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# The Anthropology of Rural Development in the Sahel

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THE ANTHROPOLOGY OF RURAL DEVELOPMENT IN THE SAHEL

PROPOSALS FOR RESEARCH

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*by*

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INSTITUTE FOR DEVELOPMENT ANTHROPOLOGY, INC.

BINGHAMTON, NEW YORK

July 1977

The INSTITUTE FOR DEVELOPMENT ANTHROPOLOGY, Inc. was organized in June 1976 under the not-for-profit laws of the State of New York:

To apply the skills of anthropology and related disciplines to improve the planning, implementation, and evaluation of development projects (both domestic and foreign) so that the assisted peoples are able to participate more effectively in the development process and to benefit thereby more directly.

To provide linkages between development social scientists and institutions in the United States and programs of social and economic development as defined by governments and donor agencies.

To promote and undertake research at both the project-identification and project-implementation level, in the general areas of social soundness and impact analysis. Research actions are designed to identify ways to increase the involvement of the local people in the conceptualization, planning, implementation, management, and assessment of problems and development actions. The research efforts identify and analyze local strengths and capacities upon which developmental actions can effectively be based.

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### ACKNOWLEDGEMENTS

During our Sahelian visit in December 1976-January 1977 we were aided by many persons, including officers of the Agency for International Development's Area Development Offices in Dakar, Niamey, and Yaounde, and Country Development Offices in Bamako, Ouagadougou, and N'djamena. We are grateful for the many courtesies shown us. Although we cannot acknowledge them all by name, we wish particularly to thank Gene Chiavaroli and Art Fell, Dakar; Ron Levin and Barbara Spicer, Bamako; Albert Baron, Jay Johnson, and Murl Baker, Niamey; John Hoskins, Don Atwell, Tom Luche, Carroll French, and Allen Bell, Ouagadougou; John Lundgren, Dayton Maxwell, Elizabeth Wilcox, and Jack Morris, N'djamena; and John Koehring, Norman Green, and Albert E. Henn, Yaounde.

The Research and Planning Staff of the Regional Economic Development Services Office/West Africa, Abidjan, played a formative role in this project. We must single out Miles Wedeman, REDSO/WA Director, who conceived of the project initially and provided it with continuing support, and Dan Aronson, staff anthropologist, who accompanied the team during most of its travels and played an active and helpful part in conceptualizing many of the ideas that appear in the text.

Repeated mention is made in this report of the need for host country professionals to direct and carry out the proposed studies. We should like to acknowledge here with thanks the help of the following host country colleagues who consulted with the team in the field: Jacques Faye, sociologist, Institut Sénégalais de Recherche Agricole; Diouldé Laya, anthropologist, then Director, Institut de Recherche en Sciences Humaines, Niamey; Michel Keita, sociologist, I.R.S.H., Niamey; Youssouf Diawara, sociologist, Centre Voltaïque de la Recherche Scientifique, Ouagadougou; Joséphine Guissou, sociologist, Société

Africaine d'Etudes et de Développement, Ouagadougou; Laoukissam Feckoua, geographer, Director, Institut National des Sciences Humaines, N'djamena; Samuel Ndoumbe-Manga, Assistant Director, Institut des Sciences Humaines, National Office for Scientific and Technical Research, Yaounde; Louis Bissek, social economist, Institut Panafricain de Développement, Douala; Cosme Dikoume, social anthropologist, I.P.D., Douala; and Ibrahima Diallo, sociologist, I.P.D.

Finally, with gratitude we acknowledge the assistance of Laura McPherson, Center for International Studies, Cornell University, who shared with us her intimate knowledge of the Onchocerciasis Control Program in Upper Volta; Brian Schwimmer, Department of Anthropology, University of Manitoba, who advised us on the application of locational analysis and central place theory to the understanding of Sahelian marketing systems; and Bernard Riley, geographer and ecologist, University of California-Santa Barbara, whose sensitive appreciation of the African landscape has been an asset of inestimable value.

In addition to seeking guidance from colleagues and A.I.D. officers, we consulted a large number of documents. Of these, we wish to cite two which were central in informing our thoughts:

"Criteria for the choice of action programmes in the Sahel."  
Club des Amis du Sahel. 29 October 1976.

Proposal for a Long-Term Comprehensive Development Program in the Sahel. Agency for International Development Report to the United States Congress. April 1976.

DWB, Siakago *via* Embu, Kenya  
MMH, Binghamton, New York  
TS, Pasadena, California

July 1977

## SUMMARIES OF SECTIONS

## 1. PASTORAL SYSTEMS.

Does the idea of the "tragedy of the commons" accurately characterize the Sahel? An examination is made of this and other myths (that pastoralists are rigid, conservative, destructive of environment, care more about social value and prestige than about economics). But studies show pastoralists to be dynamic and opportunistic, making the only possible use of marginal lands, and having complex economic systems. Many of the approaches to pastoralists have been colored by anti-nomadism, with ill-fated attempts at compulsory sedentarization and range management. We need now to know more about indigenous systems and perceptions, and to examine in detail the adaptive strategies of the herders.

The main features of pastoral societies are examined, and a detailed list of specifics presented about which we need more precise information. Much useful research has been done; what we propose will complement this.

We propose a long-term, multi-component integrated study of resource management, over 15 to 25 years, starting with an 18 month review of the existing knowledge, both written and "oral". This will be followed by a selection of field research sites, with a series of studies of selected societies, each conducted by a two-person team (cultural ecologist and pastoral ecologist). Studies will take 18/24 months. Methods will include usual ground techniques (which are spelled out) plus use of satellite imagery, bio-telemetry to track animal movements, and aerial photography.

Research

- a) A thorough review of the literature and of existing knowledge; one

SR (senior researcher), taking 15 months; will need provision for travel and consultants.

b) A longitudinal, multi-component integrated study of resource management, spread over 15 to 25 years. Individual studies, under direction of an ecological anthropologist and a pastoral ecologist, will take 18 to 24 months each. Exact sites to be decided on following phase one, the review of the literature.

## 2. FARMING SYSTEMS.

In our research, the basic need is a close examination of the farmers themselves, and their perceptions and knowledge. We shall look at successful adaptive strategies, to identify those which might be replicated elsewhere. This will involve examining problems of identifying local leadership, and also problems of center bias against periphery. Research will cover both extensive and intensive farming systems, beginning with a thorough review of the literature (which is quite extensive) of Sudano-Sahelian farming systems; we shall attempt to present an inventory of the state of knowledge. This will be followed by a workshop, which will consider specific proposals for research and select sites. For the field study, a team of three senior researchers will spend two years on about six separate projects, meeting periodically at seminars. Training of local researchers will be included.

### Research

a) A literature search, and making contact with host country nationals; one SR, 12 months.

b) Workshop to be held at end of phase one.

c) Field study (locations decided at workshop); three SR's, supervising about six projects, over two year period.

2. Studies are needed because at present we lack not only a tenable general theory, but also adequate data on Sahelian marketing systems.

3. We propose selecting three marketing regions for both intensive and extensive study.

4. The studies will cover historical, geographical, socio-economic, and governmental aspects. Although broad in scope, the central focus will be improvement in agricultural production and efficiency, to the benefit of the rural producers.

5. Initial stages will take 18 months.

#### Research

a) Literature search and contacts; three months; one SR.

b) Field research; studies of three regional systems; twelve months; three SR's and 3 junior researchers.

c) Data analysis and recommendations; three months; same staff as phase two.

#### 5. HEALTH SYSTEMS.

1. Until recently, development actions in the health field have emphasized the provisioning of clinical facilities and personnel — hospitals and doctors — primarily in urban centers.

2. During the past few years, there has been a shift of interest away from capital intensive clinical medicine to labor intensive preventive health care in rural areas.

3. In order to maximize the advantages from this shift of interest to the rural poor, it is essential to involve the traditional practitioners and the traditional health delivery systems.

### 3. LOCAL POPULATIONS AND RIVER BASIN DEVELOPMENT.

There is still an enormous demand for capital-intensive projects, especially for large hydro-electric dams: the demand comes from donors, engineers, and from host country leaders. But most of the planning has been short-term, and has narrowly focused on water resource management and energy problems. Integrated river basin development has been neglected, despite the great possibilities that exist for significantly improving the lives of many people. Planning has also been marked by the "development from above" syndrome, with no local participation. We propose to extend the use of social soundness analysis on such plans, and to tie research closely to development, especially in relation to the Niger River Commission. We propose two two-year studies of (a) flood water farming and (b) resettlement. Details of proposed research are provided.

Research: Floodwater farming.

a) Preparatory phase, comprising literature search, mapping of recession farming areas, and selection of research sites; three months, 2 SR's.

b) Field studies: 2 SR's and about 4 junior researchers, HCN's if possible, to work for 15 months.

c) Data analysis and development strategy; six months.

Research: Resettlement.

Outline similar to Floodwater Farming, although requiring about 40 percent fewer person/months.

### 4. RURAL MARKETING SYSTEMS.

1. Agricultural marketing systems are an important part of rural development.

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4. Host governments and donor agencies are hampered in their ability to do this by a lack of detailed analytic knowledge in this area.

5. We therefore recommend AID support for:

a. the training of host country medical social scientists — particularly medical anthropologists, sociologists, and geographers — and their placement within Ministries of Health, both in administrative and in research positions;

b. a workshop to summarize the state of knowledge on traditional medicine in the Sahel and to make recommendations relating that knowledge to development interventions in the health sector;

c. a field research project, in association with a development effort aimed at using paramedical personnel to better the health conditions of the rural poor (the "village health team" approach).

#### Research

a) Literature survey; 12 months; one SR.

b) Workshop.

c) Field studies, three SR's, total of 24 months involved in Niger Rural Health Projects.

d) Write-up and analysis; 12 months.

#### 6. DISEASE CONTROL AND HUMAN SETTLEMENT.

Diseases (especially onchocerciasis and bovine trypanosomiasis) are responsible for keeping much of Africa's limited productive land empty of people. With growing populations, there is an urgent need for more land to be opened for settlement. In the past, colonization of new lands has been done by:

(a) spontaneous settlement;

(b) spontaneous settlement facilitated by government;

(c) government controlled settlement;

(d) compulsory relocation.

We strongly recommend that course (b) be actively encouraged, especially in the OCP areas of West Africa, which have the capacity of absorbing nearly a million people.

The OCP is critically examined, and proposals made for an intensive ten-day conference, centered on officials from the seven OCP countries, with participation of experts from outside. The conference will both examine in detail past attempts at settlement, and consider the implications for future developments.

#### Research

a) Ten day working conference at Ouagadougou, with seven OCP host countries plus invited others.

(1) examine, with planners and researchers, different ways of colonizing new lands;

(2) consider the developmental implications, making specific recommendations for research, and providing details of past projects as a guide.

b) Consequent field research.

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Report written pursuant to  
Contract No. REDSO/WA-77-91  
Agency for International Development

## INTRODUCTION

Nearly every project proposed for AID support in Niger is marked by a lack of balance between the level of expertise that has been directed to the material, scientific, and financial aspects of development planning and the total lack of attention that has been directed to the behavioral sciences dimensions of the problems of project implementation and on-going evolution. Typically (one is tempted to say almost without exception), there is no one professionally assigned at the project level to this major aspect of the development task. As a result, one must ask those who are in charge, generally highly trained specialists in quite alien fields, for their impressions of how project implementation is to be accomplished vis-à-vis the rural population. And typically, the response one receives is that the problem is a major one. But there is nothing like a professional level of opinion available concerning the dynamics of the interface between traditional patterns of techno-environmental adaptation and those innovations that are proposed or already in effect. In terms of the needs of the rural population of Niger, *this is the most serious defect of all projects under consideration*. It is an information gap that need not exist and that can be readily rectified (Development Assistance Plan for Upper Volta and Niger, FY 1975, p. E-21, emphasis added).

Among the more overwhelming impressions that one gets in attempting to understand and analyze Mali's agricultural sector is that the answers to most technical, economic, and social questions are not known. More forthright officials (and researchers) often admit... that in many areas they have only superficial knowledge because no serious research *using good local data* has been done ("Mali Agricultural Sector Assessment," Center for Research on Economic Development [Univ. of Michigan], December 1976, p. 148, emphasis added).

Although the above comments are specific to Niger and Mali respectively, our recent trip to those countries and to Senegal, Upper Volta, Chad, and Cameroon confirms their broad validity. Despite the quite considerable increase in interest and scholarship in the Sudano-Sahelian zone as a consequence of the 1968-1974 drought and the world mobilization of attention on this previously little heard of region, it remains one of the least studied areas in the world. And worse, what information is available, much of which

is of high quality, is largely ignored by those responsible for project design and implementation.] Yet the need for detailed social, economic, and ecological analysis of the Sudano-Sahelian zone is patent precisely because AID programs applied there are not conventional, and cannot readily make use of understandings drawn from donor activities elsewhere where capital intensive technology transfer is the rule. This point cannot be overstated. Almost no project document which we have examined is well-informed on the relevance of local cultural practice on project implementation, nor on the likely impact of the project on local ways of life.

If the world were patient and non-crisis ridden, one would be tempted to recommend a massive, thorough, exhaustive program of field investigations, in which teams of social scientists — social anthropologists, cultural ecologists, human geographers, rural sociologists and demographers, agricultural economists — composed of host country and expatriate (where necessary) persons would undertake research in every specific locale in which interventions are anticipated. The monumentality of the need, and the momentum which has emerged between donor agencies and host governments could ill afford the luxury of the hiatus in action, however much long-term development in the interests of the rural people would profit from the effort. Fortunately, considerable benefit can be received from a mix of research efforts: short-term, highly focused "social impact" analyses, of the kind called for though rarely achieved — in the AID Project Assistance Handbook No. 3, and a few detailed sectorally located studies which, although specifically sited, will generate understandings of wide utility which, with some local adjustments, would facilitate the design and implementation of a large number of projects, new both in kind and in approach.

The body of this report presents a number of these latter, project gen-

erating research activities. Rather than propose a vast number of studies which would make too great demands on the managerial resources of the Agency, we have concentrated on those which, we believe, will lead to the highest payoff. These are chosen also with recognition of the professional staff of the REDSO/WA planning unit, who would have to assume managerial responsibility for the studies and would be directly involved in the research for some of them.

These six studies which we propose — pastoralism; farm systems; river basin development; marketing systems; health and disease control — were selected because of several factors, notably the numbers of people potentially affected, and the possibilities for development activities. The proposals do not follow identical formats, as they deal with vastly different problems, but in each case, we consider why research is important, how it should be conducted, and the implications for development.

Throughout our reports, we stress the necessity of "development from below" by which we mean that indigenous perceptions and practices must be understood and taken into account, and that local people should participate in all stages of research and development. Local knowledge should be studied because, first, it is likely that the people themselves possess a close and accurate knowledge of their economic systems and of the environment, and that outsiders may well have overlooked or misunderstood this source; in addition, no development project will succeed unless firmly based on at least some aspects of local society.

One of the constraints on the involvement of social science with development in the subject region is the paucity of indigenous research capacities, both institutional and individual. Much of the research proposed in this report should be carried out by host country personnel. Since

these individuals are few and typically involved in administrative work, we urge AID to use these studies as vehicles for training as well as for research. In our experience we have found it neither necessary nor even always desirable to require full professional credentials for counterpart personnel. Highly motivated individuals can be given "on-the-job" training, and more formal education can be deferred until after the research is completed.

The studies we recommend are project generating in two senses: (1) they point out new areas for intervention or help resolve problems which have impeded successful intervention in the past, particularly by tapping local initiative; (2) they permit large-scale replication by suggesting approaches to solutions of problems which confront desired actions across the entire region. In every case the guiding principle is: how can the work of the social scientist facilitate the work of those responsible for project design and implementation. We emphasize the need for research to be integrated with development, and of researchers working in the designing, implementing and evaluating stages. Behavioral science should not be seen as an occasional outside agent, but should be institutionalized within the agency. And A.I.D., in taking the lead among donor agencies in encouraging social science participation, has created a highly favorable climate for the type of research we recommend.

We have noted that the Sudano-Sahelian zone remains one of the least known of the major areas of the world. This does not mean, however, that nothing is known. As a preliminary to intensive field studies, REDSO/WA should sponsor the systematic recovery of information and analyses which have been gathered over the past thirty years or so, particularly during the last ten years. We have outlined a number of these reviews and analyses of the literature as part of our recommendations for specific research actions.

The results of these preliminary studies would be presented in the form of reports or manuals which would summarize the state of knowledge in the area and present that summary in a form useful to Agency and host country officials responsible for program planning, design, and execution.

# THE DEVELOPMENT ANTHROPOLOGY OF SAHELIAN PASTORAL SYSTEMS:

## A PROPOSAL FOR RESEARCH

### I. INTRODUCTION: THE "TRAGEDY OF THE COMMONS"

Current approaches to development among livestock producers in the Sudano-Sahelian region perpetuate the anti-nomad morality which has characterized attitudes of modern states and international organizations for the past 50 years. The consequences of sedentarization have, almost without exception, been disastrous:

Barth (1962) has described the results of sedentarization in the case of the Basseri tribe of Fars. Here during the reign of Reza Shah a government program to settle the nomads was instituted in the 1920's. Nomadism in Iran was then seen as an obstacle to modernization, a military threat, and therefore politically undesirable. It was argued then that in order to pacify, modernize and educate these people, it is necessary to settle them in village-like schemes. Barth...reports a sheep mortality of 70 to 80 percent when the nomads were settled...[During the period of forced sedentarization], since pastoralism is the only possible way of life in many districts of Iran where rainfall is inadequate for crop-growing, Iran was deprived of many commodities such as milk, meat, wool, hides and draft animals (Darling and Farvar 1972:678).

Similar effects followed the attempt to sedentarize the Kazakh horse nomads in the Soviet Union in the 1920s and the Bedouin of the Egyptian Western Desert, 90 percent of whom had been settled by the 1920s. Of the international agencies, the Food and Agricultural Organization has been, perhaps, the most consistent advocate of settling herders. There are two ways, according to FAO, of ameliorating the conditions of arid zone grazing:

The first is to introduce measures of improved management in the semi-arid grazing lands themselves which still make it possible to utilize this resource on the basis of conservation and to produce the livestock products characteristic of the environment. The second is to start actions which will make it possible if not essential for the free-range grazer and their livestock gradually to rely less and less on the semi-arid grazing resource, and to become more sedentary than they were before. This trend is desirable from a social, medical, and educational point of view (FAO 1962:363, emphasis added).

In sub-Saharan Africa forced sedentarization has not been an active policy, either during colonial days or since independence. In the Sahelian area there has hardly been any coherent policy toward herdsmen, although since independence both veterinary services and the practice of drilling deep wells in grazing areas have expanded. From time to time, ranches of one kind or another have been proposed (i.e., the FAO ranch north of Gouré, Niger) and even put into effect (Markoy, Upper Volta), but their impacts have been marginal and their spread effects nil.

In East Africa, managed grazing schemes have been more vigorously pursued, the best known of which have been among the Kamba in Machakos, Kenya, and in Masai country in Kenya and Tanzania. The "sectional grazing schemes" are remarkably close to the kinds of interventions currently under consideration for the Sahel:

These schemes [in Kenya] involved dividing a range area into several grazing blocks, instituting a relatively simple rotation system (based on the traditional movement of Masai livestock between wet-season and dry-season areas), providing water supplies and disease control, and attempting to provide for destocking by creating special markets. Livestock officers administered and supervised each scheme. These officers acted under special ordinance and by-laws, which empowered them to: (1) approve which Masai were allowed to graze..., (2) determine the number of animals each was allowed to graze, and (3) select the area to be grazed.

The first such grazing plan was the Ilkisongo... This scheme, like the others, was a disastrous failure. By 1956 the area was severely overgrazed. In 1959 the destruction was so bad that where the scheme used to be, a jagged, bare, red earth scar in the savanna landscape was visible from a high-flying airliner... (Talbot 1972:705).

In the early days of development, African herdsmen were given no credit for their abilities as cattlemen. "Experts" -- invariably expatriate advisors -- simply ignored indigenous knowledge and skills, and recommended actions which were based on their own experiences elsewhere. Now it is the

fashion to credit the pastoralists with great skill, but to claim that their individually rational behaviors are, in the aggregate and over the long run, environmentally destructive. This "tragedy of the commons" optic is most explicitly elaborated in the A.I.D.-funded Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region. In the volume dealing with livestock we read:

A conservation ethic oriented toward the long-term preservation of the ecological resource does not exist among the pastoral cultures of the sahel. An analysis of why conservation has not developed as a cultural value reveals that the benefits of conservation are delayed and tend to be shared. Thus, an individual herdsman realizes only a fraction of the rewards of his efforts, which he then discounts heavily. His benefits are shared because, since property is held in common, he cannot prevent others from grazing on pastures for which he has limited his own herds. The limitation of his own herds is an immediate cost which he alone bears. Thus, conservation has always been negatively reinforced by the same social and environmental system that positively reinforces herd maximization behavior (Picardi 1974:164-165).

According to this view, it is thus rational for the herdsman to increase his herds without limit, since he thereby monopolizes the benefits of that increase while the costs, that is the progressive inability of the range to sustain the animals, are divided among all users. This view of the herder is a far-cry from the earlier assumption that nothing could be gained by studying indigenous practice. But even this view may not be true, and there is evidence to suggest that it is false.

Most planners in the livestock sector today appear to agree on the following points:

1. There are problems associated with indigenous pastoral practices.

These problems include:

- a. Uncertain production of high quality animals for export from the Sahelian countries to the coastal consumption centers. The point of this ex-

port is to contribute to correcting the imbalance of trade between the Sahel and the rest of the world.

b. Uncertain production of animals for low cost sale in domestic urban markets within the producer countries. The point of this is to provide cheap food without government subsidy to the non-agricultural population, among whom responses to rises in the cost of living reverberate as potential threats to the stability of governments.

c. Environmental degradation due to uncertain rainfall (in amount, frequency, and distribution) and to animal loads which exceed range carrying capacity.

d. Poverty among pastoralists, reflected in poor health, poor use of educational facilities, and, it is supposed, poor diet.

2. The solution to these problems calls for managed use of the range, with controlled access to pasture.

3. Range management projects have usually failed.

It follows from the above points that either (a) we have not learned how to implement range management projects, or (b) range management is not the solution, or (c) both. Regardless of which is the case, it is clear that we need a great deal more information about how pastoral systems operate, and about how to achieve a high degree of local participation in attempts to implement change.

The call for more research in the pastoral sector is hardly new. Almost every proposal, whether from A.I.D. or elsewhere, calls for further study as essential for successful action. Yet in almost every case the projects go ahead without the understandings requested and required. A recent A.I.D. publication asks that we learn about "the apparent situation of livestock producers, their ostensible potential to implement range development

projects, livestock producers' needs and the local results likely to occur from range development. This should include studies of social and administrative aspects of range development and management, as well as a system of production best suited to local conditions" (Abercrombie 1974:7).

Not only are data lacking on social conditions, there are great gaps in basic environmental information:

Amongst the effects which the drought has had on capital, one must refer to the loss of grazing capital. If scientific research could measure the effects of the irreversible deterioration and desertification of the pasturage, and estimate the area and the potential value, it would be possible to imagine an evaluation of the draining away of these natural resources. It seems doubtful, however, that such an evaluation could be undertaken until after a vast scientific research program on the pasturage had been put into effect (FAO 1974:46, emphasis added).

Range management schemes which involve individualizing rights of access to pasture have a poor record in Africa. There are cases where for a short time herdsmen included in the scheme reduced the load on specific pastures, not by culling, however, but by shifting stock to pasture outside the project bounds. In the long run, as the surveillance broke down, stock levels were allowed to expand within the scheme as well, with a net result of more animals than there would have been had there been no project at all.

It has not been demonstrated, conventional and learned wisdom notwithstanding, that communal access to the range is in fact necessarily destructive over the long run. One must demonstrate both the long-term secular deterioration of the range and the contribution that grazing plays in that deterioration. This has not been done for the Sahel. The longitudinal data are simply not available. Picardi, for example, writes:

For the past 50 years, explorers and range ecologists have reported a slow process of desertification in various areas of the Sudan...and North Africa..., attributable to various factors such as overgrazing or deforestation. Satellite photos of the region from

1972 to 1974 indicate the contrast between protected and non-protected rangeland, where the difference in vegetative cover made by a fence and some simple management policies is clearly visible... These findings correspond with numerous accounts of 'the Sahara creeping south' which begin to appear with every account of the drought-stricken area. Thus, one can gather that desertification existed for a long time (1974:55-57).

We are less convinced that the "thus" in the last sentence is warranted. The "numerous accounts" may well be an instance of Gresham's law applied to journalism: bad news drives out good. Every drought is accompanied by warnings of the advancing desert. Yet it is also the case that in average and above average rainfall periods, such as during the ten to twenty years which preceded the 1969 drought, the desert retreated and in some places retreated spectacularly:

Charles Toupet was able to calculate that in Central Mauritania, between 1941-42 and 1951-52, the 100mm isohyet moved 650 kms toward the north... "The sector thus demarcated between [the two isohyets], which can therefore alternatively be a desert from which the herdsmen flee, or a zone of pasture land attracting the herds, covers 340,000 km<sup>2</sup>, or about 31.5 percent of the total area of Mauritania"... [T]he period from about 1945 to about 1965 corresponds to a generally wet cycle in the whole of the north sudanese and sahelian zone of West Africa, a wet cycle which is shown by a progression of crops, a projection of pasture land towards the north, and a recession of the Sahara (Bernus and Savonhet 1973:117, emphasis added).

Gresham's law precludes any treatises on the retreating desert.

We do not know what contribution pastoral systems make on enduring ecological change in the Sahel, but some of the geographers are suggesting that the notion of the Sahelian ecosystem as "fragile" may be overly simplistic, and that the term "resilient" is more appropriate (Robert Kates, pers. commun.). The herdsmen may prove to be less perpetrators of environmental degradation than victims of the joint actions of climate and governments. To predicate a development posture on the undocumented assumption of the environ-

mental degradation of herding is irresponsible and unjust. To make informed judgments on the ecological consequences of herding, we need longitudinal studies of agrostologic changes combined with close observations of pastoral and other uses of the terrain, all correlated with meteorological data. The point is well made by Western:

The stability of pastoral environments is more difficult to assess. It is frequently thought that pastoralism inevitably leads to overgrazing and a reduction in the long term carrying capacity of the region... The increased aridity of the Sahelian zone in recent millennia is an often quoted example of large scale degradation by pastoral overuse, either as a primary or a contributory factor. Against this, however, must be weighed the fact that pastoralists have inhabited the East African savannah ecosystems for millennia... And yet it is the so-called "pristine" nature of these environments that has attracted so much attention amongst conservationists... Most concern centres on the arid areas, such as the Sahara, but these are precisely the areas where the most unstable climatic conditions exist naturally, and where natural erosion is highest (1974:24).

§ The fact that pastoralists, with distinct cultures and histories, exploiting arid and semi-arid habitats in widely dispersed parts of the globe, have elected not to develop private ownership of land (though they have individualized ownership of animals and often of water), suggests that their systems are ecologically sounder than their critics would suppose. What are needed are facts, and the relevant facts are not available. "There has been no empirical assessment of the ecological efficiency of pastoral systems" (Ibid.:18). The logic of the "tragedy of the commons" position is seductively attractive. But it is not necessarily empirically correct.

The "tragedy of the commons" perspective assumes that there are no constraints on the increase in livestock, since an individual can only benefit from having more animals. While there may be no immediately perceptible land costs in the expansion of herds, there may well be pronounced managerial

costs. We have some idea, from the work of L. H. Brown (1971) of the lower limits of herd sizes needed to maintain demographic and economic viability, but we do not know what are the upper limits of herd size in terms of the ability of the herder effectively to manage them. Yet material from other pastoral regions (i.e., Barth 1964) suggests that the number of animals which can be herded is limited by the amount of labor that can be mobilized for that activity. We know from studies among Sudano-Sahelian farmers that the major constraint on increased production is labor, not land. Wilford Morris has aptly pointed out:

The farmer is rationally maximizing his return on his scarcest resource, which in West Africa frequently is not land but labor. If he can double his yield per hectare but it takes him two and a half times as much labor, he is bound to lose before he even begins (Paylore and Haney 1976:69).

Since the pastoral household is engaged in a complex series of activities, including farming, dairying, and trading as well as herding, the amount of labor which can be mobilized to care for the animals is necessarily less than the number of able-bodied persons it contains (even allowing for the fact that very young children perform productive acts). This is especially true in West Africa where only a small fraction of the pastoral population has made a full-time commitment to herding.

An individual or household with more animals than it can reasonably manage has two options regarding the surplus: (a) it can cull them for sale or consumption, or (b) it can convey them to other persons whose managerial capacities are not exceeded. While often retaining some possible claim on these animals, the owner is in effect converting animals as economic goods into social and political obligations. From an ecological point of view, the effect may in some instances reduce the charge on the pasture made by the original herd.. (For a literary example of how "surplus" cattle are invested

in social relationships, tending toward equalizing the number of animals under any herding unit's direct responsibility, see Cyprien Ekwensi's novel of the Fulani of Northern Nigeria, Burning Grass [1962].)

Although there has been considerable speculation about the carrying capacity of the range, we do not know what is the carrying capacity of labor. It is important to test the hypothesis that a constraint on herd size is the herder's recognition of diminishing returns from unimpeded increase, caused by varying factors such as predation, theft, disease. The carrying capacity will, of course, be influenced by the mix of animals being herded, since camels, cattle, sheep, and goats all make distinctive demands both on the browse and graze and on the energy of the herders. We shall return to the notion of stock composition in discussing pastoral adaptive strategies. Let us simply note here the ecological advantages of such a mix:

There exists a large measure of complementarity in feeding amongst these species, between grazers and browsers and coarse and fine feeders. Commonly cattle are grazed in a long grass area which is subsequently used by sheep and goat and finally by juvenile stock. In Amboseli [East Africa] this "succession" of pasture use is most conspicuous in the coarse swamp sedges; Maasai tend to use these areas after trampling and feeding by elephant and buffalo have improved the structure for cattle, which improve it in turn for smaller stock. Such a "grazing succession" has been described for large mammals...and is evidently commonly practised by pastoralists with a range of species (Western 1974:17, emphasis added).

Let us return to the notion of the commons. An examination of the ethnographic literature indicates that while in general there is no individual tenure to pasture, it is not true that any herdsman has an operable claim on land being used by any other. In the first place, there are obvious associations of particular areas with particular persons or groups of persons. In the broadest sense, access to pasture is constrained by ethnic membership, and incursions by outsiders may be met with persuasion, force, or

legal action. Customary law courts try cases in which the contenders dispute each other's jural claims to pasture, just as they hear cases in which herders protest the attempt by sedentary people to farm land traditionally considered pasture, or in which farmers try to obtain damages from herdsmen whose animals venture into cultivated fields. More restricted than the ethnic group, are pastoral claims traditionally associated with specific clans, lineages, and even families. We assume that any development project proposed for the pastoral sector would be preceded by a field inquiry to sort out precisely what associations exist between the land and social groups.

Access to pasture may be restricted by a local group or even an individual digging a well. That is, the pasture may in principle be open to a broad group, but since the water belongs to those who built or who had built the well, others may not use the range since they must water as well as feed their flocks and herds. This established technique for regulating access to pasture broke down, as we now know, in the tragedy of the deep wells, built by the international donor community at the request of governments. It was these deep wells which changed the transhumant orbits of many herdsmen, concentrating vast numbers of animals on the narrow tracks linking the diesel-powered pumps, and disrupting conventional arrangements which had previously obtained among different peoples. In one well documented case, Edmond Bernus (1974) shows how the Illabakan Tuareg of Niger, petitioned to have the pump turned off because the new source of water, available to any and all buyers, had overcharged the terrain and severely exacerbated relationships among Tuareg and Fulani. (See also Marti 1972.)

As a final challenge to the assumption of no constraints on access to pasture, the "tragedy of the commons" maintained by Picardi and many others (including some anthropologists), we may point to the elaborate code govern-

ing usage of the Interior Delta of the Niger River, which was established as early as the 14th and 15th centuries, and was codified into its present form by Cheikou Ahmadou who reigned from 1818-1845 (Gallais 1972). This code or Dina rigorously regulated access to and use of the vast resources of pasture which annually are made available by the floods, and allowed for a complex multiple exploitation by herdsman, farmers, and fishermen of the same terrain. It may be that the absence of such a code was responsible for the far less productive use made of the Senegal Delta. According to Gallais (Ibid.: AII/6-7), population density in the Senegal Delta is only a fifth of that on the Niger (3-4/km<sup>2</sup> against 15-18/km<sup>2</sup>), and prior to the development of irrigated rice in 1963 was used only for herding. Rice cultivation has essentially eliminated animal pasturing in the Senegal Delta.

The Dina was so flexibly administered that it well accommodated new groups that entered the area both before and during French colonization. P. J. Imperato witnessed the Dina-regulated use of Niger Delta resources in the late 1960s:

Approximately 163,000 Peul nomads participate in these seasonal movements, together with a million and a half cattle, a quarter of a million sheep, and half a million goats. Within the confines of the delta are another 250,000 Peul, semisedentary farmers and merchants who do not routinely take part in the transhumance treks, although they may do so occasionally. There are also large sedentary populations of farmers living on the periphery of the flood plains: an estimated 100,000 Bambara, 150,000 Bwa, 200,000 Minianka, 80,000 Marka, 250,000 Dogon, and 10,000 Songhai... The plains are divided into 37 districts called leydi, which are the recognized communal property of given clans of Peul. Pasturing in them is governed by a complex weave of traditional verbal agreements and conventions established by Cheikou Ahmadou, one hundred and fifty years ago (1972:63, 67).

We shall turn now to a discussion of adaptive strategies of Sahelian pastoralists and their implications for development, and state a seemingly outrageous proposition: open access to the range without added constraints

on pastoral mobility is less consumptive of environmental resources and provides a higher return — given the technology available to Sahelian herdsmen — than the "managed grazing" recommended by Picardi and made manifest in many proposals for development actions in the livestock sector. The studies we finally recommend will test this proposition.

## II. SUDANO-SAHELIAN PASTORALISM.

Most discussions of pastoralism today avoid the sterile typologic concerns which dominated earlier thought. We know now that there is little profit in classifying herding peoples as "nomads," or even "true nomads," "semi-nomads," "transhumants," and the like. These terms do not describe discrepant ways of life. They refer rather to alternate strategies or forms of action, any one of which may be elected as the appropriate response to a given, perhaps transient, set of social and environmental conditions. The alternative strategies in reference to movement form part of the response inventory of animal managers, and do not characterize whole groups of peoples. However, the interest in typology had the virtue of focusing on movement as the major technique for efficient exploitation of semi-arid grasslands.

Although relatively free of concern for categories, much of the current discussion on pastoralism is nonetheless predicated on myth, repeated and untested assumptions which, as is true with all myths, become charters for action. The assumptions appear as self-evidently true, and when held by economic planners, lead to programs which inevitably contain the seeds of their own failure. These mythic assumptions about semi-arid grasslands pastoralists are:

1. The herdsmen practice a static way of life, the consequence of millennia of adaptation; they are bound by "tradition." The "nomadic Tuareg herdsmen may be forced to abandon their time-honored customs if the sahel is to con-

tinue to maintain them" (Picardi and Seifert 1976:9, emphasis added).

2. Pastoral herding is environmentally destructive: "...even without the last drought to trigger the collapse, our simulation studies indicate that chronic overgrazing would have eventually caused similar severe desertification" (Ibid.:3).

3. Herdsmen maintain animals for motives of prestige, not economics: the herdsman "lives outside or on the fringes of a monetary economy and usually he attaches greater importance to the number of his stock than to their productive efficiency" (Nestel et al 1973:14).

A. The Recent Evolution of Sahelian Pastoralism.

There is no stable set of behaviors, no invariant set of practices, no "millenia-old customs," which characterize contemporary pastoral life in the Sahel. Apart from the ethnic and historical complexity of the region, which gives rise to a broad range of inter-group differences, the twentieth century has seen a series of changes introduced into the region to which the herdsmen responded. The ability of the people to respond, to experiment, to innovate has been documented again and again in the ethnographic literature which underscores the dynamism and opportunism of pastoralists rather than their stability and boundedness.

We may outline briefly the major changes that affected Sahelian pastoralism during this century:

(1) European Colonization. By the second decade of this century, European control was established throughout the region. From the herder's point of view, this was associated with a number of changes:

a. Colonization meant the establishment of peace, the end of raiding, forced tribute, forced slavery, and the effective 'supremacy of the warrior.' Since many herding peoples traditionally obtained a good part of

their cereal needs through these methods, other ways of articulating themselves with agriculturalists had to be developed. The ideology of dominance, particularly among the Tuareg, whose captive "Buzu" had previously supplied them with grain, continued, but it was no longer enforceable with physically coercive sanctions.

b. Peace allowed for the safe movement of peoples beyond their normal range, and particularly encouraged the rapid Fulani expansion. By the early years of the century, Bororoji or pastoral Fulani extended their range to the shores of Lake Chad and beyond, so that today Fulfulde-speaking peoples are found as far east as the Sudan and even Ethiopia. With the people came their herds of cattle, sheep, and goats, and domesticated meat proteins began to replace the wild game which hunters had previously brought in to exchange for the grains of the farmers.

c. Colonization meant increased taxation, payable in cash, which forced the herders to enter the market -- through product and/or labor -- to earn the necessary funds and to generate enough cash to provide for other items from the outside. This is not to say that either taxes or markets were colonial introductions, but simply that for the mobile pastoralist who had previously lived on the fringes of elaborately organized political societies there were now greater sanctions forcing him to pay. Animals were censused, and taxes were based on the estimated size of the herds.

(2) Independence. With the exception of Mauritania, independence left in political control of the new states individuals whose primary identifications were not with the herders. Monod recently pointed out that the pastoralist is often subject to "untimely measures decreed by a government in which the ruling mentality is usually that of an agricultural peasant" (1975: 175-176). These administrations often echoed the sentiments of multinational

agencies that the herdsmen, hell-bent on destroying the environment, must be settled for their own good. Incidentally, it has been noted that the recent drought did not become an issue of national and international importance until the consequences came to be felt by the sedentary and especially the urban populations. As long as the sufferers were pastoralists alone, there was little interest in the catastrophe (Mayer 1974:113).

(3) Modernization and Development. Especially following independence, the European powers and international organizations began to make resource transfers to the Sahelian countries, several of which had direct effects on the pastoral peoples:

a. Improved veterinary practice. In the 1960s there were extensive campaigns against rinderpest, and veterinary medicine was increasingly made available to herdsmen. The result was a marked increase in herd size. In general, the herdsmen have responded positively to veterinary medicine, and the problem has been that the infrastructure associated with livestock services has invariably been underfinanced (Beazer and Stryker 1976).

b. Establishing of permanent sources of water. The problem of animal nutrition in the Sahel has too often been seen in terms of unavailability of water, rather than as the balanced availability of water and pasture. During the early 1960s, the donors undertook the construction of bore-holes fitted with diesel engines to provide reliable sources of water for herds. Instead of small groups of animals dispersed across the terrain in the search for pasture and water, huge numbers of animals began to assemble around these bore-holes, particularly as the dry season progressed and surface waters disappeared, and in consequence the land for great distances around the wells was grazed to bare ground.

Each new construction of a bore-hole attracted great numbers of herdsmen. The traditional users of existing wells or ground water saw the arrival of nomads from all the neighboring tribes... The estimate of 5,000 cattle or 10,000 head of livestock of all species, intended to ensure a balanced availability of pasture, was everywhere more than doubled (Bernus 1974:124).

When the drought struck vast numbers of animals died for lack of nourishment in ironically tragic proximity to the new wells.

(4) The rising demand for animal proteins. Herdsmen traditionally eat meat; that is, despite the normal diet of dairy produce and grains, almost every animal not sold ends its career in the pot. But raising livestock primarily for sale was not characteristic of Sahelian pastoralism. The development of an urban meat consuming population in the interior capitals and coastal cities, however, with the ability to pay reasonable prices, provided an incentive to which the herdsmen responded with some enthusiasm. Prior to the drought, in excess of 600,000 head of cattle born in the Sahel were exported annually to the coast (Swift 1973:71). This was a remarkable achievement, and one which underscores the opportunism of pastoral action. The nomads saw an opportunity, and were in a short time culling 7 to 10 percent of their cattle, and large numbers of sheep and goats, providing a regular supply of desired beef to urban consumers, crossing national and currency frontiers, and doing this largely without the paraphernalia of modern trade, such as formal contracts and letters of credit. Again, conventional wisdom sees the herder as irrationally unwilling to part with his stock, but in fact he normally provides sufficient beef to feed the domestic urban dwellers, with a substantial amount for export, while meeting his subsistence needs for dairy produce.

In Mali, livestock exports are the largest foreign currency earner. The herdsman must resist the temptation to make a quick profit of too great a

sale of stock, for the vagaries of weather, disease, theft, and taxation, as well as social needs, require that he keep a larger number of animals than would seem to be required for simple herd maintenance, since the prime claim on the milk is made not by the calf but by the people themselves. We shall return to this point.

(5) Finally, the twenty years preceding the drought enjoyed rather favorable rains, and there was a decided northward expansion of the Sahel against the Sahara, and a consequent northward migration of herding. There was also the return to a pastoral economy by some who had previously settled down to farm.

This combination, then, of new pasture, of veterinary medicine, of bore-holes, which enabled the herdsmen to respond vigorously to the rising commercial demand for meat, came undone, first with the onset of a dry period in 1968 and then with the all-pervading drought of 1972-1973. Pastoralism is the only activity currently available which allows for the conversion of energy into forms usable by man in the more arid reaches of the Sahel (350-100mm). Yet there are limits and these, once exceeded, led to the losses noted. "On the one hand, above a certain level of aridity [pastoralism] is the only possible means of land use; but on the other the risks of biological imbalance and then of destruction of the habitat are manifest above a certain ratio of animals to land area" (Monod 1975:110).

#### B. Sahelian Pastoral Adaptive Strategies.

Let us sum up the facts, not the myths, of Sahelian pastoralism:

- It is dynamic, recent in its present form, and opportunistic.
- It makes productive a terrain for which there is no alternative use.
- Pastoral subsistence activity is complex, combining commercial

production of animals for meat, and domestic production of animals for local consumption of dairy products.

- This combination directly supports a very large population, far larger than an exclusive commitment to any form of ranching would allow, while at the same time making substantial economic contributions to the local community and to the state.

- In their exchange relationships with farmers, Sahelian pastoralists provide the only source of fertilizer to much of the region's cultivated land in their annual pasturing on cropped fields following the harvests.

It requires then no romantic idealization of the freedom-loving nomad to appreciate the major economic and ecological contributions made by Sahelian pastoralism. )

The strength and durability of the herdsman's adaptation to the arid Sahelian environment is found in multiple resource exploitation (Salzman 1972). That is, instead of concentrating efforts and investments on a single economic activity, the Sahelian pastoralist distributes his activities across a spectrum of ecological niches. He thus hedges his bets, assuring himself and his family of a reasonable level of living in all but the most rainfall-deficient years, a level which supports an exceptionally large number of persons in an environment which seems to have no alternative uses. This is a fact of tremendous import. The northern ranges of the zone support somewhere between 10 and 20 percent of the total 25 million population of the C.I.L.S.S. states, through a combination of dairying for local consumption and culling of up to 10 percent of the herd annually for conversion to carcass. No one has ever seriously proposed an alternative to animal husbandry for this terrain, and any substantial shift from dairying to a more beef-oriented activity would result in a decline in the number of individuals which can be

supported there. Caldwell (1975) is perhaps correct in noting that the pastoral population is probably close to its limit today, and will not increase. Assuming this to be true and that there are clear limits to the number of animals which can be managed under current technology,\* the pre-drought situation which was especially favorable to the expansion of herds may have approached the upper limits of total feasible animal production size also. Among certain pastoral peoples the drought induced an exodus into the wage labor sector, and these persons may be permanently lost to animal husbandry. In any case, as the overall C.I.L.S.S. population rises to more than 40 million persons by the end of the century, the fraction characterized by pastoralists will decline. The contribution they make to the overall economy, by making productive an otherwise economically sterile landscape, will be of increasing significance, as the demand for meat rises more rapidly than the supply.\*\*

The components of Sahelian pastoral exploitation are reasonably well understood:

(1) Most Sahelian herding societies maintain a broad range of livestock. In addition to cattle, they keep varying numbers of sheep, goats, and often camels, horses, and donkeys. Each of these animals makes a different consumptive demand on the environment, and when their relative numbers are in

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\*Obviously major changes in technology will affect the demography of the herds. Such changes among Lapp reindeer pastoralists, for example, include the use of snowmobiles, two-way radios, and even helicopters. In the semi-arid U.S. southwest, animals are trucked from one part of the range to another to take advantage of better grass conditions.

\*\*The price at which Sahelian countries will be able to market meat in the rich consuming centers of the West African coast will be limited by the price at which the major exporting countries, such as Argentina and Australia, sell their beef. These countries are well aware of the attractive West African markets and may provide considerable price competition for the Sahel, especially as they both deal in range-fed beef.

balance, the environment is not subjected to extraordinary demands on one of its resources. Some animals graze and some browse. Goats are effective climbers of low trees, and camels find food at considerable heights. The animals have different needs for water and different capacities to cover distance. Some are resistant to diseases to which others succumb readily. The social organizations of herding societies allow for flexible sortings of persons, and this flexibility facilitates their response to the diverse demands of their livestock. That is to say, herders can organize themselves in ways which best maintain the herds, combining and recombining in varying assortments in order that the animals may profit maximally. The goal of this action is not the well-being of the animals per se, but the well-being of the herders who live with them in relationships of mutual dependence.

(2) While the ultimate fate of any animal is the cooking pot, and herdsmen have no objection to eating meat, the fundamental socio-economic activity is dairying for auto-consumption. In order that the largest number of persons may subsist on the herd, the primary claim on the heifer's milk is made by the people, not by the calves. This means that some of the income from the herd is consumed directly by the pastoralists without their having to cut into the capital itself. Further income, in the form of male animals, is sold off, and the number of animals reared in the Sahel which reached the coastal consumers rose steadily and impressively during the decade which preceded the drought. Caldwell estimates that the "savannah as a whole already sends two-thirds of a million cattle annually to the southern markets" (1975: 62). This strategy implies a demographic herd structure quite different from that of a beef herd. The only way substantially to increase offtake, which currently requires retention of some 90 percent of its members annually (Brown 1971), is to reduce calf mortality and/or to increase the rate of

calving. These actions must be combined with providing sufficient incentive for the herder to convert animals to other values.

(3) Herdsmen and farmers have developed elaborate codes to regulate their relationships (Horowitz 1975). These relationships are derived from the fact that nowhere in the Sudano-Sahelian zone do pastoralists exist exclusively on the produce of their herds. Herdsmen and farmers spend a good part of the year in close proximity. Normally relationships between them may be termed "complementary"; occasionally they are competitive and even antagonistic.

The principal exchange between herders and farmers is the post-harvest conversion of cultivated fields into pasture, where animals graze the cropped farms, and provide manure, much valued by the cultivators. The farmers see themselves as the prime beneficiaries of this exchange, particularly as they are totally without chemical fertilizers, and entice the herdsmen with gifts of food and money.

In western Niger the Ichidenharen, a Tuareg tribe living on the border between Mali and Niger, came to the banks of the river at the end of the rainy season, when they have returned from their nomadic movements... The camps draw near to the Songhai villages that line the left bank of the river, and the Ichidenharen receive a measure of millet for six days spent in the fields (Bernus 1974a:138).

This alternating land use by farmers and herdsmen to their mutual benefit becomes a point of conflict when animals return too soon from their rainy season pasture and break into the unharvested fields. Farmers complain that herdsmen are insufficiently attentive to their animals' incursions or, worse, actually encourage them to feed off the rich millet and sorghum. The herdsmen counterclaim that farmers intentionally entice animals into the fields, where they are seized and the owner forced in the customary courts, controlled by farmers, to compensate the latter far beyond the value of the

damaged crop. Tensions rise when rainy season pastures dry up, and when farmers cut new fields in lands regarded as traditional pasture or in too close a proximity to animal watering points.

Herdsmen also take animals from the farmers on consignment, since the farmers have neither the personnel to assign to their care nor the desire to assume the lifestyle and poor diet, clothing, and housing which they associate with pastoralism.

In Ader-Doutchi, a relatively rich agricultural region in central Niger (south of Tahoua), farmers occasionally entrust their herds to the Peuls, when the latter's nomadic movements take them to the northern plains of Azawak during the rainy season. The Peuls integrate these animals into their own herds; they drink the milk and consume the butter produced by cows in their care, but the calves born during this period must be turned over to the farmers. If an animal is lost, killed by a wild animal or simply by disease, the shepherd cannot be held responsible. The Peuls must, therefore, be well-known to the farmers who entrust their herds to them, and mutual trust must prevail (Ibid.:138-139).

This consignment also gives the farmer some leverage to get the herder to pasture animals on his fields at the onset of the dry season. (It is important to get the animals to pasture the field as soon after the harvest as possible, for the stubble rapidly declines in nutritive value and the manure is of less benefit.)

During the periods when herdsmen and farmers are in close contact, many other exchanges occur between them. Farmers buy animals, especially small ruminants, and other produce (hides, butter, cheese, milk); pastoralists purchase millet and grains, and some locally crafted and imported items. Pastoral women may hire themselves out as household laborers, aiding farmers' wives in pounding grain into flour.

(4) Many herders obtain agricultural produce by growing it themselves. In her study of Fulani pastoralism, M. Dupire (1962) pointed out that among

these people stock raising and farming do not form mutually exclusive orientations. There is rather a pendulum-like movement in which first one form of subsistence and then the other dominates; when good pasture, water, and a sufficient number of animals are at hand, cultivation declines in importance, some fields are abandoned, and the people live off their herds, obtaining grains through trade. But a greater commitment to agriculture is always a possibility, for Fulani social organization is sufficiently flexible to permit the mobilization of labor simultaneously for farming and herding, and for the varying ecological demands of different types of stock.

As a consequence of the recent drought, there appears to have been a marked increase in agriculture among the Fulani. In the region of Eastern Niger, much more land is currently under cultivation by Bornanko'en Fulani than was seen in 1967-1969. This adaptation may not be permanent, but for a number of years the people will be cautious about too committed a return to herding.

(5) To restrict the accumulation of animals among a few rich persons and the loss among others, herdsman have developed various redistributive mechanisms. Animals are reallocated through loans, marriage gifts, tribute, and other kinds of exchanges. Some herding peoples have traditional relationships of political dominance over some agricultural peoples, such as those between Tuareg and Buzu in Niger. While the exchanges are hardly symmetrical, the Buzu received protection and access to animals, and gave their Tuareg overlords labor and agricultural produce. We cannot here develop the idea of the adaptive contributions of pastoral political organization, but there is a substantial literature which attests to its pertinence. We can recall that the redistribution of animals may serve the ecologically sound function of maintaining the number of animals herded by an individual

within his managerial limits.

(6) The most striking adaptive mechanism is movement. Stenning, who studied the Fulani in northern Nigeria, identified three characteristic forms of movement among herding peoples: transhumance, defined as "regular seasonal movements," for example from northern pastures in the rainy season to cropped fields in the dry season; migratory drift, "gradual displacement of transhumance orbits"; and migration, "the assumption of new transhumance orbits by a sudden and often lengthy movement" (1957). Associated with free movement is necessarily the notion of free access to pasture. This association causes distress among range managers who see in it, as we have shown, only the selfish destruction of shared resources, because it is supposedly not to the advantage of any given herder or group of herders to reduce the numbers of animals herded in order to lessen the charge on the pasture. Improving pasture locally is seen as an invitation to others to bring in their animals. Yet there is beginning to appear a counter position. D. H. Janzen has recently written: "Some studies even suggest the 'overgrazed' pastures may have a higher overall yield than more carefully managed sites, especially if the real costs of management are charged against the system" (1973:1214).

Western argues in a similar vein:

Pasture quantity and quality have been shown to have a high annual, seasonal and spatial variation in arid savannahs. A given site will show a much higher variation than the region as a whole and a static system of ranching would experience a greater absolute fluctuation in pasture conditions than mobile forms. However, mobility will only confer an advantage if it can obtain a higher production than a sedentary livestock economy in which stocking rates are adjusted to overall range carrying capacity.

It is well established that a pasture is more nutritive during the growth than non-growth stage...; the plant mass contains a higher component of digestible crude protein and carbohydrate...

A very real advantage can therefore be derived from mobility geared to select growing pastures — a high proportion of the forage can be assimilated rather than passed through as faeces.

The same pasture may be 70% digestible when green, 30% when dry; a low utilization in the green phase will mean a loss of potential, consumable energy. Mobility is primarily a strategy to maximize the intake of high-digestibility forage, leaving til last that of low digestibility. This strategy has resulted in the successive use of habitats in the African savannahs... In effect it reduces the effect of the highly seasonal growth cycles, and ironically it is the highly spatial variation in precipitation that permits this! The sensitivity pastoralists have of pasture differences and variation is extremely high because they can monitor marginal differences by milk output (1974:12-13, emphasis added).

It has clearly not been established that there are viable alternatives to current mobility practices, and we must look especially critically at development proposals which seek to restrict movements without convincingly providing alternative adaptations.

One of the consequences of the drought is that whereas the Sahelian governments and the international donor community are convinced that the herdsmen had too many animals and therefore were unable to withstand the drought-induced decline in pasture, herdsmen are equally convinced that they had too few and were therefore more vulnerable than necessary. Given the fact that a minimal herd is required to support a family, the herder who had 20 animals and saw them reduced to 10 has had to drop out of his desired occupation and way of life, whereas the man with 40 who also lost half has the basic stock with which to rebuild.

### C. The Effects of the Drought.

The short-term effects of the drought are reasonably clear, although there is much uncertainty about their magnitudes:

- The animal load on the range was substantially reduced through death and forced sales.

- Many herdsmen abandoned productive activities altogether and lived off relief foods in refugee camps.
- There was a movement out of herding into agriculture.
- There were abrupt changes in customary transhumant orbits, particularly to the south in the search for pasture in the tsetse zones.
- There was accelerated movement out of pastoralism (and farming ?) into wage labor, particularly in the coastal countries.

There was an increase in the kinds of movements Stenning called "migration," far beyond normal orbits, with pastoralists searching for grazing lands in the normally tsetse ridden areas of the Ivory Coast, Ghana, Togo, Benin, Nigeria, and Cameroon. This movement caused a number of problems in these states, for governments had to weigh the political objections of local farming peoples to the presence of their new neighbors against the possible economic advantages of having augmented domestic supplies of beef. With the return of the rains, however, most of these herders proved to be but temporary visitors.

The experience of having lived in refugee camps, and having been dependent for food and medicines from governments which were previously viewed with disdain, is likely to have long-term effects both on pastoral self-image and on the political relations between herdsmen and farmers. This is an area that calls for considerable investigation. What are the psychological effects on young Tuareg children, for example, who witnessed their mothers prostituting themselves, their fathers begging from agricultural populations whom they had previously treated with contempt? Will Buzu villagers continue to provide herding services and grains to Tuareg nobility whom they had seen reduced to begging? These questions are of more than passing interest, because relations of dominance and subordination contribute to making viable

this most marginal of environments.

While there have been very few detailed studies of the effects of drought on Sahelian pastoralists, there is an excellent thesis on the region east of Lake Chad (Clanet 1976 or 1977). From Clanet's material we can document a number of the modifications in adaptive strategies listed above:

a. A shift in the composition of herds to accommodate to the new demands of the environment, with the abandonment by the Daza of cattle in favor of camels, "better adapted to current climatic constraints" (p. 224).

b. An increased allocation of labor to farming. In Kanem, 1973 was the height of the drought, the occasion when, in the words of the herders, "the bucket met the hoe," meaning that nomads have begun to farm. In 1974, among the Kréda who had begun to cultivate, there were those who had never previously farmed (p. 225).

c. Increased labor migration, especially to the oil fields and docks of Libya (pp. 226, 238).

d. Increased importance of gathering, both for domestic consumption and for sale (p. 234).

Clanet's work, which includes considerable quantitative material, will be of enormous value to the planning of livestock sector interventions in Chad.

The Sahelian states of the interior, particularly Mali and Niger, and to a lesser extent Chad and Upper Volta, see in livestock the principal agrarian resource for export. They and many of the donors would like to see a shift out of dairying into a more beef-oriented production. There has been a congruence of interest around a scheme of zonal stratification, in which animals would be bred in the Sahel under traditional conditions, but the calves would be removed as soon as feasible for fattening and finishing in

feedlots in the intermediate rainfall zone. It is not envisaged that the herdsmen themselves would have any continuing involvement with the animals once they leave the Sahel; large feedlots would be operated by parastatal organisms or by groups of livestock brokers, wholesale butchers, and traders who combine to obtain the necessary credits and to support the required scale of operation. These feedlots are supposed to operate in connection with residues from commercial crops like cotton and groundnuts.

Similarly, there is much interest in expanding the production of animals in the higher rainfall zones, involving farmers either in small-scale stock raising, or in combined stock raising and animal traction, in which the yoked team is turned over every few years, with the farmer putting aside some of his field for forage crop production. Related to this is the opening of new lands to livestock, through tsetse and black fly clearance programs.

Since they are focused on animals after they have left the Sahel, there is little in these programs of direct benefit to pastoralists. From an economic perspective, it is questionable as to whether the herdsmen would voluntarily supply sufficient young animals to keep the feedlots going, and to meet the rising demands for high quality beef. The reason for this is that the costs of keeping an animal on Sahelian pasture from age two to about age six are far less than the increased value of a six-year old steer over a two-year old calf. Swift is not sure that increasing the price leads to increasing the supply, because "among the Iforas Tuareg 'nomads sell to realize a target income, and so have a backward bending supply curve: the higher the price, the fewer the animals they sell'" (Monod 1975:131). Our own data on Fulani cattle transactions do not confirm Swift's observations, although raising the price paid for calves may not markedly increase the number offered for sale. A partial solution would be to explore ways in which herds-

men could be involved in the ownership and management of the feedlots and commercial operations, to enable them to benefit from the added value to the animal after it completes the process rather than just on the initial value when entering it.

In the Sahelian zone itself, the intervention aimed primarily at the herders which has received much donor enthusiasm is range management: rotational grazing with restrictions on the numbers of animals which may graze. This has a certain deceptive attractiveness but, as we have indicated, it raises as many problems as it offers to solve. Clearly, it strikes at the herdsman's major adaptive strategy, mobility, by constraining the movements of his animals. Justifying itself as environmentally sound, it substitutes the judgment of persons remote from the scene for the microecological data processing of herdsman themselves. These systems may prove far more costly than currently suspected.

### III. RESEARCH IN SAHELIAN PASTORALISM.

REDSO/WA has a signal opportunity to impact upon the nature of development efforts in the livestock sector by mounting a research program which examines empirically the basic social and ecological assumptions on which such efforts have been predicated. The research program will illuminate the resource allocations affecting herd size in Sudano-Sahelian pastoral societies.

#### A. General Position on the Research.

We are not quarreling with the notion that for each population within an ecosystem there is a number which cannot be exceeded without inducing change and possibly degradation. We are questioning the unproved assertion that in the Sahelian landscape it is pastoral practice per se which is the prime cause of that degradation. Picardi and Seifert (1976) cite approvingly

Hardin's concept of the "tragedy of the commons" as descriptive of the Sahelian situation, and call for the application of range measurement techniques including the removal of "excess" animals as the minimum required action for long-term ecological survival. Yet Hardin himself cites with sympathy a letter to Science by bioethicist Van Rensselaer Potter, which points to development interventions as the villain in the piece rather than to herding behavior:

When I first read Hardin's article, I wondered if the users of the early English commons weren't prevented from committing the fatal error of overgrazing by a kind of "bioethics" enforced by the moral pressure of their neighbors. Indeed, the commons system operated successfully in England for several hundred years. Now we read that, before the colonial era in the Sahel, "overpasturage was avoided" by rules worked out by tribal chiefs. When deep wells were drilled to obtain water "the boreholes threw into chaos the traditional system of pasture use based on agreements among tribal chieftains." Thus, we see the tragedy of the commons not as a defect in the concept of a "commons" but as a result of the disastrous transition period between the loss of an effective bioethic and its replacement by a new bioethic that could once again bring biological realities and human values into a viable balance (Potter 1974, quoted by Hardin 1977).

In other words, an ethic of resource conservation may exist among Sahelian pastoralists, and their adaptive strategies may well serve, imperfectly perhaps, to preserve the ability of the environment to sustain them, within the bounds of available technology, and within the new political and technological situation which has been imposed on them.

A.I.D. anthropologist, Allan Hoben, PPC/PDA/CP, makes a similar observation. Pointing out that Masailand has been occupied by pastoral peoples since the first millennium B.C., he writes: "Recent research has demonstrated that, far from causing environmental deterioration, this long usage by pastoralists had the effect of 'domesticating' the environment for man and wildlife alike" (1976:10-11). This position echoes Jacobs: "...rather than

destroying the wildlife environment, it now appears increasingly clear that heavy pastoral grazing of medium to tall grassland regimes is both a necessary and beneficial condition for the development and maintenance of the vast herds of wild ungulates that are found in these areas today" (1975:410-411, emphasis added). Toupet, who has worked among the Maures, argues that nomadic practice is less destructive of resources than is sedentary practice: "...in a semi-arid zone it is the nomad, far more than the settled farmer, who contributes to the conservation of nature. The minute and irregular rainfall, and consequent fragility of plant life, mean that any sedentarization results in a rapid degeneration of the land" (1975:467).

Returning to the Masai, Hoben writes:

In part, this ecological balance between the pastoralists and their natural environment was the result of deliberate though unsophisticated range management technique, including elaborate grazing sequences, the preservation of standing hay for dry season use, the use of donkeys to carry water, the burning of grasslands in good rainfall years and the careful browse management of goats to control brush from encroaching on the range. Strong social pressures could be brought to bear on individuals or groups that did not conform to range management decisions agreed upon by the council of elders... Beginning in the last decade of the 19th century the Masai suffered major natural, political, and economic setbacks which set in motion an irreversible process of eco-stress and social change (1976:11-12).

If Hoben is right, ecological degradation in Masailand is not a consequence of resources being held in common, but of a rapid series of exogenous shocks, comparable to those we have noted for the Sahel. "...the major problem facing the Masai today is not their conservatism or traditional and 'irrational' culture but the continuing reduction in the available resources per capita and the resultant degradation of the environment" (Ibid.:22).

Thus, we need to take a hard look at the implicit assumptions of the tragedy of the commons argument. What about the keeping of cattle for

prestige purposes? As late as 1976, an A.I.D./Contractor team reported:

Despite the obstacles that marketing, physical, and economic factors pose, the biggest hindrance lies in the attitude of the Masai. So long as cattle are viewed as their most desirable possession, marketing will be sporadic and unlikely to provide the level of off-take that is required...

But an examination of the actual situation leads one to the understanding that the Masai are not acting irrationally at all, but in an economically sound manner: "...buying cattle is the best available form of savings and investment and the best strategy for averting risk. Banking facilities are inaccessible to most Masai, and, in light of recent inflation rates in Tanzania, investing in productive goods, i.e., cattle, would appear to be the only rational course of action" (Hoben 1976:38).

It is in the pastoral sector that field research could have a major impact on the generation of development projects based on equity and high local participation. It is precisely in the pastoral sector that development efforts have been least successful. There are opportunities now, however, to base interventions on solid information which was not available just a few years ago. In the first place, the last two or three years has seen an explosion of high quality publication on the nature of Sudano-Sahelian pastoral systems, including:

I.L.C.A. Seminar on Evaluation and Mapping of Tropical African Rangeland, Bamako, March 1975.

I.A.I. Seminar on Pastoralism in Tropical Africa, Niamey, December 1972.

I.R.S.H./A.I.D. Colloquium on the Effects of Drought on the Productive Strategies of Sudano-Sahelian Herdsmen and Farmers: Implications for Development, Niamey, June 1975.

J. Gallais, ed., Stratégies Pastorales et Agricoles des Sahéliens durant la Sécheresse de 1969-1974, 1977.

J. Clanet, Les Eleveurs de l'Ouest Tchadien: la

Mobilité des Eleveurs du Kanem et leurs Réponses à la Crise Climatique de 1969/1973, 1976 or 1977.

Secondly, A.I.D. has undertaken some highly instructive project-related field inquiries, including S. Reyna's work on Assale-Seberwol, M. P. Madland's study in Selibaby, and the State University of New York-Binghamton team of Dongui Sissoko, John Grayzel, and John Van Dusen Lewis, directed by M. Horowitz, on Mali Livestock I.

Thirdly, A.I.D. is currently funding two projects which include field research on the sociology of pastoralism:

University of Michigan's Center for Research in Economic Development, Livestock Production and Marketing.

African-American Scholars Council, Study of Adaptive Mechanisms of Sahelian Populations.

The research we are proposing is designed to complement rather than to repeat earlier work. It should illuminate the area the understanding of which is necessary for livestock sector projects which attempt to regulate access to the range: how do Sahelian pastoral peoples manage their access to and consumption of environmental resources?

We propose a longitudinal, multi-component, integrated study of resource management among Sahelian pastoralists. While it would be desirable to go forth with all components at one time, we recognize the managerial limitations of time and personnel under which REDSO/WA operates, and have designed the study to permit its being parcelled out or to having its scope reduced. Since it is longitudinal, its operation should probably be vested in an institution or institutions which have the capacity and the commitment to maintain it over a 15 to 25 year period, with regular follow-ups after the initial field study. The C.I.L.S.S. Institut du Sahel is one possibility; I.L.C.A. is another. In either case, it is assumed that the component studies would be contracted out, to host country institutions where possible

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(such as Centre Voltaïque de la Recherche Scientifique, Institut de Recherche en Sciences Humaines [Niger], Institut National des Sciences Humaines [Chad]), and to U.S. institutions where necessary (for example, for computer analysis of LANDSAT tapes). It is hoped that close, enduring collaborative relationships would develop between host country and U.S. institutions involved in the studies, with circulation and exchanges of personnel, facilities, and knowledge.

The studies should take advantage of the new techniques for describing and analyzing geographical areas provided by satellite sensing and computer analysis, combined with so-called "ground truth studies." The satellites have the capacity to present regular and repeated descriptions of the environmental changes with which pastoral populations have to deal:

The diachronic sensing capabilities of the satellites open up the possibility of following subsistence systems, productivity levels, and changes in settlement and populations through time — seasonally, annually, and over longer periods. In effect, the "life histories" of entire populations, or selected portions thereof, may be revealed (Conant 1975:1).

Since A.I.D. is already involved in the possible application of LANDSAT data to the analysis of pasture conditions in the Sahel, it would not be necessary to establish an entire new program, but rather to provide sufficient anthropological input and participation in order that the maximum useful information be drawn from the process. It would be important to assure that the areas selected for anthropological investigation are indeed included in the remote sensing program, and for that reason, the specific sites recommended for intensive study are to be considered preliminary and subject to change given the already established priorities for the activation of satellite sensors from the ground.

The satellite derived data would provide a continuing — once every

nine or 18 days, depending on how many satellites were involved — presentation of the major environmental features (pasture, both range and cropped fields, and ground water) the quantity and distribution of which provide some of the ecological information involved in pastoral decision-making.

#### B. Suggested Field Sites.

The pastoral areas of the Sahel are somewhat less complex ethnically than the agricultural areas. The principal ethnic groups exploiting livestock in the Sahel, from West to East, are the Arabic-speaking Maures, various groups of Fulfulde-speaking "P~~o~~il" or "Fulani," the Berber or Tamasheq-speaking Tuareg and Buzu, various Teda-Daza-speaking groups like the Tubu, and again Arabic-speaking Zaghawa and others. Within the limits of the LANDSAT images, we propose field studies be undertaken in areas for which there already exist, on the basis of previous ecologically-oriented analyses, a fairly good base of information. The following regions commend themselves, and REDSO/WA may care to have studies undertaken in any one, several, or all of them. The virtue to covering at least several of these suggested locales is that we can better separate the culturally and micro-environmentally specific responses from those which may be more generally true across the ~~semi-arid Sahelian range.~~

(1) The Mao-Rig Rig region east of Lake Chad, building on the recent studies of Jean Clanet. Local populations speak Arabic, Daza, and Kanembu.

(2) The Mainé-Soroa region in Niger, west of Lake Chad, building on the work of M. Horowitz (local populations speak Fulfulde, Manga, and other Kanuric languages).

(3) The area between Tahoua and Agades, centering on In-Gall, building on the work of M. Dupire, E. Bernus, and others (local populations speak Tamasheq, Fulfulde, and Hausa).

(4) The Interior Delta of the Niger, Mali, building on the studies of J. Gallais and others (local populations speak Fulfulde, with some Tamasheq, Songhai, Bambara, and Dogon).

(5) The region of Dilley, Mali, building on the U.N.D.P. studies (local populations are primarily Fulfulde-speaking).

(6) The three country region defined by Selibaby (Mauritania), Bakel (Senegal), and Kayes (Mali), where herdsmen speak Arabic and Fulfulde.

### C. The Research Program.

#### (1) Review of the Literature.

An essential preliminary to the research and one which would help select the specific field sites, is a systematic review and analysis of the literature on semi-arid grassland pastoralism, particularly focusing on the items listed in Section III.C.(2).

The work calls for 15 to 18 months full-time effort of a social anthropologist, cultural geographer, or cultural ecologist who has already carried out field studies of pastoral peoples and who has full command of French and English. The expected product is a comprehensive report, summarizing the state of knowledge about pastoral ecology and social systems, and indicating the gaps which continue to exist in our knowledge that could be closed by the ensuing field studies. On the basis of that report, the precise scopes of work for the field studies would be written and specific contracts let.

The scholar selected to carry out this review and analysis of the literature on pastoral societies will have to be provided with sufficient travel and consultant funds to enable contacts with other researchers in the United States, Canada, Europe, and Africa. Personal consultation is important because the detailed, quantitative information called for is rarely published but often exists in the field notes which every researcher has jammed in file

cabinets and boxes, with the pious hope of someday having the time properly to analyze and present them. It is particularly desirable that the principal investigator should be in contact with the Kenya-based group of range land ecologists — like Michael Gwyne and David Western and their associates — and sociologists — like Philip Mbithi, who are undertaking related studies in East Africa. He or she should be tuned into the work of the Overseas Development Institute's "Pastoral Network," headed by Stephen Sandford. It would be most helpful if the researcher were chosen in time for her or him to participate in the Fall 1977 Nairobi conference on Desertification, sponsored by United Nations Environmental Programme. ]

(2) The Field Studies.

a. Duration. The studies recommended should be repeated at 3 year intervals over a period of 15-25 years.

Each initial study will involve a minimum of 18 to 24 months in the field, plus time for language study if necessary. The researchers will, after an orientation period, spend full time in the field, except for brief departures to meet with teams from the other selected research sites, and to receive and discuss materials and maps from the following sources:

i. LANDSAT imagery and analysis.

ii. Small-scale aerial reconnaissance and photography, preferably on a quarterly basis, to allow plotting of seasonal variations in grasses, water, markets, cultivated fields, veterinary services, and other items which appear to influence pastoral movement.

iii. Biotelemetry of selected animal movements, to facilitate tracking of herds. (Small battery-powered transmitters are placed around the necks of the animals to be tracked, with receivers

mounted in 4-wheel drive vehicles to permit easy triangulation.)

b. Composition of Field Teams. Among the difficulties in bringing together the literature on pastoralism in ways which can meaningfully guide development actions, is the fact that scholars tend to focus on one component only — i.e., the range, the animals, the people — and come to advocate thereby interventions which benefit that component uniquely or disproportionately (Sanford 1976). We are therefore recommending that each field research team be comprised of at least two persons: (i) an anthropologist or geographer, with skills in cultural ecology; and (ii) a pastoral ecologist, with training in botany and zoology. Both researchers should have training in cartography. If the principal researchers — either one or both — are expatriates, they should be accompanied by host country students who would be trained to take over the research following the initial field period. The research team should have interpreters and research assistants/enumerators as necessary, and should be able to call on highly specialized consultants also as necessary.

c. Research Program. Details of the research program will await the completion of the recommended survey and analysis of the literature on semi-arid grasslands pastoralism. It is likely, however, that the points outlined below would be included:

1. Daily records of "objective" quantifiable observations will be maintained — the research assistants/enumerators will be largely vested with this responsibility — including but not limited to: numbers and kinds (age, sex, weight [on a sample basis], species, other characteristics) of animals herded; quantity of milk produced, important as an indicator of the quality of pasture and availability of water; calving, lambing; daily movements of animals

and people, plotted against maps; availability and use of water, fodder, graze, and browse, again plotted on maps; climatic features.

ii. Description of (with photographs) and treatment of the environment, including burning (always accompanied by local explanations, i.e., to encourage fresh, nutritive grasses; to rid the region of ticks and flies); gathering of wild foods; movements toward and away from places, persons, events (tax collectors, farmers, other herdsmen, mineral rich grasses); responses to disease (human and animal), predators, theft.

iii. Allocation of energy and time; authority patterns; control of women, children, self, others; labor expenditure in different types of activity (herding, milking, cheese-making, farming, gathering, trade, rest).

iv. Relationships with other people, including government, veterinarians, tax collectors, brokers, traders, other herding peoples (of same and of different ethnic group), sedentary peoples (nature of herding contracts, pasturing on cultivated fields, exchange of cereals-stubble-labor-manure-animals-women).

v. Investments and circulation of money, labor, animals, goods. How and under what conditions are animals (kind, number) sold, exchanged, loaned, given away?

vi. Description of social organization, significant groupings (kinship, residential, age, ethnic, sexual, status of birth [i.e., caste, slave, captive]).

vii. Goals, values, perceptions. How do herdsmen define the rewards of successful herd management? Do they see alternative ways of arriving at the same objectives? How do they define the

contribution of various factors in production: land, labor, animals, other forms of capital? How do they evaluate these factors, and how do they attempt to maintain a favorable transactive balance? What kinds of conservation practices are recognized by the herdsmen, and how do they act on them? How do they perceive the capacity of the range to support stock, and how do they respond to that perception: culling? loans and gifts? movement into other activities? migration to more supportive pasture? shift into different composition of stock which better accords with the perceived conditions of the range?

viii. What kinds of technological innovations relating to herding practice are made? What is their impact on the group? What is their spread effect?

ix. How do herdsmen respond to market information? Under which conditions do they increase sales when they view the price as favorable (as Hoben has shown for the Masai and Horowitz for the Fulani), and under which conditions do they manifest the "backward bending supply curve" (which Swift has observed among the Adrar des Iforas Tuareg)? What kinds of investments are made from the sale of animals? Do they see new investments outside the traditional range (such as the Dinka of the southern Sudan who have purchased trucks with the proceeds from cattle sales and have entered the transport business)?

d. Objectives. These studies will specify what is understood by carrying capacity, both in land and in labor (that is the managerial constraints on herd size), and will describe and analyze the ways in which pastoral herdsmen respond to their perceptions of the environment. These

studies will provide a basis for programs of intervention in the pastoral livestock sector predicated on the real needs and genuine participation of local populations as called for in the Congressional mandate on foreign assistance. The studies will serve to make more nearly congruent the varying, sometimes opposed agendas of the several players in the development process: local people, host governments, donor agencies.

## BIBLIOGRAPHIE DE RÉFÉRENCES CITÉS

IV. ~~REFERENCES CITED~~.

- Abercrombie, F. D.  
1974 Range Development and Management in Africa. A.I.D.
- Barth, F.  
1964 "Capital, investment and the social structure of a pastoral nomad group in South Persia," in R. Firth and B. S. Yamey, eds., Capital, Savings and Credit in Peasant Societies.
- Beazer, W. F. and J. D. Stryker  
1976 "Financing recurrent governmental expenditures for livestock development in Mali." ~~Report prepared for GRM and USAID.~~  
*Rapport préparé pour GRM et USAID.*
- Bernus, E.  
1974 "Possibilités et limites de la politique d'hydraulique pastorale dans le Sahel nigérien," Cahiers ORSTOM, sér. Sciences Humaines 11(2):119-126.
- 1974a "L'évolution récente des relations entre éleveurs et agriculteurs en Afrique tropicale: l'exemple du Sahel nigérien. Cahiers ORSTOM, sér. Sciences Humaines 11(2):137-143.
- Bernus, E. and G. Savonnet  
1973 "Les problèmes de la sécheresse dans l'Afrique de l'Ouest," *Présence Africaine* 88(4):113-138.
- Brown, L. H.  
1971 "The biology of pastoral man as a factor in conservation," *Biological Conservation* 3(2):93-100.
- Caldwell, J. C.  
1975 ~~The Sahelian Drought and its Demographic Implications.~~  
*à l'échelle de l'Afrique de l'Ouest et de l'Afrique du Nord.*  
American Council on Education-Overseas Liaison Committee Paper, No. 8. Cahier n° 8 du Comité de Liaison entre le Conseil américain et l'enseignement supérieur.
- Clanet, J.  
1976 Les Éleveurs de l'ouest Tchadien: la Mobilité des Éleveurs du Kanem et leurs Réponses à la Crise Climatique de 1969/1973.  
or  
1977 Dissertation, typescript.
- Conant, F. P. et al  
1975 "Report and Recommendation by the [N.S.F.-supported] Research Workshop on Satellite Potentials for Anthropological Studies of Subsistence Activities and Population Change."
- Darling, F. F. <sup>et</sup> M. A. Farvar  
1972 "Ecological consequences of sedentarization of nomads," in M. T. Farvar and J. P. Milron, eds., The Careless Technology: Ecology and International Development.
- Ekweni, C.  
1962 Burning Grass.

- F.A.O.  
1962 "Nomadic pastoralism as a method of land use," Symposium on the Problems of the Arid Zone. UNESCO.
- 1974 A Survey of the Problem of the Sahelian Zone with a View to Drawing Up a Long Term Strategy and a Programme for Protection, Restoration and Development. FAO/SWE/TF 117.
- Gallais, J.  
1972 "Aspects sociologiques des conditions de l'élevage en région de Mopti," Project de Développement de l'Élevage dans la Région de Mopti. Annexe A.
- Hardin, G.  
1977 "Ethical implications of carrying capacity," in G. Hardin and J. Baden, eds., Managing the Commons.
- Hoben, A.  
1976 Social Soundness Analysis of Masai Livestock and Range Management Project. A.I.D.
- Horowitz, M. M.  
1975 "Herdsman and husbandman in Niger: values and strategies," in T. Monod, ed., Pastoralism in Tropical Africa.
- Imperato, P. J.  
1972 "Nomads of the Niger," Natural History 81(10).
- Jacobs, A.  
1975 "Maasai pastoralism in historical perspective," in T. Monod, ed., op. cit.
- Janzen, D. H.  
1973 "Tropical agroecosystems," Science 182:1212-1219.
- Marti, A.  
1972 Les Problèmes d'Abreuvement et le Fonctionnement des Stations de Pompage vus par les Éleveurs de l'Arrondissement de Tchín Tabaraden. République du Niger, Service de la Promotion Rurale.
- Mayer, J.  
1974 "Coping with famine," Foreign Affairs 53(1):98-120.
- Monod, T.  
1975 "Introduction," in T. Monod, éd., op. cit.
- Nestel, B. et al  
1973 Animal Production and Research in Tropical Africa.
- Paylore, P. and R. A. Haney, Jr.  
1976 Proceedings of the West Africa Conference. University of Arizona.

- Picardi, A. C.  
1974 "A systems analysis of pastoralism in the West African Sahel," Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region. Annex 5. Center for Policy Alternatives, M.I.T.
- Picardi, A. C. <sup>et</sup> and W. W. Seifert  
1976 "A tragedy of the commons in the Sahel," *Technology Review* 78(6).
- Potter, V. B.  
1974 "The tragedy of the Sahel commons," *Science* 185.
- Salzman, P. C.  
1972 "Multi-resource nomadism in Iranian Baluchistan," *Journal of Asian and African Studies* 7(1-2):60-68.
- Sandford, S.  
1976 "The objective of pastoral development," Overseas Development Institute, Pastoral Network Paper 1D.
- Stenning, D.  
1957 "Transhumance, migratory drift, migration: patterns of pastoral Fulani migration," *Royal Anthropological Institute, Journal* 87:57-73.
- Swift, J.  
1973 "Disaster and a Sahelian nomad economy," in D. Dalby and R. J. Harrison Church, eds., Drought in Africa. School of Oriental and African Studies (University of London), Centre for African Studies.
- Talbot, L. M.  
1972 "Ecological consequences of rangeland development in Masailand, East Africa," in Farvar and Milton, eds., op. cit.
- Toupet, C.  
1975 "Le nomade, conservateur de la nature? L'exemple de la Mauritanie centrale," in T. Monod, ed., op. cit.
- Western, D.  
1974 "The environment and ecology of pastoralists in arid savannahs." ~~Paper presented at the SSRC Symposium on "The Future of Traditional 'Primitive' Societies."~~ Cambridge, ~~Décembre~~ 1974.

*Communication présentée au Symposium du SSRC, du :*

# THE DEVELOPMENT ANTHROPOLOGY OF SUDANO-SAHELIAN FARM SYSTEMS:

## A PROPOSAL FOR RESEARCH

...the greatest resource for development in the agricultural sector is the Sahelian farmer, experienced, skillful, and knowledgeable. It is imperative that he be made an active participant in the design, assessment, and management of developmental interventions (AID 1976:47).

### I. INTRODUCTION.

The study of Sudano-Sahelian farm systems aims at the identification of local adaptive solutions to the problems of cultivating the semi-arid environment of generally low soil fertility, and at the determination of the possible diffusability of these adaptations.

#### A. The Question of Leadership.

Building from local strengths is a major and stated objective of the A.I.D. program in Africa, and derives from the current approach to development, identified with the Congressional mandate, which is based upon maximum local participation, the so-called "development from below" approach. This objective is not often satisfied in the project documents we have examined, although one runs across statements like "we discussed the program with local chiefs who thought it was fine..." or "to assure project success we shall enlist the support of traditional leaders..." This clear-it-with-the-leaders attack to local participation is not unproblematic. In the first place, not all African societies have leaders, in the sense of specific individuals who have the authority to make decisions involving others and the power to see that those decisions are carried out. In many societies, authority is diffuse, vested in groups (familial, coresidential, age) and not in individuals. Even where specific individuals do seem to have leadership attributes, they may embody group consensus rather than direction. That is, they publicly announce decisions which are arrived at through community par-

ticipation. They frequently must maintain a delicate balance between the expectations of their people and the demands of the authorities, and may be unable to endorse any new measure unless it offers not only tangible benefits, but is also clearly perceived as doing so. In the second place, even small, seemingly homogeneous communities may turn out to be quite complex, comprised of individuals with different, often competing interests. The "leaders" in such communities represent the interests of some, but not all the people, and may even, where the community is stratified as in some Sudanian societies, represent the interests of only a minority. In their analysis of the introduction of dry season tomato farming in Zaria, P. O. Agbonifo and R. Cohen showed how the channeling of innovation through local authorities led to quite variable results:

...Hausa farmers may or may not trust their traditional leadership depending upon how well the leaders have looked after peasant interests in the past and what previous kin or client relations exist between farmers and leaders. In the Zaria project, good leadership meant allowing farmers to take advantage of better prices outside the agreed upon marketing scheme (1976:377).

The issue of leadership and internal complexity points also to the nature of corporate groupings within the community. We might turn for an illustration to a non-A.I.D. project, the Euraction Sahel/accord "projet embouche bovine à Liboré," a few kilometers south of Niamey. Here, as in so many donor projects, credit is made available to the peasants, in this case for the purchase of cattle for fattening. In principle, the village has the "responsabilité communautaire" for re-payment of debt in the case of borrower default. But the Djerma village, particularly one of any considerable size, is not a corporate unit, and has no established mechanisms for responding to cases of default. Since high rates of default are both common and fatal to such projects throughout Africa, it is obvious that a thorough understanding

of the nature of community groupings is an essential prerequisite for project success.

B. Center/Periphery Problems.

In addition to misunderstanding the role of traditional leadership and the nature of community groupings, many development officials -- both from the donor agencies and the host countries -- imperceptibly absorb certain authoritarian or, at best, paternalistic attitudes that make it difficult for them to accept the notion of participation by their clients, the peasants. These attitudes often include three elements:

(1) a strong pro-center and anti-periphery bias, as far as perceptions of decision-making are concerned;

(2) an under-estimation of the human resources at the periphery, an unwillingness to credit the strengths they have; and

(3) an unwillingness to allocate responsibility to local officials at the lowest levels, the encadreurs and animateurs who deliver finished programs from the centers and who are not encouraged to modify them on the basis of local interests and capacities.

Although this problem is universal, it is perhaps exaggerated in the franco-phone countries of the Sahel because of the inheritance, by the independent states, of the exceptionally intense hierarchization of authority of the former colonial power which discouraged local initiative. In a recent issue of African Environment, there is an interview with a rural nurse which is particularly instructive:

"During your studies, is there no mention made of Senegalese traditional medicine or traditional medication?"

"No. During our studies we mainly receive a hospital-directed training. We are taught modern medical techniques, with teachers who have been trained in the Ecoles Supérieures d'Infirmiers. Once assigned to a

locality, all we can do is apply what we have been taught. As a nurse, my job is to administer authorized treatments..." (Diop 1975:111).

The role of agricultural agents is similarly directive; they recommend only authorized actions, even though experience demonstrates again and again that what seems to work in the laboratory or at the experimental station may not be at all successful in the field. During our visit to a Volta Valley Authority village in December, 1976, we learned that the sorghum variety which the extension agents were required to advocate had produced that year, under the recommended application of chemical fertilizers, about one-tenth as much as fields planted in traditional seeds. The latter, it seems, were better adapted to the peculiar rainfall pattern that season. Yet, if told to promote the same variety in 1977, the agents felt that they would have no alternative but to do so.

Development efforts could only profit if these local level workers were also encouraged to communicate upwards the findings of the men and women of the villages. It is clearly very difficult to change the attitudes and practices which derive from extreme centralization of authority. One can, however, do considerably more with demonstrating what the productive strengths of the rural areas are, and what can be done within the context of local definitions of the benefits of change.

## II. RESEARCH ON FARM SYSTEMS.

There are two major categories of peasant agriculture in the Sudano-Sahelian zone:

- a. extensive or shifting cultivation, in which fields are returned to fallow after several years of farming, generally for a longer period than they are farmed;
- b. intensive, in which fields are cultivated annually through the

employment of techniques for maintaining soil fertility without regular fallowing.

Both systems operate with modest technological inputs, and generally without the use of chemical fertilizers, fossil fuels, hybrid seeds, pesticides, and other elements of modern industrial agriculture. Intensive cultivation is more productive per unit of land; extensive is more productive per unit of labor. The relative scarcity of land and labor and the returns from increased production influence the kind of exploitation selected. From an outsider's point of view, intensive cultivation has certain attractions, but since the labor costs are high, there must also be substantial advantages for the farmer. In at least two cases in West Africa, the Dogon and the Kofyar, intensive cultivators appear to be in the process of extensifying as conditions permit a movement toward rainfed swidden farming of grains. Thus an important issue is to specify both the "objective" ecological conditions and the peasant perceptions of their own opportunity situations.

Let us start with a disclaimer. In stressing an understanding of local, indigenous systems, we are not claiming that every system is perfectly adapted to its environment, so that any change is necessarily dysfunctional. Obviously not. African agricultural techniques are enormously variable in productivity. For example, in his excellent discussion of intensive cultivation of terraces among the Kofyar of the southern portion of the Jos Plateau, Netting points out that the farmers so value the contribution of manure to soil fertilization that they "have readily adapted to a symbiotic relationship with Fulani herders" (1968:62). The exchange of manure for post-harvest pasturing on stubble has been reported again and again among peoples of the semi-arid savannah (Horowitz 1972, 1973). As do the Kofyar, the Manga of Niger entice herdsman to pasture animals on the cropped fields with payments

in cash and in kind. Yet the Birom, a farming people north of the Kofyar on the Jos Plateau, are hostile to the Fulani and contend "that animal dung was injurious to crops" (Netting 1968:62-63). It may well be that the Birom have more to lose than to gain in dealing with the Fulani, but this cannot be decided on an a priori basis. If it is important to know, the place to find out is in the field.\*

A. Review of the Literature on Sudano-Sahelian Farm Systems.

The first task is to survey the literature and identify those Sudano-Sahelian groups who are reputed to have agricultural systems of unusual productivity and/or a more successful capacity to withstand deficit rainfall. There appear to be three types of intensive systems in the region, although in fact these types may be merged in practice and, indeed, combined with extensive systems:

a. The first are found among those farmers who intensify production because they cannot provide enough food for subsistence purposes through other means. Boserup (1965) hypothesizes that intensification is a function of increases in population density. For example, a people may be driven into a highland region for defense against the aggressive expansion of the neighbors. The Dogon of the Bandiagara Plateau were protected from the Mossi to the south by the abrupt, almost vertical cliffs of the falaise. But the price of living on the Plateau, with its thin rocky soils, was agricultural intensification. The Chokfem Sura, who share "the same physical environment and crop repertoire with the hill Kofyar and living near enough to allow the easy diffusion of

\*According to Audrey Smedley (pers. comm.), the Birom do understand the value of manure and utilize it where they find it appropriate. They do not apply it on the major crop, acha (Digitaria exilis or "hungry rice"), because they believe it causes excessive lodging.

ideas, have remained primarily shifting cultivators" (Netting 1968: 115). The Chokfem have a far lower population density, 82 persons per square mile, than do the Kofyar with 162 persons per square mile. As Boserup claims (1965), farmers like the Chokfem are unlikely to expend the additional energy in agricultural intensification if they don't have to (or have no incentive to), and their lower densities allow them the luxury of continuing to satisfy their subsistence needs extensively, at a considerable energy saving over their Kofyar neighbors.

b. The second are those people whose proximity to river systems and seasonal water courses (bas fonds) permits them to practice flood (crue) and recession (décrué) cultivation. In our opinion, such systems, as those practiced in the Interior Delta of the Niger, are so important that we have devoted a separate section of this Report to their consideration.

c. The third are those farmers who elect to intensify because of clear market benefits. Such farmers are generally found in proximity to urban centers, where the costs of transport are relatively low and the demand for garden produce relatively high. A case in point is the rapid spread of well-irrigated, compost fertilized, fenced gardens along the road on both sides of Fada N'Gourma, responding to the emerging market for vegetables. Comparable systems are found along the Chari, in which the costs of laboriously hand-watered gardens, in which heavy buckets are carried from the river to plots high upon the banks, are seen as recompensed by the high prices received for vegetables in Ndjamena. Studies of these latter should provide significant insights into the dynamic nature of develop-

mentally-relevant entrepreneurial activities and technological innovation among peasants. Note too that the motives to practice intensive cultivation can shift. Some Dogon, no longer threatened by the Mossi, now direct their surplus onions into markets at Bandiagara, Mopti, and beyond.

The survey we recommend would inventory the state of knowledge and identify gaps in the following items for each of the above described types:

environmental features - topography, climate, soils, ground water.

technology - tools, crops, manuring, compositing, seed selection, spacing, rotation, intercropping, fallowing, irrigation, terracing, cultivating, ridging, contouring.

land tenure - access to lands of different kinds; duration of tenure; nature of usufruct; incentives and disincentives to investment in capital improvements (trees, wells, terraces, fodder crops, dikes, dams).

social organization of production - ability to mobilize labor at different points in cycle (land clearing, preparation, sowing, cultivating, harvesting, storage, processing); nature of labor (hired, tenant, household, extended family, age grade, neighbor exchange); access to draft animals.

economics - access to markets of different kinds [see section on locational analysis]; response to price variations; consumptive preferences and obligations; nature of investments.

intergroup relationships - vulnerability of land to other peoples; to animals; theft; boundary disputes; relationships with herding peoples; vulnerability to fire.

politics - nature and location of managerial decisions relating to production and distribution of crops; taxes; equity; relationship of people to local and external authority.

ideology - evaluation of farming; preferred statuses; nature of reputation; sexual association of farming; belief systems and their relationship to agriculture.

The product of the survey would be a manual which (a) inventories the relevant data about systems of high productivity in a form which is usable by officials concerned with agricultural development among small-scale producers, and (b) which provides a social soundness framework for the analysis

of any local system considered a candidate for intervention. Thus the non-specialist reader of the social soundness section of a project document would at least have a means of assuring herself or himself that the minimum required analysis has indeed been made.

As a minimum, the survey should include descriptions of the following farm systems:

Cameroon

Mandara terracing.

Chad

Sara gardening and flood recession cultivation along the Chari.  
Kanembu farming of the polders on the eastern shores of Lake Chad.

Mali

Dogon irrigated gardening on the Bandiagara Plateau and "house" and "bush" fields on the Seno Plain.  
Bambara "house" and "bush" fields and animal traction programs.

Niger

Djerma rice cultivation along the Niger.  
Mobeur shadouf gardening on the Komadugu.  
Cuvette cultivation among Tamasheq-speakers around Tahoua and Agades.

Nigeria

Kofyar terrace and ridge cultivation on the Jos Plateau and shifting cultivation on the Plains.

Senegal and Mauritania

Various farm systems along the Senegal River.  
Rice farming in the Casamance.  
Wolof farming at the experimental program at Sine-Saloum (Kaolack).

Togo

Kabre farm systems.

Upper Volta

Gourmanche irrigated gardens along the Fada road and manured "house" fields and non-manured "bush" fields near Matiakoali.  
Gourmanche bas fonds farming for rice.  
Bobo farming, both traditional and at the Matourko station.

Before the report is published and distributed it should be the subject of a Workshop, at which a small group of experts (African, European, American) would be invited to meet with A.I.D. officers and major consultants involved in agricultural development projects. The point of the Workshop would be to subject the draft document to intensive expert scrutiny to assure both its maximal scientific strength and its maximal utility to persons responsible for planned interventions in that sector. Ideally, the Workshop should include field visits to some of the sites described.

Proposal - A Survey of the Literature and a Workshop on Sudano-Sahelian Intensive Agricultural Systems.

Objective. A survey of the available French and English literature on the sociology and ecology of Sudano-Sahelian farm systems which are reputed to be exceptionally productive (per unit land or per unit labor). The survey will be synthesized according to the topical framework outlined above, and a summary of this material will be presented in a form useful for development project design and implementation.

Method. The study will require 12 person/months of a social scientist (social anthropologist, cultural ecologist, human geographer, rural sociologist), with experience in African savannah woodlands and grasslands agriculture and with reading fluency in French and English. This individual will systematically cover all available literature, abstracting those materials relevant to the objective. Particular attention to be paid to systems and sub-systems which seem exceptionally productive, which are reputed better to satisfy the consumptive needs of their farmers, and which have developed special techniques (social as well as technological) for effective exploitation of micro-environments.

Product. Within eight months of beginning the project, the researcher

will circulate a draft report of the findings. This draft will serve as the central document for a Workshop which the researcher will chair, in which experts in the social sciences and donor agency and host government officers involved in agricultural development will participate. Out of these discussions, the researcher will prepare a final document, which will inventory the state of knowledge and provide clear recommendations as to the relevance of the material for programs of development intervention based upon the existing strengths, interests, and capacities of the local populations.

Support Required. Project director, 12 months. Travel and per diem to permit work at major documentation centers (i.e., FAO/Rome; IDEP/Dakar) and site visits. Funds for acquisition of copying of books, documents. Costs of clerical assistance, consultants, supplies, communications. Cost of Workshop. Cost of publication of report, which should be given wide distribution, in French and in English, to host country officials, as well as to A.I.D. officers and contractors.

┌ B. Field Research.

The second phase of the research program follows up the findings of the survey of the literature/workshop with field examinations of selected systems which have been identified as having the highest potential for diffusion. REDSO/WA already has considerable experience with this kind of research, and the potential payoffs from relatively modest investments have proved to be substantial. A useful illustration may be drawn from the social anthropological studies associated with the Mali Livestock I project. Since this project involved interventions among Bambara farmers and Fulani herdsmen, two sub-studies were undertaken, that of J. Lewis among the Bambara and that of J. Grayzel among the Fulani. Both studies produced findings which were useful and unexpected. Of these findings, the then Director of AFR/DS wrote:

I continue to be impressed with the vitally important information being developed for the Mali Livestock project... Indeed, their recommendations on supporting the organized character of village millet production, protection of village farming rights in the Forest, and group systems of credit seem to offer the difference between success and (almost assured) failure of the project (May 28, 1975).

Like many other peoples in the Sudano-Sahelian region, Bambara farmers are divided between those who run small operations with small and uncertain surpluses beyond the consumptive needs of their households, and those who run larger operations with large and fairly regular surpluses. On the basis of much conventional wisdom, these latter would seem to be prime candidates for interventions aimed at increasing the fraction of their production aimed at the commercial sector. C. R. Wharton, Jr., who has discussed the significance of risk and uncertainty among subsistence farmers as they related to willingness to innovate (1971), argues that farmers are more likely to experiment where they have established solid subsistence bases. Certainly applicable in some contexts, this generalization can be carried too far. It is challenged, for example, by the empirical findings from Mali Livestock. There the "successful" farmer, who regularly harvests millet and sorghum in excess of the consumptive needs of his household, is reluctant to risk the shift to increased commercial (i.e., groundnut) production. The reason for this, according to Lewis, is that in order to produce a large harvest the farmer must be able to mobilize a labor force far beyond that which can be supplied by his household, especially at peak periods of cultivating and harvesting, when demands for labor are high. (The agricultural cycle is locked into a short rainy season, and all farmers therefore are involved in the same activities at pretty much the same time, leading to a potential competition for labor.) Much of the labor is supplied by persons who are not directly compensated for their work, such as the village age grade (ṛō) of young

adults, but who have a potential claim on the grain produced with their labor should need arise. As Lewis explains:

Investigating risk-taking and economic change among subsistence farmers southeast of Segou, Mali, I found potential innovators to be as concerned about the risk a changed practice posed to their reputation in the community as it did to their investment of time and resources.

A farmer's reputation would suffer if it did not appear to his neighbors as if the labor power under his authority were being maximally utilized for the production of staple food grains, to be consumed locally if necessary. More indicatively, perhaps, the farmer's reputation would also suffer if he seemed wealthy enough (such wealth was usually stored in the form of livestock) to be conceivably able to exercise a personal choice as to whether or not he concentrated his productive efforts upon these subsistence goals. Such a wealthy individual could have the fullest granaries with which to relieve grainless relatives and neighbors in times of drought or locust attack. However, the fact that he could afford to diversify his production into commercial areas and consequently produce less of a subsistence surplus makes his choice not to do so a charitable one and, more importantly, makes those who found relief as a result of this choice seem dependant upon his will...

...a farmer seeking a personal (i.e., money as opposed to grain) profit through a shift of emphasis towards commercial production could become the focus of his neighbors' envy and suspicion. Since such a declining reputation could lead to witchcraft, sabotage, a loss of access to communal and exchange labor groups (necessary in helping the individual farmer to overcome certain labor bottlenecks in the short farming season), or, in extreme cases, expulsion from the community...

These findings -- not surprising, perhaps, to social anthropologists familiar with Melanesian chiefs' yam displays -- have clear implications for a program which would ordinarily seek to locate innovations initially among the more successful farmers in the community. Lewis went on to suggest that better candidates for development actions were to be found among the younger farmers who left their parental villages to cultivate new areas. Although they did not have access to large amounts of communal labor neither were they vulner-

able to the threat of a withdrawal of that labor for making allocative decisions defined as "anti-social." These persons would normally be overlooked in the "take-me-to-your-leader" approach to development, since they do not have the social standing nor the collateral which would seem to commend them as good credit risks and good bets for investment.\*

An unanticipated payoff from the social anthropological research on Mali Livestock I was the training of a Malian counterpart sociologist. Although the agreement with GRM called for such an individual, in fact the person assigned to the project was a school teacher with no previous experience or higher level education in development social science. He learned rapidly and well in the field, receiving in essence on-the-job training by working closely with the two American researchers in the field and participating in informal seminars with the project research director. Following the completion of the field work, he was named official sociologue for the GRM office involved with development in the livestock sector, replacing the expatriate sociologist provided through U.N.D.P. Reversing the normal but by no means necessary sequence, he now expects to do graduate study in development anthropology at a foreign university. Had the project team insisted on formal credentials as prerequisites, there would have been no host country counterpart, and no host country professional to replace the expatriate. We strongly recommend that in every project involving field research a training

\*It remains to be seen whether these recommendations have been translated into action. The Director, AFR/DS, wrote: "I have just finished reading [the most recent research report on Mali Livestock]. I was struck by the eminently practical, and at the same time perhaps vital suggestions...made... While copies of this report and [the project director's] valuable notations are sent to the CDO and QMBEVI, I wonder if there is a formal way in which such matters will get picked up and reviewed and become part of the project's management considerations... Could we perhaps build into the MIS a regular point of review and analysis of the research components, with 'critical path' indicators of decision points on management that the research raises" (April 3, 1975)?

component for host country nationals should be included.

Building on the experiences of the REDSO/WA-supported Mali Livestock and Dogon Cereals research projects, and on the findings of the survey on the literature and the Workshop, we propose a broad field effort which would further specify the adaptive strengths of Sudano-Sahelian agriculture and serve as a training ground in development social science for host country nationals. The directing research team, composed of a field-oriented agricultural economist, a social anthropologist or rural sociologist or human geographer, and an agricultural ecologist, should be provided with the resources to carry out comparative studies of intensive and extensive productive systems in a wide range of micro-environments. The specific areas chosen would be based partly on the need to fill in in greater depth the information derived from the earlier studies and survey and partly on the development interests of the Agency and the host governments. Over a two-year period, the research team should be able to organize a half-dozen specific research efforts in productive systems, training and supervising host country personnel to carry out the field work. Conceivably, the various local teams could be brought together for one or two months each year, to discuss the implications of their projects and to expand their formal knowledge of the development social sciences in a seminar situation, such as might be arranged at the new Pan-African Institute for Development/Sahel center, which is organized to undertake short, focused courses in development work, or at a national center like the Malian Institute of Rural Economy. Applications for research positions could be solicited from among extension agents, rural school teachers, as well as from persons with more formal training in social science. After two years of supervised field research plus annual seminars, these on-the-job trained persons would constitute valuable personnel resources capable of par-

ticipating in their countries' programs of development research. Some of them, with the support of their governments, might subsequently be selected for more advanced university training.

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III. REFERENCES CITED.

- Agbonifo, P. O. and R. Cohen  
1976 "The peasant connection: a case study of the bureaucracy of agri-industry," *Human Organization* 35(4):367-379.
- A. I. D.  
1976 Report to the U.S. Congress. Proposal for a Long-Term Comprehensive Development Program for the Sahel. Part II.
- Boserup, E.  
1965 The Conditions of Agricultural Growth. The Economics of Agrarian Change under Population Pressure. Chicago: Aldine Publishing Co.
- Diop, M.  
1975 "An experience in a rural dispensary," *African Environment* 1(4):111-115.
- Horowitz, M. M.  
1972 "Ethnic boundary maintenance among pastoralists and farmers in the Western Sudan (Niger)," *Journal of Asian and African Studies* 7(1,2):105-114.  
1973 "Relations entre pasteurs et fermiers: compétition et complémentarité," *Notes et Documents Voltaïques* 6(3):42-45.
- Netting, R. McC.  
1968 Hill Farmers of Nigeria: Cultural Ecology of the Kofyar of the Jos Plateau. Seattle: University of Washington Press.
- Wharton, C. R., Jr.  
1971 "Risk, uncertainty, and the subsistence farmer," in G. Dalton, ed., Economic Development and Social Change. Garden City, New York: Natural History Press.

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LOCAL POPULATIONS AND RIVER BASIN DEVELOPMENT:  
PROPOSALS FOR RESEARCH

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I. THE CURRENT SITUATION.

Momentum continues to build at national and regional levels for large-scale engineering structures, in the form of dams and irrigation works, within all the major Sahelian lake and river basins. Reinforced by multi-lateral and bilateral donors and by multinational firms seeking design and engineering contracts, the trend toward large-scale capital intensive projects seems almost irresistible.

In the Senegal River Basin, the OMVS is actively seeking funds for the Diama and Manantali dams even before the necessary environmental impact, let alone social impact, analyses have been carried out. In the Niger River Basin, the first mainstream dam has already been completed at Kainji in Nigeria while preparatory works are nearing completion in Mali on the Selingue tributary dam. Two further tributary dams are in the advanced planning stages in northern Nigeria as is the Kandadji mainstream dam up-river from Niamey. Responding to the increased need for coordination and planning, the heretofore inactive Niger River Commission (RNC) is seeking international assistance for institution building and studies. As for Lake Chad, the Lake Chad Basin Commission is already an executing agency with a commitment to "larger and larger scale projects with greater capital inputs" (AID 1976:207), in spite of the inadequacy of hydrologic and socioeconomic data needed for integrated planning purposes. During our January 1977 visit a two-man UNDP mission was in the field to draw up terms of reference for studying the feasibility of a major dam on the Logone. Our impression was not whether such a dam would be built but rather where and when.

## II. THE PLACE OF LOCAL POPULATIONS IN RIVER BASIN DEVELOPMENT.

Throughout tropical Africa, *the potentiality of large-scale river basin development projects for improving the lives of local populations has yet to be effectively utilized.* This is a major tragedy, especially for those countries (as in the Sahelian and Sudanic zones) which have access to only one or two major river systems which constitute the national heartland. Under such circumstances, the long-term costs of shortsighted planning are immense. Here it is important to emphasize that we are not claiming that such projects should not be built. What we are claiming is that *as currently planned they are realizing only a relatively small proportion of their potential* in terms of a program of integrated river basin development. It is in this sense that their opportunity costs are high since dams with their associated irrigation works constrain, by their very existence, the options available to future planners.

If anything, the planning is becoming more restricted simply because of the mushrooming cost of energy in Sahelian countries so that the attractiveness of hydropower increases. In cities like Bamako (where the cost of electricity is prohibitive) and Niamey (where electricity is currently imported from Kainji in Nigeria), the pressure to move ahead rapidly with local hydro projects is tremendous, especially given the availability of external capital since the drought. This is understandable. But the risk is that hastily planned facilities will concentrate on a rather narrow range of benefits which will favor the urban consumer (as in the above two cases) at the expense of the large majority of citizens who live in rural areas and especially in the river valleys. For most of these people, capital-intensive large-scale irrigation projects are not the answer since they tend to involve a relatively small number of tenants at not too profitable levels — as the

record of the Office du Niger in Mali so sadly illustrates. Furthermore, the capital costs for such projects are escalating because of an increasing international awareness of the need for far better drainage facilities to reduce the omnipresent dangers of waterlogging and salinity. Here it is not inappropriate to note that recent FAO data show that at least 50 percent of the irrigated land in the world is saline, with several hundreds of thousands of hectares going out of cultivation each year because of salinity alone. Irrespective of such warning signals, Nigeria, Chad, Senegal, and Mali in particular are proceeding all too rapidly with plans for large-scale irrigation. The solution to this problem, in our opinion, is to show in economic, social equity, and environmental terms the wisdom of combining large-scale "development from above" with localized "development from below" strategies. Before making our recommendations for development-oriented research, it is necessary to analyze in more detail just why it is that local populations do not benefit as much as they should from river basin development.

### III. THE DEVELOPMENT FROM ABOVE SYNDROME.

#### A. Introduction.

The construction of dams and auxiliary structures in connection with river basin development are a classical example of "development from above." Simply because Africa contains over 40 percent of the world's potential for the generation of hydropower, and because dam construction is the product of a relatively inexpensive and easily transferable form of modern technology, the pressure for more and more dams throughout the continent, and especially in West Africa with its favorable drainage patterns, can be expected to increase. More often than not this pressure is intensified by the personal involvement of the Head of State with key projects which he actively pushes as symbols of modernization. In West Africa historic examples are the

Volta, Kainji, and Koussou Dams which constituted the largest single expense in national development plans at the time of their construction. A product of big government and international finance and expertise, the very scale of dams makes it very difficult to actively involve local populations, except as passive recipients, in the development process.

In using the phrase "involve local populations" we mean two things, both of which are important and both of which are too often ignored. First, we mean their involvement in the planning, implementation, and evaluation of programs and projects which will impact upon their lives in major ways since after all the local people are the major risk-takers in connection with such ventures. Second, we mean the constructive and active involvement of their current land and water use systems, the enhancement of which should be a major goal of development. Yet it is these very systems (many of which have sound economic, social equity and environmental bases) that are virtually ignored by national and international planners alike during the crucial formative stages of project design -- in spite of their capacity to support large numbers of people and in spite of our knowledge that West African dams, as designed and built, tend to reduce their productivity without providing equivalent opportunities for the large numbers of people involved.

Kainji is a striking example of a large West African dam (itself on the Niger) reducing the productivity of local land and water use systems, a point emphasized by Adeniyi in his 1973 review of the "Downstream Impact of the Kainji Dam." Concentrating on three villages, with a total population of somewhat over 12,000 people, and located 70, 114 and 186 miles below the dam, he noted declines in floodwater cultivation (fadama) during the dry season of 70, 44 and 53 percent respectively. Since over 2,000 acres were lost to cultivation in these three villages alone, the total loss below the dam must

amount to tens of thousands of acres. These cannot be cultivated by customary means simply because they are no longer flooded during the dry season due to flood retention in the Kainji reservoir. Furthermore, "In addition to loss of fadama as a result of decreased flooding, yields of swamp rice at Rabba went down from an average of 1,650 pounds paddy rice per acre to an average of 1,300 pounds, a decrease in yield of eighteen percent as a result of moisture shortage and loss of fertile alluvial sediments usually brought down by the Niger while in flood every year." Reduced flooding also adversely affected the downriver fisheries. According to Adeniyi's research, the income of fishermen in the above three villages decreased 73, 60 and 47 percent following dam construction while actual catches monitored by the FAO-Nigerian Government Kainji Lake Research Project at one landing point dropped fifty percent.

Because approximately sixty-five percent of the flood waters of the Niger are considered or alleged to be "lost" in the interior delta, attempts will be made to "capture" some of this for other uses through the construction of regulatory dams similar to Kainji, and channelization and other mechanisms in the interior delta itself. Unless the needs of existing populations who use the delta are taken into consideration, the results could be far more catastrophic than in the Kainji case. On the one hand, far more people and livestock are involved. According to Gallais, the population of the Inland Delta in the 1950s exceeded 350,000 people of whom approximately 35 percent were Peul who controlled over 1 million cattle and 2 million small-stock. These depend on the annual flood, just as do approximately 80,000 fishermen, who catch up to 100,000 metric tons of fresh fish per annum, with Mopti considered by some to be the largest volume inland fish port in Africa. Additionally, large numbers of farmers use flood waters to cultivate

up to 100,000 hectares..

On the other hand, alternate resources are less available for these people than was the case with Kainji. Though governments obviously will build into their plans gravity fed and pump fed irrigation projects, these, as in the Kainji case, cannot be expected to come on line until years after the initial regulatory structures in the form of dams and barrages are built. In the meanwhile what are the local people to do who lose their livelihood as soon as the annual flood is reduced through regulation? Because of the cost of irrigation (estimated by the World Bank at about \$7000 per hectare in 1975 for pump schemes in Niger) alone, which reduces drastically the total number of people who can be involved, and because of the difficult physical and economic problems associated with existing projects (like the Office du Niger), *a careful study of current uses of the natural flood for floodwater farming, grazing and fishing must be completed before development strategies are designed.* Quite possibly, as the 1975 World Bank Mission to Niger believes, perennial and flood water irrigation in the inland delta of the Niger are not "mutually competitive." In terms of socio-cultural feasibility, spread effects and beneficial impacts, the initial enhancement of the latter makes the most sense since it will reach a larger number of people in a shorter period of time.

To counter the negative implications of "development from above" strategies for the rural poor, there are a number of things that AID can do. We have identified three, all of which are congruent with the Congressional Mandate of 1973. The first is for AID to correct more actively its own tendency to think in terms of water resource development alone as opposed to water, land, and human resource development. The second is to utilize social soundness analysis at an earlier stage of policy formulation. And the third

is to encourage research on local populations which will show why it makes good economic sense, at both the national and local level, to merge "development from below" with "development from above" strategies, an approach which has the further benefit of introducing some actionable perspective into the all too sterile arguments between the 'change at all costs' and 'traditions at all costs' protagonists. Under the third suggestion, we will recommend two specific research projects.

B. Overemphasis on Water Resource Management.

A narrow focus on water management is characteristic of most agencies dealing with river basin development. Usually the main institutional responsibility lies within Ministries of Irrigation or Public Works, or within Commissions which are an outgrowth of such ministries. The OMVS and the RNC are both examples. In working with such commissions, AID has tended to emphasize the water resource management aspect at the expense of approaches which would include evaluation of local land and water use systems in terms of their development potential. A case in point concerns AID's initial involvement with the River Niger Commission, which currently is in the process of developing its own planning and coordinating staff by recruiting twelve candidates from the nine member countries, who will be trained up to the M. Sc. level on fellowships to be provided through AID and CIDA. On their return in three to four years' time, these first twelve professionals can be expected to dominate the RNC in terms of orientation and policy. When we visited the Commission headquarters in Niamey last January, we were disappointed to learn that none of the fields selected for the first twelve fellowships dealt directly with the study and evaluation of socioeconomic data relating to local river basin inhabitants and their systems of production. Such an omission was all the harder to understand in the face of AID's posi-

tion that the major interest of the United States was in the integrated rural development component of the Commission. Nor can it be stated that the Commission itself had no interest in such fields as agricultural economics and rural sociology, since it was made clear to us through talks with Commission staff, including the Executive Secretary, that personnel trained in these fields could easily be absorbed within the Commission's Division of Agriculture, Fisheries and Livestock. One result of our conversations was a subsequent request from the Commission and the ADO, Niamey that we write up the terms of reference for a trainee in rural sociology who apparently would now be included within the first twelve staff recruitments (Ref. Niamey 0006). While this is a start in the right direction, we urge that additional fellowships be added at this time for training in related disciplines.

Though AID is currently pushing for a more integrated approach to the development of the Niger Basin through its participation in the forthcoming training program and Diagnostic Survey for the RNC, experts concerned with the involvement of local populations are rarely present when the original prefeasibility studies are carried out so that their inputs are not taken under consideration by national, regional, and international agencies when the basic strategies for development are subsequently formulated. The importance of this point is hard to overemphasize: indeed, we are aware of only one case (the Bicol River Basin in the Philippines) where experts on microstudies of local economic systems have played a prominent role in conceptualizing the terms of references for those responsible for carrying out diagnostic and prefeasibility studies. Time and again the same international consultants are drawn in whose expertise lies exclusively in the fields of hydrology, engineering, and macroeconomics.

C. Broadening the Use of Social Soundness Analysis.

AID should be justifiably proud of the fact that it is pioneering social soundness analysis within the foreign aid community. Nonetheless, the introduction of such analysis into the project planning cycle is usually delayed until it is already too late for the results to have a major impact on the selection of development strategies. Furthermore, adequate social impact analysis is still largely left out of certain AID funded activities in the Sahel and elsewhere. Finally, the whole conceptualization, with its emphasis on sociocultural feasibility, spread effects, and social impacts, can be interpreted as reinforcing the "development from above syndrome." That is, "let us use social soundness analysis so as to improve our capacity to design projects from the center rather than to use our analytical abilities to learn more about how local peoples are trying to assist themselves so that we can profit from and enhance their efforts." Social soundness analysis is now a reality and that it a step in the right direction. The next step is for AID to think through more carefully how best to broaden the utility of such analysis in the earliest stages of program and project formulation.

D. Research for Development Among Local Populations.

The lack of knowledge within planning agencies, including the OMVS, the RNC, and the LCBC, about the nature of the economic strategies of local lake and river basin populations is a fundamental constraint to future development for the benefit of the rural poor. Take the case of the Lake Chad Basin. Aside from fisheries, virtually no attention has been paid by any of the four governments to the dynamic and complex land and water use systems of the local people. The same applies to the Lake Chad Basin Commission which has scarcely begun even to inventory the human resources of the basin. Dis-

regard for local economic systems is especially obvious in Nigeria near Baga, where, on the one hand, there is a capital-intensive, potentially large-scale government irrigation system (involving a relatively small number of people) while a few miles away, along the fluctuating lake shore, the large majority continue their relatively intensive systems of recessional cultivation, live-stock management, fishing, and trade. The two systems have virtually nothing to do with each others, despite the fact that economists working at the International Institute of Tropical Agriculture at Ibadan have emphasized that most of the food needs of Nigeria must continue to be met by small and medium-sized farmers rather than from government projects.

The downplay of the utility of local economies as a basis for national development strategies is reinforced by a number of myths that perpetuate the image of local farmers as homogeneous, nonexperimental, and nonrisk-taking, despite thirty years of research which suggests that much of the agricultural development in Tropical Africa, and West Africa in particular, is self-initiated and self-assisted by the local farming community. Such myths are very convenient for central planners and policy makers since (1) they allow them to justify plans for the total transformation of local populations for "their own good" and (2) they provide an excuse for failure which can be attributed to the inability of the conservative farmer to follow the advice that is offered.

Obviously what is needed, for both economic and social equity reasons, is a partnership in which national, regional, and international development forces try to combine "development from above" with "development from below" strategies. Since it will not be easy for host country agencies to take the initiative here, there is a tremendous opportunity for AID to play a pioneering role. In the following sections we develop two research programs dealing

with lake and river basin populations which we believe can have a high economic payoff. The first is a broad-based study of floodwater (crue and décrue) farming. The second focuses on populations designated for relocation in connection with future dam construction. Before outlining these two programs we wish to suggest how they might best be tied into the institutional framework of host country governments.

#### IV. THE RELATIONSHIP OF RECOMMENDED RESEARCH TO HOST COUNTRY ACTIVITIES.

While the recommended research has major development implications for all the major Sahelian water systems, we believe that it should be initiated within the Niger and Lake Chad Basins.\* The prime reason for this relates to the current activities of the Niger River and Lake Chad Basin Commissions and AID's close relationship to these activities. Should our suggestions prove feasible they should provide a mechanism for focusing attention on local populations, for upgrading the coordinating and planning capacity<sup>2</sup> of both Commissions, and for generating projects that relate directly to large numbers of rural poor. Cooperation is particularly appropriate in regard to the current activities of the Niger River Commission, although the same may also soon apply to the LCBC.

The Niger River Commission was founded in 1964 following the 1963 Act of Niamey. Although nine countries were involved (Chad has since dropped out), much of the initiative came from the then President of Niger whose main interest related to improved navigation upriver from Yelwa in Nigeria. Little was accomplished by the Commission during the next ten years. Then in 1973 it was reorganized with representation on the governing council upgraded to the ministerial level, with members tending to represent ministries of planning, public works, or water resources. During 1976, the Secretariat

\*While the Gambia River Basin may also be a highly appropriate locale for such research, we are not familiar with the situation there.

of the Commission launched a major effort to become a more effective planning organization. Basic to this effort was a "Programme of Action" for formulating "A Master Plan for the Development of Water and Related Resources in the Niger Basin." With UNDP playing a coordinating role, a donor's meeting was organized in Paris with over \$27 million pledged in September 1976 of which approximately \$3-5 million would come from AID subject to the usual Congressional approval.

The Master Plan is a five year program for training and institution building and for the execution of studies. A nine-month Diagnostic Survey will begin this year and will lay the basis for the subsequent research program. As its contribution, AID has agreed to take over responsibility for the agricultural, geodetic control, remote sensing and mapping components, with agriculture defined as including fishing and livestock management. Granted this, it makes sense for the research that we are recommending to be integrated into the Diagnostic Survey and subsequent program of studies wherever feasible, although its significance will of course extend beyond the basin.

Under the training component, an eighteen member professional staff will be educated up to the M.Sc. level during the next four years, with the first twelve recruited during 1977-78. AID and CIDA have agreed to fund the necessary fellowships, including a further nine for one professional from each host country. Since it is our belief that the number and mix of fellowships is negotiable with the Commission (indeed the Executive Secretary made it clear to us that he would appreciate guidance from AID and CIDA in regard to the integrated rural development component). AID has a major opportunity for working in concert with the Commission and host country agencies to plan for the integrated development of the Basin. We have built

into our research proposals a training element which could enable all eighteen of the RNC trainees to be exposed during their M.Sc. degree programs to fieldwork among local residents of the Basin. Regardless of the trainees' specific disciplines, such exposure could provide one of the most valuable learning experiences during their training.

#### V. A TWO YEAR STUDY OF FLOODWATER (CRUE AND DÉCRUE) FARMING

##### A. Background and Rationale.

In a recent chapter on "Traditional Systems of Plant Food Production and the Origins of Agriculture in West Africa," Harris (1976:311-356) assigns considerable antiquity to hydraulic systems of continuous cultivation. These he divides into small-scale hand irrigation, swamp-rice cultivation, and floodwater (or crue and décrue) farming. Small-scale hand irrigation tends to predominate near urban centers such as Bamako, Niamey, N'Djamena, and Kano where small-scale truck farmers produce vegetables for adjacent markets, although it also occurs in relatively isolated areas with the produce long-hauled by truckers to distant urban centers — the onion growers of Yauri along the Niger in Northern Nigeria being an example (Roder 1968). Swamp-rice cultivation covers a more extensive area and includes fadama cultivation in Northern Nigeria and bas fond cultivation in Upper Volta.

By far the most extensive system, however, is floodwater farming which has a wide distribution in the Senegal, Niger, and Lake Chad Basins, with hundreds of thousands of hectares cultivated during most years. In the Senegal River Valley below the site of the Manantali Dam at least 130,000 hectares are cultivated on the average as the flood waters recede (décrue), while twice that amount may very well be utilized along the Niger River. No figures are available for Nigeria and Benin (though we know that thousands

of hectares are cultivated downriver from the Kainji Dam), but estimates for Niger, Mali and Guinea are 15,000 ha., 130,000 ha. and 20,000 ha., respectively. Extensive areas are also cultivated within the Lake Chad Basin, although again figures are not available.

In its most sophisticated form, floodwater farming produces two crops per year by utilizing both the rising (crue) and falling (décrue) floodwaters with a variety of crops cultivated. According to Harlan and Pasquereau (1969), floodwater farming is most highly developed in the inland delta of the Niger. This region, in the opinion of Portères (1976), is where African rice (Oryza glaberrima) was first domesticated over three thousand years ago, the first cultigens being "floating" varieties which adapt to the rising waters by lengthening the stem. In the inland delta of the Niger today local farmers still sow "floating" varieties in their dry lower gardens just prior to initial flooding (the beginning of the crue cycle) in September. Non-floating varieties are sown at a later date in the upper gardens where depth of the floodwaters is less. They are harvested after the floodwaters recede — unlike the floating varieties which may be collected from canoes while the flood, though receding, is still high.

The décrue cycle, which has a much wider distribution along the major rivers and their tributaries throughout the arid and semi-arid areas of Africa, begins once the floodwaters have peaked and begun to recede. The main crops are pearl millet and sorghum. Although the total acreage sown in each species varies from one year to another depending on the nature of the flood, pearl millet is the most drought resistant so that it is sown first, especially in the sandier soils which tend to predominate on the upper garden slopes. As for sorghum, two races are present, with the durras being the next most drought resistant and the guinea corns the least drought resistant.

Hence as the flood recedes, the farmers shift from millet to durra and then from durra to guinea corn, which is sown in the lowest gardens. Especially prized is a black-glumed variety of guinea corn which "has the very special feature that it may mature normally even if the waters rise early in the fall" (Harlan and Pasquereau, 1969). Like floating varieties of rice, it too may be harvested from canoes, although during the rise of the flood in the lower gardens rather than after the floodwaters begin to recede from the upper slopes. The farmers also cope with early flooding by sowing guinea corn in seedbeds and then transplanting individual plants into the lower gardens so as to give them a head start. Farmers also mix varieties and vary planting according to flood, soil conditions, and previous experience with pests.

In spite of its antiquity and complexity, little has been written about this system of hydraulic agriculture in West Africa, aside from Gallais' two volume study of the Inland Delta (1966) and the brief article by Harlan and Pasquereau. Though Gallais' fieldwork (between 1956 and 1960) has produced a fine general analysis of the peoples, economies, and marketing centers of the Inland Delta, his analysis of floodwater farming is based on the detailed study of only a few families in a small number of villages. Little is known about crop yields in the three basins, especially during the décrue (recessional) cycle, or the intricate interplay of different economic activities within different communities or within different compounds within the same community, not to mention variations through time in response to ecological factors and changes in individual and family preferences. Similarly, little is known about the environmental effects of floodwater farming aside from the fact that they are presumably very different in the Lake Chad Basin (where salts must periodically be flushed from polders cultivated by local farmers),

the Niger, and Senegal River Basins.

Though décrue cultivation is mentioned on occasion in reports generated by the recent drought (as on page 176 of the 1976 AID Report to the United States Congress), there are no systematic appraisals of its development potential. The extent of floodwater farming would have been significantly reduced during the drought, and hence less obvious to visitors to the area, yet we still find this situation most puzzling and recommend that it be rectified by a systematic study of the distribution and nature of floodwater farming and of the communities engaged in this relatively intensive form of permanent or semi-permanent (as in the Lake Chad Basin where polders are periodically "fallowed" while salts are dispersed) cultivation. We wish to include entire communities within the study since we know that floodwater farming is only one of a number of land and water use strategies used by those involved. While some strategies will involve dry land farming, others will also be tied to the annual flood and recession regime. These will include livestock management and especially grazing and browsing during the dry season, and fisheries -- all of which can presumably be enhanced through intelligent government assistance. If so, then such a study can have significant development implications since we believe that there are a number of ways in which government agencies can help farmers increase the productivity of crue and décrue farming and extend the area under cultivation with relatively small inputs of capital, expertise, and agricultural requisites. In discussing the vulnerabilities of rice cultivation during the crue cycle, Gallais mentions a number of possibilities. He also comments on how some farmers have begun to use ox ploughs so as to increase the amount of land under cultivation.

Such a study is especially timely since dams planned for the Senegal,

the Niger, and the Lake Chad Basin will, as designed, drastically cut back the area that can be flood farmed. In the Senegal River Valley, it is estimated that the Manantali Dam will eliminate most of the 130,000 hectares of décrue cultivation previously mentioned, cultivation which supports hundreds of thousands of people. While planners note that this land will be replaced by 400,000 hectares of irrigated perimeters, it will take generations for this land to be developed — should it all be developed, which is unlikely given the current escalation of construction costs and the history of the Office du Niger and other large-scale irrigation schemes. In the Niger Basin we know that several thousand hectares of décrue land have been adversely affected by the Kainji Dam, while hundreds of thousands of people and millions of livestock could be put in jeopardy by poorly conceived storage dams upriver from the Inland Delta. If the tentative conclusions of the 1975 World Bank Mission are correct, floodwater and perennial irrigation are quite compatible in this area.

Under these circumstances, it just does not make sense to ignore existing land and water use systems. Their current status should be carefully appraised, with the knowledge gained and properly utilized in formulating strategies for achieving integrated development within the three basins.

#### B. Work Plan.

The overall research program will require twenty-four months which will be divided into three phases, of which the first will be a three-month preparatory phase. Phase two will require a fifteen-month field study of floodwater farming, possibly within the inland delta of the Niger so as to build on Gallais' work, along with a supplemental study of décrue cultivation in the Lake Chad Basin. Phase three will consist of a six-month period of data analysis leading to the formulation of a long-term development strategy for

the enhancement of floodwater farming, and related land and water use systems.

1. Phase One: Three-Month Preparatory Investigation.

This phase has three principal components. The first is a library search for information on floodwater farming from Senegal to Chad. We expect this will be brief simply because relatively little information exists. In a recent personal communication, Harlan (February 1977) was unable to provide us with references other than the 1969 article by himself and Pasquereau. "The whole subject," he wrote, "seems to be neglected." Nonetheless a further attempt should be made, drawing for example on the collections at the Documentation Center of the Niger River Commission, on ORSTOM materials dealing with the Lake Chad Basin, and the OMVS.

The second component, far more important than the first, is to map the extent of recession (décrue) cultivation during years of high, medium, and low flood conditions, using available satellite and aerial photography which should be supplemented by air and ground reconnaissance. Quite possibly this task has already been done for the Senegal River Basin (see Major et al 1974:41). In the Niger River Basin we recommend that the distribution of floodwater farming be mapped as carefully as possible by whatever contractors are chosen to carry out the scope of work specified by AID in connection with their responsibility for the mapping component under the RNC's 1977 Diagnostic Survey. As for the Lake Chad Basin, we are aware of no figures indicating the extent of floodwater farming under different conditions. Here the logical agency for liaison is the LCBC which has the responsibility for assessing natural and human resource within the basin, though little has been done to date.

The third and final component of the preparatory investigation is to pick a primary research area based on analysis of the information gathered under components one and two. For the moment, we believe that this area should be in Mali within the inland delta of the Niger since that is where floodwater farming may have originated, where it subsequently seems to have developed its most sophisticated form, and where Gallais has already undertaken initial fieldwork. Mali is also indicated as a likely research site because Lamine Keita, Minister of Industrial Development and Tourism and Malien representative on the Niger River Commission, is said to be well disposed toward both "development from above" and "development from below" strategies. While he was the promoter of the Selingue Dam Project, on several occasions he has advocated small projects within the Commission (including at donor meetings). Furthermore, it was he, or his representative, who asked why agriculture and rural development in general had been left out of the report of the 1976 Paris meeting of donors (though this omission was in fact an oversight, it is nonetheless indicative of the attitudes of many of those involved!).

We also believe that a secondary area for research should be picked in the Lake Chad Basin. One possibility is Bol in Chad where AID will be one of the donors in connection with the Bol Polders. More specifically AID will be involved with the Matafo Research Station to which a sociologist will be attached. Serious attention should be given to extend the work of this station to include a study of local land and water use systems, with special emphasis on recessional (décrue) farming. Not only will such research be locally relevant but it also will have implications for the design of a mainstream dam on the Logone River which

inevitably will have major impacts on downstream and Lake Chad users.

2. Phase Two: Fifteen-Month Field Study of Floodwater Farming.

Fifteen-month studies are necessary so that the agricultural and other activities can be observed throughout a complete annual cycle, with an initial and final six weeks for establishing and closing down field operations. Neither the Inland Delta or the Lake Chad studies should commence before the research teams have adequate land and water transport.

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— a. The Inland Delta Study: This will be a detailed micro-study of floodwater farming in several communities, one or more of which conceivably could be chosen from villages surveyed by Gallais in the 1950s so that continuities and changes could be more accurately assessed. While the emphasis throughout will be on the crue and décrue cycles, these must be studies in relationship to other options including the full range of land and water use strategies available to the people. These can be expected to include dry land farming, fishing, livestock management, trade, and wage labor, with the relative importance of each shifting from year to year and from household to household as a result of a wide range of ecological and economic factors and factors relating to local preferences. Without detailed information on labor profiles for different activities and on how and why heads of households and other production units allocate labor for economic purposes, it will not be possible to design realistic development programs for increasing production and the standard of living of the local people.

During the study, information should be systematically

gathered on the following topics:

- (1) The social organization of production units, including their actual composition, and their relationship to absentee members (especially labor migrants), other kin, and neighbors in terms of capital inputs (remittances especially) and labor.
- (2) The systems of land tenure, including detailed maps of all gardens controlled (whether in use or not) by members of the study community, assessment of water rights, and of the implications of population trends and of systems of inheritance as they relate to resource availability.
- (3) The systems of land and water usage, including agriculture, livestock management, and fishing.
- (4) Labor profiles (including the division of labor between male and female members of the production unit), and labor availability, information to be gathered on a weekly basis at least.
- (5) The economics of production, information to be obtained through the weekly recording of income and expenditures from a carefully selected stratified sample of production units. As with social organization, a special effort will be made to include resources, such as remittances, brought into the community from the outside. Study of income and expenditures will be combined with a study of food consumption within the production unit. While such consumption surveys provide useful information on nutrition, their main purpose is to provide a reliable mechanism for identifying the range of foodstuffs available and for tracking the use and distribution of locally produced commodities within the community. Special attention should also be paid to the extent to which women

benefit or do not benefit from the increased demand on their labor that the introduction and development of cash cropping often involves.

(6) The storage and processing of local produce.

(7) The price structure in reference to potential and actual cash crops, including the relationship of this structure to other options (such as labor migration out of the country or to urban centers).

(8) The marketing system within the community, the Inland Delta, and Mali as a whole as it relates to local produce.

(9) The comparative advantages and disadvantages of local systems of production to relevant government irrigation projects.

b. The Lake Chad Study: Depending on the results of preliminary investigation, this will either be a full fifteen-month study or a shorter study of the décrué cycle and related economic activities. In either case the general format will be similar to the Inland Delta Study.

### 3. Phase Three: Development Strategy Formulation.

Following the fifteen months of field research, the principal investigators will prepare, over a six-month period, a long-term development strategy for floodwater farming in the Shaelian and Sudanic zones. The strategy will be based on the following types of information:

a. Information gathered during the period of field studies which will enable analysis of when and why river and lake basin inhabitants opt for floodwater farming, and of the circumstances which cause increases and decreases in participation and in yields through time. Emphasis will be on the factors which influence decisions on when to

undertake floodwater farming granted the change of opportunities open to potential farmers at different seasons and during different years.

b. Information dealing with the constraints to the future development of floodwater farming resulting from current preferences, current systems of land and water allocation and use, labor utilization, and storage facilities.

c. Information dealing with the constraints to the future development of floodwater farming resulting from inadequate government services, inadequate transport (land and water) and marketing facilities, and price structure.

d. Information on the implications for floodwater farming of current development strategies for river basin development, including dam construction.

On the basis of the above information, development strategies will be designed for minimizing current and anticipated constraints and for capitalizing on the strengths of the current systems of floodwater farming.

### C. Personnel and Training.

Each field study should include personnel trained in agronomic and social science fields, with the ideal mix combining as principal investigators a social anthropologist-rural sociologist-cultural geographer who has carried out previous microanalysis among small-scale producers with a similarly experienced agricultural economist. Considerable flexibility should be used, however, in personnel selection so that a predoctoral candidate from West Africa might well be selected over a more experienced postdoctoral candidate from the United States. Either must be fluent in French and capable and willing to train host country nationals. In the field both sets of principal investigators should work closely with four junior col-

leagues who, preferably, are fluent in the language or languages of the study area. Their academic background need not go beyond secondary school or equivalent education, provided this has been followed by at least three years experience in rural development, including teaching in village schools. On completion of the period of fieldwork, fellowships should be available to allow junior colleagues to enter one to two year training programs in rural development (such as at the Pan African Institute for Development). While such programs may lead to higher degrees in some cases, their major purpose is to prepare the trainees for careers as extension and development officers.

Each field team will be assisted in the design of research procedures, the selection of research communities, the execution of the fieldwork, and the formulation of development strategies for floodwater farming by several international consultants with a wide knowledge of tropical land and water use systems.

At an appropriate point during the field season we recommend that the research team in the Inland Delta of the Niger participate in a period of field training for the first twelve to eighteen candidates selected for RNC fellowships. Lasting for up to two months, this field session will be organized and run by the international consultants mentioned above. The training will be organized to accomplish two goals:

1. To familiarize the trainees, who will form the core group of planning professionals of the Niger River Commission, with the nature and potential of local land and water use strategies as they relate to local and national development, and with the economic, social equity, and environmental justification for "development from below" strategies.

2. To contribute to the research program by enabling the increased manpower to carry out the more extensive surveys needed to place the com-

munity studies in a wider context.

## VI. A TWO YEAR STUDY OF RESERVOIR RESETTLEMENT.

### A. Background and Rationale.

Looking to the future, it is clear that a number of mainstream and tributary dams will be constructed within the Senegal, Niger and Lake Chad Basins. Preparatory works have been completed at Selingue in Mali and dam construction will begin this year. The OMVS is seeking funding for the Manantali and Diama Dams, while planning for the Kandadji Dam on the Niger is well under way, as is planning for dams on the Benue in Nigeria. In the Lake Chad Basin, momentum is building for a mainstream dam on the Logone River.

Most, if not all, of these dams will be built, as well as many others. We hope that at least some will be designed and operated as tools for integrated river basin development rather than as a means for subsidizing urban and industrial development at the expense of rural areas as has been the case to date throughout West Africa. Though the long-term opportunity costs of such a narrow approach negatively affect all residents, those who relocate prior to reservoir formation bear the initial burden.

Relocation in connection with dam construction has been carefully studied in a variety of locales around the world. In all cases, the relocatees have responded in a similar fashion so that it is possible to predict, with considerable accuracy, the probable impacts of future relocation programs on those who must move (see Scudder 1972, 1975, 1976). These impacts are especially apparent during a period of transition that begins as soon as the first rumors of impending removal begin to circulate. They terminate only after the relocatees (a) regain their former degree of economic self-sufficiency, and (b) come to feel at home in their new habitat

which includes the relations with host communities. In no case has the length of the transition period been less than two years from the time of removal.

Most people can be expected to resist, either passively or actively, their removal in connection with dam relocation. Since relocation is forced, policy-makers should realize that they are sacrificing the immediate interests of the relocatees in order to achieve a wider set of national or regional goals. It is hard to imagine a worse insult to a community than to force its members to leave against their will. In this regard, forced removal creates a crisis of socio-cultural identity in which people come to question the efficacy of their customary coping mechanisms to protect their homes and livelihood. They are caught up in a grief reaction not unlike that which occurs within a family after the death of a beloved member. The accompanying stress can be expected to have psychological, physiological and socio-cultural components, all of which are synergistically interrelated. Psychological stress has two aspects: grief for the lost home and anxiety about the future. Physiological stress results from increased morbidity and mortality rates, especially among the very young and the very old. Socio-cultural stress includes an undermining of local leadership following removal and the reduction (in some cases permanent, in others temporary) of a number of valued behavioral patterns which are either not feasible or not appropriate in the new habitat.

The stress load, already high, is heightened by the predictable hostility of the hosts who correctly see the relocatees as competitors for land and services. Unaware of the stress that removal causes, the hosts also can be expected to envy any government assistance that is unavailable to themselves. Still further stress arises from the inability of relocation authori-

ties to provide a viable habitat at the time of removal, with the result that some food relief becomes necessary, with all the attendant dangers of creating a dependency relationship upon governmental agencies.

Presumably because of the magnitude of this stress, the relocatees respond to forced removal as if their socio-cultural systems were closed. In coping with removal, they cling to the familiar — to familiar people in the form of family members, relatives and neighbors, and to familiar behavioral patterns and institutions which they alter only to the extent necessary to come to terms with their new habitat, including the hosts. As a result, they can be expected to reject during the transition period attempts either from within their own communities or from external agencies to alter in a major fashion their social and political organization at the time of removal. This is a logical response which can be interpreted as a mechanism to keep the stress load under some control through the rejection of additional changes that carry unknown implications for the future.

Because of the closed system orientation of the relocatees during the transition period, government agencies responsible for their welfare should not attempt to introduce major changes at the time of removal; that is, they should separate the resettlement phase from the development phase. During the former, the primary goal should be to bring the stressful period of transition to a close as soon as possible by helping the people to get back on their feet so that they can then take advantage of the new opportunities that follow dam construction and reservoir formation.

This approach to relocation does not mean that development need be neglected during this critical period. Quite to the contrary, during the transition period land can be allocated and water points provided in such a way as to enhance subsequent development. At the same time, pilot and

demonstration projects can get under way and extension services can be established. But throughout this period, the special nature of the resettlement situation must be kept in mind. For example, because of the magnitude of the effort required to adjust to a new habitat, most relocatees will be unable to compete initially with spontaneous immigrants who come into the reservoir basin seeking such new opportunities as fishing. Until they can compete, their interests should be protected by the government so that they do not find the best opportunities closed off when they regain their footing and begin to actively seek out new options. At the Kariba reservoir, the Zambian (then Northern Rhodesian) government protected the interests of the relocatees by allowing them a temporary fishing monopoly on the new reservoirs at the time of filling. At the same time extension and credit facilities were made available so that the better local fishermen were able to compete successfully when the reservoir subsequently was opened up to other fishermen. A similar approach is currently being used by the Government of the Ivory Coast in connection with the Kossou reservoir.

Because they are unwilling participants in development programs involving dam construction and because they carry the heaviest cost burden during the years immediately following reservoir formation, a much greater effort than in the past is needed to involve the relocatees (and also the hosts) in the benefits of river basin development. This effort should have two goals. The first is to reduce the stresses of removal as much as possible, bearing in mind, however, that some stress is inevitable simply because of the nature of forced removal. The second is to design realistic programs for involving the relocatees in the benefits of development. The research program outlined below is directed toward the achievement of both these ends.

## B. Work Plan.

As with the study of floodwater farming, the plan of work will require twenty-four months divided into three phases. The first phase, of three months, will be preparatory and educational, while the second phase will require one or more fifteen-month studies of select reservoir populations, with the research emphasis including but not restricted to the same general topics to be covered under the Farming Systems Study and the Floodwater Farming Study. Six months long, phase three will result in the formulation of a general strategy for improving host country capabilities to execute economically and socially sound resettlement and development programs in connection with reservoir formation. It will also produce reservoir-specific programs for populations involved in the phase two studies.

### 1. Phase One: Three-Month Preparatory and Educational Phase.

This phase has two goals. One is to discuss with host country nationals in the relevant agencies, and with AID and other concerned personnel, the relevance of relocation theory for local and national development purposes. The second is to choose the areas for study during phase two. Although there is an existing literature (published under United Nations auspices) on reservoir relocation available in both French and English, including Butcher's An Organization Manual for Resettlement: A Systematic Approach to the Resettlement Problem Created by Man-Made Lakes With Special Reference for West Africa (1971), very little use has been made of this material (even within the agencies that have published it!) despite its major policy implications. One reason presumably relates to the absence of suitable social science staff within river and lake basin authorities who are both aware of such literature and who are able to relate it to agency needs. In our

experience the general utility of relocation theory for planning the resettlement phase can be assessed during relatively short visits, the purpose of which is to identify situational factors which mitigate or otherwise alter some of the assumptions on which the theory is based. Such factors could include a recent history of immigration into the area or a high emigration rate, both of which could influence the attitudes of at least a significant minority toward removal in such a way as to reduce the stress load.

During phase one, the AID-sponsored research staff would visit such major reservoir sites as Manantali, Selingue, Kandadji, and the two areas under consideration for a mainstream dam on the Logone River. As a result of these visits, sites would be selected for the phase two studies. At the same time, they would also provide the research staff with sufficient background material to discuss within the relevant host country agencies the general implications of different development strategies as they relate to reservoir populations. Ideally such material should be gathered during the original feasibility or diagnostic surveys which more often than not are carried out under U.N. or bilateral auspices. Unfortunately this has rarely been done to date, which explains why the nature of local systems of production both above and below the dam site are not taken into consideration in designing dams and in allocating the storage waters. In the case of the future relocatees, the necessary social surveys and resettlement planning is usually postponed until after preparatory works have begun at the dam site in spite of the fact that such a delay makes it virtually impossible to design and implement a well-thought out resettlement and development program. As a result, relocation becomes a crash and

tension-laden exercise, often requiring police or military intervention, to remove the people to only partially prepared living sites prior to the flooding of their former homes.

Though it may already be too late in regard to the Selingue Dam and dams on the Benue River, it is not too late to involve relevant populations in the planning process as it relates to other dams on the Niger River and its tributaries, and on the Logone and Chari Rivers. And it may not be too late in regard to the Senegal River Basin, although there both the future relocatees and the downstream users have been largely ignored to date. Accordingly, a major purpose of phase one, and indeed of all three phases, is to facilitate the early involvement of the future relocatees in the development process.

2. Phase Two: A Fifteen-Month Study of the Population of One or More Reservoir Areas.

If the relocatees are to benefit from dam construction and reservoir formation, systematic studies of their current lifeways, and especially of their systems of land and water use must be completed during the period of feasibility studies. Three possibilities come to mind. One relates to the Gambia River, where AID is currently involved in a long-term cooperative planning effort, although we are unfamiliar with the details. Another relates to the forthcoming studies of the revitalized Niger River Commission which are to be at least partially identified during the 1977 Diagnostic Survey. And the third relates to the feasibility studies which are just getting under way in regard to the Logone River and the development of the Lake Chad Basin.

As in the case of other studies of local economic systems, the research team should spend a complete annual cycle in the field, with an

additional six weeks available at either end for initiating and terminating field operations. Reservoir studies are more complicated, however, in that they must provide information which (a) enables agencies responsible for relocation to plan and execute the removal of the people with as little stress as possible, and (b) enables the same or other agencies to plan viable economic support systems and communities for the relocatees in their new habitats. A whole range of important policy questions immediately come to mind which can best be decided on the basis of detailed information, the collection of which will require a full twelve months. Should the relocatees be resettled around the reservoir margins or downstream below the dam site? What type of economic support systems should be stressed? Can the people be expected to respond favorably after the end of the transition period to major new economic opportunities like capital intensive settlement schemes based on irrigation, or should the emphasis be on the enhancement of existing land and water use systems? What should be the size of new communities, bearing in mind that economic viability tends to favor smaller settlements while the desire to provide a wider range of social services predisposes governments to aggregate the relocatees in larger and more densely populated communities. If a number of existing communities are aggregated into larger settlements which are also economically viable, how are such settlements to accommodate the existing forms of political organization? What should be government policy toward compensation and the provision of housing in the new settlements? Should the relocatees be encouraged to rebuild their own housing while government provides feeder roads, water supplies, and a wider range of community services, or should the authorities play a more

active role by providing ready-made housing? What types of tensions and conflicts can be expected to arise between the relocatees and the hosts and how can strategies be best devised to reduce them?

These and many other questions require a broad-based research program relating not just to the systems of production of the future relocatees, but also to the nature of their social and political organization, and to their values, current preferences and expectations for the future. These can be best studied through carefully designed community studies supplemented by relatively simple, extensive surveys that cover the entire area to be inundated as well as probable resettlement areas, and by the analysis of whatever material has been collected by government agencies during the course of both normal and extraordinary activities.

### 3. Phase Three: Six-Month Design Phase.

Two tasks should be accomplished during this phase. The first is to formulate strategies for the resettlement and development of specific populations in the study areas. The second is to generalize these strategies so that they can serve as a basis for planning subsequent river and lake basin programs which may involve reservoir resettlement. In terms of the relocation and development of specific populations obviously the analyses must be prepared in time to influence the choice of development strategies especially as they relate to dam design and operation. Two such policy questions concern fishing and regularization of the reservoir drawdown.

To date the development of reservoir fisheries has been one of the success stories of dam construction in regard to local participation. Provided they are given the opportunity, and provided immigrant fisher-

men do not take over during the transition period immediately following relocation, the relocatees can be expected to participate actively in a future reservoir fishery. Since this does not conflict with other water uses, such a fishery can be expected to develop and to enhance the productivity of the lake basin. For a variety of ecological reasons related to the flooding of land and vegetation, biological productivity in the reservoir can be expected to peak during the years immediately following lake filling. Thereafter production of fish can be expected to drop off significantly, followed by a gradual recovery, although not back to the original peak. Development strategies should anticipate this initial burst of productivity following impoundment by encouraging relocatees and hosts to tap it before it declines and to utilize the profits gained to capitalize other forms of development, as occurred within the Zambian portion of the Kariba Lake Basin. At the same time the resulting decline should also be anticipated through development strategies which diversify and extend the fishery over a wider area as inshore productivity drops. In this fashion, fishermen can cope with the changing nature of the reservoir fishery without drastic reductions in their numbers such as occurred at Kariba, where the number of fishermen dropped from over 2,000 along the north bank to under 1,000 within a several year period.

Drawdown regulation poses a more difficult situation since it conflicts with other water uses. Annually the West African reservoirs behind the Volta, Kainji and Kossou dams drawdown during the dry season, with many thousands of hectares exposed between the high and low water levels. Around the margins of the Kossou Reservoir we estimate, for example, that a minimum of 10,000 hectares could be culti-

vated through a system of low-cost décrue (recessional) cultivation provided the drawdown was regularized so that farmers could be promised a minimum number of water-free days. Unfortunately such is not the case. Though local farmers, on their own initiative, attempt to cultivate the drawdown area in each reservoir, the risks are too great and all too often they lose their crops since the reservoir level begins to rise before they can be harvested.

While the Kossou drawdown area could support over 40,000 people through the cultivation of vegetables and other crops, this zone has other potentials including aquaculture and livestock fattening. In the former case, inexpensive barriers could be constructed across some of the many inlets that enter the reservoir, with fish ponds created and annually reflooded when the lake level rises. As for livestock, the potential for grazing, especially along such rivers as the Niger, the Senegal, and the Logone is tremendous, bearing in mind that the drawdown occurs during the dry season and that such highly nutritious grasses as Panicum repens tend to colonize the recessional area and the lake shore margin over the years. Accordingly, we suspect that the economic and social equity benefits resulting from a systematic utilization of the drawdown area would easily offset the loss in generating capacity that would follow from regularization. Such utilization could also have major downriver benefits since some of the flood waters would have to pass through the dam rather than be stored for future use in order to allow farmers to harvest their drawdown crops. Carefully controlled to simulate the natural flood without its extremes, these flood waters could increase the potential of downriver floodwater farming, fishing, and grazing. In spite of such potentials, in no

cases have feasibility studies been broadened to consider whether or not the benefits that would accrue from drawdown regularization and controlled downriver flooding would offset or exceed the costs associated with reductions in electricity generation. Obviously such a situation just does not make sense, especially if dams and the resulting impoundments are to serve as means for both rural and urban development, and are to benefit a larger number of people.

C. Personnel and Training.

As with the farming systems studies, the field team should include two senior personnel with agronomic and social science training, the former including crop agriculture, livestock management, and fisheries. While one such team with associated junior colleagues could cover a relatively homogeneous population, the presence of several socio-cultural systems within the area, with quite different forms of social and economic organization, would require additional personnel so that the exact number of teams cannot be calculated at this time. Each team should be associated with junior colleagues and supervisory personnel as outlined for previous field studies. At the same time it makes sense for several Peace Corps or other VSO personnel to participate in the research program and especially in the survey research and the accumulation of statistical material dealing with the area as a whole, although preference should always be given host country personnel where available. Visits to the field stations could also be arranged for trainees preparing for careers in the RNC and LCBC; indeed, field training might be included for such personnel as outlined under the Floodwater Farming Study.

## VII. REFERENCES CITED.

- Adeniyi, E. O.  
1973 "Downstream Impact of the Kainji Dam." Socio-Economic Conditions. In Kainji: A Nigerian Man-Made Lake, Kainji Lake Studies, ed. Akin L. Mabogunje, vol. 2:169-177. Nigerian Institute of Social and Economic Research, Ibadan University Press.
- AID  
1976 Technical Background Papers. In Proposal for a Long-Term Comprehensive Development Program for the Sahel, Part 2. Report to the U.S. Congress, Washington, D.C.
- Butcher, D. A. P.  
1971 An Operational Manual for Resettlement: A Systematic Approach to the Resettlement Problem Created by Man-Made Lakes, with Special Relevance for West Africa. Food and Agricultural Organization, Rome.
- Gallais, Jean  
1967 La delta intérieur du Niger: Étude de géographie régionale. 2 vols. IFAN, Dakar.
- Harlan, Jack R., and Pasquereau, Jean  
1969 "Décrue Agriculture in Mali." Economic Botany 23:70-74.
- Harris, David R.  
1976 "Traditional Systems of Plant Food Production and the Origins of Agriculture in West Africa." In Origins of African Plant Domestication, ed. J. R. Harlan, J. M. J. De Wet, and A. B. L. Stemler, 311-356. Mouton, The Hague.
- Major, David C., Kirshen, P. H., and Lengyel, Z.  
1974 An Approach to Water Resource Planning. In A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region, Annex 8. Center for Policy Alternatives, M.I.T., Cambridge.
- Portères, Roland  
1974 "African Cereals: Eleusine, Fonio, Black Fonio, Teff, Brachiaria, Paspalum, and African Rice." In Origins of African Plant Domestication, ed. J. R. Harlan, J. M. J. De Wet, and A. B. L. Stemler, 409-452. Mouton, The Hague.
- Roder, Wolf  
1967 Irrigation Farmers of the Kainji Lake Basin. Mimeographed. Food and Agriculture Organization, Rome.
- Scudder, T.  
1973 "The Human Ecology of Big Projects: River Basin Development and Resettlement." In Annual Review of Anthropology, ed. B. Siegel, 45-55. Annual Reviews, Inc., Palo Alto, California.

- 1975 "Resettlement." In Man-Made Lakes and Human Health, ed. N. F. Stanley and M. P. Alpers, 453-470. Academic Press for Institute of Biology, London.
- 1976 "Social Impacts of River Basin Development on Local Populations." In River Basin Development: Politics and Planning, Proceedings of the United Nations Interregional Seminar on River Basin and Interbasin Development, vol. 1, 45-52. Institute for Hydraulic Documentation and Education, Budapest.

## SUDANO-SAHELIAN RURAL MARKETING SYSTEMS:

## A PROPOSAL FOR RESEARCH

Agricultural development studies usually assume that increased production for markets will automatically lead to economic growth in underdeveloped areas. Given this premise, theory and research have concentrated on why producers do or do not respond to market opportunities and have paid little attention to the structure and process of marketing itself. However a number of opponents to this approach have suggested that market participation can be detrimental to the economic welfare of producers and that regions have become underdeveloped precisely because of their linkages to national and world markets (Frank 1967). These opposing views on the developmental role of markets indicate that development planners and researchers must understand the dynamics of existing market institutions and their effects on agricultural output and income before they can make realistic proposals to increase production and welfare.

If agricultural production is to increase, there has to be more specialization, an extension of wider markets, greater use of inputs, all of which emphasize the central importance of the marketing system.

The marketing system needs to keep pace with the development of the agricultural sector as a whole. It can be a positive asset, acting as a strong encouragement to agricultural development, or it can be a real hindrance if its development lags behind. The familiar problems of inadequate market outlets, unreliable food distribution systems and difficulties with input distribution, arise all too frequently throughout the developing world (Heyer et al 1976:313).

To aid the development of both agricultural and livestock production, it is essential to have, then, an efficient marketing system: and efficiency is based on low cost and on flexibility, the capacity to respond to needs for new services as production increases. But only too often the provision of

additional services results in spiralling costs which defeat the objects of providing such services.

#### I. CURRENT STATE OF KNOWLEDGE.

Wide gaps exist in two crucial areas in our knowledge of marketing systems. First, there is no single theory or model that can be applied to the Sahelian situation, although there are some promising leads. Second, detailed and accurate information on specific Sahelian markets is meager, and much first hand research is needed to provide an adequate data base.

Regarding theory, several recent studies emphasize the spatial organization as the base for a study of markets. These are derived primarily from studies by geographers in Latin America and Asia (Johnson 1970; Skinner 1964; Smith 1976; Vance 1970). These models will certainly be useful in conducting research, in suggesting promising lines of enquiry, and also in drawing attention to important variables.

Almost without exception AID small farmer projects in the Sahel focus on increased production. This is entirely understandable, given the drought-induced massive food shortages which were the immediate cause of our Sahel involvement. The drought-mentality, combined with the desires of host governments to be self-sufficient in basic foods, has directed attention to technological solutions: better seeds, fertilizers, animal traction, improved storage. Recognition has been given to making the technological innovations reasonably risk-free, testimony to the increasing acceptance of the peasant farmer as a hard-headed rationalist, interested like anyone else in the maximization of (locally-defined) values within a set of techno-environmental constraints.

Curiously, given the prominence of economist involvement in the design and administration of development projects, there has been almost no economic

analysis of the conditions of Sahelian peasantry. In 1969, Wharton called for studies of the responsiveness of subsistence farmers to economic incentives (1969:463). Seven years later, the C.R.E.D. agricultural sector analysis of Mali repeated this call (1976).

Our lack of understanding of the incentives on resource allocations by small producers may lie in the inability of disciplinary specialists to bridge the macro-level concerns of the economists, who are most comfortable dealing with high order aggregated statistics, and the local community optic of the anthropologists. Even where anthropologists have studied markets they have, with few exceptions, treated them as if they were entirely within the local scene. C. A. Smith and her associates are attempting, through the use of locational analysis and central place theory, to provide that bridge. She writes:

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...much more work must be done to relate studies of peasant marketing systems to studies of regional or national marketing systems. Most local-level studies fail to appreciate the outside forces that determine the organization and character of local-level systems, while most national studies mask the local-level processes that must be understood in order to interpret the broader national patterns. In addition, primary attention has been given to whether or not peasants engage in marketing, this considered to be the crucial variable explaining peasant economic behavior. But it should be clear that it is not the presence of markets that explains the economic response of peasants but rather the type of market that is present (1976a:44).

Smith's definition of development is apt, since it is entirely consistent with the congressional mandate.

...economic development should be seen as the process whereby rural or undifferentiated parts of an economy become increasingly specialized in production requiring more efficient and equitable exchange articulation among the parts—increasing hierarchical and vertical market integration. The solution, then, may rest on promoting several urban centers or "growth poles" in the developing region or nation, which will individually

concentrate capital but will also provide competition and markets for one another, thereby providing the necessary internal dynamic for sustained growth (1976a:58).

Equity is seen then not merely as an ideological goal but as the sine qua non of development. Thus we are warned against investment in only one sector or a few closely related sectors of the society, such as hydroelectric development for urban consumption which does not, at the same time, genuinely enhance the opportunity situation of the small farmers, fishermen, and herdsmen in the river basin. In the short run, these investments may show a rise in GNP, but they do not impact upon rural poverty.

A partial answer may lie in the embrace by AID of the "integrated rural development" approach which is inherently regional in scope. That is, the attempt should be to identify all segments of poverty within a geographical zone and to deal with them simultaneously. We have referred to this elsewhere, when we argued that the full potential of a developed river basin is achieved only when the water, land, and human systems are dealt with as a package.

Smith considers why certain areas (usually rural, usually linked by regional markets to urban centers) remain poor and underdeveloped even though they participate in exchanges with richer, more developed areas:

The problem is not that capital cannot be accumulated but that local investment opportunity for it is poor because of the very process *by which* it is accumulated. That is, capital must be concentrated in the local system if local specialization and industry are to develop; but to the degree it is concentrated—profits from export-import trade flowing to a few entrepreneurs rather than dispersed among export producers—the local market for goods is restricted. Producing for the alternative market—an external or world market—is no solution because industries in the developed countries provide powerful competition, which can be met only by severe limits on local wage and profit levels, which will also restrict local growth (1976a:53).

We need thus a full-scale description and analysis of the nature of marketing

in the Sahel as a function of the use of space. We need to know what kinds of markets exist, what kinds of access small producers (both farmers and herders and fishermen) have to them, how the terms of trade are determined. It may then prove that where an investment is made has as great or greater significance in improving the conditions of the rural poor as the kind of investment that is made. It should help to place technological "solutions" aimed at increasing production into proper perspective.

In addition to the theoretical approaches, there is a small number of studies of African markets (Bohannon and Dalton 1965; Hodder and Ukwu 1969; Meillassoux 1971; Schwimmer 1976). There are also some very useful studies of the traders such as Cohen's (1969) work on Hausa traders in Ibadan, Hill's studies in Nigeria and Ghana (1970), and Garlick's (1971) analysis of the central market in Kumasi.

There are fewer systematic rigorous studies of specific Sahelian marketing systems (a notable exception is Bonte n.d.), although there is much useful information scattered in ephemeral papers and in government reports.

The proposal which follows is concerned with investigating the types and ranges of market systems in the Sahelian countries of West Africa and the current and future consequences of marketing for development of agricultural regions. Methods of observing existing marketing arrangements and analyzing their consequences will be proposed.

Sahelian markets are ancient, numerous, and complex. They range from small local markets that serve as centers for buying and selling a few basic food commodities, to international markets handling export crops and livestock. It is clearly impossible to make anything like a comprehensive study of all markets, so we propose that the marketing systems of carefully selected regions be examined.

## II. REGIONAL STUDIES.

We recommend studies of marketing regions rather than of single community markets, as the former are easier to relate to national development aims. And we do not propose national surveys, as these would be far too costly and complex. We believe that selected market regions, if carefully studied, will be adequate for our purposes.

The regions, which should be based on ecological and socio-economic criteria, might include:

- a vast and complex area, like the Inland Delta, Mali, which would necessarily take into account the many-stranded relationships among farmers, herders, and fishermen.
- an agricultural production region in reasonable close proximity to urban centers, where innovations in intensive cultivation are being carried out, such as the Gourmanche area near Fada N'Gourma, Upper Volta.
- an area remote from major consumption centers where traditional rainfall agriculture and open-range grazing dominate, such as the Manga/Peul region around Mainé-Soroa, Niger.

In each of the selected regions, the marketing system should be approached extensively, as a total system, and intensively, with in-depth studies of certain crops, markets, traders, and institutions. All studies need to take into account a range of historical, geographical, socio-economic and political factors. There are some of the relevant questions to be asked.

### A. Historical Aspects.

1. What were the salient features of the pre-colonial marketing system?

To what extent were particular ethnic groups or social classes

associated with specific marketing activities?

What was the range (in geographical and economic terms) of the marketing system?

Who exercised political and economic control of the markets?

To what extent did women participate in the different market activities?

2. What effects did French colonial rule have on the marketing system?

Was a "dual system" established?

A dual system results from the imposition of colonial trade in a setting where indigenous trade has developed on a small scale, but in which there is little articulation between the two systems. The local systems are fairly static and do not develop complex hierarchies or interconnections. The colonial system is restricted to a few large cities around which commercial production concentrates. The result is a primate pattern consisting of one large city and numerous villages (Johnson 1970:152-177).

What have been the long-term consequences of any dual system?

What was the extent of colonial control of commodity and livestock marketing?

How much do colonial marketing patterns persist in modern Sahelian countries?

(We stress that a knowledge of markets in historical perspective is an essential pre-requisite for any contemporary study; however, to gain adequate insights is a fairly easy task, and need not be time-consuming.)

#### B. Geographical Aspects.

1. We need to know details of location of markets, as well as of

the extent of their hinterlands periodicity, and their rank in the hierarchy of markets. By using methods developed by central place theory (modified for Sahelian conditions), a direct evaluation can be made of:

- a. The actual and potential range and size of markets for particular commodities.
- b. The way in which commercial producers are interconnected within and across regions.
- c. The way in which regions and urban centers are interconnected within nation states.
- d. The way in which terms of trade (and consequently levels of market production) for agricultural producers are affected by transport costs and trading practices.
- e. The extent to which markets encourage or discourage local specialization and diversification within regions.

Studies of spatial patterns are therefore of great importance to the development theorist and planner. They allow the theorist to evaluate the work of micro-economists, macro-economists, and anthropologists within a synthetic theory which cuts across the levels of corporation, nation-state, and ethnic community in which these disciplines have concentrated respectively. They allow the planner to consider a number of influences and consequences of economic change within an integrated framework.

2. We also need to get precise information about the range of different goods in different markets.

Range is defined as the maximum distance consumers or producers are willing to travel to purchase or sell a good. Ranges for different

goods vary according to their transport costs. Goods which have high transport costs relative to value have small ranges, beyond which potential suppliers and consumers are inhibited from visiting the market. Goods which are more valuable relative to weight will have greater ranges. Regular surveys of selected markets could easily establish not only range, but also price variations, variations of quantities sold, numbers of traders, flow of goods and approximate boundaries — though the boundaries are established separately for separate goods. Seasonal variations, according to severity of transportational difficulties, could also be included; for example, the effects of floods or droughts might be important.

Another important geographical factor is the relationship of markets to roads and railways. To what extent is marketing aided or handicapped by the transport system? The analysis of the relationship between roads and markets would enlighten judgments on the developmental payoffs from investments in road and other infrastructural transport facilities, and help resolve an issue which has remained moot for want of an appropriate analytic perspective.

#### C. Socio-Economic Aspects.

Socio-economic questions include:

What are the main patterns of trade?

Who are the successful traders?

What are the qualities that make for a competitive entrepreneur in the marketing system? (Individual case-histories would be useful in isolating influence of age, education, ethnicity, kin linkages.)

What is the importance, for a trader of his/her kin network and "traditional" base?

To what extent is a "modern" network developed?

Is there a clear or a blurred distinction between "trader" and "farmer/herder"?

Do professional "middlemen" exist and with what functions?

A sample of traders in selected market places should be interviewed to determine:

1. if they are producers or full time traders;
2. what products they deal in;
3. if they retail or wholesale;
4. where they travel to obtain supplies;
5. whether their suppliers are producers or other traders;
6. where they travel to sell goods (in the case of assemblers);
7. whether they sell to other traders or to consumers.

Similar information should be obtained from marketing agencies. Information from all markets can be collated to determine the flow of selected commodities and the bulking, wholesaling, transshipment and retailing functions of market places. This survey should yield complete data for formulating a market hierarchy and delineating the connections between market centers. The survey will also lead to the identification of additional selling points, especially of small rural bulking locations, which do not appear in the initial survey.

#### D. National and International Influences.

##### 1. National Governments.

What is the extent and broad pattern of government regulation of the marketing system, regarding price control, movement control, cesses and taxes, licenses, credit availability, and government boards or institutions to control produce and livestock marketing?

To what extent do private (i.e., non-governmental) marketing or-

ganizations exist?

What is the relative efficiency of private and governmental organizations?

A recent study from Tanzania concludes that "private marketing organizations almost always serve the peasant farmer better than government-sponsored organizations, cooperative or otherwise. This is because the personnel who man government posts are generally poorly qualified for the positions they hold and uninterested in the success or failure of their work, whereas private enterprises do not survive when poorly managed" (Fleuret 1977).

And Heyer et al (1976:359) state: "Among the most critical problems of Kenya's agricultural marketing system are those stemming from the high degree of regimentation and control that it exhibits. The highly organised system satisfied those who like to feel that a high degree of organisation implies a high degree of efficiency. But — there are far more potential inefficiencies arising from such a high degree of control than is usually realised."

Many areas of market study are sensitive: traders may be reluctant to give possibly compromising information, and government officials may resent any apparent criticism of favoured government agencies. Nevertheless, we cannot ignore the crucial question of government policy.

## 2. International Forces.

These affect the marketing system in several ways. First, the physical proximity of the coastal states (Senegal, Guinea, Ivory Coast, Ghana, Togo, Benin, Nigeria), with different marketing prices and regulations, makes the prospect of smuggling, and illegal deals, more likely.

Then export prices are clearly subject to great fluctuations according to international forces, though there are signs that many develop-

ing countries are seeking improvements in trade negotiations, culminating in the "New International Economic Order."

We do not deal directly with political pressures on the marketing system except to note that in many African countries they are similar to Kenya where "political pressures militate against efficiency and against equity -- political constraints considerably limit the possibilities [of making improvements in the marketing system]" (Heyer et al 1976:360).

### III. RESEARCH.

We do not propose to outline in detail the research strategy, as this will depend in part on the marketing regions that are chosen for study. However, we can indicate the sorts of aims and approaches that we recommend.

#### A. Main Aims.

The main aims should be to:

1. determine the local production, employment and investment developments associated with different marketing arrangements;
2. analyze the distribution of selected commodities to determine how prices are affected by trading profits, transport costs and storage and processing costs;
3. select farming communities in different parts of single systems and determine relationships between marketing arrangements and producer-behaviour in respect to production, diversification, specialization and investment.

We need information on a variety of topics -- physical environment, land-use, land tenure, agricultural and non-agricultural labor, capital and credit, inputs, technology, agricultural extension efforts and farmers' responses to innovations. Though the list is formidably long, it would be

manageable because all enquiries would be directed to the marketing system.

### B. Local Development Indices.

Markets can be compared to determine if their structures are associated with particular forms of local economic development. Development indices might include:

1. Diversity and specialization of agricultural production.
2. Proportion of goods traded within the local system as opposed to exports.
3. Farm size (probably only in crude, general terms) and farm types.
4. Urbanization: number of local towns, percent urban population, relative distribution of large, intermediate and small sectors. (Available from national census.)
5. Percent non-agricultural employment (trade, crafts, industries, services) in local region and in its town. (Available from census.)
6. Variety and availability of local services for different segments of the population.
7. Level and variety of capital investment open to the local population: transport, business, property rental, small-scale construction or manufacturing.
8. Rates of out-migration and in-migration. (Census data will provide gross information on inter-regional flows.)
9. Wage rates for agricultural labor.
10. Demographic indicators: sex and age balance, ethnic heterogeneity.

Smith (1976b:267-292) has discussed methods for determining statistical

relationships between market system structures and development indicators. Some of her simpler techniques, such as regression and factor analysis, should be quite useful.

We need to collect much basic information, which will necessitate several ongoing surveys of selected markets. For each market (choosing a representative sample) we need a detailed description of:

1. day(s) held;
2. market - is it fenced? roofed? how many entrances? what area?
3. what are the main non-food trading activities?
4. any food shops, butcheries?
5. what facilities in market - water, latrines, garbage disposal, canteen, permanent stalls (lockable? rented?) - porters? what charges? do they have carts?
6. what market fees are charged? give amounts for specific commodities; what monthly variations in amount collected?
7. what transport facilities - buses, trucks? how far main road?
8. how far is nearest major livestock market? and nearest cereal store?
9. any commercial facilities? how far to nearest post office? bank? government offices (different levels)?

For farm produce, check prices, at different times of day to see if any variation. Use the measures of volume that are traditionally used, and convert these to weight, using graduated containers (easy to make, and easy to work out conversion for each commodity), estimate number of units sold in a day.

Ask Sellers:

Where they bought or grew the produce? how far? type transport used?

Ask Buyers:

Will they buy again at this market? or where? details of distance and transport again?

C. Central Focus.

Throughout all the studies, the main questions for researchers should be:

1. How well is the marketing system now operating?
2. What are the main obstacles to efficient (rapid and inexpensive) distribution of food and handling of exports?
3. What can be done to improve the system?

We stress these practical questions in the awareness that many researchers might be tempted to keep amassing ('possibly useful') data. For market studies have - as we have indicated - such wide ramifications that it is easy to become lost in nonessential aspects.

To elaborate on the first question, here are some criteria of market efficiency as posited by central place theorists; this is applicable to a situation of free competition, but could be modified, or other criteria introduced, for other situations. A market can be said to be efficient when:

1. shipping costs are low, because markets become located at numerous points of easy rural access;
2. the level of competition is high and allows farmers to bargain effectively for higher prices for their products and lower prices for their purchased goods.

Good market access and competitive pricing provide terms of trade that should stimulate farmers to increase sales and allow them to specialize in particular lines of production, with the assurance that they are obtaining fair returns for their labor and will receive adequate supplies of inexpensive

consumption goods.

In regard to the general development of the local region the theory posits:

1. the transportation network provides efficient and multiplex distribution and communication links within local marketing areas;
2. the hierarchy of centers provides a diversity of local settlement and occupational alternatives;
3. a variety of rural and urban enterprises provides capital investment and accumulation opportunities for people with moderate resources.

As a result of these three influences the market area should display a diversity of goods and opportunities for the system as a whole and specialization of production within its subsections. These characteristics have more important development implications than simply increasing agricultural income and output. Expansion of opportunities and services should provide a high level of local services, appropriate for rural families and generate and maintain flows of labor, capital and skill with local systems.

Therefore, we propose that:

1. three regions be selected for study, on the basis of representativeness, and importance to development within each region, a one-year study be made;
2. the initial stages should take approximately 18 months: three months devoted to preliminary reading of published material and government surveys and registers, twelve months to conducting field research and three months to data mapping and analysis and to collecting and correlating development indices. Staff for each region should include two senior researchers, advanced degree holders or candidates, three or

four support staff, draftsmen and coders, and ten to fifteen enumerators. Senior researchers should all have inter-disciplinary social science interests and should represent anthropology, geography, economics, and statistics. (It is scarcely necessary to add that senior researchers should, where possible, be host country nationals. Where experienced researchers are not available, every effort must be made to recruit university students, or young professionals, and to train them on the job.)

Enumerators do not have to have a great deal of education and people who are not obviously university students or government officials may get greater cooperation from respondents during market surveys. Research teams should be responsible for periodic progress reports, at regular intervals. And the different regional researchers should meet, after every six months, to discuss these reports, to ensure production of comparative data, and to share insights.

#### IV. CONCLUSION.

The results of the research will provide detailed information on varieties of existing marketing arrangements and their effects upon market production strategies and upon local and regional development. The data provided can be effectively used to formulate rural development policy. Short-run improvements can be made in instances where simple inefficiencies or unnecessarily high costs are observed in the system, e.g., storage or transport facilities can be improved if these costs are major factors inhibiting trade. More long-range policy involving structural changes in the marketing system will have to be based on a balance between fostering decentralized institutions which stimulate local initiative and establishing centrally-controlled institutions which provide economies of scale for the investment of scarce

government resources. Policy could both formulate an eventual complete spatial design, and concentrate applying middle range strategy improvements providing flexibility for:

1. expanding transportation to best serve and improve the existing distribution system and to create adequate interconnections among market centers' factors trade.
2. orienting marketing corporation policy towards improving producer terms of trade, and providing rural credit and investment opportunities to initiate them.
3. planning administrative and service and small-scale industries on sites that have potential as 'implosion focii' to decentralize wastefully dominant central markets.

## V. REFERENCES CITED.

- Bohannan, P. J. and G. Dalton, eds.  
1965 Markets in Africa. Garden City, New York: Natural History Press.
- Bonte, Pierre  
n.d. L'Élevage et le Commerce du Bétail dans l'Ader Doutchi-Majya. Etudes Nigériennes No. 23.
- Cohen, Abner  
1969 Custom and Politics in Urban Africa: A Study of Hausa Migrants in Yoruba Towns. Berkeley and Los Angeles: University of California Press.
- CRED (Center for Research on Economic Development, University of Michigan)  
1976 Mali Agricultural Sector Assessment. Ann Arbor: The University of Michigan.
- Fleuret, Patrick  
1977 Unpublished report on "Markets in Lushoto, Tanzania."
- Garlick, Peter  
1971 African Traders and Economic Development in Ghana. Oxford: Clarendon Press.
- Frank, André Gunder  
1967 Capitalism and Underdevelopment in Latin America. New York: Monthly Review Press.
- Heyer, Judith, J. K. Maitha, and W. M. Senga, eds.  
1976 Agricultural Development in Kenya: An Economic Assessment. Nairobi: Oxford University Press. (See especially Ch. 10, "The Marketing System.")
- Hill, Polly  
1970 Studies in Rural Capitalism in West Africa. London: Cambridge University Press.
- Hodder, B. W. and U. I. Ukwu  
1969 Markets in West Africa. Ibadan: Ibadan University Press.
- Johnson, E. A. J.  
1970 The Organization of Space in Developing Countries. Cambridge, Mass.: Harvard University Press.
- Jones, W. O.  
1972 Marketing Staple Food Crops in Tropical Africa. Ithaca, N.Y.: Cornell University Press.
- Marris, Peter and A. Somerset  
1971 African Businessmen: A Study of Entrepreneurship and Development in Kenya. London: Routledge and Kegan Paul.

- Meillassoux, Claude, ed.  
1971 The Development of Indigenous Trade and Markets in West Africa.  
London: Oxford University Press.
- Schwimmer, Brian  
1976 "Periodic markets and urban development in Southern Ghana," in  
C. A. Smith, ed., Regional Analysis, Vol. 1, Economic Systems.  
New York: Academic Press.
- Skinner, G. W.  
1964 "Marketing and social structure in rural China," Parts I and II.  
Journal of Asian Studies 24:3-43; 195-228 (1975).
- Smith, Carol A.  
1976a "Regional economic systems: linking geographical models and  
socioeconomic problems," in C. A. Smith, ed., op. cit.  
1976b "Causes and consequences of central-place types in Western  
Guatemala," in Ibid.
- Vance, C.  
1970 The Merchant's World. Englewood Cliffs, N.J.: Prentice-Hall.
- Wharton, Clifton R., Jr.  
1969 "The issues and a research agenda," in C. R. Wharton, Jr., ed.,  
Subsistence Agriculture and Economic Development. Chicago:  
Aldine.

## THE DEVELOPMENT ANTHROPOLOGY OF TRADITIONAL HEALTH DELIVERY

### SYSTEMS IN THE SAHEL: A PROPOSAL FOR RESEARCH

#### I. CAPITAL INTENSIVE VS. LABOR INTENSIVE APPROACHES

... (Man) is more heavily parasitized in the African continent than in any other part of the world... (There) are on the average two infections per man (Thomas 1965:133).

A.I.D.-funded health projects have shown an abrupt and welcome change in direction during the past year. During the 15 years following independence in Africa, the vast bulk of external assistance in health went to urban-centered clinical facilities and to the training of persons to run them, as the newly independent countries understandably tried to model their health sector needs against the apparent achievements of the industrialized West. The solution to the problem of endemic poor health (measured in exceptionally high morbidity and mortality figures, particularly for infants) was seen in the transfer of capital intensive technology and technologists: hospitals and physicians. Since the capital intensive path chosen was enormously costly and there is no hard evidence that investments in hospital-based clinical medicine have a measurable impact on the national economy, it is clear that the state was responding to the political demands of the élite. The élite demand is for modern hospitals with the latest diagnostic and clinical equipment, specialist physicians, and medical schools. Thus, in 1968, sixty percent of the Ministry of Health budget in Uganda was consumed by a single teaching hospital in Kampala! This may have removed the necessity for a miniscule fraction of the urban population to go to London for medical treatment, but it left precious little to be distributed among the vast majority of the people, scattered in small villages in the remote countryside.

The emphasis on the hospital-machinery-physician complex was probably itself based on an erroneous assessment of the causes of low morbidity/

mortality rates in the West. Even without the clinical medical apparatus, industrial countries would be relatively healthy precisely because they are rich, and can afford therefore the minimum investments required: clean and adequate supplies of drinking water, good sanitation and disposal of waste materials, prevention of epidemics through vaccination, a general understanding of the requirements of public hygiene, and last, but not at all least, sufficient food, particularly for the young and for pregnant women. (We are here applying, of course, a very narrow definition of "health," one which does not deal -- as it must ultimately -- with the psychosomatic condition of the individual. For it is not at all established, and probably not true, that rich countries are, in total, "healthier" than poor; accidents, suicides, homicides, hypertension and other stress-related problems are major areas of concern, health issues which may become more prominent with modernization. Indeed, one of the great things we have to learn from traditional medicine is its efficacy in the treatment of psychosomatic illnesses.)

Even the more affluent of the underdeveloped countries simply cannot afford to place capital intensive health care systems where they will reach the bulk of the population. Zambia, for example, in 1967, had a gross domestic product of \$310/person, unusually high for Africa, and spent one percent of its GDP, slightly more than \$3/person, on health. This allowed for one physician for 11,900 people (400 percent better than in Malawi, which had one medical doctor for 53,000 people), and 3.58 hospital beds per 1,000 inhabitants. The comparable figures for the United Kingdom, which spent five percent of the GDP or about \$100/person on health care, were one physician for 860 persons and 10 beds per 1,000 inhabitants (Frankenberg and Leeson 1974).

Thus the LDCs are faced with both poor health and inadequate access to

medical services, in which the limited amount of facilities and trained persons are concentrated in urban areas. Since the populations of most Sahelian countries are 90 percent and more rural, the inequitable distribution of health resources is even more pronounced than in many other lands. But people want to be healthy. They want to live longer. They especially want their children to live free from disease. With the new donor agency emphasis on the rural, peripheral areas, there is a new opportunity to impact upon the state of health of rural people.\*

The model which is obviously being followed, although almost never acknowledged, is that of the People's Republic of China, in which preventive and labor intensive approaches to health care, widely distributed in the rural areas, have replaced the earlier, exclusively capital intensive urban-concentrated clinical approach. This has meant viewing health not only as a medical problem, but as an economic, political, and educational one as well. The component which has been seized upon, albeit not by name, in project after project, is the village health team, the front-line first aid and referral system known, from the Chinese literature, as the "barefoot doctor" approach. These are medical auxiliaries or "para-medics" who are selected by the local community and who, after short-term training (followed by periodic retraining and upgrading) serve as local-level health care workers. The component which appears not to have been appreciated, but which is perhaps equally significant in the marked improvement in Chinese health statistics

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\*In this section we are not going to discuss the negative aspects of development on the state of health of rural people. Though the rapid spread of schistosomiasis through irrigation works is a frightening and well-known instance, donors continue to be associated with large-scale irrigation projects which do not adequately confront the issue. Similarly, programs which favor a shift from pastoral dairying to beef production or from subsistence cultivation to commercial export production rarely deal in a satisfactory way with the effect of these actions on local nutrition. See, for a good summary of this problem, Hughes and Hunter (1970).

since the program was initiated, is the shift of political rewards from the towns to the villages, the official support for improved nutrition, and the ability of the political organization of the state and the communes to mobilize vast numbers of people in public health campaigns (i.e., destruction of rodents, lice, and, in one potentially disastrous mistake, of insect-eating birds which were thought to be attacking the standing fields of grain).

According to V. and R. Sidel (1974), the barefoot doctor is a consequence of the Cultural Revolution. Mao said, in 1965: "In medical and health work put the stress on the rural areas." These paramedics work at the level of the production brigade; they are peasants or workers selected by their fellows for three to six months of initial training. The barefoot doctors treat so-called "light" diseases, such as minor injuries and wounds, colds, bronchitis, and gastrointestinal disturbances. They are responsible for vaccinations and immunizations against diphtheria, tetanus, whooping cough, smallpox, measles, polio, encephalitis, and meningitis. They supervise the handling of human excrement and its conversion to fertilizer. They lead the continuing campaigns against disease-carrying pests. And they refer cases beyond their capacity to the next higher level of medical expertise and to the hospitals. All of this is done within an arena of broad-scale ideological and organizational support. It is questionable that this ideological and organizational commitment is well-established in the Sahel, or rather that Sahelian governments have the Chinese ability to mobilize their populations in public campaigns.

The labor intensive village level health worker, drawn from the local community, unpaid by the state, is the central feature of a number of AFR health sector PRPs and PPs, including:

Mali: Rural Health Services Development

- Niger: Improving Rural Health
- Senegal: Sine-Saloum Regional Health Project
- C.A.E.: Ouham Rural Health Project.

According to the Senegal paper:

The purpose of the proposed...Project is to create within the region of Sine-Saloum a network of staffed village health posts supported by local communities and to strengthen a backstopping system for secondary health posts supported by the National Government.

With the exception of a few village pharmacies and maternities, the present GOS health delivery system serves primarily the urban centers and lacks the infrastructure needed to penetrate the rural areas. The Health Post is the last link to the health system and little or no care extends into the village except in one or two demonstration centers where mobile health teams make a circuit over limited areas. Moreover, because of the deterioration of these health posts, the facilities of the Health Center, the regional hospitals and especially the hospitals of Dakar are overburdened with referrals.

The proposed project will attempt to remedy this situation...by

- Creating a cadre of village health workers (VHW's) and a network of village health huts (VHH), where basic health services (first-aid, environmental sanitation, simple health and nutrition education, and preparation for vaccination campaigns) will be provided... Cases requiring medical attention will be referred to higher echelons.
- Upgrading and expanding the secondary health posts in the region...so that the VHW's will be adequately back-stopped...
- Organizing a system of surveillance and supervision of the village health workers by an "Agent itinérant" working out of secondary health posts...

The Niger paper reports its purpose is to:

improve the Rural Health Delivery System of the GON with an objective of providing basic promotive, preventive and curative health care services at the village level. This project will provide health care services in 50% of the country's 9-10,000 villages, using primarily non-salaried volunteer village health teams (VHT's) consisting of secouristes (basic village health workers) and matrones (retrained and reoriented traditional midwives) who will be supervised, supported and coordinated by the Government of Niger.

In Mali:

...the project will develop a system of simple basic health services, emphasizing those health promotive and disease preventive activities and simple diagnostic and curative activities that can be undertaken by a person of the village, who remains of the village and who receives rudimentary training followed by continuing education and supervision.

These are all laudable actions, and they speak well of the several governments' attempts to bring some of the benefits of modern medicine to their own rural poor. Ultimately the solution to certain problems of physical ill health will be found in the eradication of poverty itself, but the above are important first steps. These projects also envisage direct support to the health ministries in terms of added personnel and facilities. Since the extension of modern medicine is as much a social as a biological issue, we recommend that A.I.D. provide support for the training and maintenance of medical anthropologists, geographers, and sociologists as well as for physicians, technicians, and paramedics. Such persons, host country nationals, would prove to be invaluable resources to the ministries in the attempts to reach out to the rural (and urban) poor. Medical social scientists could devise systems of monitoring the proposed programs, identifying constraints on the utilization of the village health personnel, assessing the pertinence of traditional conceptions of disease causation and treatment. Working with other members of the ministries of health assigned to the rural outreach programs, the medical social scientists would design techniques for upgrading the skills of frontline workers through training and retraining sessions, and would provide for periodic program evaluation by anticipating the social and cultural problems which, left unresponded to, would serve as obstacles to the effective diffusion of the system and thereby impede the

goal of improved health for the rural population.\*

The three Sahelian health care project proposals differ in their recognition of the existence and relevance of traditional health delivery systems in the rural areas. The Mali paper is committed to exploring the possibility of working with indigenous curers;

...most health services in rural Mali are provided by traditional practitioners; this project will attempt to gain their cooperation and make use of their services as much as possible (p. 14).

It may be that the traditional medical practitioner at the village level will often become, or assist, the VHW, thereby combining traditional and newly introduced approaches to curative and preventive health care (p. 18).

[The project envisages studies of the] relative effectiveness of traditional healers, traditional birth attendants, and newly recruited women or men as Village Health Workers (p. 29).

...older traditional health practitioners of various kinds should be considered as sources of VHW recruits... This would assist the development of liaison between traditional and modern health services at the village base (p. 38).

Another important local social question involves the potential benefits of integrating traditional medicine and traditional practitioners into the spectrum of modern health services. The local (i.e., village) approach offers the best opportunity to begin integration of traditional and modern health sectors (p. 65).

Most of the services intended to deal with health problems in rural Mali are provided by traditional indigenous medical practitioners who are members of the communities that they serve. In the modern sector, little is known about who these practitioners are and what methods they use. The few modern medical workers in Mali (especially at the Institute of Traditional Medicine) who have taken an active interest in traditional medicine feel that the presence and activities of traditional workers could be important determinants of the success or failure of VHWs. It may be possible to actually train some of the traditional practitioners as VHWs and should be possible to incorporate some of the methods, if they prove efficacious, into the training of VHWs (p. 66).

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\*The Senegal project contemplates periodic social science evaluation, using host country contractors.

The Niger project plans to work with the traditional midwife, training her as a matrone. The male secouriste is not a traditional curer retrained to work within the new system, but a man chosen by the village chief and most likely his younger brother or son. The traditional health delivery system in Niger is extensive, and reaches into every village and pastoral band in the country. Although there are tremendous local and ethnic variations, there are in general four types of traditional practitioner, only one of which, the midwife, is considered in the project. The others, distinguishable in theory though frequently merged in practice, include surgical specialists (i.e., barbers), herbalists, and psychiatric practitioners, who are often Islamic holy men. We are making no general claim for the efficacy of their treatments; that efficacy — in both physical and psychiatric cases — is problematic, and should be assessed by rigorous field inquiry. But the unequivocal fact is that the rural people (and many urban people) call on and will continue to call on these practitioners when they think they have need of them. Even the presence of a modern hospital with fully trained staff does not put them out of business. How often in a Sahelian hospital is the physician on rounds followed by the marabout also on rounds? The former dispenses medications from the standard French pharmacopeia; the latter dispenses prayers in liquid form, washed off a slate to be drunk by the patient. In Eastern Niger, where a fully staffed hospital was available, we witnessed a school inspector, an educated French-speaking civil servant, summon a barber to treat his infant son who was suffering from diarrhea. (The barber excised the baby's uvula.) The rural people are hardly likely to abandon the boka and kaskama herbalists for exclusive reliance on a newly appointed secouriste.

The traditional health delivery system constitutes an existing resource potential for development. The curers are already in the villages; they have

established practices, and they have the confidence of the local people with whom they have established mutually acceptable means of compensation. We have found, in the course of our own research in the region, that they have a vested interest in success and a receptivity to learning.

At a recent A.I.D. health planning workshop in Washington, the medical anthropologist Charles C. Hughes, discussing Nigerian indigenous curers, said:

The Yorùba have a long history of health or medical specialists, including those who make a special practice of treating the ills of the mind... Most scholars divide such specialists into two classes: the diviners (babalawo) and the "herbalists" (onishegun). These persons (most of them males) make extensive use of indigenous pharmacologic substances, including sedatives and tranquilizers..., many of which they procure in the forest themselves or else purchase at one of the market stalls which display elaborate arrays of substances which we would call medically effective (as well as many we would not put in that class, such as monkey heads or snake eyes). These health workers have extensive practices, some keep records and are publishing booklets on their craft, and many (especially the babalawos) belong to societies which meet periodically to discuss professional matters.

Clearly this represents a resource that should be used and the possibility of bringing these health workers into a working relationship with European-derived medicine has been demonstrated by the work of the Nigerian-born, British-trained psychiatrist, Dr. T. A. Lambo [now Deputy Director, W.H.O./Geneva]... Clearly there are problems of threat and competition that must be negotiated; but the fact is that it is these people...who provide the great bulk of medical care for the population in Western Nigeria when the problem is too serious for common home treatment (1976:15).

In other African countries — Ghana and Kenya are good examples — there have been sporadic governmental attempts to promote the study and preservation of traditional medical beliefs and practices. In Cameroon, the Ministry of Health has a Commission on Traditional Medicine, and there are organizations of indigenous curers at least formally recognized if in fact neglected by the

government. In Mali there is the Institute of Traditional Medicine, headed by Dr. Koumare.

It is difficult in the area of medicine to propose a research inquiry which, while localized, provides information broadly useful to the generation of projects in the health sector across the Sudano-Sahelian region. The reason for the restricted general utility of the findings of a medical study is that, unlike inquiries dealing with farming systems or range management or river basin development, the ecological components are not as central and therefore the specific findings from one area may be only marginally relevant to any others. We expect there to be quite considerable regional variation, since conceptions of health and disease are basically cultural and historical in nature, without high degrees of environmental fit. This is an area where much reliance will have to be placed on sociological investigations specific to a proposed development project.

## II. HEALTH SECTOR RESEARCH RECOMMENDATIONS

Our first recommendation is for a relatively brief but intensive review of the literature on indigenous medical systems in the Sudano-Sahelian region, with a view to the generation of a standard research protocol to guide the sociological analyses of specific development proposals in the rural public health sector. The protocol should lead to a description of the indigenous health delivery system, with an identification of the incentives and constraints to the participation of the traditional practitioners in the new systems. The research would also specify the perceptions of the local populations as to the efficacy of different kinds of curers, and their predisposition to solicit the attentions of one or another kind of practitioner. These studies will point out the willingness of local people to pay for treatments and, more importantly perhaps, for preventive actions.

We are not suggesting that, without further field research, it will be possible to do complete ethnomedical descriptions of even a few local systems. Professor D. M. Warren, an anthropologist at Iowa State University, needed two years of field research to study the medical beliefs and practices of the people of Techiman in central Ghana, where he analyzed beliefs about disease causations and cures, articulated a taxonomy of illnesses, and compared attendance at traditional shrines and curers with visits to the Western (mission) hospital. Following field work, the analysis of data and the writing took another two years. We are suggesting that there is much to be gained from organizing, systematically, what is already known. A single scholar\* working for a year should be able, assuming of course previous experience with the material and bilingual competence, to review the literature and provide not only a summary of what is known but also a manual which would guide physicians, paramedics, development and government officers on how to anticipate the relevance of the traditional practice and delivery system to programs of the extension of modern medicine to rural areas on a labor-intensive high participation basis.

Following the preparation of a bilingual draft of the report, a Workshop should be convened in Africa, perhaps under the auspices of the Malian Institute of Traditional Medicine. The draft document, distributed well in advance to the participants, would serve as the basis for discussion of the experiences of the various countries involved in extending modern medicine to the rural areas. The sociological evaluation envisaged in the Senegal proposal would provide a most important contribution to the Workshop, as would the participation of those with pertinent experience outside the immediate Sudano-Sahelian region. It is significant to note that much of the scholar-

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\*or two graduate assistants working under the direction of a senior scholar.

ship dealing with African traditional medicine has been undertaken by African scholars.

The proceedings of the Workshop would lead to the final version of the report and manual, to be published in French and in English for wide distribution. We expect that the report and the Workshop would draw considerable attention, particularly from host country medical specialists trained in Europe or in Western-oriented medical schools but who are caught up in the general interest in authenticité which pervades much of the thinking of African intellectuals today. It is interesting to note that in 1962 the Minister of Health in Ghana, greatly concerned about the cultural gulf which existed between recently graduated (mostly from British medical schools) Ghanaian physicians and their patients, asked the Department of Sociology at the University at Legon to present these doctors with a course on indigenous culture, consisting of several short sessions over about a month. The faculty involved, ironically, were two expatriates who had made intensive studies of rural communities. To the surprise of the instructors, the doctors showed no resentment, and quickly accepted that in many ways their ideas of traditional culture were limited to outworn stereotypes. They lamented their separation from their own "roots" and eagerly joined in the discussions. We are not suggesting, of course, that in 1977 reliance need be placed on expatriate sociologists, but rather that these kinds of orientation sessions have considerable value and might be received with considerable interest and even enthusiasm by professional modern-sector health workers. Indeed, if translation logistics could be handled, the sessions would immensely profit from the participation of traditional-sector health workers too. In the course of these discussions ways should be found of further enlisting the cooperation of indigenous practitioners in modern rural health programs. Of course, both

the host government ministry and the donor agencies involved would have to communicate their sympathetic support for this approach. Without it, we predict host country modern-sector professionals would be less willing publicly to ventilate any feelings of interest in the traditional system.

In addition to salary (and graduate assistant stipends, if appropriate) for a year, the contractor would need funds for travel, both domestic and overseas (including Africa, if not already an African), materials acquisition, consultants, communications, translation, and secretarial assistance. The Workshop and ultimate publication and distribution of the report/manual would require separate funding.

Our second recommendation is for a field research study in association with the Niger Rural Health Project. The study would have two main objectives:

(1) an assessment of the Village Health Team approach from the perspective of the rural village, to advise the Ministry of Health on possible directions or adjustments in the Project;

(2) to train a Nigérien medical sociologist, anthropologist, or geographer to provide a continuing social science competence for the Ministry of Health.

The Niger Project provides an ideal opportunity to test the relative advantages to working with the indigenous system or to creating a parallel, competitive one. Two social scientists, at least one of whom is Nigérien and has been selected to continue working with the MOH following the completion of the study, working for 18 months to two years each, would study the utilization of health care personnel within the area in which the Project is to be active, studying both villages included in the VHT system and those which, culturally and ecologically similar to the former, will not be included, at

least not during the early years of the program. The field scientists will describe and analyze the complete health care arena, including the indigenous taxonomy of disease causation and cure, the utilization of different kinds of health specialists by different kinds of people (herdsmen, farmers, women, children, etc.). The field research would, in other words, monitor the traditional and modern systems and assess their relative social impacts.

The study could take place in either a Hausa-speaking or Djerma-speaking region, although the former is preferred because of the richness of available material on the Hausa compared with that on the Songhai-Djerma. (This is not to fault the work that has been done on the Djerma but merely to point out that quantitatively there is far less available than for the Hausa.) This study should not await the results of the literature survey and manual recommended above, because it is important that the researchers be in place before the VHT approach is brought to the village, in order that any changes in the utilization of health care specialists might be noted from the beginning. The researchers would assess the traditional practitioners' strategies for dealing with the new system; do they elect sabotage, avoidance, cooperation? Will the traditional curers attempt to be selected as secouristes? Will they refer patients to the secouristes, or, conversely, will the latter refer to the traditional curers difficult cases which fall outside their ken and the reach of their first aid kits, or will they refer such cases up the ladder to the next official level of health care? Are there specific kinds of traditional curers -- by age, sex, specialization -- who seem predisposed to participate in or support the new system, and who should be incorporated into it? From the point of view of the local people, the patients, is use made of both systems, in which certain kinds of complaints are brought to the secouristes and others to the indigenous practitioners?

Are there differences in the kinds of compensation received by different types of curers?

The researchers should make their information and analyses and recommendations available to the Health Project and the Ministry of Health, but they should not be seen — nor see themselves — as advocates for any particular approach. If it were felt, for example, that they were partisans of government medicine, they would risk losing the confidence of the traditional curers, and people would be reluctant to reveal their continued access to indigenous specialists.

Funds for this research include 24 person/months of field research plus 12 person/months for further analysis and write-up. Support is needed for travel, vehicles (four-wheel drive, including fuel, maintenance, and insurance), field assistants/interpreters, and the usual research supplies and equipment.

## III. REFERENCES CITED

- Frankenberg, R. and J. Leeson  
1974 "The sociology of health dilemmas in the post-colonial world: intermediate technology and medical care in Zambia, Zaire, and China," in E. DeKadt and G. Williams, eds., Sociology and Development.
- Hughes, C. C.  
1976 "Culture and health planning for the Yoruba of Western Nigeria," Medical Anthropology Newsletter 8(1):14-18.
- Hughes, C. C. and J. M. Hunter  
1970 "Disease and 'development' in Africa," Social Science and Medicine 3:443-493.
- Sidel, V. and R.  
1974 "The delivery of medical care in China," Scientific American 230(4):19-27.
- Thomas, J. D.  
1965 "Some preliminary observations on the ecology of a small man-made lake in tropical Africa," in D. W. Brokensha, ed., Ecology and Economic Development in Tropical Africa.

## DISEASE CONTROL AND HUMAN SETTLEMENTS

## I. INTRODUCTION.

Africa is unique among the continents of the world in having a significant portion of its lands either sparsely inhabited or virtually uninhabited because of the prevalence of disease. The two most important in terms of their distribution are river blindness or onchocerciasis, and human and bovine trypanosomiasis. Both are present in West Africa where the savanna zone constitutes one of the worst oncho-infested areas in the world. Nearly 700,000 km<sup>2</sup> are affected, with a population of over ten million, one-tenth of whom were infected according to data collected under United Nations auspices in 1971 and 1972. Of this number, an estimated 70,000 were classified as either blind or having serious sight impairments.

Upper Volta is particularly adversely affected since most of the southern portion of the country is within an oncho zone. Corresponding primarily with the upper basin of the Volta River (including the Black, Red and White Voltas), this zone includes some of the best soils in the country. Indeed, if the Senegal, Niger and Lake Chad Basins constitute the most valuable physical resources of Senegal, Mauritania, Mali, Niger and Chad in terms of rural development, the equivalent in Upper Volta is the Volta Basin. Unfortunately, the favorable riverine areas also contain dense populations of black flies (*Simulium* spp.) which breed in aerated waters along the rivers and are the carriers of river blindness. As a result, in the early 1970s approximately 65,000 km<sup>2</sup> (or nearly a quarter of the total area of Upper Volta) were unoccupied. As in Ghana, riverine inhabitants have been retreating from heavily infested valleys since the turn of the century, moving up onto the upland plateaus which in many instances have a considerably lower carrying capacity. East of Diebougou in the Dissin area, for example, the

soils are generally poor and susceptible to erosion. Capable of supporting twenty to thirty people per km<sup>2</sup> under existing systems of land use, they currently hold at least three times that number, hence accelerating land degradation. In the past, there appears to have been a cyclical movement between the river valleys and the uplands with people periodically fleeing the riverine areas for the less infected uplands but then being forced to re-colonize the valleys when upland soils could no longer support their number. During the current century, though some people have begun to drift back into the valleys in recent years, most participate in circulatory labor migration and permanent migration to the south, and especially to the Ivory Coast.

Quite obviously the oncho areas of Upper Volta, of West Africa and of the continent as a whole contain a reservoir of relatively unoccupied land which, along with areas infested with tsetse flies (the carriers of trypanosomiasis) constitute one of the major (if not the major) untapped land resources of Africa. Looking to the future, these have tremendous significance for development especially in countries such as Upper Volta where the Sahelian portion of the country is overpopulated with people and livestock as are the interfluvial areas such as the Mossi Plateau. *In spite of this potential, no attempt has been made for the continent as a whole or for West Africa in particular to develop a set of operational strategies for the colonization and development of such areas. We believe that AID can play a major role here in Upper Volta, in West Africa, and in Africa as a whole.*

## II. PATTERNS OF SETTLEMENT.

The colonization and development of river valleys tends to follow one of four general patterns. These are:

- a. Spontaneous migration, with virtually no governmental inputs.
- b. Spontaneous migration which is facilitated by governmental agencies

through the provision of feeder roads, water supplies, schools, clinics and other social services, and an extension staff, which direct the settlers to certain areas where they are encouraged to intensify their systems of production in ways congruent with soil conservation.

c. Government-sponsored and controlled settlement in which settlers are selected from a variety of established communities according to a relatively narrow set of criteria and then are required to follow a closely supervised program of agricultural development which tends to put primary emphasis on the production of cash crops.

d. Compulsory relocation which is usually a by-product of large-scale national development programs such as dam construction with the resultant need to evacuate people from the future reservoir before flooding. (We have dealt with compulsory relocation in the proposal on Local Populations and River Basin Development so that no further reference will be made in this section.)

While the first type of spontaneous migration has dominated the history of human expansion around the world and today is still very important in the lowlands of Central and South America, and throughout Africa, national governments and multilateral agencies tend to ignore or deplore it. Instead, they continue to support centrally controlled and closely supervised settlement schemes (pattern c), which reach a relatively small number of people because of the high capital and personnel costs involved, and which tend to have relatively high failure rates. The general conclusion from reviews of settlement schemes throughout the tropics is that the greater the degree of government financial and supervisory involvement, the greater the chance of economic failure. This is not surprising when one considers the magnitude of the task of trying to create from scratch economically and socially viable

communities in new lands: indeed, it is hard to imagine a more complex job for planners to attempt to undertake. Generally speaking, the greatest degree of success is with housing and community services. Though obviously important, such facilities are of little use if the new communities are not economically viable and if they have insufficient social attractiveness as communities to retain settlers.

We believe that far more attention in the future must be paid to pattern b: government facilitation of spontaneous migration. It is here that we think AID can play a major role, especially in the tsetse and the Onchocerciasis Control Program (OCP) areas of West Africa. Such an approach is justified for two primary reasons. The first, the high failure-rate of government-sponsored and controlled settlement schemes (pattern c), we have already mentioned. The second is that such schemes, even where successful, reach only a relatively small proportion of those who move into colonization areas that are close to densely populated zones. The large majority, often totaling over 80 percent of the total number of colonizers, are spontaneous migrants, and there is no reason to expect that the situation will be any different in the tsetse and OCP areas of Africa. Spontaneous migration with no government inputs, however, poses major risks for the future development of the remaining arable lands of Africa since such settlers tend to practice extensive systems of agriculture with low yields per acre. These systems also tend to have adverse environmental effects as population densities rise since fallow periods are shortened to the extent that soil fertility is no longer restored prior to re-cultivation. The obvious solution to such problems is to design policies which extend to spontaneous migrants; policies which capitalize on their initiative and their ability to form socially viable communities while offsetting their weaknesses by attempting to realize

more productive and less degrading forms of land use.

According to the best available estimates, the resettlement capacity of the OCP areas in Upper Volta alone is between 600,000 and 1,000,000 people. Current government programs, carried out under the auspices of the Volta Valley Authority (AVV), have relocated only thirteen villages since 1974 consisting of 445 families which together total less than 5,000 people. Even if long-term projections are met -- and currently the AVV is suffering from financial constraints -- the total number of settlers to be involved in rain-fed government schemes under the AVV program is a maximum of 150,000, or one-fourth or less of the carrying capacity of the OCP areas. Though the government also hopes to resettle some 350,000 people in connection with a series of irrigation projects based on dam construction, these projects are only in the planning stages. Even if they are eventually executed, it will be many years before the first settlers will be able to start operations. In the meantime, we can expect the rate of spontaneous migration to accelerate, so that many areas will in fact be occupied before planned settlement gets underway.

While oncho-infested areas in the Ghanaian and Upper Voltan portions of the Volta Basin are largely unoccupied, *they are not unclaimed*: this must be remembered in projecting trends of spontaneous migration. Even before the OCP began and before the first rumors of its existence began to circulate, people were beginning to move from certain seriously overpopulated plateau areas back into the adjacent valleys from which they or their ancestors came and of which they still claim ownership. Already the OCP has begun to act as a catalyst to accelerate such return migration. Though WHO estimated that settlement could be planned approximately eighteen months after control operations were carried out and the World Bank used a figure of twenty-four

months, both these organizations were thinking of government-controlled settlements which could be postponed until formerly infested areas were considered medically safe. Actually governments have not waited this long (the AVV launched its first settlements along the White Volta even before OCP spraying began). As for spontaneous migrants, some can be expected to move in as soon as spraying operations begin with the flow subsequently accelerating. We were told about a number of such cases, involving the reestablishment of whole communities, along both the Black and White Volta. According to one World Bank estimate (which we were not able to check in the field), approximately 10,000 spontaneous settlers (or well over double the number involved to date in government-sponsored villages) have recently moved into the upper portion of the Black Volta from the Mossi Plateau. We were also informed of an Ivorian case where spontaneous migrants had moved into a heavily infested area along the Upper Bandama presumably because of extreme land pressure in the Korhogo area, although in this case it appeared that the colonized area had been unoccupied for centuries and hence no group claimed any land rights.

Such movements can be expected to accelerate. Furthermore, we believe that it will not be politically possible or even desirable to stop the massive movements that can be expected in the years ahead, although the AVV has tried either to expell or absorb the first trickle of such migrants into its first settlements along the White Volta. Granted the numbers of people involved and the impossibility of political control over their movements, we believe that it is a serious mistake to view them as undesirable elements and their settlements as 'pirate' communities. What is needed is some sort of compromise strategy which combines government-sponsored and controlled settlement with government facilitation and enhancement of spontaneous migra-

tion. Rather than being divorced from the communities of spontaneous migrants, the former settlements might serve as pilot and demonstration projects. As pilot projects, they could play an important role, experimentally, in helping to develop a broad policy for the colonization of disease control areas -- a policy which would be designed to reach the largest number of settlers, including spontaneous migrants. As demonstration projects, they could serve as information, extension, and service centers for the surrounding areas. In this way, they would reach a larger number of settlers at a lower cost per family or household unit (costs of government-facilitated spontaneous migration, however, are still relatively high because of the need to provide feeder roads and other services). The opportunity for AID to work closely with host country agencies and bilateral and multilateral donors in the development of such policies is great.

### III. THE WEST AFRICAN ONCHOCERCIASIS CONTROL PROGRAM (OCP).

The history of the OCP goes back at least to 1968 and has consistently involved AID participation throughout. In that year WHO, OCCGE (Organisation de Coordination et de Cooperation pour La Lutte Contre les Grandes Endemies) and AID organized a conference in Tunis to consider whether or not the technical means were available to control Oncho over large areas. Since the answer was affirmative and agreement was reached to focus initially on West Africa, a subsequent meeting was organized by WHO in Brazzaville during 1969 with AID again participating. Thereafter events moved rapidly; donors were involved and the terms of reference for an interagency UNPAG (Preparatory Assistance to the Governments) Mission drawn up following a meeting between the seven host country governments and bilateral and multilateral donors in Geneva during July 1970.

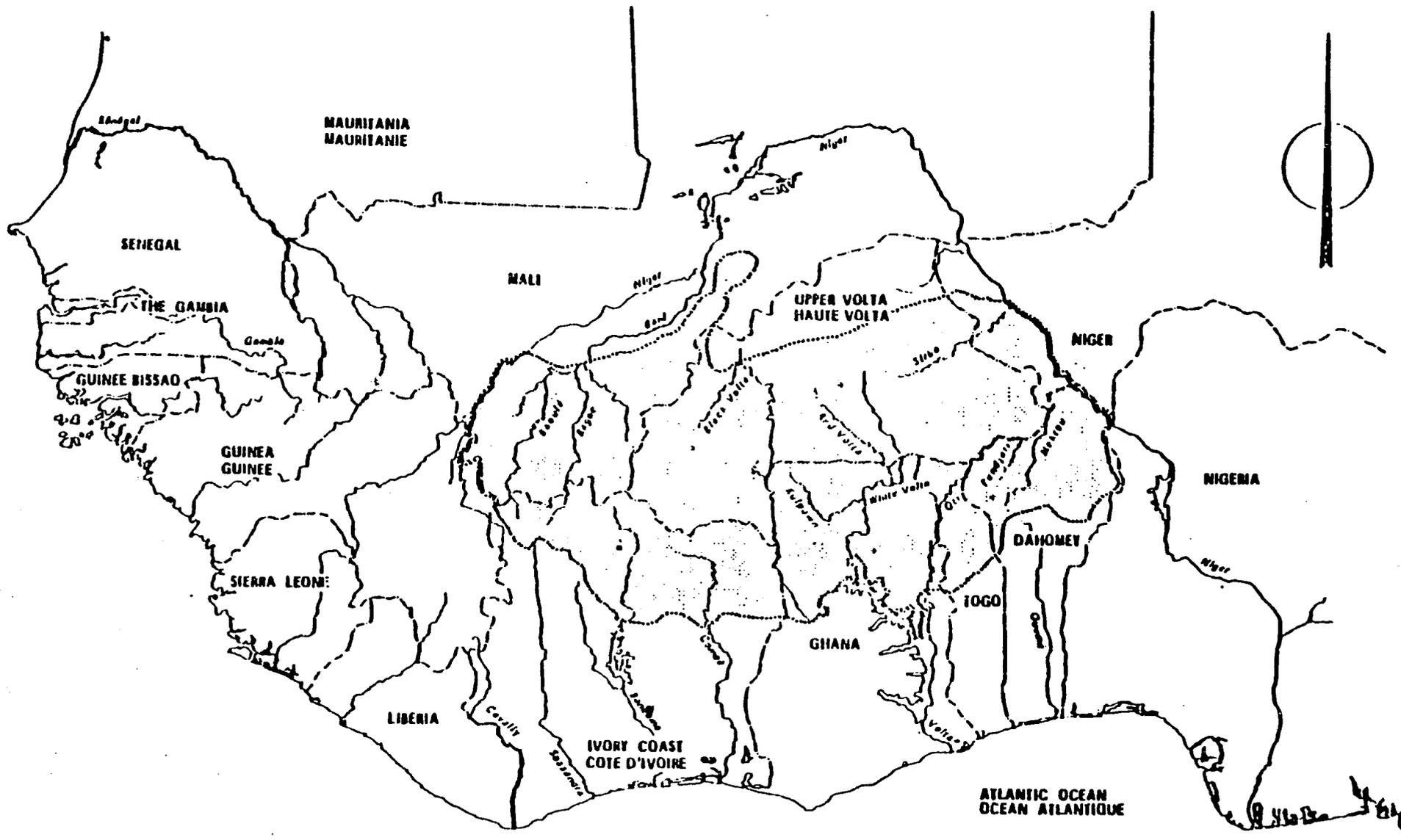
The PAG Mission was funded by UNDP and executed by WHO and FAO. It got

under way during 1971 and continued throughout 1972, with the final report submitted in August 1973. Hosted by Upper Volta, Ouagadougou was subsequently picked as the site for OCP headquarters when the control program was launched early in 1974. The area to be covered is shown in Figure 1 which is taken from the 1973 PAG Mission Report. The initiation of spraying was delayed to an extent, but operations finally started in December 1974. Since then the control program has moved forward rather as expected. Though re-invasion of fly has occurred in previously treated areas during both 1975 and 1976 with the commencement of the rainy season, this phenomenon was expected by the biologists appointed to the UN interagency Ecology Panel which was established to monitor the control program throughout. Counter measures have been set in motion and, as of January 1977, the biological control portion of the program was expected to be successful.

We are less optimistic about the economic development component. The original PAG Mission produced an impressive set of diagnostic reports which competently integrated the biological control and the economic development components of the program. On the economic side, Mission members included an agronomist, a livestock specialist, two agricultural economists, an economist, two human geographers, and a sociologist. During their work, they identified five development zones for which they recommended projects. The two largest were in Upper Volta, with single projects recommended for Togo, Ghana (and adjacent to the easternmost Upper Voltan project), and the Ivory Coast (Figure 2). In each zone they proposed an integrated rural development approach "to provide the necessary infrastructure, particularly roads and wells, that should stimulate a spontaneous movement of people, and an agricultural extension service to promote improved farming." In other words, they recommended the same approach that we have recommended, namely pattern b, governmental facilitation of spontaneous migration combined with a degree

of agricultural intensification, along with an experimental and pilot project approach to pattern c, government-sponsored and controlled settlement. Because the OCP areas in the Ivory Coast and Togo appeared to have been previously unoccupied, there the PAG Mission was more favorably inclined toward government-controlled settlement schemes. In Ghana and Upper Volta, on the other hand, they preferred a policy which facilitated the return migration of the descendants of previous inhabitants.

Unfortunately the close coordination between the biological control and economic development aspects that characterized the work of the PAG Mission, has only belatedly been institutionalized within the organization of the OCP itself. Hence the Economic Development Unit within the Program did not begin to operate until February 1976 — a full two years after the Program Manager took up residence in Ouagadougou. Similarly the UN interagency Economic Development Advisory Panel, which could have encouraged an overview of economic development strategies for the OCP area as a whole, provide expert counsel to host country governments in regard to specific problems and projects, and directly assist the Economic Development Unit during the first months, did not hold its first meeting until June 1976! At the same time host country governments did not respond rapidly to UNDP initiatives in 1973 and early 1974 to provide whatever assistance they might need for planning the development of oncho-freed areas through the utilization of \$.5 million which UNDP was willing to make available to each OCP member country. As a result, the initial opportunity to integrate the economic and social development program with the biological control program has yet to be realized. The same applies to the opportunity for host country governments to work together among themselves and with the donor agencies in order to consider a wider range of available options, since each country tended to develop its own plans in isolation.



THE PROGRAMME AREA  
LA REGION DU PROGRAMME

FIGURE : 1

Report of the PAG Mission on  
Onchocerciasis Control in the Volta  
River Basin Area, Geneva, 1973



Only in Togo was there the early establishment of a complete planning team to formulate fundable proposals as a follow-through on the recommendations of the PAG Mission. While Dahomey had accepted in principle the Togo model by June 1974 for initiation in its own oncho zones, both the Ivory Coast and Niger were proceeding within the terms of reference of their national development plans, while Ghana was planning minimal inputs, depending on the spontaneous colonization of the oncho-freed river valleys by the original inhabitants and their descendants.

In Upper Volta the situation has been more complex. Although some governmental interest in the Togo model was expressed, FAC had begun a study prior to the initiation of the OCP that was concerned with the water management of the whole Volta River system within the national boundaries. This followed the classic "development from above" approach with dams for hydro-power generation and associated irrigation works. According to one projection, execution of the associated projects would involve the settlement of 600,000 people, 250,000 of whom would be supported by rain-fed agriculture while the rest would be irrigation farmers.

Although it was not officially established by presidential decree until late 1974, the AVV also was operational before the OCP. Staffed mainly with French experts, it initially accepted the FAC approach to centrally planned and tightly supervised settlement. Settlers were to be selected according to rigid criteria based on age and the number of active people within the family, and drawn from a multi-ethnic population so that new settlements would start their existence as aggregates of families with little or no prior contact and with no community structure as such. Anticipating the OCP, the first settlers were moved into Zone A (Figure 2) during 1973. As for Zone B, the first settlers are to be chosen in 1977, although up to 10,000 spon-

taneous migrants are said to have already moved into the valleys of the Black Volta and its tributaries.

#### IV. PROPOSED CONFERENCE.

The OCP is an immensely complicated and important operation, the implications of which extend far beyond the seven countries involved. As a first step toward clarifying the colonization issues we believe that a systematic attempt should be made to examine previous experiences, especially in the arid and semi-arid areas of tropical Africa, relating to the colonization of new lands, to evaluate the significance of these experiences for policy formulation, and to present the results of this evaluation to relevant host country and international agencies. To achieve these purposes we recommend that AID convene in Ouagadougou a working conference which will be divided into two phases, which together will run approximately ten days.

We recommend Ouagadougou for three reasons. First and most important, the future of Upper Volta is more dependent on the development of OCP areas than is the case with the other six countries within the program. Second, the OCP itself is headquartered in Ouagadougou. Third, the AVV is the first host country institution to launch an ambitious program for colonization and development, with some settlements entering their fourth year of operations. The AVV, though still tied to a single settlement philosophy, appears willing to have its program and indeed its own organization evaluated, and has also shown flexibility in responding to the limitations of existing settlements. We would hope that the AVV would be willing to act as one of the sponsors of the conference and would encourage evaluation of its own settlements by one or more conference participants who would complete studies before the conference begins.

Phase One will last a maximum of five days. Its primary purpose will

be to examine experiences with colonization of new lands in tropical Africa, although participants will include a few experts dealing more broadly with migratory movements throughout the continent (such movements are particularly significant in the Sahelian countries because of the large-scale migration of younger people toward the coast). Consideration will be given to government-facilitated spontaneous migration (pattern b), and government-sponsored and controlled settlement (pattern c). A small number of experts familiar with spontaneous migration with no government inputs (pattern a), and compulsory relocation (pattern d), should be included, since lessons learned in these situations definitely have applicability to other types of settlement. Furthermore, in the case of pattern d, dams will be constructed in oncho areas, requiring some forced removal of villagers.

Between twenty and forty people should be invited, the actual number reflecting available expertise. Though research scholars should predominate, a smaller proportion of officials responsible for planning, implementing, and administering existing settlement schemes should be invited. Though not meant to be inclusive, areas of expertise should include the following situations:

1. Migratory movements throughout Africa since these can help clarify the conditions under which migrants would be more willing to join settlement schemes.
2. Spontaneous and government-sponsored colonization of tsetse cleared areas as in Tanzania and Zambia.
3. Settlement schemes attempting the partial or full sedentarization of herders such as have been attempted in the Sudan, Kenya and Tanzania.
4. Spontaneous colonization of oncho areas in West Africa such as have already been documented in the Ivory Coast by one of the OCP sociologists.

5. Settlement schemes based on raid-fed agriculture of which there are many examples throughout the Guinea and Sudanic zones of Africa.

6. Settlement schemes based on irrigation including such West African examples as Office du Niger and S.A.E.D., as well as schemes in Egypt, the Sudan, and Kenya.

7. Settlement schemes involving compulsory relocation in connection with dam construction.

Phase Two will also run a maximum of five days. Its primary purpose will be to discuss with planners from the seven OCP host countries, the OCP itself, and concerned multilateral and bilateral donors the developmental implications of the preceding five days. A rather different mix of personnel will be involved, most of whom will not have attended the Phase One sessions. Continuity will be provided by the conference organizers and a small number of Phase One participants whose expertise is particularly relevant to settlement strategies within the OCP area. During the initial two-three days, all Phase Two participants will visit whatever AVV or other Upper Volta settlement projects have been evaluated in connection with the conference. They will then spend a minimum of two days discussing strategies for the future which are directly relevant to the development of the OCP area.

Apart from widening the horizon of those present, we expect two further outputs from this conference. The first will be in the form of a "do-it-yourself" manual for policy-makers and planners responsible for the colonization and development of disease control areas. This will be the responsibility of the conference organizers and will be included within their scope of work. The second, harder to define at present, will take the form of a more active effort to utilize government facilitation of spontaneous migration as a colonization and development strategy. Looking to the future, it is clear

to us that spontaneous migration in one form or another will produce by far the greatest proportion of settlers in most reclaimed areas. This is especially the case in Upper Volta where adjacent interfluves are often seriously overpopulated. Under the circumstances, agencies like the AVV, the Ministry of Planning, and the ORDs (for the AVV has jurisdiction over less than half of the Oncho areas in Upper Volta) must attempt to guide the process of spontaneous migration in order that the potentials for development of this type of movement can be tapped while such costs as extensive land clearance and low yields can be reduced. AID can assume a major role in working with host country and international agencies like the World Bank (which is also working on a policy position in regard to spontaneous migration) in trying to enhance the value of this form of colonization. Out of the conference we would expect a set of recommendations which would outline for AID: (1) areas of ignorance which require further research, and (2) specific details of actual projects for facilitating spontaneous migration within several OCP nations, including Upper Volta.

#### V. TIMING.

There has already been too much delay in evolving a consistent set of strategies which can be applied in more than a single country. The neglect of strategies dealing with spontaneous migration is particularly serious. Since the OCP spraying program is well under way and since spontaneous migration has begun and can be expected to accelerate, the working conference should be held at the earliest possible moment. How the OCP zones are colonized and developed will influence in a major way the future of such countries as Upper Volta.

## VI. REFERENCE CITED.

UNDP, FAO, IBRD, and WHO

1973

Onchocerciasis Control in the Volta River Basin Area, Report of the Preparatory Assistance Mission to the Governments of: Dahomey, Ghana, Ivory Coast, Mali, Niger, Togo and Upper Volta.  
W.H.O., Geneva.

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- 1582
1. Michael M Horowitz, ed., Colloquium on the Effects of Drought on the Productive Strategies of Sudano-Sahelian Herdsmen and Farmers: Implications for Development. September 1976.
  2. Richard Tutwiler, Muneera S. Murdock, and Michael M Horowitz, Problems and Prospects for Development in the Yemen Arab Republic: the Contribution of the Social Sciences. December 1976.
  3. Michael M Horowitz, with the assistance of David W. Brokensha and Thayer Scudder, Social Science Consultant Network (TA/RD). May 1977.
  4. David W. Brokensha, Michael M Horowitz, and Thayer Scudder, The Anthropology of Rural Development in the Sahel: Proposals for Research. July 1977.
  5. Laura McPherson, Michael M Horowitz, and Thayer Scudder, with the assistance of Muneera S. Murdock, eds., Anthropology and the Agency for International Development. Forthcoming.

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