliest variety and is grown on the Plateau and in the Séno;

Erè-ban - the red pea.

(h.) Other Rainy Season Crops

Among the other rainy season crops, peanuts rank first in the Séno where they begin fallows the duration of which are not long (two to three years).

Tubers are very common on the Plateau, especially sweet potatoes which are grown near water courses or marshes providing a permanent source of moisture. Sweet potatoes are planted in large ridges and are reproduced by cuttings. There are two principal varieties: the red variety, which is more common, and the white variety. Once planted, sweet potatoes require no additional care. Some Plateau and Escarpment villages are large producers; for example, Korou and Idjely. Sweet potatoes are grown in the latter village even during the dry season

thanks to a permanent spring there.

Maïs and sesame are not grown on a large scale, but almost every family grows some maïs as a household crop. Some Plateau farmers cultivate corn in garden plots at the level of dams, sumps, or ponds. Corn is grown for nibbling and for sale by the ear.

(i.) Cotton

Cotton is cultivated throughout the Escarpment area, and serves as a cash crop in some villages where no market-gardening occurs. Very little cotton is grown on the Plateau. On the Escarpment it may be an annual or a perennial. Perennial cotton is grown on soils found between the area of fallen rocks and debris and the dunes at the beginning of the Séno. Here cotton may be grown in association with annual sorghum. Annual cotton is grown on soils located at the level of the fallen debris (on prepared terraces). It alternates with millet. Of all the Escarpment villages we visited, Bamba is the largest producer of cotton. Here every farmer has a small plot protected from animals by a thorn fence.

(2.) Market-garden crops and gardening

Dry-season market-gardening is the main feature of agricultural activities of the Plateau and the Escarpment, and onions are the main crop exported. Other items produced are tomatoes, red peppers, eggplant, chewing tobacco, cucurbits (calabashes), and some potatoes, cabbage, and lettuce. These crops are not distributed evenly throughout the area. Due to natural and historical factors, economic necessity, a lack of knowledge, and insufficient information, each village produces a particular range of crops. This contributes to a fairly well-delimited geographical distribution of market-gardening.

Onions are produced throughout most of the Plateau, but some villages do not produce any. The largest onion producers are the Dourou, Sangha, Kendié, and the Ningary arrondissements.

Tomatoes are grown mostly in villages located about five kilometers east of Bandiagara which have sufficient water. They are grown in some central Plateau villages but not on a large scale (such as Korou and Sassambourou). Nombori is the largest producer of tomatoes on the Escarpment.

Red peppers are grown mostly in Sangha (around the village) and Nombori. In addition, some are grown in most all other villages for family consumption.

In the Dourou arrondissement, eggplant is grown in the Plateau villages of Korou and Sassambourou, and Nombori on the Escarpment. Tobacco is grown on a small scale in many places, and is the main cash crop of Idjely and Yawa.

The ten Guimini villages specialize in the production of calabashes.

Papaya is also grown in villages where sufficient water is available.

Onions have been grown on the Plateau for generations, but no one was able to say when they were introduced. Up until the 1940's they were not widely cultivated and were produced in only a few villages: Dourou, Pélou, Korou, Sassambourou, Nakombo, Sangha, and Kamba. The expansion of onion production came with the opening-up of the region thanks to road construction. The cultivation of onions reflects economic necessity: the need to obtain food, to pay taxes, and the need to satisfy certain consumption requirements which are necessary and continually growing. Cultivated grains barely suffice to feed the family. Plateau soils are poor; Séno soils are poor and distant as well. These same requirements have also contributed to the production of other cash crops.

The methods used to produce onions and other market-garden crops are distinguished by their highly-developed and exacting nature. Frequent variations occur from one region to another, but they are not large. It is because of these production methods that researchers have described Dogon production as

intensive.

The gardens are located around water sources: dams, sumps, ponds, streams, and springs. Most generally they are close to the villages (twenty meters distant at Soningué and Koro; 200 to 300 meters away at Dourou Taga) and may stretch out for as much as a kilometer. Two neighboring villages might have contiguous gardens. No matter where the garden area is located, it is very difficult to pick out the plot belonging to any given gardener because all plots are adjacent.

The topography of the garden locations varies quite a bit. Some gardens are high: from one to 2.5 meters above the stream bed at Dourou-Taga, and even higher at Sangha. The plots are arranged at different levels according to the nature of the surrounding rock formations. Others are located on much more gradual slopes, but some incline is always present. Elsewhere gardens are located on flat spaces.

Two principal kinds of gardens may be distinguished on the basis of the type of soil contained therein. There are artificial soil gardens (terraced gardens) and terre pleine[5] gardens.

(a.) Artificial Soil Gardens

Artificial soil gardens are the most common and illustrate the ingenuity of the Dogon farmer who creates a garden plot on stone by bringing in soil from some distance. The creation of these gardens is the most difficult of all the tasks facing the gardeners. The work is always done during the dry season, and consists of four principal stages. These are as follows:

- removal of [protuberant] rocks - When the area is dominated by rocks of

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5 "terre pleine" may be translated "full earth/soil" or "earth platform" in this connection. Given the explanation contained in the text, the original French term has been retained. trans.

workable size, the farmer breaks these up with a hammer or by the use of traditional explosives in order to situate the plot. Situations like this are not too common, but at the Dourou dam, many gardeners used this method to set up their plots, for the terrain did not lend itself at all to plot-construction.

- breaking-up of boulders - The farmer breaks up large deep-rooted outcroppings with a hammer. The resultant pieces are then taken to the location selected for the garden.

arrangement of the garden beds - The pieces of rock are placed side-by-side in such a manner as to form polygons which will make up the garden (gono). The shape and the size of the garden beds vary. They may be triangular, rectangular, squares, or something else. The beds are very often square or rectangular-shaped. Small beds measure one meter on each side. The largest in Dourou is four meters by nine meters. More often the beds are about 2.3 meters on a side, or 5.29 square meters. Variations in size often reflect the slope upon which the bed is constructed. The steeper the slope, the smaller the bed. Beds in the Sangha arrondissement are smaller (one meter by one meter) than those at Dourou.

Several beds make up a plot, or garden, which is bordered by rocks. The thickness of the small wall made of the rock pieces may vary from twenty to forty centimeters depending on the slope.

- soil transport - The task of transporting soil to the gardens is also a difficult one. Using a hoe and a basket or calabash, the farmer goes to look for soil, usually sandy, which is located at some distance (100 meters to two kilometers) from the garden. He carries the soil atop his head and places it in the beds. We saw only one gardener use a donkey for this. Once the soil has been placed in the beds, manure--which has been head-carried from the farmer's house--is added and the two mixed together with a hoe. In many cases, the beds are first filled with dried weeds and leaves from trees and shrubs. To this is added a

gravelly-sandy soil. The decomposition of the debris produces needed compost. This method is most commonly used by Dourou gardeners. The manure used in the beds is made up of domestic refuse (compound-sweepings, etc.). The depth of the soil in the plots does not exceed twenty centimeters.

The construction of the beds and plots takes place during the dry season only. They are seeded at the end of the rainy season. On the other hand some plots may be left unprepared for up to three years. This depends upon the availability of soil and labor.

(b.) Terre pleine Gardens

For this kind of garden no soil need be transported to the site, for it is already present. The gardener need only break up and arrange the soil a bit prior to planting. The beds are bordered by small dikes made of earth.

Gardens (either type) are protected from wandering animals by stone walls, by millet-stalk hedges, or by straw-thatch fences except when the harvest coincides with the end of the period during which the animals are tended.

Escarpment gardens are terre pleine gardens and the beds are small despite the absence of any slope. They are constructed on the sandy part of the bank of the golo nearest the cliff wall. Here one finds enclosures made of millet stalks and straw. Water is obtained from sumps and natural springs.

(c.) Onion Cultivation

The techniques used in onion cultivation are very minute, and vary from one farmer to another. But in any given area, most of the methods are common to all. The Dogon follow a well-ordered sequence of operations when growing onions, and success depends heavily upon the extent to which the sequence is upheld in practice. Does this state of affairs reflect scientific study carried on since the introduction of onions to the area, or is it the result of empirical experimentation? A very pertinent question for which a pertinent answer cannot

easily be found. When asked, farmers explain that their ancestors did things this way.

Onions may be grown in one of two ways; one makes use of a nursery, and the other does not.

(c. 1.) Cultivation Without a Nursery

Onion cultivation without a nursery is the more widespread of the two methods. It is practiced in the Sangha, Dourou, and the Ningary areas. The process is as follows:

First step: Cleaning the beds. This operation consists of several tasks:

- Weeding: Using the "coïn" daba or the "Diavéré" pick, the gardener weeds the beds. The uprooted weeds may be left there to dry in which case they are piled up near the edge, or placed in some other bed which will be used the next year. Or, they may be removed immediately after weeding. If there are not too many weeds, the gardener leaves them in the bed. With watering they decompose and form manure.

- Burning: Instead of uprooting the weeds, the gardener may burn them where they stand; the resulting ashes enrich the soil. Burning is used only when sowing is late, for the weeds are still green when sowing is done earlier.

The use of one or the other of these methods reflects the availability of labor (gardeners may be involved in activities whose postponement is not possible; e.g., the fonio harvest), the size of water supplies, and the expectations for sale-prices sufficiently high to warrant early sowing.

In artificial soil gardens, any soil is replaced in the bed that might have been washed away due to heavy water-erosion. On the other hand, this may not be necessary.

For those plots in rotation, cleaning consists of uprooting the stalks from the preceding crop--usually millet or maïs--and burning the stubble.

Second step: Preparation of seed beds

Once cleaning is finished, the seed beds are prepared. A pick is used to dig up and pulverize the soil.

This might be done the same day as sowing. In many cases, preparation occurs two to three days before sowing. When the soil is hard (often the case in terre pleine gardens), it is watered to make it softer.

Third step: Sowing

Sowing is always done when the soil is dry or contains very little moisture. Since there is no nursery, the onion bulbs are planted directly. Sitting in the prepared bed, the gardener takes the bulbs from calabashes in front of him, and plants them with the root-portion downward, bulb by bulb. He moves back as the space before him fills with planted bulbs. There are no rows and the average spacing between bulbs is about ten centimeters.

If not too tired, the gardener waters the bulbs as soon as they have been planted. The seed-bulbs are selected before and during the sowing process.

There are two methods of sowing: one uses bulbs which have not been broken up; we call this whole-bulb sowing. The other, divided-bulb sowing, entails the bulbs being divided into four parts which are then planted separately.

The choice of method is linked to the availability of water, risk (of bulb loss), as economical use of seed bulbs (planting the greatest area with a small number of bulbs), and yield per hectare. The reasons for this are the following:

Divided bulbs rot when heavy rains fall unexpectedly three days after sowing. Because the bulb-parts are small, it is very difficult if not impossible to dig them up and use them again. Whole bulbs, on the other hand, hold up with gentle rains, and when problems arise, can be dug up, dried in the sun, and saved for

sowing again sometime later. Whole bulbs take root and grow faster than divided bulbs, and their yield per hectare is greater.

When seed-bulbs from the current harvest are used, the divided bulb technique must be used. Otherwise the onion harvest will be very late due to the prolonged growth cycle caused by slow germination (of whole bulbs) and bulb formation. This is because rooting occurs after the food reserves of the bulb have been exhausted, and this latter process is very slow in new bulbs.

No garderners in Dourou Taga use the divided bulb technique. Because water reserves are quickly used up there (there being no dams), planting is done very early--late in August and during September--with the hope that the rains will not ruin the plants. In Dourou Na, which has a dam, some gardeners who plant after the rains have stopped using the divided bulb process.

All the sowing we observed was a communal effort. All family members old enough to work sow their plots together. Occasionally families help each other in the process. Women in Dourou do not participate in sowing while those in Sangha do.

Some gardeners have their own supplies of seed-bulbs; others purchase their bulbs. Availability of water and knowledge of the art of bulb-preservation are the two key factors in determining whether or not a farmer will have enough seed-bulbs of his own for planting. Another factor for many is the cost of seed-bulbs (see the section on input-acquisition below).

Some gardeners apply fertilizer (made mostly of urea) after sowing; others use it just before they plant. Small quantities--a handfull or two--are used. Examination of the yield-study forms will tell us the actual quantities used. Not all farmers use fertilizer for knowledge of its use is a fairly recent development.

Fourth step: Watering

Watering begins the day after planting if not the same day, and continues on a daily basis. It is a difficult task and causes the farmers a great deal of effort; it may be the most difficult because of its duration. Every morning for at least fifty days the farmers must water their onions. They rise early and at 5:30 or 6:00 AM, leave for the garden carrying on their head a basket, a calabash, or a sack full of manure. Men, women, and children--most all of the village--go to the gardens [which become animated for] an hour or so, and work amidst the contrast of greenness and the blackish, greyish rocks of the terrain. The sight of these gardens and their greenness is a delight, but it is sad to witness the enormous, almost superhuman effort expended by these people in order to survive.

Equipped with a calabash, two gourds, or a water jar, the gardener descends to the level of his water supply, fills the container, and then climbs back in order to water each bed by spraying. He stands upon the small dikes or the stones bordering the plots. Since the level of the water is always lower than that of the gardens, there are crude stairs to be climbed.

In Dourou Taga some plots are 2.5 meters above the water level even when the water is high and plentiful. Once seepage stops, water can be found only in sumps As the level in these drops, the farmer must descend even lower in order to fill his container Climbing out of the sumps is hazardous and there is some danger of falling. But the farmers are so dexterous that one would think they are walking on flat ground.

The amount of water used depends upon the particular stage of onion growth.[6] In the beginning some farmers use two calabashes for each small bed and

[6] Quantitative analysis of the forms will tell us the actual amounts of water used at different stages of growth.

three calabashes for each large bed.

Irrigation is used on the Escarpment. At Idjely water from a natural spring flows from higher on the Escarpment downward toward the hollow of the golo. The spring has never dried up, even during times of severe drought. The gardens are situated at the terminus of the principal water-flow. Canals--twenty centimeters wide and forty centimeters deep--take water from this spot to the gardens. From these canals branch others which channel the water into holes from which the gardeners draw water for spray-watering.

Fifth step: Application of Manure

Manure is usually applied from ten to fifteen days after sowing, once any small weeds present have been removed. Next to each plot is a pile of manure to which the farmer adds from the time of sowing onward. Each morning he carries a bit more to the plots, either on his head, or on his donkey.

The nature of the manure varies. Often it is a mixture of sheep, goat, and donkey excrement, straw, millet stalks, compost from dead trees, household sweepings, and the decomposed remains of leaves and weeds left in the lavatories.[7] Families owning animals obtain a purer manure, consisting almost entirely of litter. Families without animals (e.g., goats and sheep), or having only a few, rely much more on their lavatories as manure sources. In the Sangha region some farmers use a red soil as manure. They also use bird-droppings which are even sold at the market.

Sixth step: Watering

Following the application of manure, less water is used for two or three days in order for the water to mix better with the contents of the bed. After this, more water is again used.

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[7] "toilettes." trans.

Some gardeners apply fertilizer, while others do not. Some plots in Dourou Taga were burned by it. Not knowing the proper use, the gardeners used the fertilizer as they would manure: after application, they reduced the quantity of water rather than increased it. The technical information available was insufficient in these cases.

If manure is applied a second time, it is usually done about twenty days after the first application. Generally, manure is not applied more than twice.

Onion-watering in the Dourou region occurs at the same time as the fonio and millet harvests, hence the farmers are confronted with very heavy demands on their labor. In the case of Dourou, the families must divide up: one part takes care of the grain harvest in the Séno, while the other--usually older members--waters the onions. When such a division of labor is not possible--such as within a small family--the farmer waters very early in the morning, and then fills his goat-skin with drinking water, and leaves to work in the Séno. He does not return until the next evening in order to water his onions during the night. This arrangement continues until the grain harvest is completed. In the meantime, the onions may remain for thirty to forty hours without being watered.

Seventh step: The Harvest

The first harvests begin during the second half of October. They frequently take place before the plants are fully ripe, for the farmers are anxious to sell and take advantage of the higher prices that prevail during the early part of the season. The variety grown matures completely in 2 1/2 months, but it may be harvested earlier.

The harvest is comprised of two operations--mowing (cutting) and digging up of the bulbs.

- Mowing. Mowing is done with knives or a small sickle (gone-goro) and consists of cutting off the green part of the plant low to the ground. The greens

are placed in small piles and then taken to a large rock at some distance to await beating.

- Unearthing the bulbs. This always follows mowing. Using a small, very narrow-bladed pick (djévéré diaba-goro), the gardener digs up the bulbs and gathers them as he works while being careful to remove any soil adhering to the bulbs. The bulbs are placed in a bag or a basket. From the plot the onions are taken either directly to the market or to a processing area.

Eighth step: Processing

In order to preserve the onions, the Dogon process both the greens and the bulbs. Thus everything is used--nothing is discarded.

- Processing of leaves. This consists of two operations: beating and the formation of balls.

-- Beating: The greens are placed on a large clean rock and are beaten and mashed by a group of workers using sticks in a rhythmic fashion.

-- Formation of balls: Once beaten, the greens are formed into balls. This is done by squeezing the mashed greens together in order to remove all water Seated and conversing, the farmers deftly complete the operation; the resulting balls are all round and of the same size. They are left on the rock to dry in the sun. Once dry, they are taken home for consumption or sale.

- Processing of bulbs. There are two ways of preparing the bulbs. One is to make them into balls. This is done in the same manner as the leaves except that once the bulbs have been beaten, they are then pounded in mortars before being shaped into balls. These balls are smaller than those made of the onion greens. They are dried at home or in the fields and are all sent to the market, for the Dogon only eat the leaf-balls.

The second method of processing the bulbs produces a course powder,

for they are only beaten, and not pounded. The result is sun-dried and is likewise sent to the market for sale.

(c. 2.) Cultivation with a Nursery

The use of nurseries in onion cultivation is limited to only a few villages near the Escarpment like Kassa, and only one village on the Escarpment, Nombori. At Nombori, which we visited, the nurseries are used only with an introduced, large-bulb variety of onion. The local variety is grown without a nursery.

The nurseries are located at the level of the rock-fall at the bottom of the cliff. They are placed on raised areas in order to prevent damage by domestic animals, and are made by forming circular beds surrounded by stones that retain the soil brought in for the purpose. Manure and household waste are added to the carefully prepared beds, and the onion seeds are broadcast-sown.

The garden plots are prepared in the sandy area used to cultivate millet once the harvest is over and the millet stalks removed. The gardens are on natural soil. After having prepared the beds in the manner described in the section on terre pleine gardens, the farmer transplants the onion sprouts from the nursery to the garden. Plant care is the same as that described above: only the dates and the quantities of ingredients used vary due to differences in soil types. Onions--no matter which variety--grown in sandy soil have a longer growth cycle thar those grown on the Plateau, thus they ripen later--at the outside, 4 1/2 months after transplanting.

The farmers draw water from large holes surrounded by piles of sand. We have no details concerning the methods used at Kassa.

(d.) Cultivation of other Vegetables

Because other market-garden crops are less important at Dourou, we did not observe the methods used to cultivate them in any great detail. In Nombori where peppers, tomatoes, and a native eggplant are important crops, we had a chance

to observe and obtain details on the methods used; these are described below.

All three crops--peppers, tomatoes, and eggplant--require the use of a nursery. They are grown in three steps. The first is the nursery: broadcast seeding is done in prepared beds located atop the large boulders of the Escarpment's side. From the nursery the seedlings are transplanted to larger beds at the base of the Escarpment--these are relay-nurseries. The plants remain there until they are finally transplanted into the gardens. In the case of peppers and eggplant, this transplanting takes place at the same time as the millet harvest; the small plants are placed among the millet plants.

Given the length of the plants' growth cycles, nurseries must be used. The different transplanting phases depend upon the stages of plant growth. In the gardens the plants are placed in rows and the plots are almost always square-shaped.

(d. 1.) Peppers

Nursery-cultivation of peppers begins at fonio-planting time--late May to early June--which varies from year to year. The plants remain in the nursery and relay-nursery for a total of three months after which they are placed in the garden. During the first few days after transplanting, watering occurs in such a way that six plants receive eight liters of water (from a calabash of that capacity). Manure is applied after three months in the garden. Subsequent applications occur according to the gardener's estimation of the need. After manure has been applied, the water/plant ratio increases--only five plants are watered with the same six liters.

Peppers appear on the plants four months after final transplanting, or seven months after sowing in the nursery. The peppers ripen eight months from the time of sowing. When ripe the red and greenish peppers are collected and dried in the sun. They are then ready for market.

Pepper plants are usually perennials, but since there is not adequate water in the area, they stop producing fruit when the sumps dry up.

Peppers from Nombori and Escarpment villages are mostly sold in the Séno (Madougou, Koprokenié-Pè, etc.), and only rarely on the Plateau.

The average planting density is about 105 plants per 48 square meters, or 21,875 plants per hectare. The 105 plants may yield four baskets of peppers (three baskets during the first harvest, and one more during the second) selling for between 2,500 FM and 2,000 FM per basket. This makes for a gross production value of from 2,083,333 FM and 1,666,666.6 FM per hectare.

(d. 2.) Eggplant

The nursery cultivation of eggplant takes place in August. The seedlings are watered daily, and each bed receives one calabash full of water. Once in the garden, three to four plants are watered with a calabash-full. Fruit begins to form in 5 1/2 months, and is ripe in six.

The type of manure used varies with the plant's stage of growth. Manure used in the nursery is made of household compost. Bales of millet are used in the relay-nursery, and cattle, sheep, goat, or donkey manure is used in the garden.

The average planting density is 122 plants per 47 square meters or 24,900 plants per hectare. Each week or two the fruit are collected for sale at Séno and Plateau markets.

On good soil, 100 plants yield six baskets during 1 1/2 fruit-bearing months. They sell for 1,200 FM per basket at the beginning of the season and 600 FM for the rest of the season. This produces a gross return of between 1,792,800 FM and 896,400 FM per hectare.

Peppers yield a greater profit than eggplants but require greater labor. Eggplants will continue to produce fruit as long as sufficient water is

available, but water sources in the region dry up.

(d. 3.) Tomatoes

Not as hearty as the crops described above, the tomato plant dies after a month of fruit-bearing. It is also grown in a nursery. During the first month of growth, the manure used is entirely household compost; during the second month, animal manure is applied.

The planting density is 44 plants per 28 square meters, or 15,714 plants per hectare. In a good garden one hundred plants yield six to seven baskets of tomatoes in a month. These sell for 800 to 1,000 FM per basket, and produce a revenue of from 754,272 FM to 1,099,980 FM per hectare.

Some Nombori gardeners use fertilizer on their tomatoes, eggplants, peppers, and onions. They purchase it for 125 FM and 150 FM per pâni (local measurement) through the Dourou Action Maraichère. Gardeners who own many animals do not use fertilizer, for they have sufficient manure.

Methods used in Dourou for the cultivation of peppers and eggplants are similar to those used in Nombori, except that in Dourou there are no relay-nurseries, and planting is done in rows.

(d. 4.) Tobacco

The cultivation of tobacco was not observed in any great detail. It is also grown in nurseries, but no relays are used; from the nursery it goes directly to the garden. The young plants are covered with straw in order to protect them from the sun. They are sprinkled with ashes. Tobacco cultivation is not very important in Dourou where it is planted after the onion harvest in the very same plots.

Other plants such as melons and squash are grown, usually alone, somewhere near the garden among the cracks in the rocks, but these are not grown by all farmers. In Guimini calabashes are grown as an income-crop. We did not

visit this area.

Production-situations for market-garden crops in those villages we studied are as follows:

Situation 1	-	Onions only	Dourou
Situation 2	-	Onions, tomatoes, eggplant, and peppers	Nombori
Situation 3	-	Onions and peppers	Sangha
Situation 4	-	Onions, tomatoes, and eggplants	Kourou, Sibi-sibi, and Sassombourou
Situation 5	-	Calabashes and onions	Guimini
Situation 6	-	Onions and chewing tobacco	Idjeli and Yawa

(3.) Orchards

Orchards are found in most all Plateau villages; their size varies with the size of the local water source. They are larger on the Escarpment, in those villages where ground-water flows to the surface.

Mango trees are the most common, and are the only type of fruit-tree to be found in some orchards. The orchards vary. We saw several kinds, reflecting the range of species they contained. Each type may be identified with a particular village. Those orchards containing only mango trees (Type 4) are the most common. Some villages have only a single mango or guava tree. The Plateau and the Escarpment are well-endowed with orchards, and fruit is available there at all times.

Type of Orchard	Species						Village
	Pawpaw	Mango	Guava	Lemon	Banana		
1		X	X	X	X	X	Nendé
2		X	X	X		X	Kamba
3		X		X			Sambourou
4		X					Korou
5	X	X	X	X			Sibi-sibi
6	X				X		Dourou
7	X	X		X	X		Idjeli

The orchards are maintained through the use of water from natural springs and sumps that do not dry up. In the case of springs, gravity-irrigation is possible. The growth of orchards in the region began with the advent of the rural exodus.

(4.) Summary

Dogon agriculture is highly diversified. Farmers selectively develop different aspects of the natural milieu; this leads to varying combinations of plant production from zone to zone. The following table shows the distribution of the different crops according to the soil-types of the three major zones--Plateau, Escarpment, and the Séno.

Zones	Type of Plant-Crop Production											
	Millet	Sorghum	Fonio	Beans	Dah	Peanuts	Peas	Rice	Sweet Potatoes	Cotton	Market Gardens	Orchard
Plateau	X	X	X	X	X	X		X	X		X	X
Escarpment	X	X						X	X	X	X	X
Séno	X	X	X	X	X	X	X	X				

The Plateau and the Escarpment are market-gardening zones. One Séno village (Dangaténé) also produces market-garden crops. Orchards are also found in some areas. The following types of fields may be distinguished on the basis of the rotation-pattern employed:

Plateau

Type 1 Millet (millet + sorghum; millet + beans)

Type 2 $\underbrace{\text{Millet - market-garden crops}}_{\text{One year}}$ / $\underbrace{\text{millet - market-garden crops}}_{\text{One year}}$

Plateau

Type 3	Maïs - market-garden crops One year	/ Maïs - market-garden crops One year

Escarpment

Type 4	Millet- market-garden crops One year	/ Millet - market-garden crops One year

Séno (Plain)

Type 5	Beans - millet - millet - fonio - fallow (4-5 years)
Type 6	Peas " " " " "
Type 7	Beans - millet - millet - fonio + dah - fallow (4-5 years)
Type 8	Peas " " " " " "
Type 9	Beans - millet - millet - dah - fallow (4-5 years)
Type 10	Peas " " " " "
Type 11	Beans - millet - millet - millet - fonio - fallow (4-5 years)
Type 12	Peas " " " " " "
Type 13	Beans - millet - millet - millet - dah - fallow (4-5 years)
Type 14	Peas " " " " " "
Type 15	Beans - millet + dah - millet + dah - fonio + dah - fallow (4-5 years)
Type 16	Peas " " " " " " " "
Type 17	Beans - millet - millet - millet - fonio + dah - fallow (4-5 years)
Type 18	Peas " " " " " " "
Type 19	Peanuts - millet - millet - fonio - fallow (2-3 years)
Type 20	" " " " - dah - fallow (2-3 years)
Type 21	" " " - dah - fallow (2-3 years)
Type 22	" " " millet - fonio - fallow (2-3 years)
Type 23	" " " " - dah - fallow (2-3 years)
Type 24	" " - dah " " - fonio - fallow (2-3 years)
Type 25	" " - millet " - fonio + dah - fallow (2-3 years)

Thus peanuts are planted after a fallow period if the latter has not lasted more than three years (the case of a short fallow). With long fallows (4-5 years), beans or peas begin the rotation cycle. The length of the fallow depends upon the cultivable area available to the farmer and the possibilities for barrowing land. For millet, the length depends upon soil fertility.

The sequence of crops in the rotation cycle is rather scientifically arranged. Legumes fix atmospheric nitrogen and thus enrich the soil. Millet, which requires more nitrogen, follows and benefits from the leguminous contribution. After several years of millet cultivation, the fertility and organic content of the soil drop. At this time the farmer plants crops whose nutritive requirements are not so great: fonio and dah. A fallow-period follows.

One might ask whether these rotation sequences reflect generations of scientific study or the results of trial and error. When asked this, the Dogon responded that their ancestors had always done it thus.

B. Animal Raising

Some animals are raised in each of the three areas (Plateau, Escarpment, and Séno). Cattle, sheep, and goats are either cared for by their owners or given to others (usually Peulhs) who care for them. The Plateau is ill-suited to cattle-raising because of the very irregular nature of the terrain; all the climbing about which is necessary tires out larger animals and poses the constant threat of accidents. The poor quality of soil results in poor pasture, and thus limits the number of head. Sheep and goats, on the other hand, are raised throughout the Plateau region. Their manure is used in the fields.

The Séno, with its large expanses of land, is the cattle-raising area par excellence; cattle are always found there. Many sheep and goats are raised there as well.

(1.) Types of Animals Raised

(a.) Cattle

The methods used by the Dogon to raise cattle differ hardly at all from those used elsewhere in Mali. The principal form is transhumance, and this reflects three factors: generally insufficient pasture, insufficient water, and the presence of biting insects. Each of these or combinations of them contributes to the transhumant pattern. The herds must move whenever pasture becomes too poor. The same occurs when water becomes too scarce or when biting insects spread disease among the animals.

Transhumance is practiced by all Peulh herders, but not by the Dogon. Because their herds are not very large, they can get by on what is left-over by the transhumants.

The transhumance area runs along the Plateau. During the rainy season Séno herds travel to Gondol, a pasture-area located east and northeast of Diankabou, and they remain there for five months (June-October). They leave the Séno when the rainy season crops are planted; from this time on, pasture is limited to fallow areas only.

The herds must leave in order to avoid the cultivated fields. After the harvest (October-November, December) the herds return to the Séno. During the dry season the herds move from Gondol to Bankass. The cycle begins again once the rains start to fall.

Once in the Séno, the herders keep their animals in the harvested millet fields in accordance with verbal contractual arrangements: The Dogon are to provide cooking utensils (mortars, pestles, and cooking-pots) and occasionally, to build huts; the herders' animals manure the fields until the pasturage in the area is exhausted.

Transhumant animals on the Plateau move is a north-easterly direction. Following the millet harvest, they move into the flat areas of the western Plateau region (the Goundaka-Bandiagara strip), and then continue on toward Niger. Herds from the areas of the Plateau where the terrain is rough--east of Bandiagara--are not involved in transhumance. In this region the cattle are taken care of by the Dogon themselves.

In the past the Dogon (from each of the three zones) gave their cattle to Peulhs who cared for them. Presently, due to the misappropriation of animals by Peulh herders, many Dogon care for their own cattle. More than ninety percent of Plateau Dogon cattle owners have their sons look after their animals. The figure for the Séno is about sixty to seventy percent.

Herding arrangements between the Dogon and the Peulh always involve a verbal agreement. This specifies the means of payment to be used and the length of time the animals will be cared for. Payment may be made in cash or in kind. Very often a heifer (from one to three years of age) is given each year. Cash payments in 1977 ranged from 6,000 FM to 8,000 FM per month. Whatever the arrangement, the herder is entitled to all milk produced by the animals.

In this part of Mali where water is scarce, the watering of animals is the herder's most arduous task. During the dry season in the Séno, the herders crowd around the wells early in the morning and, working in pairs, draw water from depths of from sixty to one hundred meters. Besides being deep, the wells often have a very small capacity. The water is poured into wooden water troughs which are made locally. The animals (cattle, sheep, and goats) impatiently await their turn to drink even a little water. With so many animals, someone must stay at the trough in order to manage the drinking animals. There is a great deal of activity around the well: two persons draw water, one pours, and a fourth watches

the animals. On the Plateau the animals are watered at dams and natural sumps (crevices which hold seeping water).

Cattle-feed is composed solely of natural pasturage. In Dourou, and many other villages in the arrondissement, there are many young bulls among the cattle. Once back from pasture, these bulls are fed chopped-up millet stalks and hay gathered in the bush. They spend the night in an enclosure behind the owner's concession. The bulls are purchased when young, are fattened for several years, and then sold so that heifers might be purchased.

Generally speaking, the farmers take good care of their animals. They are vaccinated yearly by the Service d'Eelevage (now O.D.E.M.). Some farmers vaccinate their own animals. They do not understand the relationship between the Service d'Eelevage and the government, and are afraid lest their herds be counted by the former for tax purposes. The farmers provide salt for their animals, and purchase some each year.

Given the lack of space and workers, the young animals are left to pasture with their mothers, and nothing is done to prevent the calves from taking the mother's milk. Calves also remain with their mothers during the rainy season in the Séno, but they are unable to suckle because of a device called Tondje in Peulh, which is attached to their muzzle. Calves are separated from their mothers during the dry season. This requires that the herder provide two watchmen: one for the calves, and another for the rest of the herd. The Dogon rarely sell milk; its commercialization is not very well developed. They prefer the calves to drink the mother's milk in order to fatten up [and calve early]. On the other hand, Peuhl sell milk--fresh or sour--at the markets, either for cash or for grain.

(b.) Sheep and Goats

Sheep and goats are very commonly raised throughout Dogon country.

This is especially true of the Plateau where one rarely finds families without them. They produce manure and are a kind of bank account from which the farmer draws when in need of money. Smaller animals get along well in this rocky area. The flocks are large (results of the animal-count will indicate their actual size).

The methods used to raise these animals are not complicated, but more care is invested here than in many other parts of Mali. This is because manure is an especially important factor in the yields of rainy season and dry season crops. During the rainy season the flocks are cared for by children. Unlike other areas of Mali, the animals are not kept together within a given village. Here families take care of their own animals, or do so in groups. Then several (not more than five) families combine their flocks before sending them to pasture, each appoints a child to help watch over the animals. This pattern reflects the small size of most pasture areas as well as the Dogon's [mistrust]. At sunset the animals return to the village or to a pen some 100 to 200 meters from the village. At the house, they are tied to stakes inside the concession. In the dry season, some farmers keep their sheep and goats, in order to protect them from wild animal attacks; especially those of jackals.

Rainy season forage consists entirely of green plants (grasses and legumes). When dried, these same plants figure importantly as dry season feed. They are supplemented with chopped millet stalks, hay, [the leaves of thorny species], and fruit from the Acacia albida. The vaccination of animals began rather recently (1976-77). Salt-treatment is widely used; families always keep bars of rock salt which are placed in the center of the concession when the animals have returned from pasture. During the dry season sheep and goats are watered at the house (this applies to the Plateau), at wells (Séno), and at ponds before they dry up.

(c.) Other Animals

With the exception of donkeys, few other animals are raised. There was a time when the Dogon knew very little about donkeys and did not raise them. But since the construction of the Bandiagara-Koro road, and improvement of the Yawa slope in 1953, the number of donkeys on the Plateau ahs increased. Having seen donkeys used by the Mossi, the Dogon began to raise them and use them for transportation. Donkeys also increase the quantity of manure available for use in the fields. In Dourou almost each family has at least one donkey.

During the dry season donkeys are left to wander about in the daytime. At night they are sometimes given chopped millet stalks. During the rainy season they are kept in uncultivated areas.

Horses are rare, and not found in some villages. They are a luxury animal and used solely for riding.

In Dogon country as elsewhere in Mali, the concurrence of cultivation and animal-raising has posed problems for years. As the fields expand the size of the grazing areas decreases; at the same time, the number of animals increases. This situation has contributed to a general degradation of rural areas.

C. Poultry

Commercial poultry-farming does not occur. Chickens are raised in order to augment cash reserves, for use in sacrifices (in the case of pagan families), and as gifts for visitors. Eggs are not eaten.

III. Non-agricultural Production Activities

Non-agricultural activities are carried on within the household and include basket-making, rope-making, fire wood gathering, and the preparation of "dolo," "tougoussi," couscous, and "sâdi." Aside from basket and rope-making, all these are done by women.

The types of activities vary from village to village. For example, only gunpowder is manufactured at Ende; in other villages, none of these activities will be found. Mens' activities occur during the dry season and generally produce commodities for sale.

Materials used in basket-making all come from the bush: straw, rônier [palm] fibers, tree roots (andolfia...). Dolo preparation requires: firewood, millet or sorghum, and yeast.

Rope is made by stripping the bark from Baobab trees and then removing the underlying fibers. Once dry, the fibers are used to make rope after being moistened a bit. Fibers for rope are also obtained from dah stalks.

Tougoussi is made from shelled peanuts and dah leaves (or calyxes), and requires firewood for its preparation.

Sàdi is a sweet drink made from grape seeds left to soak in water overnight.

IV. Acquisition of the Means of Production: Factor Markets

Agricultural production requires certain means or factors; these must be present before production is possible. What is more, the eventual results of production may be influenced by the mechanisms whereby these factors are procured. Thus it is important that we look at and understand the nature of factor market.

There are four avenues to acquiring the means of production in Dogon country, around which the market structure arises: purchase, borrowing, credit (loans), and self-provision. We will describe the markets for labor, water, land, tools and equipment, and for variable factors of production (manure, fertilizer, seeds, medications, and pasture).

A. The Labor Market

The labor used in Dogon agricultural production comes from four sources: wage-labor, youth associations, communal work, and the persons directly engaged in production. The labor market structure is based on these sources.

Agricultural wage-labor is rare. It is not found on the Plateau or the Escarpment. In the Séno, some wage workers are found in the few villages located near Koro.

Youth associations are a common form of wage-labor. These groups do any kind of work (agricultural or domestic) in exchange for an agreed-upon but renegotiable sum of money. This is the only form of wage for agricultural and household work found on the Plateau. At the end of the rainy season the youth have a festival paid for by the income earned during the year.

Communal labor is a common labor-source. Several persons belonging to different farms get together and by taking turns, eventually cultivate the fields of all the participants. The person whose field is being worked feeds the workers throughout the work period (usually a day). Communal labor is also sought after for domestic chores, and has a number of advantages. It allows for a response to urgent labor-needs for field work (e.g., weeding) and thereby helps to minimize losses, for in a day or two an entire field can be done. Communal labor is more efficient than individual labor, for the intensity per hectare is reduced: a group puts in less time than an individual to weed a hectare. Thus the farmer eliminates a labor bottleneck. Communal labor--often limited to members of an extended family--very often occurs at planting-time, during the onion harvest, and when fonio is being threshed.

Generally speaking, the labor used in agricultural production is supplied mostly if not entirely by the persons involved. Labor in the fields belonging to the Hogon and the eldest village members is provided by all able

villagers of sufficient age.

B. The Water Market

There is no market *per se* for water in Dogon country. Farmers obtain water from dams, sumps, pools, and natural springs. Dam water is free to all, but this may change as the government is considering charging for it in order to pay for dam maintenance costs.

Water from sumps may belong to individuals or groups depending upon how the sump was made. Only those who somehow contributed to its construction may use the water. If the owner(s) decides that the water supply is in excess of his needs, he may allow others to draw from the sump. Ponds and sumps produced by natural water flow are open to all villagers. Natural springs are also open for all to use.

C. The Land Market

Dogon country differs from other regions of Mali in that there are no landowners. The land belongs to the village community and is administered by the council of elders in conjunction with the Hogon. Land is more or less free, and the land market structure varies from one zone to another.

On the Plateau one either owns the land one cultivates or one borrows it. Private property is passed on from a father to his son. The oldest son cultivates the land of the deceased relative. Borrowing consists of asking someone else for the use of his land. If he agrees, the user must thank the owner and give him a few cola nuts at the end of each harvest. The user may continue to cultivate the borrowed plot(s) as long as he remains courteous and upholds the tradition of giving thanks. The land is taken back by the owner either because the social conventions have not been upheld or because of an increased need for cultivable land due to a growing number of people to feed. We noticed that some farmers owned a lot of land while others owned only a little. Causes for these

differences reside in the carving-up of rural areas which has gone on for some time, and the extent to which the number of families has increased. If the ancestors of a family did not procure enough land, the descendents are likely to end up with very little. In order for unused land to be put into cultivation, the individual must first ask the community which controls it. A farmer may begin a garden most anywhere within the territory of his village community.

Land is not sold on the Plateau. In the Séno, besides private property and borrowing of land, land is sold. A few farmers and merchants who have given up farming are buying and selling land. We were told this practice is alien to the Dogon tradition and a recent development in the region. Land sales are carried on with a great deal of care and discretion lest the parties involved be socially sanctioned.

D. The Market for Equipment and Tools

Tools and equipment are obtained from two sources: traditional and modern suppliers. Traditional suppliers are the smiths (who make farming tools), merchants, and other farmers.

Modern suppliers include Opération Mils Mopti, which indirectly furnishes equipment (plows, seeders, multicultivators, and carts),[1] and the Bandiagara Catholic Mission. This equipment is not used by Plateau and Escarpment farmers. Séno farmers make somewhat greater use of it, but the very high prices limit its diffusion. The actual costs involved will be described later in quantitative analyses.

The equipment may be purchased for cash or for credit.

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[7] S.C.A.E.R. (Société de Crédit Agricole et d'Equipement Rural) furnishes equipment and fertilizer to Opération Mils Mopti which in turn makes these available to farmers and collects the required amounts of money.

E. Acquisition of Variable Factors of Production

Among these factors are included manure, fertilizer, seeds, medications, and pasturage.

(1.) Manure

Manure is obtained in one of two ways: by penning animals and by the preparation of compost.

The first method is most often made possible by animals belonging to the Peuhl which are stationed in the fields. Two kinds of arrangements may be made between the farmer and the herder. In the first, the farmer furnishes the herder's family with cooking utensils (a mortar, a pestle, and cooking pots), and sometimes provides a hut. In the second the farmer agrees to furnish weeding and harvest-labor in the herder's field. These kinds of arrangements occur in the Séno and in the area between Goundaka and Bandiagara.

Farmers who own cattle (whether or not they are cared for by Peuhl) pen the animals in their fields.

On the central Plateau, that is, the 25 km strip running along the Escarpment, animal-penning is very limited because of the inaccessability of the zone and the limited extent to which cattle are raised there. Compost is prepared in this area. Occasionally it contains small animal and donkey manure. Other ingredients are branches from shrubs, household waste, chopped millet stalks, and weeds. These latter items are given to domestic animals (sheep, goats, donkeys, and young bulls being fattened) as forage and thus become incorporated in their stable-litter; this adds to the quantity of compost. Or, the ingredients may be placed in the toilets [les toilettes]. Combined with peoples' waste-water, urine, and wash-water, decomposition takes place and compost material is produced.

Each farming unit produces its own compost, and it is sometimes taken to the fields by youth who work together.

Some farmers in the Sangha region collect bird droppings and the manure of wild animals such as rabbits, as well as the red soil called "dolo" which is very rich. We saw a basket full of bird dung for sale in the Sangha market for 700 FM.

(2.) Fertilizer

Fertilizer is supplied principally by Opération Mils Mopti (in the same manner as farm equipment), the Bandiagara Catholic Mission, and merchants. Prices differ from one supplier to another.

The Mission offers numerous advantages to its customers, the majority of whom are Christians. It sells at prices below those of other suppliers, sales on credit are possible, with the amount due payable after the harvest, and the fertilizer is delivered to the buyer's village.

Opération Mils Mopti sells fertilizer for 4,750 FM per fifty kilogram sack. The price is payable immediately or within a short while--a month at the most. The villagers travel to the seat of the Z.E.R. chief or to the Secteur de Base in order to pick up their fertilizer.

Given the various advantages, the farmers prefer to do business with the Mission.

Merchants sell a fifty kilogram sack for 7,500 FM. Farmers buy from the merchants when the quantities available through the Mission or Opération Mils are inadequate.

Many farmers do not use fertilizer. Many Dourou gardeners tell us the prices are too high and that they do not know how to use it. It is used in millet and onion fields.

Cost, insufficient technical information, a lack of knowledge among the farmers, and modes of payment are the largest obstacles to the use of fertilizer.

(3.) Seeds

For the most part, farmers supply their own seeds. For market-garden crops the seed market is well-structured and amounts to self-sufficiency or purchase.

All onion seeds are provided by the farmers themselves. Some areas specialize in onion seed production depending on the availability of water and the farmer's knowledge of seed preservation techniques. The main onion seed producing villages are Soningué, Idjeli, Dobolo, Védjé, and Kaye in the Dourou Z.E.R., and Tiogou in the Sangha Z.E.R.

Seed production depends upon the size and duration of water reserves. When supplies become exhausted before complete ripening occurs, the farmer cannot hope to be self-sufficient in seeds. The general opinion is that three months of growth are necessary in order to produce good quality seeds. The manner of preservation also affects their quality. Seed bulbs must be stored in a cool, ventilated place; otherwise they may rot.

Many farmers purchase their seeds. The price is very high--275 to 300 FM per kilogram on September 23rd, 1977. It is higher at planting time than at the end of the harvest. In order to avoid the higher prices, some farmers buy their seeds right after the harvest and store them at home, risking some loss.

Due to the high prices, some farmers (especially the younger ones) are not able to obtain enough seeds and therefore are unable to plant all their land--or do not grow any onions at all. In order to avoid this, farmers find financial backing with merchants in return for which half of the harvest goes to the merchant. This practice seems rather common, but since farmers who participate will not admit to it, it is very difficult to estimate the overall size of the credit thus obtained.

As opposed to seed-bulbs (above), farmers supply themselves with

onion seeds (this is the case where nurseries are used).

Farmers also provide their own seeds for tomatoes, peppers, and eggplant. Seed purchases are rare.

(4.) Medications

Medications for animals are supplied by O.D.E.M. (Opération de Développement de l'Eelevage dans la Région de Mopti) and merchants. Some individuals vaccinate their own animals. Bars of salt are bought from merchants.

(5.) Pasturage

There are no pasturage fees in Dogon country. All herders may wander freely in pasturage zones.

(6.) Stud Animals

The animals within a given herd either belong to it or have been given to the herder for care. Whoever happens to own the herd, the animals in it are either the product of the herd itself, or have been purchased. Generally, more females are purchased. Farmers on the Plateau, having meager income and capital, more often buy young bulls at about 30,000 FM per head, and keep them for several years, sell them, and then buy heifers and female calves in order to make up a productive herd. Monetary demands occasionally lead to the sale of young fattened bulls. Generally speaking, the herds reproduce themselves.

Conclusion

The factor market seems to work fairly well in Dogon country. Problems are minimal and seem to be localized at the level of Opération Mils Mopti which offers the farmers very few advantages--it supplies farm equipment and fertilizer at prices too high for many farmers. Increased onion cultivation is hampered somewhat by inadequate supplies of seed-bulbs. For the most part, farmers are able to obtain the means necessary through working harder, paying more, and

by upholding the traditions in a courteous manner. Some intervention is needed in order to organize better supplies of onion seeds and water.

V. Production Systems

Several production systems may be distinguished. Each system is made up of a combination of factors and specific productions. Those factors which are fixed in the setting may be broken down into ten elements:

hoe (HOU) - plow (CHA) - calabash (CAL) - gourd (GOU) - jar (CAN) - bucket (SEA) - pump (POM) - rentention dams (BAR) - sumps (PUI) - and natural springs (SOU).

Three basic variable factors--manures (FUM) - fertilizers (ENG) - and seeds (SEM) increase the variations within situations. The influence of seeds (SEM) in system differentiation applies only to market-gardening.

Production is differentiated into staple crops (CUV), which include grains, legumes, tuber crops (TUB), market-garden crops (MAR), orchards (VER), cattle (BOV), sheep and goats (OCA). To these are added commercial activities (COM) and local manufactures (COL), which together make up non-agricultural activities (ANA).

The number of systems, then, is rather large. Each system is distinguished by a combination of different fixed factors, a range of definite productions, and the addition of specific variable factors.

The Dogon is a good farmer. His operations always seem very scientific. He selectively uses elements of the environment and achieves an equilibrium among them. He makes maximum use of scarce resources in such a way as to obtain as much as possible from the few things given him--this is especially true of his use of the land.

FIELD REPORT-DOGON CEREALS PROJECT: THE DESTINATIONS OF PRODUCTS

Hamadoun Sidibe

June 12, 1978

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Completed Activities

Our activities during the period (February-May) included the following:

-- Measurement of areas cultivated in staple crops by peasants observed in Dourou.

-- Inventory of animal and material resources at Dourou.

-- Census of the Dourou population.

-- Computation of surface areas.

-- Collection of facts based on operations undertaken in staple crop fields and gardens of ten Sangha farmers during the 1977-78 campaign (1977 rainy season).

-- Measurement of surface areas of ten Sangha farms.

-- Study of work-time, manure, fertilizer and water consumption on ten Sangha farms.

-- Study of income and expenditure records of ten Sangha farms for the 1977-78 year.

-- Inventory of the animal and material resources of ten Sangha farms.

-- Population census of ten Sangha farms.

We experienced some difficulties during the most recent research period at Dourou. Because our surveys were done regularly every two or three days often with some repetition during a given day, the peasants began to feel harrassed. They told us "You ask too much and you don't give us anything." They tired of being interviewed. Some of them fled at the sight of the interviewers in order to avoid being questioned. In order to prevent these refusals it was necessary to lengthen the interval between interviews to four or six days.

Measurement of surface areas was extremely difficult. Children did not want to point out, the fields, unless they were paid -- and paid well. In any event, we were obliged to pay for much of the information and weight data. People

argued: "Riitta paid us for everything we did."*

We tried to use the Brunton for surveying. Operations with it were very slow and difficult, for the fields around the Dourou Taga quartier have very complex shapes and are often broken up by rocky outcroppings. We therefore had to break the various shapes down into geometrical figures in order to carry out the measurements.

The Destination of Production

The second written report of last February described the conditions in which agricultural and non-agricultural production takes place in Dogon country. This third report, which is part of field work still underway, describes qualitatively and sometimes quantitatively--on the basis of direct observation and interviews--the destination and uses of this production.

In Dogon country, agricultural products are destined for three kinds of use once they leave the locations in which they are produced (fields, the bush, or forests); the destinations and their relative importance varies with the product. Thus products go for (1) use at the domestic or local level of consumption, by the family, or as part of seed stocks, (2) for use in customary social obligations, and (3) for sale.

Most rainy-season crops, especially grains, are consumed locally. Dry-season market garden crops are of great commercial importance. Most all onion production is sold at local markets and in the bush. Income thus obtained enables peasants to purchase millet in order to help fill family consumption needs which are barely satisfied by the production of family fields. It also--and very

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* "...it was never our policy to pay for information, but villagers were paid for work performed, as only seems ethical. There is a long tradition on the part of civil servants of obtaining free goods and services, as well as food, in the Dogon country, which is sheer exploitation of the villagers. However, people were often very reluctant to impart information, especially in the beginning, but conditions grew better over time" (R.K. Eskelinen to M.M. Horowitz, March 15, 1979).

importantly--enables the peasants to pay the head tax[1] which ranks in importance second only to food. In addition, these revenues make other purchases possible in order to satisfy the consumption needs that have increased with the times. In the Séno, income from grain sales serves the same purposes as market garden crop sales on the Plateau.

Within the range of commercialized products, some are processed, and others are not.

For sales and purchases, the Dogon peasant participates in networks of commercial exchange which are regional, national, and international.

I. Domestic Consumption

The satisfaction of family nourishment requirements is a primary motor force in Dogon agricultural production. The various rainy-season crops are used differently in fulfilling these needs. Thus millet is the most important crop and occupies more cultivated land area than other crops;[2] fonio is the second most important item, followed by beans, dah, and sorghum.

A. Domestic Millet Consumption

Millet forms the basis of the peasant's alimentation. It is used in various food preparations, the most important of which are to and crème.

--To (the Bambara name of the dish) is a cooked paste (pate) made from millet flour, and is eaten with a sauce. There are two kinds of to in Dogon country: the first, called orogna, is prepared with millet flour produced by crushing the grain between two stones. The second kind of to, called orogna dogo,

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[1] Based on active individuals. All persons between 15 and 60 years of age are considered active.

[2] The final report will indicate how much surface area is occupied by millet.

is prepared by repeated pounding of the flour once the bran has been removed following the initial crushing process.

Of the two, orogna is more widely consumed by the Dogon. It requires less time to prepare and uses less millet for a given number of persons. Thus by preparing orogna, families are able to economize a bit on their millet. It should be a nutritious dish for it contains millet bran, the part of the grain having the most vitamins; something which is recognized by the peasants.

--The second type of dish prepared from millet is pounou, which is made by mixing flour (obtained by pounding once the millet bran has been removed) with boiling water into which tamarinds have been squeezed. This mixture is a very popular porridge which serves as a midday meal in many villages during the rainy and dry seasons.

B. Domestic Fonio Consumption

Fonio is the second most important item in the diets of people in Dourou and in Dogon country. It is, however, forbidden to certain persons, especially the heads of large families or Gina.[4] According to information received from Dourou and Sangha peasants, fonio influences the powers of some fetishes. Persons who are the guardians of these fetishes must not eat fonio.[3] Fonio is the basis of several dishes which are well-liked by the Dogon; it may serve as the sole ingredient or be mixed with beans. Fonio is eaten most of all during the dry season for breakfast and supper in the following dishes:

--autodjou - Fonio with sauce; this is the most common manner of preparing

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[3] When asked why fonio affects the powers of fetishes, we were told "That's the way it is."

[4] "Ginna organization is separate from the patriarchal family (i.e., household) organization. The discussion of the influence of fonio on the power of fetishes does not really apply in any important (i.e., nutritional) way in Dourou where the major proportion of household heads are Muslim and much opposed to the animist ways" (KKE, March 15, 1979).

fonio.

--pogo-gna - A mixture of fonio and beans, served with a sauce of baobab leaves or okra and kamwa. This is always served as a supper dish.

--antagua - This is a dish in which fonio is the only grain present. Other ingredients are dah leaves or calyxes, kamwa, fish, fried onions and red peppers. Antagua is prepared most often for breakfast.

--tori - This is a porridge made from fonio, but is consumed only infrequently.

C. Domestic Consumption of Beans

Beans are eaten most often in the form of pogo-na, in which they are mixed with fonio. Less frequently, beans are eaten together with sorghum. The various bean dishes are the following:

--noudianou - which is made solely from beans.

--cooked bean balls, which are made only for sale.

D. Domestic Dah Consumption

Except during severe famines, dah seeds are always used as a spice called kamwa. Dah leaves and calyxes are used in the preparation of sauces. Dah is a complementary dish and is important because it lends flavor to solid foods. A sauce made without kamwa has no flavor, just as antagua without dah leaves or calyxes has none. Kamwa is a popular spice and is sold in the towns--Bandiagara, Mopti, Segou, and Bamako.

E. Domestic Sorghum Consumption

Sorghum is most often consumed as dolo (kondjam in Dogon and Peulh), a local beer. As a dish, sorghum is most often served with beans. See the section on the preparation of dolo in Appendix A.

F. Domestic Consumption of Peanuts

Peanut oil is extracted locally by the Dogon, and some of the oil is exported to Bandiagara and Mopti; it costs less than the oil refined by the

Malian oil factory SEPOM (Société d'Exploitation des Produits Oléagineux du Mali) Peanuts are also eaten either raw or roasted.

II. Consumption as a Part of Customary Social Obligations

Another part of production is consumed during the observance of customary social obligations. In the case of local traditions, these obligations take the form of advances given to the fetishes from the yields of the fields, gifts to relatives, to persons without means, to the aged, and to blacksmiths. Some is also consumed in connection with introduced customs (from Islam and Christianity) as well, e.g., tithes and zakat.

Millet is most often used for sacrifices (advances to the fetishes)

III. Commercialization (Sales)

Commercially oriented agricultural production on the Bandiagara plateau is restricted to market garden crops of which onions are the most important. Millet is also sold through a government organization which assigns quotas to the peasants. In the Séno, on the other hand, rainy-season crops, especially millet, are produced not only for subsistence needs, but also for sale and thus enter into commodity circulation at the regional, national, and international levels.

Produce sales take two major forms in Dogon country: commercialization by the State and commercialization by private parties. The government purchases only millet; it sells manufactured products (sugar, salt, kerosene, cloth, and milk) and millet to Malian civil servants. Each of these types of commercialization will be discussed below.

A. Commercialization by the State

State commercialization is provided by four organizations:

--O.P.A.M. (the Malian Agricultural Produce Office), which operates under the authority of the Ministry of Finance, has a monopoly on grain marketing in Mali.

--The Cooperation Service, and

--Opération Mils Mopti (O.M.M.), both of which operate under the authority of the Ministry of Rural Development.

--The Service du Commandement, which is formed by the Ministry of Defense and the Interior.

The commercialization campaign is one of the government's major undertakings, for it is necessary that food be supplied to those regions of the country that are chronically short of adequate grain reserves; it is also necessary to furnish grain to the mass of civil servants, spread throughout the country. Thus the millet which is marketed goes to supply grain-deficit areas and government employees.

O.P.A.M. is the central state marketing organization in Mali; its interventions begin at the regional level. Cooperation and Operation Mils Mopti have the responsibility for purchasing millet, and thus are in greater contact with the peasants. They gather the grain and see that it is shipped to O.P.A.M.--approved magazines--generally at the cercle level. A number of inter-relations are established between them.[5] Operation Mils Mopti collects millet in the operational zones, i.e., in those zones under its jurisdiction. The Cooperation Service collects millet in areas which are beyond the operational limits of Operation Mils Mopti, such as the central Plateau.

1. Commercialization in Operational Zones

Operation Mils Mopti has responsibility for the collection of millet in its intervention (operational) zones. During the rainy season each of its agents provides monthly reports to his superiors on completed activities, rainfall conditions, and the condition of the crops in his sector. The Governor also receives

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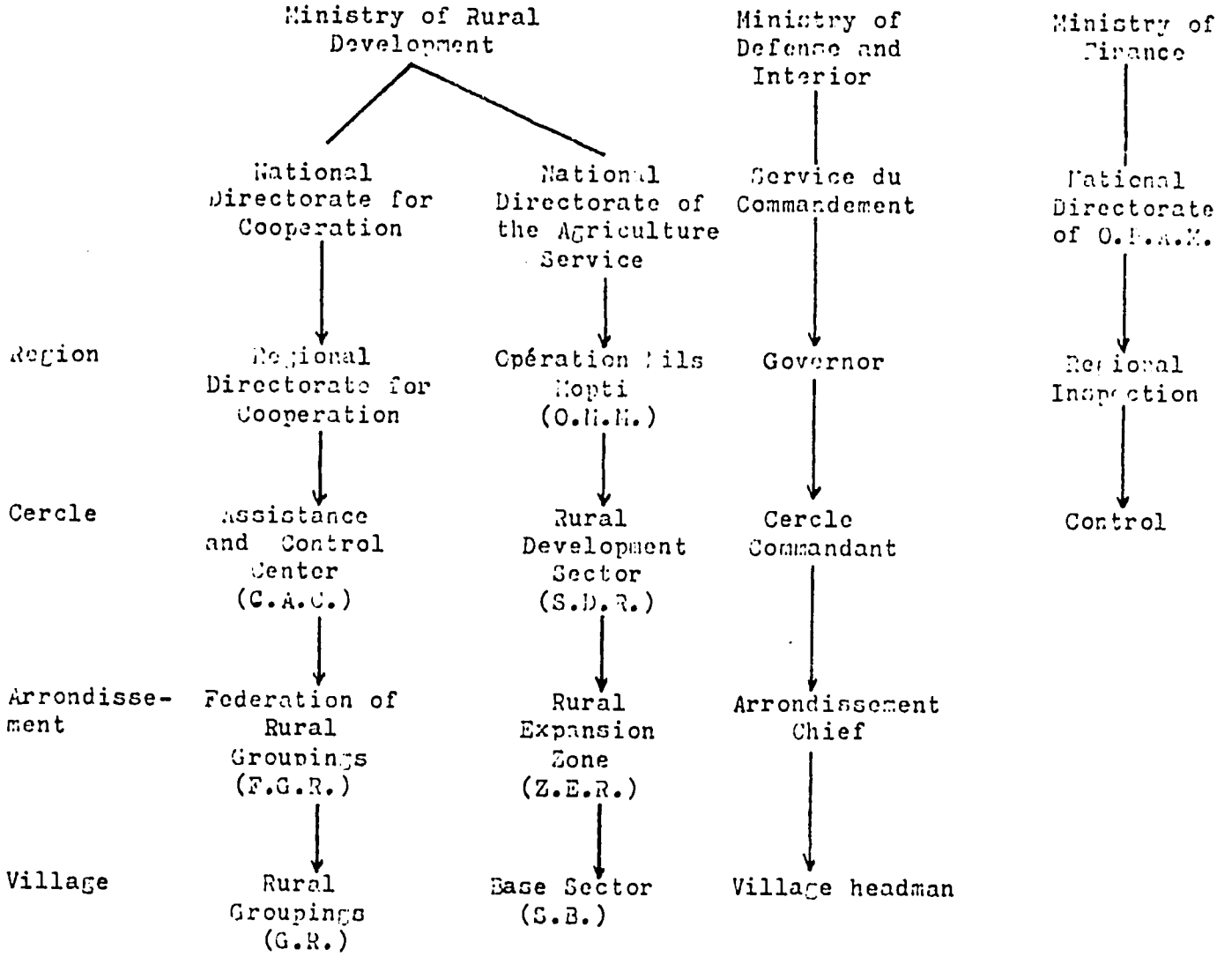
[5] Additional details on their operations will be provided in the analysis .

Diagram I


Ministry of Rural Development
Ministry of Defense and Interior
Ministry of Finance
National Directorate for Cooperation
National Directorate of the Agriculture Service
Service du Commandement
National Directorate of O.N.A.M.
Region
Regional Directorate for Cooperation
Opération Nils Mopti (O.N.M.)
Governor
Regional Inspection
Cercle
Assistance and Control Center (C.A.C.)
Rural Development Sector (S.D.R.)
Cercle Commandant
Control
Arrondissement
Federation of Rural Groupings (F.G.R.)
Rural Expansion Zone (Z.E.R.)
Arrondissement Chief
Village
Rural Groupings (G.R.)
Base Sector (S.B.)
Village headman

reports.

Toward the end of the rainy season--in October--each agent makes an estimate of the expected yields in his sector.[6] These estimates are gathered together by the SDR heads and sent to the Director of OMM who evaluates them and issues an official forecast which is then sent to the Governor and O.P.A.M. During a regional meeting which brings several different services together, the tonnage to be purchased by O.P.A.M. during the upcoming commercialization period is set on the basis of the estimates made by the various agents. No objective decision-making model is used to set the quotas which are then given to the peasants. During this meeting quotas are set based on regions, SDRs, and ZERs. Village quotas are set at the arrondissement level, usually during a meeting between the arrondissement head and the ZER chief; and sometimes with others in attendance as well. Family and farm quotas are set at the village level by the villagers themselves.

Once the target marketing tonnage has been set at the regional level, Operation Mils Mopti receives appropriate financing, cash, and sacks in progressive installments. Sacks and money are distributed in each village according to the quantity of millet to be purchased there, as set by the quota.

Each family-head fulfills his quota, and the village takes charge of transporting the millet to the arrondissement seat. OMM provides for the transportation of millet from there to the location of the cercle where it becomes the responsibility of O.P.A.M. The latter in turn redistributes it within Mali by mechanisms about which we have no knowledge at the moment.

The marketing season is opened by a ministerial decree. The purchase-price to be paid producers is also set by ministerial decree in the very middle of

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[6] These estimates are made at a glance, and very rarely based on careful field observations.

the growing season, i.e., August-September. It is absolutely impossible to make accurate projections of the harvest size at this time for a number of factors, changeable rainfall being one of them, can potentially damage the crop and thus reduce the yield. In addition, the Ministerial Council and the Ministerial Counsellors have no models for yield evaluation and prices based on production factors: quantity, distribution of rains, and variable inputs (fertilizer, selected seeds, etc.). Overall yield forecasts, based on eye-ball estimates, and the prices set for grain are not very trustworthy, and are very uncertain.

2. Commercialization in Non-operational Zones

The non-operational zones in Dogon country include a part of the Plateau and the Escarpment. Marketing in these zones is the responsibility of the Cooperation Service through the intermediary of the Federations of Rural Groupings (FGRs).

O.P.A.M. sends funds and sacks to the FGRs via the cercle chief. The Federation president obtains the funds and announces their arrival to the FGR general assembly. The money thus obtained is divided up during a meeting of the arrondissement chief, village head-men, and several members of the Federation's administrative council. The quota of millet to be marketed in 1978 is based on a figure of eight kilograms of grain per active individual.

The peasants fill their quotas once the sacks and money have arrived, and then transport the millet on donkeys to the F.G.R. seat. There the manager weighs them in order to record the deliveries from each village and follow the overall progress of the marketing process. Details are sent weekly to the Commandants and Governors.

On the Plateau where yields are meager, the peasants purchase millet at levels above the government's price in order to be able to fill their quota.

The official government price is 3,600 MF per 100 kilograms. The

same 100 kgs costs from five to six thousand francs during November-December 1977 and January 1978 on the Plateau open market, and 10,000 MF on May 1, 1978. This enormous difference in price induces the peasants to sell much of their stock on the open market, hence the government's marketing programs often remain unsatisfied. In some regions the difference is so large that government agents severely harass the peasants in order to obtain the required grain. Economic police agents watch over the circulation of millet along all the roads and paths. Anyone found transporting millet from one village to another without the special authorization issued by the Governor, the cercle Commandant, or the arrondissement head, loses his grain. We witnessed several seizures of millet on the Plateau and the Séno. Even women who take small quantities of millet to market to sell in order to purchase condiments are often stopped and lose their grain to the police agents and the gendarmes. This amounts to a veritable pillage of the peasants. One day the gendarmes from Koro and Bandiagara met at the Escarpment. Those from Koro hid at the foot of the Escarpment and seized millet, from those who were ascending to the Plateau. The Bandiagara agents, situated at the top of the Escarpment face, seized passersby who did not have an identification card as well as merchants carrying goods even though the latter were in possession of all legal papers. On that day there were very few people (about 200) at the Dourou market which ordinarily attracts at least a thousand persons. Members of the populace complain a great deal about this official manner of dealing, for because of it they are unable to freely trade their goods and agricultural produce, and even lose them at times.

Given such strict control--coercion--most all grain transactions of any importance take place in the villages, within individual compounds, and not in the market. In some villages the peasants sell their grain to merchants during the night; such is the case at Bankass. Only through means such as this are the peasants able to obtain a greater return from their grain and avoid the ruinous

seizures.

The political justification for the state marketing of millet--characterized by a pillage of the peasants and excessive coercion--is found at the national level. The state, having the burden of supporting a large number of poorly-paid civil servants, purchases millet from the peasants at low prices and then resells it to government workers, who drag along unproductive individuals with them, at a price such that they do not feel the full burden of alimentation costs. We should recall that whatever the time or place, the government always purchases millet at 36 MF per kilogram and resells it as 53.6 MF. On the open market millet sells for 50 to 60 MF per kilogram at the beginning of the market season (November) and for 100 MF per kg. in May. Today (June 2, 1978) a kilogram of millet is selling for 150 MF on the open market in Bamako. Due to the large price difference, some civil servants purchase millet from O.P.A.M. at 53.6 MF per kilogram and then resell it on the open market at 100 to 150 MF. This practice is known to many if not to all.

This marketing policy does not contribute to development. It favors an already privileged social stratum and works against the interests of the peasant masses, the improvement of whose position is essential to the country's harmonious development, for they constitute more than eighty per cent of the total population.

B. Private Commercialization

Private commercial activity occurs at the level of local and national markets and makes up the traditional African business system. All important transactions are carried out at the market where buyers and sellers meet to exchange commodities. The market place is a meeting ground for buyers, sellers, and floaters who come from many villages.

There are several villages in Dogon country with markets. Plateau markets meet every five days in a given village. On the Séno (Plain), the administra-

tion has established a system of fixed market days for each village in order to synchronize the area with marketing in the rest of Mali. This synchronization, however, throws the Séno markets out of phase with the Plateau markets; this results in a number of exchanges between two zones which otherwise have a symbiotic relationship: the Séno produces grain and the Plateau produces market garden crops.

Commodity circulation in the markets includes agricultural products, products from the bush areas, and non-agricultural products. We will now describe the ciruclation patterns of each of these types of products, the individuals involved in their circulation, their interaction, and the products' prices.

1. Circulation of Agricultural and Bush Products

Judged in terms of the number of persons involved in their circulation, agricultural and bush products are the most important commodities in Dogon country. These products may or may not be processed and their movement entails a multiplicity of modes-motor vehicles, head-carrying, donkeys, camels, carts, bicycles, and mobylettes. Men and women, children and the aged are involved in their circulation and exchange.

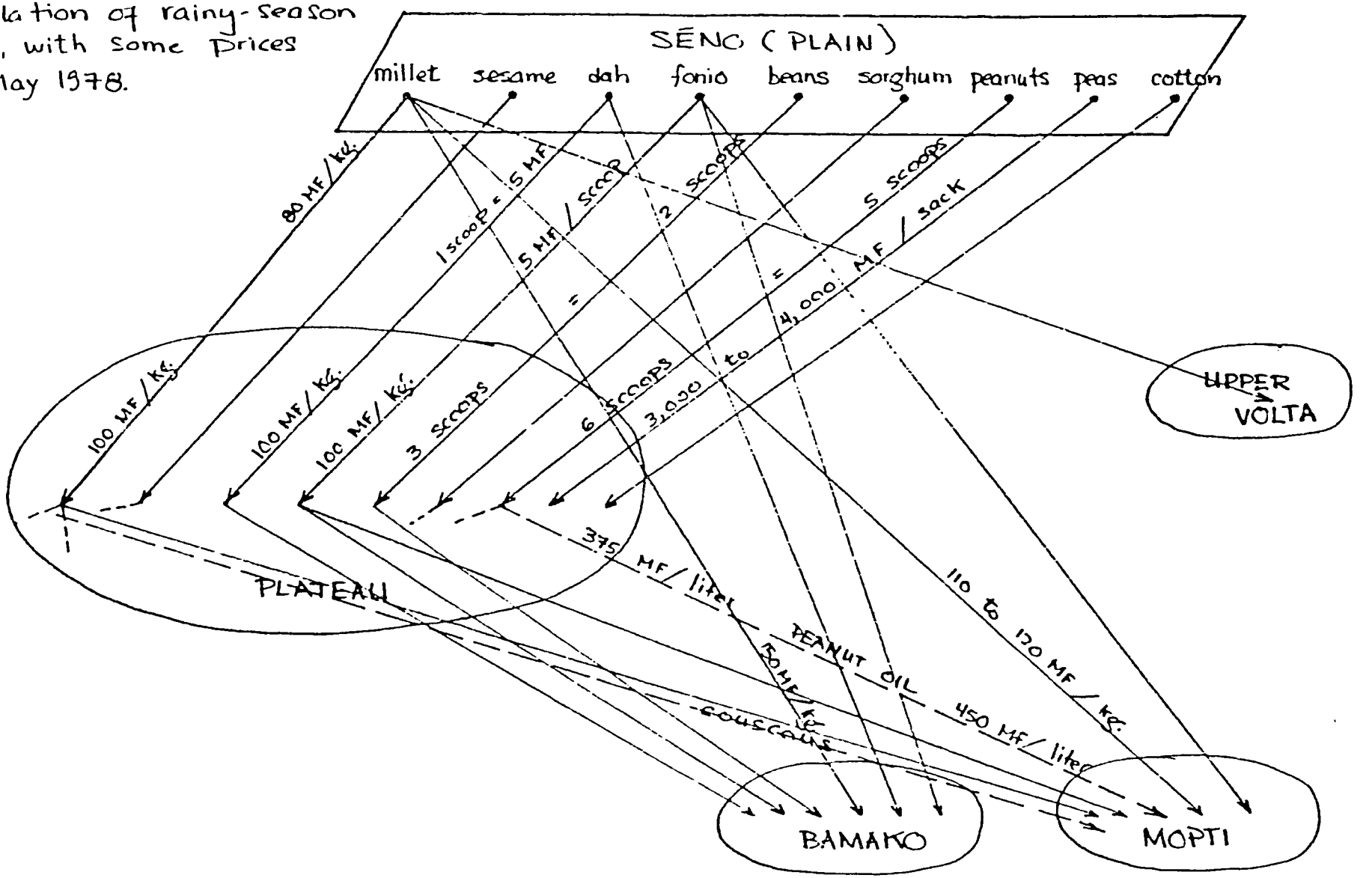
Agricultural and bush products move toward several destinations: villages on the Plateau and the Plain, towns and villages in the Mopti region, within and outside Mali. Some items do not leave the market area; they are consumed there by passers-by: couscous, cakes, dolo, boiled ears of corn, tougoussi, and boiled potatoes. A distinction will be made between rainy-season crops and market garden crops.

a. Circulation of Rainy-Season Crops

Rainy-season produce includes millet, fonio, beans, dah, sesame, sorghum, rice, peas, peanuts, and tubers (especially sweet potatoes). Transactions and exchanges occur either at the market place or outside the market, depending on the disequilibrium between supply and demand and the persecutions by the economic

Diagram II -

Circulation of rainy-season crops, with some prices for May 1978.



KEY

--- indicates processing or movement of processed forms.

Most measures are in scoops.

police agents and the gendarmes.

Much of the circulation of these products occurs thanks to women who buy and sell. Most all of the sellers come from the Plain and transport the produce on donkey-back, head-carry it, or use bicycles; less frequently mobylettes and carts are used. The buyers are either men from the Plateau who purchase grain for family consumption, Plateau women who engage in petty-commerce after transforming the grain into various foods, or merchants. These latter resell the produce in Mopti, Bamako or elsewhere, and in Upper Volta.

Diagram II illustrates the circulatory paths of these products. The Plateau may serve either as a destination for produce or as a transit point. Thus the millet, peanuts, sorghum, and cotton that enter the Plateau are generally consumed by the people there. On the other hand, dah, fonio, and beans coming from the Séno may be either consumed on the Plateau or trans-shipped via the Plateau markets to Mopti and Bamako.

Most of the rainy season crops are produced in the Séno. Sellers in the Séno may be:

--buyers and sellers who engage in petty commerce.

--heads of households in search of better prices.

--housewives who sell their harvest in order to satisfy their personal needs and purchase needed condiments.

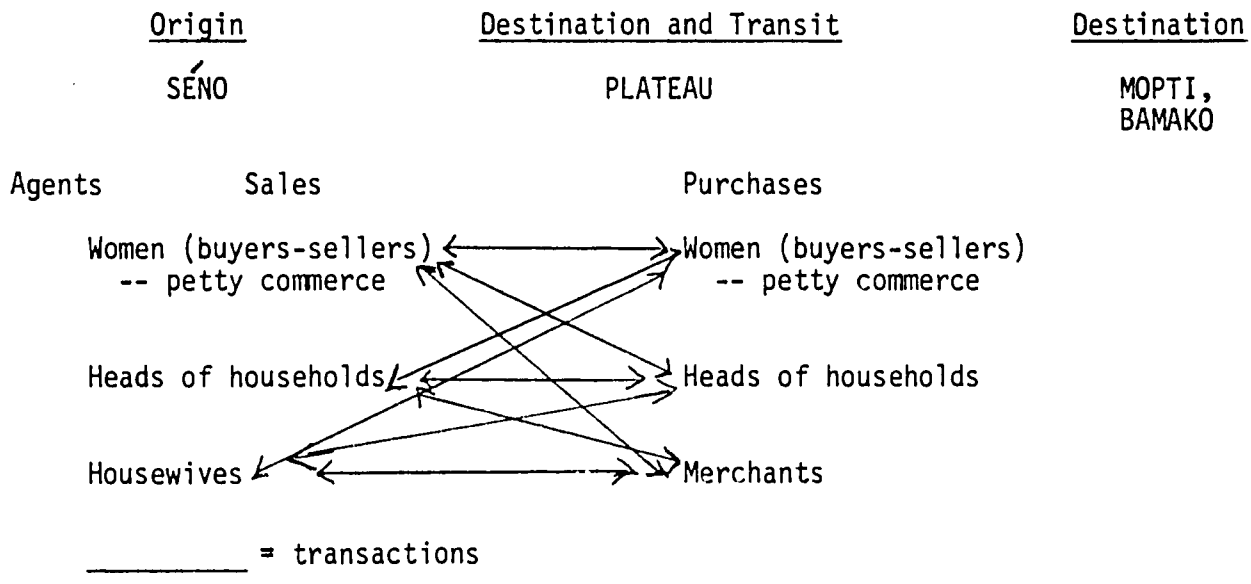
Plateau buyers may be:

--buyers/sellers - these purchase the products and process them for resale. This is especially true of couscous, cakes, dolo, kamwa, and peanut oil.

--heads of households who purchase grain in order to complement their own harvest production.

--licensed and unlicensed merchants - Diagram III shows their interaction.

Diagram III - Interaction of Agents



Produce in transit through the Plateau is handled by licensed and unlicensed merchants; shipment occurs via motor vehicle--one or two trucks.

Millet also moves from the Séno toward Bamako, especially from Diallassagou and Bamako, and is transported by vehicle.

b. Circulation of Bush Products

Some bush products circulate only within Dogon country; others leave it and are exported to Bamako. Grain from Pégou moves from the Plateau toward the Séno. This commercial activity is carried on by women. Tamarind fruit coming from the Escarpment and the Plateau is exported to Mopti and Bamako. Male merchants control the tamarind commerce. After onions, tamarind is the most widely commercialized product during the dry season, and it is the object of speculative activities on the Plateau, for several intermediaries are involved in the circuit. Gum, which is obtained from Detarium microcarpium, comes from the Séno and is exported to Mopti. Baobab leaves circulate solely within the Plateau region. Sometimes they are exported to Mopti.

Firewood is sold only within villages. To the west of Bandiagara,

it is exported to Mopti.

Products from the rônier, palm tree, especially dissi, go from the Plateau toward the Séno. Donkey drivers (all men) transport the rônier products.

2. Circulation of Market Garden Crops

Dry season market gardening is characteristic of the Plateau and Bandiagara. Given that onions are the principal export crop, their marketing is the most important and best organized commercial activity on the Plateau. It is the object of a veritable trade and involves several kinds of individuals ranging from the peasant (whether a market-gardener or not) to the large Malian financiers in Bamako, whose hidden capital is brought into play by way of petty merchants and other intermediaries. All markets are very active at the time of the onion harvest.

Market-garden commerce, especially onions, has undergone some change since the completion of roads which serve, however poorly, the Plateau. According to peasants, the creation of the Bandiagara-Yawa road with the improvement of the Yawa descent brought with it changes in onion-marketing in Dourou.

a. Onion Marketing Before the Creation of the Bandiagara-Yawa Road in 1953

Information provided by Dourou peasants.

Before the road was built there were seven onion producing villages in the Dourou arrondissement. The other villages in the arrondissement produced eggplant, red peppers, tomatoes, tobacco, cotton, or calabashes, and know nothing about onions.

All onion production (both leaves and bulbs) at this time was processed

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* The term intermédiaire appears in the original report. It will be rendered as both "intermediary" and "middleman"--largely for the sake of variety.

into balls[7] that were dried in the fields and stored in the peasants' homes in sacks or on mats made of sorghum stems. During the marketing season groups of young girls and boys transported the dried onion balls and bulbs in baskets (made of millet stalks) atop their heads. These groups went and returned on foot. One truck provided the liaison between Mopti and Bandiagara, but the income obtained by the peasants from their onion sales was not enough to pay the transportation costs.

According to the peasants, the cost of one person's load did not exceed 500 MF; today a similar load costs 18,000 MF.

The onion-leaf balls were purchased by Mossi from Ouahigouya and other villages in Upper Volta; they loaded their donkeys with the onions and returned home to sell the produce. It was from these Mossi that the Dogon learned to use donkeys for carrying goods.

b. Onion Marketing After Completion of the Road

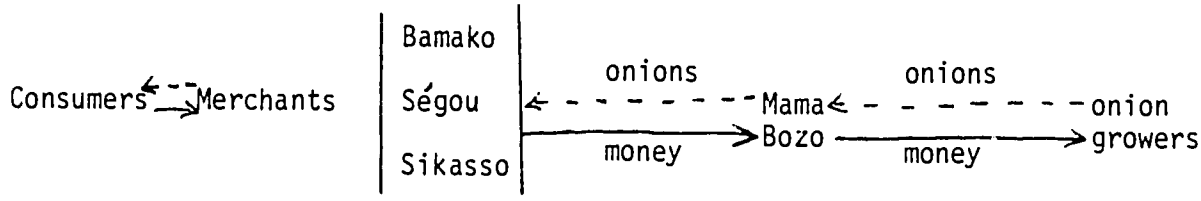
The technology of onion marketing changed with the construction of the road. Instead of processing the bulbs into balls, the peasants sold them fresh at the markets. Most all of the changes were brought about by the number of merchants involved, their ethnic and geographical diversity, and the number of village producers. We will examine the situation on the basis of what took place at Dourou.

First stage -

Once the road was completed a single merchant, Mama Bozo, purchased onions from the various gardeners. He was the only one who knew Dogon country. He was given money by large merchants in Bamako, Ségou, and Sikasso, who set the prices at which he would sell the onions to them. Once at the gardens, being the sole buyer, he paid whatever he wished for the onions. The difference between the price agreed upon with the owners of the capital and the price paid by him to the

[7] See details on onion processing in the second report.

growers constituted his profit margin. Mama's function was that of an intermediary (middleman). His operating capital was composed of his own money together with that belonging to the merchants. Schematically, the liaison appears as follows:

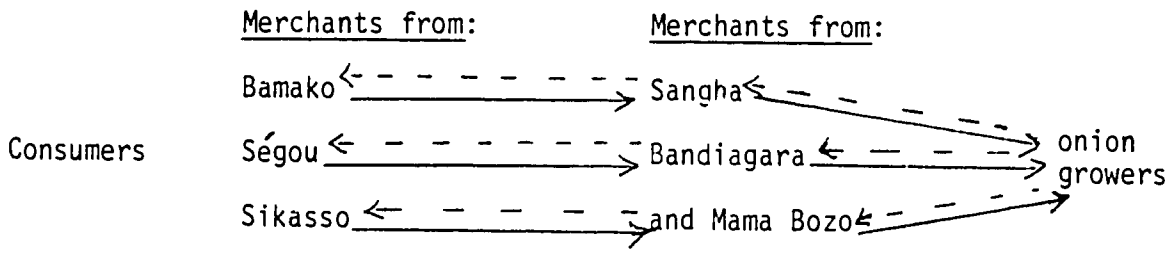


Second stage -

After several years of business, Mama Bozo noticed the arrival of competitors; these were merchants from Bandiagara who had learned that, not all of, Mama's operating capital was his own. On the basis of this knowledge they dealt with the sources of capital--the large merchants in Bamako, Ségou, and Sikasso. The operating rules remained the same as those in effect when Mama was the only buyer: the capitalists set the price at which they would purchase the onions (le prix de cession) from the merchants; the latter had to seek their profits in the difference between this price and that they paid the growers--often very low.

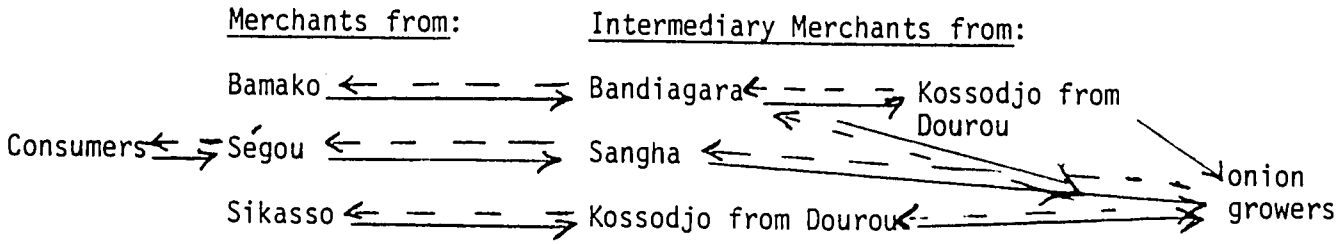
At this stage much onion buying occurred at the markets. The residents of Sangha went into the onion business at about the same time as the Bandiagara merchants.

The commercial network then took the following form:

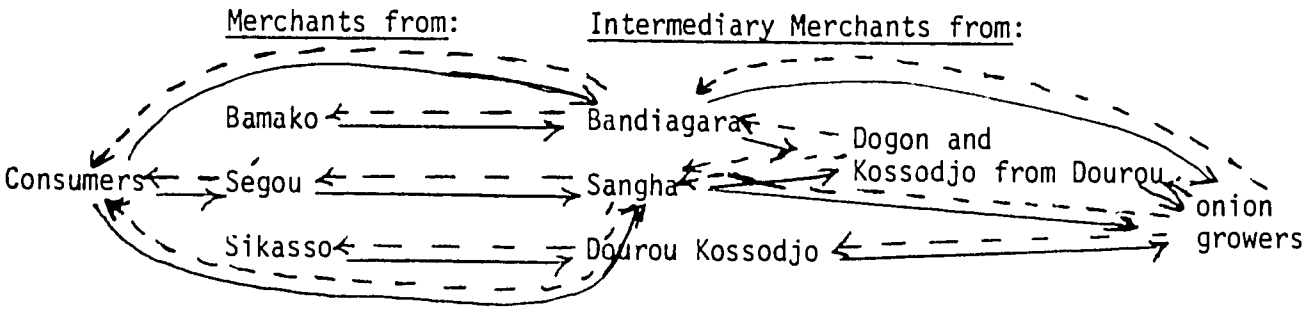


Third stage -

Given the business sense of the Kossodjo,[8] those in Dourou quickly understood what was budding in the onion trade. Two years' of observation of developments were sufficient for them to become intermediaries and obtain capital from merchants in Bamako and Bandiagara. Slowly but surely, the pioneer Mama Bozo was overshadowed by the others.



The intermediary merchants from Bandiagara, having accumulated capital in the form of property, and having gained control of the onion commerce and the intermediaries at Dourou and Sangha, eventually side-stepped the Bamako, Ségou and Sikasso merchants. Rather than sell onions to these latter individuals, several of the Bandiagara merchants began to sell directly to the consumers. Thus the region's merchants began to export on their own to Bamako; before, the onions they exported were not theirs....The marketing network then took the following form:



8 See the first report for details on the characteristics of the Kossodjo.

Sangha merchants also provided money to the dourou Kossodjo. Some of them came to the Dourou market to buy onions. According to informats, Dourou growers received a maximum of 10 MF per kilogram, the intermediary (Kossodjo from Dourou) for the Bandiagara and Sangha merchants received 10 to 12.5 MF per kilogram, and the merchant or intermediary from Banadiagara, Sangha, or the Dourou Kossodjo intermediary received 20 MF per kilogram. Thus the Bamako merchants bought onions at 20 MF per kilogram.

A few Dourou Dogon entered the onion business, but were little more than simple middlemen who were able to sell to Bandiagara and Sangha merchants only. These Dogon intermediaries did not export onions beyond the Plateau. For a long time they were ignorant of all business activity. In 1974, Bandiagara and Sangha merchants, together with Dourou Kossodjo, tried [illegible] the Dogon out of their positions as secondary middlemen in order to gain exclusive control over onion purchasing. The Dogon, thus threatened, began to look into the onion trade in greater detail. They wanted to know why other intermediary merchants were able to export onions while they were not. In the process of their inquiries, they discovered that onion exporting requires an export license. Thus in 1977 they all contributed to the purchase of a license in one of their names.

--<u>The Present Situation</u> -- At the present time there are four groups engaged in onion marketing at the Dourou market and on the Plateau: <u>Dogon from Dourou</u>, <u>Kossodjo from Dourou</u>, <u>Bandiagara merchants</u>, and <u>Sangha merchants</u>. The Dourou Dogon are managers. Their chief handles conflicts among the different groups. There is a strong competition and extreme egoism among the various groups. Experience in a number of situations enables us to state that the onion business knows neither pity nor humanism. Twice the Bandiagara group purchased small quantities of onions and sent one of their members to detain the transport truck at Bandiagara. Because the group of Dourou Dogon had purchased a large quantity, the

Bandiagarans wished to cause the Dogon heavy losses, through drying, for with a delay of the truck the onions would not be sold quickly, they would lose weight, and thus the merchants would lose as well--the sales being based on weight. The Dourou Dogon reacted to this by hiring another truck at a price above the normal rate.

It also happens occasionally that a single truck arrives to transport onions when two are needed. In these cases the arguments can be endless. The Bandiagarans demand the right to have their onions taken away while leaving those of the Dogon. In all cases to which we were witnesses, the Dourou group managed to win out in the argument and impose their decision which was that the truck should carry each group's onions in proportion to the group's total volume of purchases.

The competition also manifests itself in higher purchase prices. Bandiagara merchants, veterans of the onion trade, and having accumulated capital, caused a price rise. This was done in such a manner as to cut back, even to nullify the profits of the Dourou group. The latter group blocked the prices very early.

Competition also takes the form of the exclusion of direct purchases from onion growers. At the Dourou market place, Sangha merchants are not allowed to deal directly with the growers; they always purchase from an intermediary.

1. Agents -

Onion marketing on the Plateau can involve several agents related in a hierarchical manner depending on the ownership of capital. A distinction may be made between those who provide (i.e., own) capital, intermediaries (middlemen), collectors, and producers.

Capital suppliers[9] -- We were unable to identify any capital suppliers.

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[9] "There are capital suppliers on the Plateau, including Dourou-Tanga. I have heard of similar arrangements with Peuls but was unable to determine the conditions of such transactions. However, it is doubtful that the amounts of money involved could approach what town merchants can put up." (RKE March 15, 1979).

Those persons who were asked, about this, told us the suppliers come from Bamako, Ségou, Bandiagara, and Mopti. There are two kinds of capital suppliers: merchants and civil servants. Civil servants give the money to an intermediary merchant who carries out the transactions sometime during the onion marketing season, after which the profits are divided (often fifty-fifty) according to a verbal or written contract. The capital is then reimbursed. Merchant suppliers, on the other hand, buy back onions from the middlemen, to whom they furnish money. In other words, merchant suppliers advance money to an intermediary in order that the latter purchase onions for them at a set price "P". The intermediary arranges it so as to buy the onions below "P" in order to obtain a certain profit. Once the merchant source obtains the onions they are usually exported to Bamako for sale.[10]

Intermediaries (middlemen) -- There are three types of intermediaries: regional exporting intermediaries, licensed non-exporting intermediaries, and unlicensed intermediaries.

--Exporting intermediaries:

These are merchants with regional export licenses who receive funds (capital) from a supplier (town merchants or civil servants), who purchase onions on the Plateau, and then export them to Bamako. Their operating capital includes their own money and that of the supplier. In most cases the quantity of money contributed by the supplier is less than the middleman's own capital. According to Malian commercial regulations merchants may export products outside their region only if they possess a license to do so.

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10 "...the long-established trade with Bandiagara, Mopti, and Upper Volta should not be overlooked. Archival reports indicate trade with Bandiagara from at least the early 20th century. Older informants recalled walking to Mopti in their youth with head loads of onions. I rather doubt the Dogon of Dourou were ignorant of all business activity until 1974. It is more likely that with conversion to Islam, it has become easier to trust a wider network (which, itself, has been established through out-migration) of Dogons and non-Dogons and so become assimilated into the world of licensing, travel to Bamako, etc." (RKE March 15, 1979).

--Licensed non-exporting intermediaries:

These individuals possess a seventh category license authorizing them to purchase onions and resell them within the Plateau region. Licensed non-exporting intermediaries also receive funds from civil servants and other merchants. When money is provided by a merchant, the middleman seeks his profit in the difference between the price he pays the growers for their onions and that at which he sells them to the supplier of the capital. When capital is supplied by civil servants, the profits are shared. The licensed non-exporting intermediary operates with his own money and that of the suppliers. According to informants, these operators may receive funds from one or several suppliers, ranging from 30,000 MF ($67) to 100,000 ($223) per market (five days). In the Dourou arrondissement there are twenty-two such agents.

--Unlicensed intermediaries:

These intermediaries are onion merchants who, by their very status, are illegal operators. they work with their own money or that supplied by someone else--either intermediary exporters, non-exporters, or even civil servants. Some of them operate solely with other peoples' money. They receive no more than 45,000 MF per market (five days). In the case of surveillance by the economic police agents, these intermediaries are protected by licensed middlemen who pass them off as their apprentices.

--Collectors:

The middlemen take on workers--all adult males--to collect onions for them. There are two kinds of collectors: those who collect on market days, and those who collect between markets, i.e., during the four days between markets. On market day the collectors go to meet the sellers, often at more than a kilometer's distance from the market place. They accompany and take them to their respective employers who await them impatiently at the market place, behind

their scales.

When collecting is done between market days, the employer gives the collectors sacks and money in order to buy onions, often at a set price. If the collectors are not given money, they may suggest to growers that they take their onions to the collectors' employers, and in so doing, guarantee to purchase the onions.

One can count on the average, two collectors per intermediary, hence 44 collectors in the Dourou arrondissement. Some intermediaries also collect onions between (two) markets.

--Laborers:

Each intermediary has a group of people working with him and often with other intermediaries as well. These laborers fill sacks with onions, sew them shut, and mark the sacks.

2. The Market Place -

The Dourou market is held at two different locations, about 120 meters apart.[11] One is called the "station" (gare) and is the place where market garden crops are bought and sold, especially onions. It is a stopping place for trucks, and there are at least ten scales in operation there day and night.

3. The Marketing Process -

Onion production is a meticulous activity, and so is the commercialization of onions. The production is highly variable and as a consequence, so is the commercialization. The market for onions takes three forms: the fresh onion market, the onion bulb-ball market, and the leaf-ball market. The onion ball markets may be described collectively as dried onion markets. Fresh onions

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[11] For additional details, see Riitta Eskelinin, Field Report, "Dogon Cereals Project: The Market System," February 1977.

and bulb balls are the most important products; their respective markets are also the most important and are identified with specific regions of the Plateau. Apart from onion seeds, all onion production in the Sangha arrondissement is sold in the form of balls. In the Dourou arrondissement most all onions are sold fresh.

The marketing season begins with the first harvests which began this year at Dourou on October 16, 1977 with the production of four villages: Ourou, Inderou, Konsogou and Pelou.

Marketing of Fresh Onions -- The marketing process involves a series of operations: gathering (collecting), drying, treating, and shipment.

--Gathering (collecting):

At harvest time the onions are placed either in baskets or sacks provided by the middlemen and are taken to the "station"--the sales point. Growers from all the surrounding villages, in lines of 20 to 40 persons, head toward the "station." Men carry 20 kg. sacks full of onions on their heads or drive donkeys carrying loads varying from 80 to 120 kgs. The women, as usual, carry baskets and calabashes. There are three methods of collecting onions:

First Method: Purchases along the road -

Collectors, stationed along the roads, await the passing of the growers in order to take them to their employers. Once at the "station," the onions are weighed, the buyer announces the weight, and the price he is willing to pay. Thereafter several things may happen:

---If the grower accepts the price, he may ask for payment on the spot; otherwise he may wait until evening (once the merchants have finished with their purchases) to receive his money.

---The grower may refuse to sell at the price offered him in the morning and await another in the evening, though it may be lower.

The buyer might be an intermediary exporter, a licensed non-exporting intermediary,

or an unlicensed intermediary He may use a scale or a Roman balance to weigh the onions.

Second Method: Purchases by collectors in the fields or villages -

Onions that come to the "station" in sacks have either been purchased or promised to a buyer; the sacks having been previously distributed to the collectors. Once at the "station," the buyer, who may be any of the agents described above, weighs the onions and announces the weight. At the announcement of the official price in the evening--that paid by the collector's employers for the onions--the collectors learn whether they have gained or lost. If the onions are bought in the fields or in other villages, the collector must pay the transportation costs, something which is automatically reflected in the sales price.

Collectors with sacks are very often at once growers and friends of the middlemen, and live in the same village.

Third Method:

Occasionally the intermediaries scour the villages in search of onions. The peasants (men and women) who sell them may or may not transport the onions to the "station." In all cases the buyer must pay the transport fees of from 500 MF to 1,000 MF per sack. There is a difference of 25 MF between the price for a kilogram at the "station" and in the bush. An intermediary can sell to another with a certain profit.

In the Dourou arrondissement the middlemen divide up the bush areas among themselves. Each one, or each group, scours an agreed-upon group of villages. Sometimes the division, of areas, is done without guidelines; common sense is enough. For example, if an intermediary knows that there are one or two other middlemen in a certain village, there is little reason to go there, for the others will certainly purchase whatever is produced there.

Marketing Operations at the "Station" -- A number of transactions

take place at the "station." The market begins at about 9AM. and ends around 6:30PM., depending on the day. It attains its peak of activity around 2PM.

Some intermediaries buy directly from growers and resell to other intermediaries with a certain profit margin. These practices or speculations are carried out by the licensed non-exporters. There are buyers dispersed throughout the "station" with their Roman balances, who trick the poor folk, none of whom is able to read weights well. We saw one of these buyers announce a weight of 25 kilograms to a grower when the actual weight was 40 kgs.

These middlemen profit doubly--they profit from the stolen weight and from differences between prices, for they always purchase at 10 MF per kilogram below the official price--this is a strict rule at the "station.

Several middlemen buy and resell at the "station."

Licensed intermediaries resell very little at the market place. They buy from unlicensed middlemen, from collectors, or from growers who come to market from the bush areas. If they buy from unlicensed middlemen, they have to increase the purchase price to these latter from 10 to 25 MF per kilogram. When the onions are brought to the "station" they are weighed, each grower is told how much he has--this information is often incorrect--and he is given a price which he may accept or reject. The onions are then dumped onto the ground before the buyer's scale, forming an enormous pile. As the pile grows in size due to additional purchases, laborers sort the onions and remove clods of dirt from them. All onion purchases of a given intermediary are mixed together in order to produce a homogeneous product. From 9AM. until 3PM. activities consist of weighing, selecting, cleaning, and rendering the whole uniform. Once this is done the laborers fill sacks with the onions, sew the sacks shut[12] with thread, and then

[12] The price for sewing is 10 MF per sack.

mark the sacks using carbon from discarded flashlight batteries or blue. Each licensed intermediary wishing to send his merchandise to Bamako or Segou has his own mark which is placed on the sacks. While the laborers fill and mark the sacks, the more important intermediaries meet atop the large rock which overlooks the station (market) and discuss the official price, the price to be paid the intermediary speculators and the growers having sold to non-speculating middlemen.

Once the marking is finished and the official price has been announced, all the middlemen have their purchases weighed at the main scale in order to know the weight per individual and the total weight upon which the calculation of transportation costs will be based. The truck driver is present during this process and keeps a record. The intermediaries' "accountant" takes note of the weight per individual. The shipping costs from Dourou to Mopti are 10 MF per kg. and 25 MF per kilogram from Dourou to Bamako. After the final weighing the shipping costs are computed as well as the costs for the truck driver's "overtime hours," and the latter are paid him. This "overtime" payment is then used to pay off (bribe) the customs officials and gendarmes who are stationed along the Dourou--Bamako road in order to expedite shipment and to reduce weight losses caused by slowdowns in the movement of produce. These "overtime" fees amount to 2 MF per kilogram.

While the above calculations are underway, laborers load the sacks onto the truck at a cost of 25 MF per sack.

--Shipment:

Once the truck has been loaded, it leaves Dourou immediately. Traveling with the driver is one of the middlemen, supplied with one or more export permits for Bamako. The load in the truck varies from eight to fifteen

metric tons, and on some days two trucks are needed to take the onions out.[13] Sometimes there are no trucks available; in these cases the middlemen send a messenger to Bandiagara or Mopti to locate one. Thus the onions may sit in the market place for twelve hours or more. This contributes to greater weight loss (estimated at 10% by merchants) and cuts down on profits. At Bandiagara the trucks pass by the conditioning service where the drivers declare the weight (which is recorded) and describe the condition of the onions without verification. The driver and the intermediary who accompanies him, in order to avoid lost time along the way, use money from the "overtime" amount to pay off the local agents. The same fund is used to make payments to officials at each of the customs, gendarme, and police posts along the way. These payments are such a common occurrence that officials needn't even hint to receive them; the drivers pay the sums as soon as they arrive as if it were a normal procedure.

One or three days after the departure of the truck(s), the licensed non-exporters leave Dourou and the other villages in the arrondissement for Bamako where they sell the onions. There is always a middleman from Dourou in Bamako who, together with the middleman who accompanies the truck driver, takes care of the unloading and the proper storage of the onions while awaiting the arrival of the other middlemen.

Sometimes several middlemen are present in Bamako when the truck arrives. They receive the sacks of onions sent to them by their collectors and friends; the sacks being easily identifiable by the markings. Some middlemen stay in Bamako for more than a month, but every five or six days they receive onions sent by their relatives; the money from the sales always returns to Dourou in order that additional purchases may be made. There is always a messenger on the

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13 The analysis of marketing accounts to be included in the final report will provide details on daily onion sales in the market.

Bamako--Dourou line, between the markets.

Once back on the Plateau, some middlemen purchase manufactured products in Bamako--clothing for men and women, soap, cups, plates, shoes, and pots--which they resell.

Prices -

The prices of fresh onions have risen considerably during the last few years. The 1977-78 season's price is double that of the previous season. At the beginning of this season's harvest, in October, some intermediaries were paying 200 MF (45 to 50 cents, U.S.) per kilogram for fresh onions at the Dourou station-market. In November, near the beginning of the Tabaski feast, a kilogram of fresh onions was worth 300 MF (60 to 70 cents, U.S.) in Dourou. In the middle of the marketing season--January and February--when there was an abundance of onions, the price dropped to 50 MF per kilogram.

From one day to the next the price changes,[14] depending on the quantity of onions on the markets at Dourou or Bamako, and the information available to sellers. The buyers employ several means to depress onion prices; three of these will be described below.

a. The Psychological Ploy -- This strategy affects the onion growers. It consists of delaying the truck's arrival at the station. Instead of arriving around 11AM., it doesn't arrive until 4PM. In order to induce a drop in prices, the merchants explain that purchases at higher (or reasonable) prices would cause losses due to a lack of means to transport the onions from the market. The growers, first of all psychologically weakened by this sort of talk, and secondly, pressed for money in order to make their purchases, agree to let their onions go at the lower prices set by the middlemen; the actual facts of the

[14] Price profiles will be given in the final report.

matter are not explained to the sellers.

b. Dourou merchants receive letters and telegrams from middlemen in Bamako--these communications contain false information on the market situation in the capital. If purchases are weak in Bamako, they affect Dourou sales as well and the price drops. News concerning sales in Bamako is not diffused at the level of the sellers (growers), but the Dourou population obtains information for those who send the news are related to them.

c. Sometimes middlemen send people to tell the vil lagers (outside Dourou) not to harvest because there will be no purchases owing too poor business in Bamako. When this happens the prices drop markedly; offers being greater than demand in these cases, for some producers need to sell. This happened only once this year at Dourou; on that day there were very few onions--not more than 200 kilograms.

Due to the number of intermediaries the price of onions is highly variable and actually composed of several different prices:[15]

--the price to the growers at the village level

--the price to the collector who accompanies the growers to the point of sale

--the price to growers who go to the station and sell to a middleman equipped with a Roman balance

--the price to growers who go to the station and sell to a middleman with a scale

--the price to the first middleman.

In Bamako, the middleman's sales prices include:

--retail prices

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[15] The share of each agent in prices will be specified in the final report.

--wholesale prices

--prices to buyers (consumers).

(Details on sales in Bamako will be given in the final report, as well as actual exports to other regions.)

5. Exports of Fresh Onions to Mopti -

The shipment of fresh onions to Mopti is provided by a truck different from that which goes to Bamako. The truck comes to Dourou on every market day during the dry and rainy seasons. It brings assorted products and merchandise (fish, rice, salt, manioc), but more than anything, brings people. On the return trip it carries fresh onions, leaf balls, gum, tamarind, mangoes, and tomatoes. Onions going to Mopti are purchased in the same manner as those going to Bamako. There are no more than four middlemen who send fresh onions to Mopti

6. Circulation of Dry Onions -

The circulation of dry onions includes bulb-balls and leaf-balls.

Leaf-balls are all bought by one or two middlemen who take them to Mopti where they are either sold or taken to Delta Villages, especially in the Débo lake region. The bozos and the Somonos in particular consume leaf-balls.

Bulb-balls are very popular and are sold in Malian towns and are exported to the Ivory Coast. The bulb-ball trade is very active, especially during the rainy season. Unlike the Dourou arrondissement, the Sangha arrondissement has more marketing of onion balls. The organization of the trade is almost the same as that of fresh onions with the difference that onion balls can be stored. The same kinds of agents are involved here as are found in the fresh onion trade. Middlemen who are better-off and who have access to more capital buy many balls when they are abundant and store them until the next rainy season (July-August) when they are sold at twice the original purchase-price. Sometimes it is not

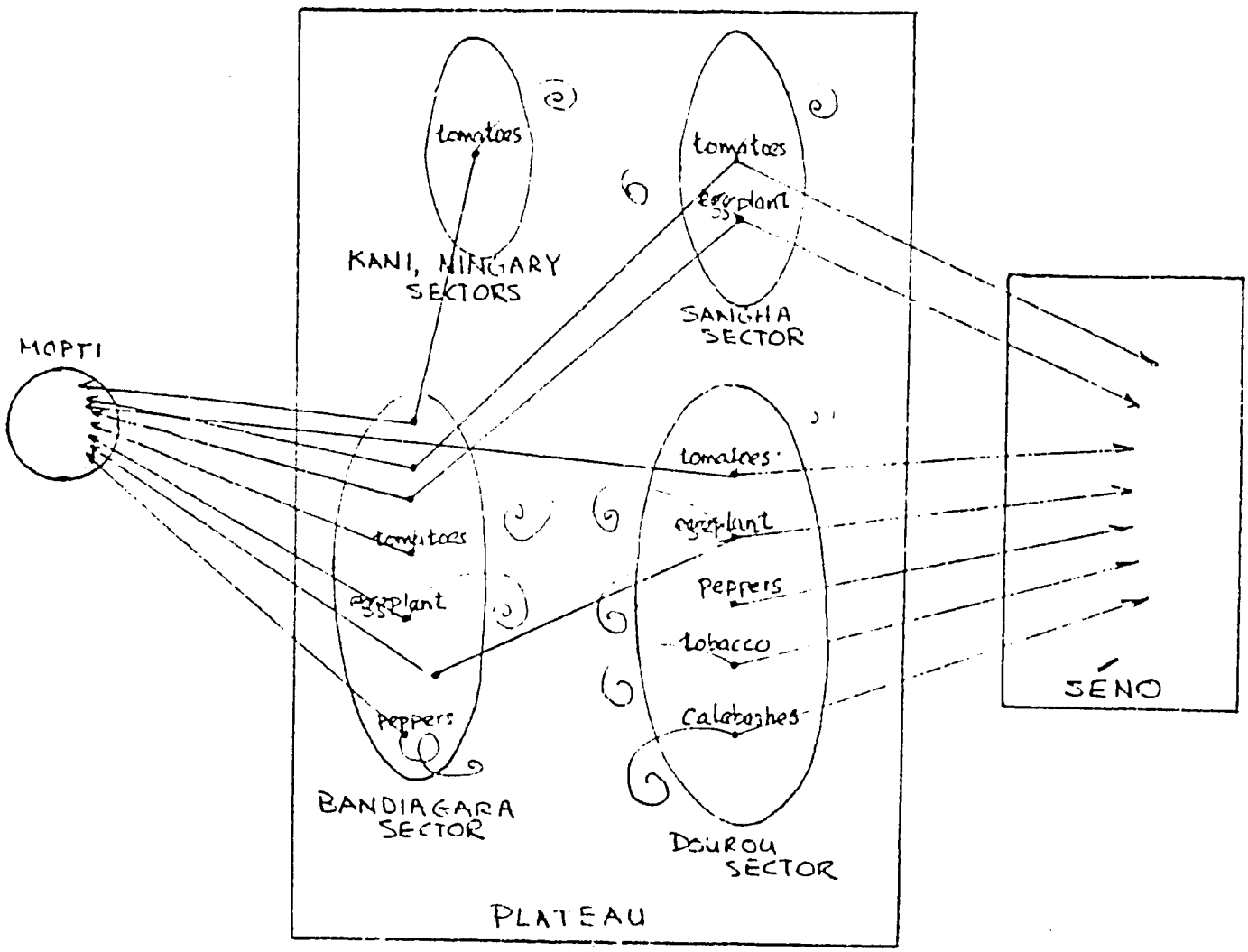
necessary to ship onions to Bamako. Shippers and merchants come from the capital to purchase onions in Dogon country and sales take place within households. Some merchants stay in Bamako throughout the rainy season to sell their dried onions. After each sale they send money to their family on the Plateau in order that more purchases might be made. Capital circulates in this manner throughout the season. As in all cases of fresh onion commerce, the unlicensed middlemen are all--without exception--peasant growers. They gather their purchases together and give them to a regional licensed exporting middleman who takes them to Bamako; then they select two or three persons to handle the sales. This is their only way of maximizing income from their produce.

The shipment of onions from Bamako is not the same every market day. It is variable: at least one truckload is necessary, and a load cannot be obtained unless an important middleman or several middlemen decide to go to Bamako to sell. Unlike fresh bulbs, onion balls gain weight with time for they absorb moisture. Intermediaries purchase onion balls in units (e.g., three balls for 25 MF) and resell them by weight. The profits can therefore be very large: a gain due to the difference in measurement methods, and another gain due to increases in weight and the selling prices. In the final report it will be possible to evaluate the magnitude of each of these increases. The price of onion balls in Dourou is presently 600 MF per kilogram. During the rainy season the price may climb to 1,200 MR per kg. in Bamako. Last year (July-August 1977) it varied from 800 MF to 1,000 MF per kilogram in Bamako. It was this high price of last August which, according to merchants, caused the rise in the prices of fresh onions last October.

Fresh and dry onions also ciruclate within Dogon country. Plateau producers, especially those on the Escarpment, sell a certain quantity in the Séno. Some Séno women travel to the Plateau and the Escarpment to buy onions and then

Diagram IV

Circulation of Market Garden Produce



- indicates circulation within the Plateau

resell them in their home areas. They also carry on this commerce during the dry season.

3. Circulation of Other Market Garden Products

Other important market garden products of the Plateau are tomatoes, eggplant, red peppers, tobacco, calabashes and various lettuces and cabbages in Bandiagara. The marketing of these products is also very important. The commerce is divided into that which occurs within Dogon country and exports to Mopti (see Diagram IV).

Commerce Within the Plateau Region

Internal commercial transactions take place at the markets and are carried on by women. Those from the Plateau and the Escarpment come to sell a part of their produce in the Séno in order to buy grain: fonio, millet, and peanuts. It also happens that men and women come from the Séno to purchase on the Plateau and then resell their goods in Séno markets. Occasionally men from the Escarpment take donkey-loads to the Séno. The circulation of market garden produce within the Plateau region is carried on mostly by women; they are the only sellers. Buyers, on the other hand, may be either men or women.[16]

Since not all areas of the Plateau produce market garden crops, the circulation is especially heavy going from producing to non-producing areas.

b. Exports

Most exports go to Mopti. Export trade is carried on by intermediaries who send onion to Mopti and by women merchants from Bandiagara. Two of

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[16] In the Dourou region, women are not the producers or owners of revenue from vegetable sales. Rather, they sell the products on behalf of their husbands or fathers and receive a minimal payment for their labor. In Sangha, of course, women do garden, and the system is different." (RKE March 15, 1979).

these women were present at the large Plateau markets: Dourou, Sangha, Ningary--which they supplied with a substantial quantity of fish. Purchasing points for export are the "station" in Dourou and the market places at Sangha, Ningary, Bandiagara, and Kani-Gogona.

At the Dourou station, tomatoes, eggplant, and some red peppers are the major products exported to Mopti. Peppers and tomatoes are shipped from the Sangha market; tomatoes and peppers from the Ningary and Kani-Gogona markets, and mainly tomatoes, eggplant, peppers and lettuce from Bandigara.

Exporting is also the work of individuals from Mopti--civil servants and large merchants--who come and spend several hours on the road leading out of Bandiagara; the latter buy mainly for their own use.

Aften onions, tomatoes are the Plateau's second major export crop.

4. Circulation of Non-agricultural Products

An intense commercial activity is created by the circulation of non-agricultural products. A number of agents are involved: men and women, young and old. Most non-agricultural products are manufactured articles. Fish also figures importantly. Most manufactured products--sugar, milk, sweets, cigarettes, etc.--come from Upper Volta. Men predominate in the merchandising of these articles. Poor-quality dried fish comes from Mopti and is sold in Dogon country occasionally by men, but most often by women; it is shipped by truck and on donkey-back. Fish shipped by truck becomes badly broken up enroute due to the poor quality of the roads and the practice of seating passengers atop the sacks of fish. Fish shipped into Dogon country on donkey- back arrives at the market whole.

Conclusion

Products in Dogon country have varied, diversified destinations

which are, in all cases, oriented toward the satisfaction of various needs of the populace: the need to be nourished and clothed, the need to fulfill traditional social obligations, to satisfy the exigencies of the state, and to keep up with the pace of the times. The responses to these needs have produced a network for commodity circulation and exchange.

The internal network is based upon the complementary nature of the different areas--the Plateau, the Escarpment, the Séno, and their sub-zones. The external network in which the State plays a role illustrates the importance of the countryside's contribution to national equilibrium. In order to commercialize the regions' products, merchants and middlemen have developed a relatively effective organization in which some producers are involved. The participation of these latter--at Dourou and Sangha--will undoubtedly have a positive impact on the ensemble of producers who, one day, will manage their own affairs, whatever the level of management may be.

Appendix A -- Preparation of dolo (local beer)

Dolo made from sorghum

1. Sor hum is placed in a large earthen jar.

2. A quantity of water just sufficient to cover the grain is poured into the jar. This is called trempage.

3. After a while--twenty minutes at most--the water is poured off.

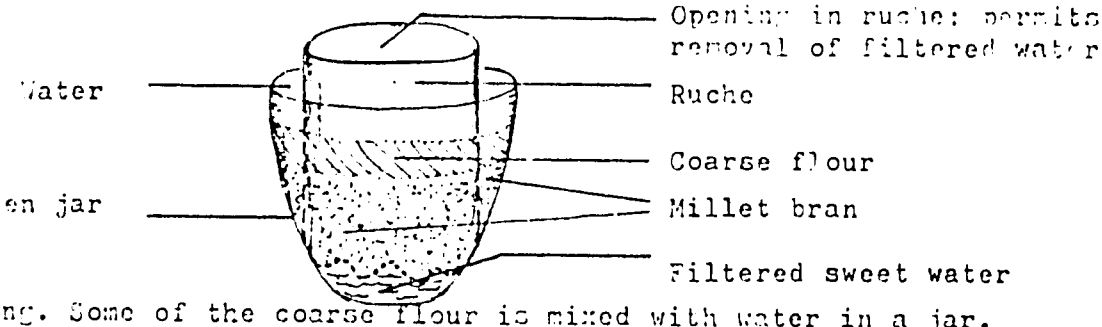
4. The damp grain is left in the jar for about two days, until it begins to germinate.

5. The sorghum is then removed from the jar and placed in a basket where it is pressed in order to separate the grains which have clumped together.

6. The separated grain is then set out on mats or on clean rocks in the sun. The grain dries in a day or two, depending on the sun's intensity.

7. After drying, the grain is gathered up and ground between two stones; this produces a coarse flour.

8. Filtration. The coarse flour is then used together with millet bran to filter water which has been heavily sugared.



9. Cooking. Some of the coarse flour is mixed with water in a jar. The mixture is cooked over a fire for twenty to twenty-four hours. Following this the mixture is allowed to cool.

10. After cooling, the liquid is mixed together with the filtered sweet water, and a dab of yeast, shaped like rope, is added.

11. After eleven to twelve hours with the yeast, the mixture produces dolo which is ready to drink.

Dolo made from millet is prepared in the same manner.

Appendix B -- Prices of some products

1.) Sample of retail prices at the Dourou Market (October 11, 1977)
(We purchased those products we had weighed at Mopti.)

Product	Number of sellers involved	Price (MF/kg.)
Fresh (seed) Onions		425-500
Millet	3	55, 56
Fonio	3	50
Nere[a]	1	-
Beans	2	52, 63
Couscous	3	150
Pepper[a]	1	-
Peas	3	150
Sorghum	3	75
Dah (seeds)	3	75
White rice	1	250
Brown rice	1	178, 57
Salt	2	104, 17
Dried fish (50 MF for a pile)	1	500
Dried fish (100 MF for a pile)	1	666, 66
Pégou seeds	2	33, 33
Tamarind (May 10, 1978)		100-110
Gum (May 10, 1978)		30-35

2. 2.) Prices at the Bamba (Escarpment) market (October 14, 1977)

Millet	1	50
Fonio	1	50

Sorghum	1	55, 56
Pégou seeds	1	50

3.) Prices at Bamako (February 16, 1973)

Fresh onions (bulbs)	150
Dried onions (bulb-balls)	750
Dried onions (leaf-balls)	450
Dah:	
retail	175
wholesale	150
Fonio:	
retail	225
wholesale	175

[a] The accuracy of the balance precluded a determination of weight.

DOGON CEREALS PROJECT: "MODERN" INSTITUTIONS IN DOGON COUNTRY

Hamadoun Sidibe

September 5, 1978

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FIELD REPORT
DOGON CEREALS PROJECT: "MODERN" INSTITUTIONS IN DOGON COUNTRY

Hamadoun Sidibe

September 5, 1978

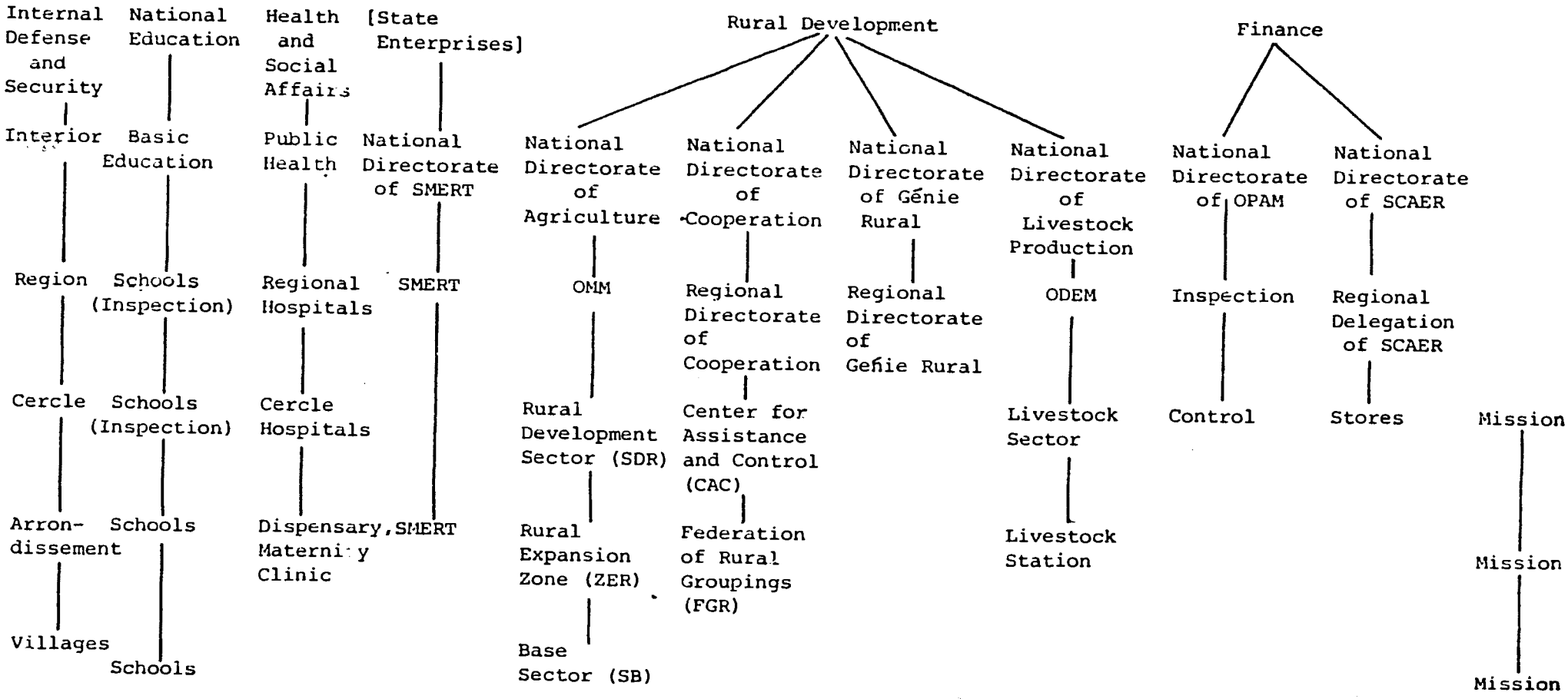
The institutional framework in which peasant producers function can importantly influence the short and long-term growth and development of their agricultural holdings, i.e., units of agricultural production. An acquaintance with this institutional framework will allow us to better understand the possibilities made available to producers within its context.

This report, which is a continuation of field research in Dogon country, will describe those institutions whose interventions influence Dogon peasant producers and their systems of agricultural production. On the basis of personal observations and interviews with officials of various institutions, we will attempt to specify very succinctly the nature of the institutions, their objectives, and their modes of operation.

Figure I identifies the different institutions involved. All began during the colonial period and though some have been around much longer than others, all are alien to the local populations. For the most part they are extensions of the Malian government, designed to better reach the peasant milieu. Otherwise, they also constitute the last links of their superstructure established in the West. Some but not all of these institutions are directly involved in agricultural programs.

This analysis will be concerned with non-agricultural institutions in Mali (the Administration, Education, Health, and Tourism), those which are linked to agriculture through the Ministries of Rural Development and Finance, and, finally, the religious missions. A number of less formal institutions are also found in Dogon country; for example, research teams from foreign universities and

Figure I. Institutions in Dogon Country



missions from international development agencies. An analysis of these latter, something which would require a lengthy discussion, will not be included as a part of the present report.

I. Government Institutions

A. Non-agricultural Institutions -

Non-agricultural institutions do not have direct responsibilities in the agricultural domain; instead, they deal with factors of production such as people and land. These institutions include the Administration, Education, Health, and Tourism.

1. The Administration

In our study of the Administration we were especially interested in programs at the arrondissement level, having their origins "from above," and directly concerning peasant producers. Before moving on to the analysis, however, it will be necessary to provide a brief description of the administrative divisions within the country.

At the national level the administration is represented by the Ministry of Internal Defense and Security. Mali is divided administratively from top to bottom into regions, cercles, arrondissements, and villages. Regions, of which there are seven (Kayes, Bamako, Sikasso, Ségou, Gao, Mopti, and Tomboctou), are adiminstered by military governors. The cercles are administered by commandants who function under the authority of the military governor. Arrondissements are administered by arrondissement heads (chefs) who in turn operate under the authority of the cercle commandant. The village, finally, is (theoretically) administered by a headman (chef de village).

Several cercles make up a region just as several arrondissements make up a cercle, and several villages an arrondissement. The arrondissement is

the last direct link between the central government and the rural population. Dogon country encompasses the Bandiagara, Bankass, and Koro cercles and part of the Douentza cercle.

While the arrondissement head carries on his administrative duties, he affects the social, economic, political, and cultural systems within his areas of jurisdiction. In his role as the state's legal officer, he carries out marriages, and handles conflicts and disputes occurring in the arrondissement, or refers them to a judge or the cercle commandant. He registers births, censuses the human and livestock populations, and annually collects taxes which are then forwarded to the cercle commandant. He oversees and supervises all technical services--agriculture, health, education, cooperation, etc.--all of which keep him up to date on the problems they face and the solutions they propose for them. It is necessary for both the arrondissement heads and the cercle commandants to keep informed on all aspects of life in their administrative areas.

Major disputes within Dogon country occur over divorces, the kidnapping of women,[1] damages caused by animals (especially cattle), and the demarcation of territories between villages. The boundary problem is a very common one

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[1] This is a custom among the Dogon. It makes it possible for a married woman to leave her household and to live with another man whom she likes and who is couring her. If the woman leaves with her paramour, she is said to have been kidnapped. Her husband then goes in search of her. If he finds her, he askes her to return home. If she agrees, then so much the better. If she refuses to return, the husband may seek the help of the arrondissement-head. During the precolonial era--before there were arrondissements--the deserted husband sought assistance from the notables in the kidnapper's home village. The resolution of these disputes is very difficult and becomes even more complicated if the woman stays with her "kidnapper" for a week or more during her menstrual period. According to Dogons interviewed in Douone, if she conceives, the father of the child is always the man with whom she stayed during the last days of her last menstraul period. Husbands do not want their wives to conceive with other men.

between Plateau, Escarpment, and Séno villages.[2]

The arrondissement-head or his representative also attends the selection of village chiefs and their counselors. It is claimed that the arrondissement-head and his party actively try to influence villagers in their selection of candidates. In such cases, the people have very little confidence in the chiefs elected, for they are seen simply as representatives of the Administration, hence the authority of the central government. Problems can also arise in cases where the selected village chief is not a member of a traditionally powerful family. Villagers in Dourou are pleased with their chief who is a member of such a family, the Hogon's family, even though there are no more Hogons. On the other hand, in Dourou-Taga, the quarter where I lived, the first counselor is not well-liked. We don't know why this is so, for he was among the first people to practice and propagate Islam.

The Administration has an influence on agricultural production systems. It intervenes in land issues through the redistribution of holdings during

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[2] Some villages are older than others. The older villages are, naturally, the owners of the new villages' lands. Given the tradition of rights of possession and the political changes which have done away with customary territorial property rights and have made the state the absolute owner, the new villages settle on lands beyond the traditional limits. This outrages the owners and is the cause of disputes. Judges, arrondissement-heads, and cercle commandants are slow to deal with these land disputes, or neglect them altogether, either because they are too complicated, or because the peasants involved have not collected a sum of money (a "pot-devin") to give to the adjudicator in order to "promote" their cause. Disputes of this kind came to our attention, especially in Escarpment villages. Similar tensions have caused opposition to develop between Dourou-Yawa, Guimini, and Séno villages, such as Koporoké-nié-Pé, some twenty kilometers distant from the Escarpment. Dourou-Yawa and Guimini have fields in the Séno, but the villagers are unable to dig wells there, and so must walk more than five kilometers in order to obtain water. The inhabitants of Koporoké-nié-Pé do not want any wells dug for fear that once the wells appear a more permanent settlement by Dourou-Yawa and Guimini villagers will follow. The administration often remains passive in such situations which may involve several officials from the same arrondissement, from different arrondissements, or from several cercles.

inter-village boundary disputes. It also intervenes in the demarcation of cattle-corridors and stopping places for transhumants. In addition, it sets up a schedule for herd movements. The Administration is also involved in millet commercialization and purchasing and sales activities of basic groupings; in short, it enters into all aspects of arrondissement life. The Administration follows up all development programs.

2. Education

Education in Dogon country began with the Catholic and Protestant missions which are well-established in the area and know for the quality of their school programs. Public schools, few in number, were rarely found at the arrondissement level, but since Independence in 1960, public education has been expanding. Today schools are located in each arrondissement seat and several villages have classrooms. There are two schools in the Dourou arrondissement: one in Dourou, established in 1972, with six classrooms, and one in Nombori, founded in 1977 with one classroom. Other villages have also requested schools; usually their requests are transmitted via functionaries coming from the villages in question. The poorly-located Nombori school was built because of requests presented by functionaries from the village. Villagers ask that schools be built in order to avoid sending their children to schools in distant villages.

In the Dourou arrondissement as most everywhere else in the Malian countryside, the schools are constructed by the villagers. When the schools are built entirely of local meterials (mud bricks 'banco', straw, etc.), the State incurs no construction costs--the energies and resources are provided by the local population. On the other hand, if the classes are built of materials not found locally (brought in from elsewhere in Mali, or imported, such as cement, sheet iron, and certain kinds of wood), the State pays the purchase and transport prices and provides the salaries for qualified masons and carpenters. In Dourou there are

five classes built of stone (provided by the populace), and cement-roofed with sheet iron. Their financing and construction were made possible largely due to the dynamism of the arrondissement-head. The lack of wood (timber or lath), transportation problems, and administrative stinginess all act to impede the progress of classroom construction. Major problems facing the schools are the following:

(a) Equipment problems - Equipment shortages occur in public schools throughout Dogon country; e.g., insufficient classrooms, not enough tables and benches, and a lack of school supplies (notebooks, chalk, pencils, books, and slates). In Dourou, Nombori, Koporo-Pé, and in many other places, we have seen students sitting on low walls made of banco, without tables; some students had no slates. Books are generally in short supply and, in some cases, nonexistent.

(b) Human problems - Students at the Dourou school who come from neighboring villages are unable to return home during the midday hours. Because they have no places to stay in Dourou, most of them do not eat during the day; a few get by with peas, peanuts, or millet gruel they bring from home. It is a pitiful sight--these poor children--alone, in pairs or threes, sitting under the practically shadeless trees that surround the school, in the overwhelming heat of March, April, and May. At one time there was a school canteen for those students without hosts in Dourou, but the teachers, unhappy with their meager salaries and badly in need of money, made off with the canteen funds. There is no more money for the canteen.

(c) Payment problems - Each year the peasants are obliged to contribute a specified amount of money to the schools. Some of the parents fail to see why their children are taken away from home, much less the necessity to pay out cash, and refuse to turn over the required sums unless they are threatened with prison.

(d) Teacher problems - Teacher shortages occur in many schools, and one often sees one teacher in charge of two classes. On the Plateau this problem is due largely to the region's isolation, difficulties of access, and the lack of

places for recreation and relaxation. Teachers--and other functionaries as well--like to dance, but the Dogon are a bit behind when it comes to this sort of thing.

In addition to the problems listed above, rural education has an influence on agricultural production. Children who attend school are not available at home for agricultural work, especailly during the planting and harvest of rainy-season crops, or for the watering of gardens. This labor shortage influences the size of the productive agricultural holding. Production is also influenced by the shunting of household funds for purposes of student-maintenance (the annual payments and purchases of school supplies).

The school's problems are at once material, social, economic, and cultural. Insufficient teaching material, the hunger experienced by those students who are torn away from their home villages, the absence of a program suited to the needs of the milieu--none of these contributes to the individual and intellectual development expected of the students. The students realize this and know that many among them fail and are dismissed after five years in school. We were told the following in Nombori: "By doing higher-level studies one is able to get a good job and earn a lot of money. But those who do not pass at Bandiagara[3] are wasting their time. They will be of no use to themselves, to their parents, or to society. They are lost." These remarks are quite true. Prior to Independence and even three to five years after, fifth-level students were highly-esteemed and could get desirable positions. Today all this has changed; schools are found everywhere. The country is full of unemployed ex-students, and even graduates; they are

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[3] At Bandiagara the ninth level is equivalent to nine years of study. At the end of nine years the students take an examination (the DEF), success on which is required in order to enter the lycee. Ninth-year students are permitted to repeat only once.

plentiful in Mopti and Bandiagara. They form groups and drown their troubles in tea, cigarettes and even drugs while listening to "pop" music programs broadcast from Washington, DC and Paris.

3. Health

One cannot ignore the importance of health for individual and societal productivity. Health influences all aspects of human activity: productivity, fertility levels, and overall population growth. This fundamental importance is reflected in the presence of health services in the rural milieu. Dispensaries and maternity clinics are found in all arrondissement seats, but these health services encounter numerous difficulties, instances of which we will examine in the case of Dourou.

Dourou has a dispensary and a maternity clinic. These are staffed by a male nurse (who is well-qualified to give shots) and a midwife respectively. Due to a lack of equipment, the male nurse's second wife stays in the dispensary. Due to the irregular and generally insufficient replinishment of medical supplies, the nurse may spend up to four months without medicines. Several times we found him without any nivaquine, quinine, aspirin, or mercurochrome even though malaria and skin infections (caused by sores and injuries) are very common during the rainy season. But even when he is well-equipped with medicines the villagers do not go to him for care, either because they must pay high prices (at least 800 Malian francs, or c. $2.00) for the medications, or because traditional methods of treatment are more effective. People do go to the dispensary because of snake-bites but, since there is no refrigerator at Dourou for serum storage, victims are taken to Bandiagara.

Unlike the dispensary, the maternity clinic is a very busy place. Many expectant mothers in Dourou register there and deliver their babies in the clinic, and even women from other villages, suffering from birth complications, are

brought to the Dourou clinic. The heavy use of the maternity clinic is due to the effectiveness of the midwife and the low registration fees. If serious complications arise, the women are taken to Bandiagara. Very often transportation is not available for evacuations, and the patients must be carried by the villagers.

In order to better serve the population and contribute to its development, the dispensary ought to be better equipped and supplied with free or inexpensive medicines. If these conditions were met, the rural population would use the facility more. This lesson has not been lost on the missions whose dispensaries are always taking in the sick. Unfortunately, the missions accept Christian patients most of the time if not exclusively.

4. SMERT (The Malian Association for the Development of Touristic Resources)

The main SMERT office in Dogon country is located in Sangha, the village visited most often by tourists. This year, however, a SMERT representative was assigned to Dourou. The agent's task is to collect the 4,000 MF tourist fees and, from time to time, take especially curious tourists to points of interest. Touristically speaking, the Dourou arrondissement has more to offer than Sangha; the ladders at Guimini and Dourou, for example, evidence a great deal of ingenuity--the work of magic pure and simple, or that of science?

Even though tourism does not directly influence the agricultural process, it does affect production systems and the people's way of life. Modern dams were constructed on the Bandiagara plateau because of tourists who brought the existing needs to the attention of their home governments and international

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* "In 1976-77, the building was more often closed, the door barred, than open--as was the case with the dispensary. The lack of materials is a constant problem--the materials that are sent usually are 'lost' en route--but beyond that are the attitudes of arrogance, disregard, and financial exploitation of the local populace..." (RKG March 15, 1979).

development organizations. In providing their support, however, through the purchase--often at very low prices--of masks and statuettes, tourists and travelers have taken away the region's major cultural resource. Dogon youth, always looking for money, have no hesitations about stealing fetishes and ancient works of art in order to sell them. Young people in Dourou and Pellou told us that cash from the sale of a statuette or mask is enough to enable them to escape poverty. With ten million Malian francs, one has quite enough to be both wealthy and happy.

The development of tourism in Dogon country could generate enough revenue to finance development programs within the region; even in the present circumstances the reinvestment of SMERT revenue could provide the basis for numerous activities, such as dam construction;[4] unfortunately this does not happen.

B. Institutions linked to agriculture -

Our principal concern in this section is with those services that are part of the Ministry of Rural Development, Finance, and Public Works. The rural development services are directly involved in agricultural production; the other ministries provide needed inputs (e.g., equipment, fertilizer, money, hydro-agricultural installations, etc.,). These are OPAM (The Malian Agricultural Products Office), SCAER (The Agricultural Credit and Rural Equipment Association), and the hydrological service. The latter will not be discussed in this report.

1. Services involved in the agricultural process:

Only those services with which we were able to obtain interviews will be discussed; these include the Mopti Millet Program (OMM), Cooperation, Genie rural, and ODEM (The Mopti Region Livestock Development Program).

(a) The Mopti Millet Program (OMM).

Since 1968 the Malian government has been involved in development

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[4] Presently SMERT revenue at Sangha is sent to the national office.

interventions with the object of reducing if not eliminating the threat of famine. OMM reflects this governmental orientation. Created in 1972 and presently funded almost entirely by USAID, its major goal is the promotion of millet production in the Mopti region. From its inception up to 1974, OMM's activities covered the two largest millet-producing cercles in Mali: Bankass and Koro. Presently OMM programs extend to the entire flood plain region of Mopti located on the right bank of the Niger River; specifically the Bankass, Koro, Bandiagara, Douentza, Mopti, and the Djenné cercles. Two arrondissements within the Bandiagara cercle (Wo and Goundaka) are also included in the OMM programs. In the remaining areas of the cercle, largely rocky plateaus, OMM is planning a market-gardening component to be known as "Operation Market Gardens" (AM).

Attainment of OMM goals will require an intensification and modernization of production through the diffusion of specific productivity themes to peasants, e.g., the use of seed-dressings, fertilizers, animal traction, and stright-line planting.[5]

OMM extension methods are of the classical kind, and might be described as being based on the "oil drop" principle. A number of peasants are selected who are then introduced to and adopt the innovations selected for extension in rural areas. The hope and expectation is that through observation of the superior results obtained by the innovative growers ("model farmers" or "paysans pilotes"), others will also accept and apply the new techniques in their own fields.

Thus a number of paysans pilotes have been selected by OMM on the basis of their having satisfied the following criteria:

Voluntariate - The individual must show a voluntary willingness to use the new methods.

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[5] These techniques are totally unknown in the traditional cultivation methods.

Notoriety - The individual must be well-known and respected in the community.

Possession of land - The individual must own the land on which the new techniques will be used.

Possession of equipment - The individual must have the equipment required for use with the new techniques.

Variable agricultural inputs are supplied without charge to the individuals selected. There are some problems, however, in securing enough participants for the programs. Not all individuals are able to pay for the necessary equipment--the plows, hoes, multicultivators, and harrows, etc.; in addition, there are the additional costs of keeping work animals. Some peasants, unfamiliar with the new and expensive techniques, give up after two years, and recruitment of volunteers becomes increasingly difficult.

The effectiveness of the new techniques is publicized in order to promote them. Some peasants respond positively, want to try them, and contact the extension agents, but the high cost of the various inputs discourages many, and yields have not increased very much.

OMM is also concerned with plant protection and is involved in campaigns against plant pests and diseases, but supply-shortages and a lack of storage facilities for the materials severely hamper the effort. The problems are compounded by an insufficient knowledge among agents of the nature of plant diseases and the appropriate substances to be used in each case. Several millet diseases are unknown to them.

OMM also deals with rural infrastructure. Thus one finds branches of OMM concerned with agricultural roads and wells. In this case, road improvements are designed to facilitate the shipment of grain during the commercialization period, and the delivery of agricultural inputs to peasants.

These are the main activities of OMM insofar as millet production

is concerned. The commercialization of millet in the region is also a part of OMM's responsibilities, but ever since the beginning OMM has functioned de facto as an intermediary between OPAM and peasants who are obliged to sell their grain to the government, and thus OMM has been concerned solely with the collection of millet. Our third report entitled "The Destination of Products" (June 12) describes the functions of OMM during the commercialization period. For additional details, the reader is referred to that report.

In order to carry out its program, OMM set up an organizational framework identical to that found in other Malian development structures. The OMM intervention zone is divided into SDRs (Rural Development Sectors) at the level of the cercle, ZERs (Rural Expansion Zones) at the arrondissement level, and SBs (Base Sectors) at the village level. Each SDR is directed by a SDR-head, generally having an Engineer of Applied Science level of education (i.e., having obtained a first university agricultural degree). ZER-heads have often attained the level of ITA (Agricultural Works Engineer). The SB-head or base-organizer, located at the bottom of the organizational ladder and having the greatest contact with the peasantry, is generally a monitor.

All SDRs are linked to the directorate of the OMM extension service located in Mopti. OMM carries out its activities by working through the extension structure. The major focal points of much activity are the SB-heads. Each agent submits a monthly report to his superior in which regional conditions are described; these include information on rainfall, crop conditions, equipment purchases, and estimates of areas planted as well as expected yields--all made without the benefit of measuring devices.

Operation Market Gardens (L'Action Maraichère, or AM).* - Operation Market Gardens (AM) is an OMM program which affects the Bandiagara plateau, and began in 1977. The major objectives of AM are (a) the increase of market-garden production on the plateau where the inhabitants raise onions, tomatoes, and peppers for sale, and (b) the purchase of millet in order to complete their insufficient production.

The AM program proposes to increase production through the promotion of fertilizer, selected seeds, and new plant varieties; but in order to do so, is seeking detailed information on selected technical aspects of local conditions. Thus during the 77/78 campaign AM began a study of the water requirements of onions in three Plateau ZERs: Bandiagara, Sangha, and Dourou. During the following campaign studies will be made of the response of local onion varieties to chemical fertilizers and manure.

For the time-being, AM has assigned agents to the three largest onion producing ZERs or arrondissements: Bandiagara, Dourou, and Sangha. AM also expects to include the Ningary and Kendie arrondissements which produce substantial quantities of onions and tomatoes.

The only role of AM will be to supply needed inputs to market gardeners, such as fertilizer, water, and improved watering equipment--insofar as these contribute to greater garden profitability. AM has nothing else to offer through extension, but should also give advice (technical information) on the uses of the new inputs. Thus it is essential that AM agents know the technical characteristics of the inputs as well as the response of local varieties to their application. Unfortunately this is not the case.

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* "L'Action Maraichère is a very questionable undertaking, and villagers are well advised to be cautious, considering their experience with forced grain commercialization. The Dogon who are so very industrious and inventive are taken advantage of at every turn by the government and its representatives." (RKE March 15, 1979).

Peasants and merchants are hostile toward the AM program. They fear they will have to sell their onions and tomatoes to AM just as they are already obliged to sell their production in all other similar government programs; they are already required to sell their millet to OPAM through the Cooperation service.

(b) Cooperation.

The structure of the Cooperation service consists of several levels of organization. There are directorates at the national and regional levels, offices at the Assistance and Control Center (CACs) level within the cercles, within the Federations of Rural Groupings (FGRs) at the arrondissement level, and within the Rural Groupings (GRs) or "cooperatives" at the village level. There are no Rural Groupings in the Plateau; there, the FGRs function as "cooperatives."

In response to our inquiries, we were told that the goal of the Cooperation service is the promotion of the cooperative movement as a means of contributing to rural development through the organization of peasant producers. Actual observation of the service's activities, however, and even inquiries addressed to most anyone (including officials), leads one to conclude that Cooperation does everything but promote peasant organization. It is, in fact, a very bureaucratic state structure which, in its present form, is unable to effectively bring the producers together. What is more, the peasants' participation in the FGRs is presently mandatory.

The major functions of the Cooperation service are the following:

(1) The collection of millet for OPAM in the non-operational zones (see my third report on the destination of products).

(2) The purchase of some commodities for resale to the populace. At the level of each operation, the CAC acts as an intermediary between the state organizations and the FGRs.

The Dourou FGR collects millet obligatorily sold to OPAM by the peasants. The FGR also sells sugar, salt, cigarettes, kerosene, soap, cloth, and powdered milk purchased from SOMIEX (the Malian Import-Export Organization). At one time the FGR also sold medicines purchased from the Malian Pharmacie Populaire. The FGR supplies functionaries in the arrondissement with rice and millet received from the Bandiagara CAC, which is supplied in turn by OPAM.

Peasants buy very little from the FGR; mostly kerosene and sugar. Stocks being small, the functionaries are the first to be supplied. The FGR does not sell grain (millet and rice) to the peasants even though they are in need.

The Dourou FGR had realized substantial profits but not much for redistribution among the villages in the arrondissement. The villages gained little, for a CAC agent made off with the funds. Since that time, the FGR's financial situation has been disastrous.

The Federation, started with funds supplied by the peasants, is not concerned with their needs. Instead, the FGR's major role is to supply functionaries with the basic staple products they need; the functionaries are the only ones to really benefit from FGR services. Peasants participate in decision-making, but are intimidated by the functionaries.[6]

(c) Génie Rural.

Génie Rural is concerned with hydro-agricultural works (dam-construction on the Bandiagara plateau, especially in mares), dyke and road

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[6] The FGR is composed of a general assembly, an administrative council, a manager, selected by the peasants, who takes care of the deliveries and sales of goods, a technical assistant from the Cooperation service who takes care of the accounts, and a president (peasant) who surveys all income and outgo and who calls meetings. Village headmen participate in the general assembly.

construction, flatland improvement, and well-digging.

(d) ODEM (The Mopti Region Livestock Development Program).

Mopti is Mali's principal livestock-producing region; it contains 41% of the country's cattle while accounting for only nine percent of the national population. Because of the importance of cattle-raising in the Mopti region, ODEM was created in 1976. Financed by IDA, a division of the World Bank, ODEM's objective is the promotion of cattle-rpoduction in the region through the use of a rationalized production strategy. The following are included in ODEM's activities:

1. Improvement of pasture areas,
2. Well-construction in pasture areas,
3. Creation of five cattle markets,
4. Construction of a slaughterhouse,
5. Creation of a station for pasture research and experimentation, especially with bourgou,
6. Organization of an animal health program.

Linked to the Livestock Service, ODEM is based in Sevare with an institutional structure similar to those organizations seen earlier.

The major concerns of ODEM in Dogon country focus on the Séno where a great deal of livestock production occurs. According to the ODEM representative, the organization has invested four milliard Malian francs ($8,000,000) in one-third of the Séno for the improvement of pasture, for forestation, and the installation of an animal-care infrastructure (animal-posting areas "pictane," medicines, interdisciplinary staffing resources, and pastoral education). ODEM expects to begin a pasture rotation system there also, with demarcated parcels and permanent wells.

Presently ODEM does not plan anything more for the Bandiagara

plateau than the annual vaccination program against rinderpest, peripneumonia, and anthrax; nonetheless, sheep production is also very important there. Plateau Dogon raise sheep, goats, and donkeys in order to secure the manure they need for their millet fields and gardens, their major sources of revenue.

Major problems in Dogon country are insufficient pasture and water. During the dry season animals are watered at wells sixty meters and more deep, and very often with inadequate aquifiers. Herders often spend at least four hours in order to draw water sufficient for their animals.

Improvements in livestock production would contribute to better living conditions for the entire population of the region and would also add to the national economy.[7] But improvement is not easy. The herds are already widespread and become even more so yearly while available pastureland declines under the impact of a growing population and the deterioration of the natural environment which obliges the peasant growers to cultivate larger areas.

2. Supply structures

Organizations supplying inputs to the population are part of the Ministry of Finance; specifically these are OPAM and SCAER.

(a) OPAM (The Malian Agricultural Products Office).

Observation of Figure I reveals that OPAM is not represented at the arrondissement level.[8] In Dogon country OPAM buys millet from the peasants and sells it and rice to functionaries in the towns and to the FGRs which then sell it solely to functionaries in the different arrondissements.

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[7] The second report "Systems of Production" (February 1978), describes the interaction between herders and farmers.

[8] In some regions of Mali, OPAM is represented at the arrondissement level by a storeman.

Millet and grain purchases are carried on by development programs. Sales and financing of the purchases are assured by OPAM.

(b) SCAER (The Agricultural Credit and Rural Supply Organization).

SCAER was formerly linked to the Malian Development Bank (BDM), but in 1971 became financially autonomous with the object of furnishing agricultural, livestock, and fishing supplies and loans.

SCAER's major role in the Mopti region is to supply OPM with equipment, fertilizer, and plant treatment products. SCAER does not carry on transactions with other development programs based in Mopti because the latter prefer cash loans whereas SCAER's national headquarters does not allow such loans at the regional level.

SCAER also functions as a commercial intermediary. It purchases equipment and goods--mostly imports--and supplies them to various government programs, the first to be supplied, followed by other consumers--peasants outside the program's scope, and functionaries and merchants involved in agriculture. Through their agents the various development programs supply the peasants with inputs and recover their value (in cash or in credit) for reimbursement to SCAER. According to SCAER, these reimbursements are not always made, and this leads to financial difficulties.

II. Private Institutions: The Religious Missions

The regional office of the Catholic Mission, responsible for the propagation of the Catholic faith, is located in Bandiagara. Presently the Mission is involved in a number of activities of importance to rural development.

The Mission is concerned with education. It operates several schools--all known for their high quality and enjoying the highest success rates on the national examinations. The Mission is also involved in agriculture, and

supplies fertilizer and equipment to the villagers. It operates a dispensary and maternity clinic where care is provided free of charge. The Catholic Mission is also involved in civil engineering works--and digs wells. Unfortunately these different services are available only to Catholics who constitute a minority on the region. The Bandiagara, the Mission sells pumps for watering gardens to Catholics for 30,000 Malian francs ($70) and to functionaries for 90,000 ($210); it does not sell to non-Catholic peasants.

The Mission has a contract with SCAER to provide supplies to the Plateau. The agreement was a serious error on the government's part, for the Mission concerns itself only with Catholics. To benefit from its services, one must convert. This is a powerful attraction, hence a strong acculturating force. Numerous advantages are afforded Mission clients: prices below government levels, purchases on credit, and delivery of goods to the customer's home.

In Pellou we observed an incident caused by these kinds of benefits. The peasants had requested that AM supply them with some fertilizer. Their orders were filled, the fertilizer arrived in Dourou, and was stored there. Before distribution could occur, however, the Mission supplied its Catholic clients. Once the others became aware of the situation, they refused to accept the fertilizer sent by AM. Several hours of negotiations were necessary in order to convince the peasants to take their fertilizer, and even then the dispute was resolved only because of the skills of an AM agent.

There are also Protestant Missions in the region, but their activities are more discrete and we did not obtain any information on them.

In addition to the missions, several foreign private and public organizations operate in Dogon country.

Conclusion

Several "modern" institutions and organizations are to be found in Dogon country. Each influences the life-style of the people as it acts upon technical, economic, social, and cultural factors. The numerous national organizations are all externally financed. Despite their autonomy at the regional level, they are constantly subject to the caprices and bureaucratic controls of the national offices based in Bamako. Since interventions in the rural milieu are interrelated, the delimitation of functions is not clear. Some organizations interfere with the actions of others and insist on the right to do so. Disputes are as common as non-reimbursements. (Elles se rejettent les fautes; page 32 in text): the development programs do not reimburse SCAER, either because OPAM does not reimburse the programs or does not acknowledge commercialization costs that surpass the provisions of fee schedules. The Cooperation Service claims control of the dams on the Plateau because of its self-proclaimed cooperative character. OMM also claims control because AM is concerned with the improvement of onion production. All things considered, the different institutional structures, especially those linked to agricultural processes, are in need of a clearer role-definition if the peasants are to benefit from their presence.