PD-AAR-059 39319

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PP

2. DOCUMENT CODE: 3

3. COUNTRY/ENTITY: Lake Chad Basin Commission

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): ¢625-0010

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: 06

7. PROJECT TITLE (Maximum 40 characters): LCBC Livestock and Mixed Agriculture

8. ESTIMATED FY OF PROJECT COMPLETION: FY 82

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 78; B. QUARTER 3 (Enter 1, 2, 3 or 4); C. FINAL FY 82

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	(319)	(15)	(334)	(3757)	(1247)	(5004)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY	25	431	456	49	2126	2175
OTHER DONOR(S)	655	229	884	2572	686	3258
TOTALS	999	675	1634	6378	4059	10437

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 78 F. GRANT	E. 1ST FY 78 G. LOAN	H. 2ND FY 79 I. GRANT	H. 2ND FY 79 J. LOAN	K. 3RD FY 80 L. GRANT	K. 3RD FY 80 M. LOAN
(1) SDP	123	095		334		1690		1094	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 81 O. GRANT	N. 4TH FY 81 P. LOAN	Q. 5TH FY 82 R. GRANT	Q. 5TH FY 82 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) SDP	898		988		5004	
(2)						
(3)						
(4)						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULED: MM 2 YY 79

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET

2 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

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15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (3-76)

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I. SUMMARY AND RECOMMENDATIONS

A. Background

The Project herein described is a follow-on Project to the "Central African Livestock Production and Marketing Project" for the Assale (Chad) and [illegible]el (Cameroon). The present Project continues the core activitie[illegible]ject I and initiates new activities to combat desertification an[illegible] the present and future incomes of the residents of the Project imp[illegible] more secure. It also provides technical assistance for range management planning in the adjacent Bornu State of Nigeria.

All strategy assessments indicate that the core development problem in the "Conventional Basin" of the LCBC member states - Chad, Cameroon, Nigeria and Niger is degradation of the land and vegetation resource base. Unless negative trends in the quality and yield of range and grasslands in the fertility and yield of cropland are reversed, the incomes and indeed the very survival of the human population of the Basin are threatened. Principal causative agents of desertification are: (a) human and animal population pressure; (b) poor use and allocation of resources due to low levels of income, and low levels of technological development; (c) traditional forms of land tenure and resource use rights allocation. These trends are accelerated by, but do not directly result from, periodic drought. Therefore, short, medium and long-term development strategies must address these principal physical and human resource problems on a priority basis.

Data from detailed resource and socio-economic studies conducted during the parent project indicated that the majority of persons resident in the Project zone are sedentary farmers/herdsmen and most, if not all, have important subsistence crop farming enterprises, as few have sufficient livestock to support their families.

It was determined that solutions to the problems of rural income, food crop self-sufficiency and resource conservation and management would also require inputs to improve food crop production in the Project Zone. Although the Project in and of itself will not "save" the endangered natural resource, it would continue the processes of adaptive research and institutional change which are prerequisites for finding solutions to the more fundamental problems of "overpopulation" and "desertification".

Desertification is the diminution or destruction of the biological potential of the land, and can ultimately lead to desert-like conditions. It is an aspect of the widespread deterioration of ecosystems, and has diminished or destroyed the biological potential, i.e., plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development. Important factors

in contemporary society - the struggle for development and the effort to increase food production, and to adapt and apply modern technologies, set against a background of population growth and demographic change - interlock in a network of cause and effect. Progress in development, planned population growth and improvements in all types of biological production and relevant technologies must therefore be integrated. The deterioration of productive ecosystems is an obvious and serious threat to human progress. In general, the quest for ever greater productivity has intensified exploitation and has carried disturbance by man into less productive and more fragile lands. Overexploitation gives rise to degradation of vegetation, soil and water, the three elements which serve as the natural foundation for human existence. In exceptionally fragile ecosystems, such as those of the Project Zone, the loss of biological productivity through the degradation of plant, animal, soil and water resources can easily become irreversible, and permanently reduce their capacity to support human life. Desertification is a self-accelerating process, feeding on itself, and as it advances, rehabilitation costs rise exponentially. Action to combat desertification is required urgently before the costs of rehabilitation rise beyond practical possibility or before the opportunity to act is lost forever.

Agricultural Systems and Target Groups: The Project approach will continue to be based upon improving the efficiency of the existing agricultural production systems and the output, income and security of the largest number of family production units within these systems. It recognizes that existing systems are part of the problem -- shifting cultivation, sedentary grazing patterns contribute to resource degradation and must evolve in positive directions.

It recognizes that there are conflicting land uses reflecting social (group) differences which must be resolved if resource degradation is reversed. Although the agronomic resources of the region are modest in their potential, mass migration out to higher potential areas is not viewed as a feasible alternative. As there are few off-the-land employment opportunities, the near and longer term subsistence and cash income of residents is dependent upon adoption of improved resource management methods. The income and management problems of target groups must be addressed in place.

The approach must be attuned to the felt needs and aspirations of the target groups. The Reyna report documented the fact that a majority of residents in the area are subsistence farmers, many of whom own cattle and most of whom own sheep and goats. The evidence is also clear that crop yields are declining and that shifting cultivation and indiscriminate harvesting of wood and lopping of branches to feed sheep and goats are important causes of negative environmental trends. Target groups are concerned with increasing levels of food crop production and thus meeting this concern must be part of any balanced assistance program

for the project zone. Project support for food and cash crop production enterprises of the non-cattle owning villages may be a necessary trade-off for achieving range management objectives.

The above pressures and negative trends appear to be greatest in the delta area of the Logone/Chari River system and adjoining Bornu State in Nigeria which are inhabited by sedentary farmer/herdsmen who are primarily of Shua-Arab tribal affiliation. Certain portions of the Project zone (generally those with standing water for livestock) are used seasonally by transhumant pastoralists, a majority of whom are Fulfulbe and a minority who are Arab. As these two major producer groups - farmer/herdsmen and transhumant pastoralists tend to use different land resource zones, the potential for conflict is minimized. In the Cameroon sector there is an important minority (politically dominant) group of Kotoko fishermen that remain as the ruling elite and who often control land use decisions. The medium and long-term success of the project is dependent upon devising appropriate "trade-offs" between the often conflicting interests of these several groups and wherever possible, delegating responsibility and authority for management of these resources to those groups with use rights to soil and water resources.

While both the crop and grazing lands of the Project zone are admittedly of low productive potential, the large scale migration of persons to higher potential regions is not seen as a viable short or medium-term strategy. Therefore, the problems causing desertification and low incomes must be addressed in place. Some soils believed to be of medium to high potential do exist on the periphery of the zone in the seasonally flooded or periodically flooded soils of the delta and within the shorelines of Lake Chad itself. The expansion of cultivation on these sites is gradually reducing the dry season grazing available for livestock use.

The livestock population (numbers of animal units) now greatly exceeds the "safe" carrying capacity of the range and grasslands given the traditional methods of range management. It is generally conceded that no long-term solutions to the problems outlined can be achieved without positive steps to limit the numbers of animal units using the degraded and degrading range resources within the <u>near</u> future.

Paraphrasing the parent project evaluation report findings:

a. The evaluation indicated that a new strategy for the present Project should therefore be adopted as opposed to a mere modification of the integrated livestock sector approach of Phase I. That new strategy should aim at decreasing the dependency of the target population on livestock as a source of food and subsistence income.

b. As a human population reducing strategy (out-migration) was not considered feasible, the dependence upon livestock could <u>only</u> be reduced by increasing subsistence food and cash crop production or by facilitating persons shifting to new <u>local</u> occupations.

c. As any activity which succeeded in increasing real incomes might encourage owners and potential owners to retain or buy more livestock, compounding overgrazing, a progressive shift to a greater dependence on other sources of subsistence income would, "neither lessen the need for the initiation and implementation of a broad grazing development plan nor provide an immediate solution to overstocking".

d. This strategy would require that the implementation team continue the process of herder association (cooperative) formation and herd owner registration initiated in Phase I, that they initiate generalized range management planning: at the sub-district level and village/on-farm localized planning of land use at the village or village cluster level which could progressively be expanded to include the entire project zone.

e. Any implementation plan for a follow-on project should provide for an evaluation to include verification of a program of work to be conducted jointly by the LCBC/UNDP/FAC/AID and host countries at an early stage in the life of the Project.

B. Project Description

1. Project Goal. The overall project goal is to intensify (use more effectively) and integrate livestock and food crop production in the conventional Basin of the LCBC Member States while at the same time halting and eventually reversing the current degradation of the land resource base - soils, range, agricultural lands and woodland vegetation - as a necessary foundation for improving the living standards of the population over time.

2. Project Objectives.

a. To develop effective programs for involving farmer/livestock owning and livestock dependent family units in resource use conservation programs adapted to the Sudano-Sahelian region to be undertaken throughout the Project area.

b. To apply such programs on selected grazing blocks and within selected village cultivation perimeters for demonstrating the value of rational use/management of soil, vegetation and water resources and of conservation and revegetation programs.

c. To channel the existing traditional discipline which governs use of resources into technically sounder direction, leading to maximizing production, consistent with maintaining the continued productive capacity of the resource base.

While the project builds upon a first phase project which has now been implemented, the scope is considerably broadened, consistent with the evaluation of the first project, so as to effectively constitute a new departure.

The project is designed as a second phase five-year element of a fifteen-twenty year program.

The period of fifteen-twenty must be accepted as the minimal time for establishing a rational resources use/management program in the area. This is because of the experimental nature of the project, particularly from the sociological and economics point of view, the substantial educational program which will be required, and the slow pace at which vegetation and soil regeneration can be expected to occur. The latter is of special significance, since the introduction of intervention cannot proceed at a pace which in the first instance reduces too drastically production from the affected areas.

Two underlying assumptions of the design are: (a) that technical solutions are known for most of the problems of low productivity and resources degradation and, (b) that the local population will accept and enforce, through self-disciplining mechanisms, the restrictions on resources utilization which must be initiated, and will accept certain innovations in their production practices.

3. Project Outputs. The project involves two rather separate stages: (a) the development in the field of a detailed work plan based upon in-the-groun study and on interaction with the population and (b) the actual implementation of the work plan.

a. Development of a Detailed Work Plan. This phase is programmed for a twenty-four month period, in which the team of AID, other donor and LCBC/country technical personnel will (1) based upon a reconnaissance of the area, select specific sties (natural blocks, ground villages, etc.) which will become the subjects of the operational program; (2) identify specific technical interventions, including marketing with respect to the livestock/range, crop production and forestry sector; (3) develop a detailed plan for the application of these interventions - the what, where and when of specific actions; (4) identify the local organizations through which the various action elements will be implemented, including the mechanism for disciplining the used resources by the local populations themselves; (5) undertake educational/promotional activities with the local population of the selected sites for the purpose of informing the population of possible alternatives and a means for assessing the probable level of acceptability of possible interventions; (6) certain limited demonstrations, experimental areas, grass, forestry and other plant materials nurseries will be established during this period.

A wide range of technical interventions, discussed more fully in Part II and II, will be considered for each area, block or unit selected. It is not likely that all interventions will be applicable to each unit. However, before any given unit will be considered for implementation of a resources use and management program, it must be established that a certain minimum balanced package will be feasible and acceptable. For example, actions limited to water development or animal health will not be undertaken in any given area, since such unbalanced programs frequently

aggravate the problems rather than contribution to solutions.

b. Work Plan Implementation. The second stage, extending a two year period, will be the actual application of the plan for resources utilization/management in the selected areas.

4. Project Evaluation. Three points of stocktaking or evaluation are projected: (a) at about the eighteen-month stage, a preliminary evaluation will be made of the local population's response to proposed project actions. This will be made by the project team in conjunction with LCBC, country governments and local populations. This will not be a typical evaluation, but rather will be an element of and will serve as a guide in developing the detailed resources management plan for the selected sites; (b) an evaluation of the resources management plan at about the thirtieth month. This will be a pre-implementation critical appraisal of the project teams' implementation plan in which external consultants will be brought in to interact with the project entities listed in (a) above; and (c) after the first year of full-scale implementation action (at the fourth year) an evaluation of adaptability, acceptability and effectiveness of implementation actions will be made as a prelude to defining the next five-year phase of the development program or reaching a decision to abandon the project.

5. A.I.D. Inputs. A.I.D. inputs will consist of a substantial technical assistance element, participant training, commodities and other costs.

a. Technical assistance. The critical stage of project implementation will require a field team of five-six technicians on a full-time basis for the first two years of field work. They will be supported by short-term specialists for specialized tasks. Six areas of specialization will be involved. It may be possible to reduce the number of both the full-time and short-term specialists depending on the number and kinds of specialists which other donors will provide.

After the detailed work plan has been established and approved, some reduction in the number of technical personnel will be possible. The total input of technical services during the work plan development stage will be about 114 persons. There are 82 person months programmed for the last two years, during which time the work plan will be put into operation.

The full-time technical specialists will include:range management, range/livestock husbandry, agronomy, sociologist, land use specialist and extension/information.

Short-term specialists will include : veterinarian, soil/water conservationist, forestry, agricultural engineering, hydrologist and economist.

6. A.I.D./LCBC/Cooperating Country Coordination and Management. The LCBC Administrator will be directly responsible for management of the project and will coordinate the inputs of the LCBC divisions involved - livestock, agriculture, water resources, fisheries and forestry. While in principle the A.I.D. technicians will work within the framework of the LCBC organizational structure, during the development of the field operational plan, they should work as a team and with local and other expatriate technical advisors assigned to the LCBC. When the operational plan moves to implementation, the individual A.I.D. technicians will be fully integrated within the LCBC divisions and cooperating country personnel are seconded to the LCBC and integrated into the LCBC divisions. In this manner, the LCBC assumes the responsibility for services ordinarily provided by the cooperating country in the area of LCBC action, so that there will not be duplication of structures and efforts in the project area.

7. Project Implementation. Project implementation can be divided into three stages:

a. Pre-implementation actions; These actions will consist of preparation of the project agreement, project implementation documents, contracting for technical services and orientation and pre-departure French language training, and initial commodity procurement actions. All of these will be completed during the projects first twelve months.

b. Preparation of Detailed Work Plan in the Field. This is programmed to begin at the end of the first year, with fielding of technical personnel and arrival of support commodities, and should be completed in about twenty-four months. This stage can be separated into five steps as follows:

i. Field reconnaissance to lay foundation for identifications, determinations and definitions (items 7-24 of spread sheet) months 12-18. This will be accomplished by a full-time team of four-five technicians supported by short-term specialists.

ii. First approximation of the whats, wheres and whens of implementation actions (items 9-28 of spread sheet) months 18-24. Public information programs should be carried out throughout the period.

iii. Synthesis and refinement of ii. (months 24-30). An important element will be that of observing responses of the local population and judging probabilities of acceptance of proposed interventions. It is assumed that consultation with the local populations will be maintained on a continuing basis beginning with the reconnaissance stage.

iv. Evaluation of project implementation plan (month 30).

v. Refinement and completion of definitive operational plans (months 30-36). This period should also serve to initiate procurement for project implementation and to staff up for project implementation.

c. Implementation of the Detailed Work Plan. This will extend over a twenty-four month period and will complete the second five year project of the fifteen-twenty year program. Also, during this time project documentation for external assistance for the third five year project can be completed so donor assistance can be provided without disrupting project continuity.

C. Issues

1. Acceptability to the LCBC, cooperating countries and other donors. This project represents a substantial departure from that prepared by LCBC and proposed to donors. Although the LCBC proposal includes attention to crop production, the project is very heavily weighted in the livestock sector. Moreover, there is little suggestion of integration of actions in the several subsectors - livestock crops and forestry - within natural block, areas, or village groups. The LCBC project includes a more substantial commodity/other cost element and less technical inputs than the present proposal.

Another element which could become an issue is the consecration of 24 months of effort to develop in the field a detailed work plan. The diagnosis of the basic problems are well known and there exists fairly general agreement as to the range of technical interventions which are applicable to the area.

Relating specific action to specific sites and areas, the approach to obtaining participation of the local population in decision making, and how to utilize and channel existing traditional organizations and discipline so that respect for certain use/management principles and regulation can be achieved through self-discipline are important aspects of the project which require a concerted planning effort, which can only be accomplished on the site.

2. Experimental Nature of the Project. The project must be accepted as experimental in nature and involving a considerable degree of risk. Technical solutions to the major problems is not an important issue. However, the compatibility of technical solutions with the socio-economic setting remains a major unknown. The critical issue then is to plan technical interventions acceptable to the local population. It is only through the exercise of self-imposed discipline by the local population that it will be possible to apply a sufficient array of technical interventions to impact on the problem.

D. Summary Findings

The project is to a large extent an experimental approach for the solution of a very pressing problem of continuing deterioration of soil, vegetation and water resources in an area which is typical of a vast region of Sahelian Africa. Implicit in the approach is a relatively high risk of at least partial, if not complete, failure.

The technical basis for the project is judged to be sound. The sociological and economic bases are more problematical, since the end product of the project will be a substantially different system of resource use and management. The degree and rate to which the populations and governments will accept, adapt and adjust to the new systems will largely determine the degree of success.

If successful, even to a partial degree, it is expected that improvements will be brought about in the ecosystem leading to greater productivity while preserving and improving production potentail, and consequently, a favorable social, economic and environmental impact. Moreover, and probably of even greater importance, some insights will have been gained in the development of solutions to problems which are of long standing and which to a large extent have reamined without solution in any generalized fashion.

A less comprehensive approach which could lead to partial solutions was considered but rejected. Partial approaches have been applied in many similar situations over the past fifteen to twenty years. Among these efforts have been several A.I.D. projects. In most, if not all cases, the limited successes did not lead to lasting solutions; in some the results were aggravation of these problems. It was concluded that only through a broadly based series of interventions dealing with virtually all aspects of resource use and management as proposed here, could a reasonable probability of success be expected.

E. Recommendations

1. That a five-year life of project approval be given for the project "Lake Chad Basin Commission Livestock and Mixed Agriculture" in the amount of $8,004,000.

2. That this project be authorized with the proviso that, if 611(a) certification for FY 1979 housing construction has not been completed prior to signing the Project Grant Agreement obligating FY 1979 funds, then the Agreement shall obligate all FY 1979 funds excepting the $480,000 for construction of housing.

II. BACKGROUND AND DETAILED DESCRIPTION

A. Background

The Lake Chad Basin is situated in the northern Sudan-sub sahara region of Central West Africa between latitudes 10° - 20° N. and longitudes 10° - 20° E. The target population in the Assale (Chad)-Serbewel (Cameroon) sectors of the project is approximately 120,000, with about 40,000 living in Assale and 83,000 in Serbewel.

Population density of northern Borno State is comparable to that of Serbewel. The area's rate of popualtion growth is not particularly fast, estimated to be in the 1.3-1.5 percent per annum range and held down by the migration of younger people to surrounding areas. The northern areas of the LCBC region is desert or semi-desert, with a desert shrub cover, whereas near the lake and southward the area has a dry steppe climate of extensive savannah or short grass vegetation cover. Rainfall in the immediate area averages 400-600 mm per year, with less than that amount falling to the north and greater amounts of rain experienced in the south. Temperatures range from a daily average of 23°C. in January, to 36°C. in April.

Overwhelmingly, the inhabitatnts of the southern Lake Chad Basin earn their livelihoods as transhumant herders or an sedentary herders who also participate in some subsistence agricultural activity. A small percentage of the area's population is occupied as shopkeepers and traders. Seasonal migration patterns bring herders from Niger southward into northern Borno State of Nigeria and then eastward across northern Cameroon into Chad, where traditionally the grazing of cattle, sheep and goats has occurred. A map of the area is provided on the following page.

In attempting to begin dealing effectively with the challenges of drought, excessive land use and resource depletion, previous activity in the area has concentrated on the improvement of animal health. National livestock services have attempted, through a mix of expanded veterinary services, livestock vaccination and animal health programs to improve the overall quality of animal health in the area. The result should be a stronger, more stable animal resource base for the resident population to rely upon.

These programs of the LCBC have been successful, although in a qualified way. The recent expansion of animal health services has influenced the area several ways. First, the LCBC's efforts have increased overall animal health, decreased animal mortality, and expanded the animal population base. This has had the impact of heightening pressure on already scarce resources. Furthermore, because of the demonstrated effectiveness of the LCBC's programs, additional herders have migrated to the area with their animals to take advantage of the available LCBC assistance, adding to the burden of human and animal population on the southern Lake Chad region.

LCBC-LIVESTOCK AND MIXED AGRICULTURE

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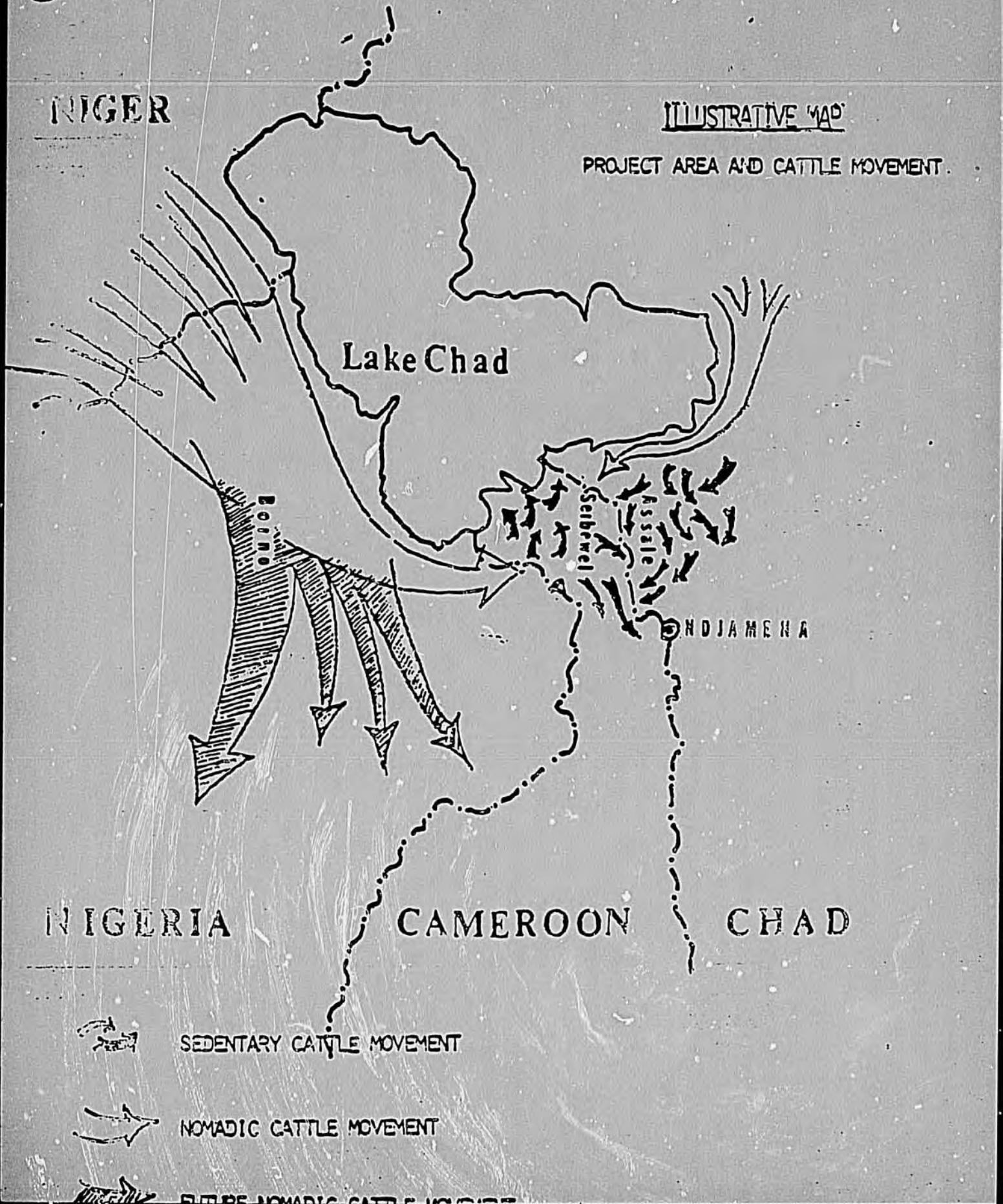

It becomes clear that an additional effort must be made to diminish livestock pressures on the region's meager resources if the area is not to demonstrate desert-like conditions in a measurably short time. A project period of 10-15 years must be accepted as the minimal time for establishment of a rational resources management program in the area. This is because of the substantial educational program which will be required and the slow pace at which vegetative and soil regeneration can be expected to occur.

Considerable activity to counter the effects of the drought period has already taken place within the LCBC region. This activity includes that of the previous phase of this project. The Central African Livestock and Meat Marketing Project was originally designed as a multi-phased effort, with each segment being five years in length. Project implementation began in 1972, with actual field activities beginning in early 1973. This first involvement in the area by AID was aimed at five principal objectives:

1) develop a livestock service apparatus;
2) promote the reorganization of national livestock services;
3) gain the confidence and participation of livestock herders;
4) organize national livestock support committees;
5) begin initial activities directed at the establishment of long-range agricultural and livestock programs in the areas of agricultural and livestock associations, rangeland management, reforestation efforts, soil conservation and technical training for country nationals.

The impact of these initial activities has been to heighten awareness at all levels of the issues of resource base degradation, overgrazing, deforestation, herd sizes, dysfunctional traditional agricultural practices, and importantly, the need for participation and organization on the part of the residents of the LCBC region. The fifth objective became operational through the creation of several associations. The success of the previous project established the foundation for this effort.

During the previous project the LCBC and other project donors began the development of producer groups, or herder associations, to assist in the execution of the LCBC's overall mission to develop the Lake Chad Basin area. Specifically the herder associations were designed to facilitate communication between the project and its personnel and the area's population. These groups would serve as liaison agents, and attempt to foster amicable and productive relations between and among resident peoples. Furthermore, they would function as common interest associations, promoting animal health, better agricultural methods and a more balanced and progressive approach to the area's resources generally. One specific activity was the herder association's involvement in the issuance of cattle registration cards. Figure 1 clarifies the interaction of these associations with villages and other donors as proposed in the project.

Herder registration cards have been issued to all of the herders in the Assale/Serbewel who own cattle. These cards identify them as project participants and are used as vaccination records for their cattle. The registered participants are represented in the project by their own elected delegates. These delegates have all participated in a three-day conference at which Phase I of the project has been explained, and discussions and practical demonstrations have been held on animal health, range management, herd control, and the formation of herder associations. In carrying out these steps, care was taken to work through respected members of the herder villages. Measures were introduced that were of obvious benefit to herders' animals, and herders' opinions were solicited and considered. All of this was accomplished during four years of hard work in the field. As a result of this effort, knowledge of the project and confidence in its personnel are widespread.

Moves towards the strengthening of producer groups have been taken a step further in the Assale. Registered herders have been divided into fourteen groups. The groupings were the result of village-by-village research to find out which villages wanted to be grouped together for the purpose of forming herder associations. This task has recently been undertaken in the Serbewel by a full-time rural development agent (paid by LCBC) and the groupings should be completed by the end of 1977.

The first phase of the project presents a clear demonstration of success in most areas. A mid-project evaluation by Messrs. Irving H. Licht and George B. McLeroy, issued in late 1975, concluded that progress had been made in the creation of herder associations and that these groups were essential to the success of future efforts to reduce livestock populations and enhance land management practices throughout the region.

It becomes increasingly apparent, however, that despite these advances, more effective livestock and agricultural practices must be identified and introduced on a broad scale if the Lake Chad Basin's resources are to be protected from further abuse and restored at the very least to pre-drought levels of production. This realization prompted the earlier efforts in the previous project to establish the herder associations which would serve as promoters of resource conservation and effective range management. Furthermore, it is apparent that agronomic interventions are essential to project success. Specifically these include the compost-derived fertilizers, the reforestation of denuded areas, the reduction of shifting agriculture practices which rapidly deplete the soil, and the regeneration of grasslands.

A Project Review Paper (PRP) for Phase II, entitled the LCBC Livestock and Mixed Agriculture Project, was drafted in late 1975. This PRP drew upon the suggestions submitted in the Licht and McLeroy evaluation. It proposed several activities for continuing the work begun in Phase I, including sustained attention to food crop production and rangeland

management. Through the mechanism of the existing livestock producer associations and in cooperation with national extension service support, agricultural production would rise as the herder associations assumed responsibility for:

a) initial grazing boundary demarcations;
b) optimum resource allocation in terms of grazing and crop production;
c) water usage.

At the close of 1975, range management consultants Charles Magee and Fred H. Mass proposed a system of "policed" grazing areas that would provide for staggered or sequential livestock grazing in selected zones or blocks in the Assale Sector of Chad and Serbewel Sector of Cameroon. Upon presentation to the LCBC, this Mass-Magee range management plan was considered but then rejected on grounds that it was inordinately complex for successful implementation at the local level. Further, the plan was deemed to be too costly in both manpower and actual monetary requirements. Its rejection by the LCBC has led to the design of the more modest project contained herein. This project is based on the successes and experiences to date of village level involvement in Phase I, and extends the resource management plan development to include Borno State of Nigeria.

The overall project comprises four specific areas of functional activity. The first includes that of animal health improvement, and assistance in this area is to be provided by FAC. Secondly, AID and the UNDP/FAO will, under this arrangement, provide assistance for resource management plan development, including pilot grazing reserves in Borno, Assale and Serbewel areas. Thirdly, marketing and feed lot development activities will be assisted by the UNDP/FAO and FAC. Lastly, AID and FAC will be concerned with development of a plan for agricultural improvements in the project sectors and with establishing the necessary equilibrium between increased agricultural production and enhanced livestock development.

This project design was presented and approved at the twenty-first session of the LCBC Commission in Lagos in June of 1976. Proposed budget expenditures then were estimated to be $7.5 million, of which $5.6 million was to be requested from the participant donors, and the remaining $1.9 million to be provided by the LCBC itself.

Since the approval of the plan, FAC has assigned a marketing expert to begin work with feed lot operations at Dro-Gana, and the UNDP has provided a principal technical advisor. AID began its Phase II design refinements with a team of consultants who conducted field activities in

N'Djamena in April and May of 1977. At a midstream review of design activities during August, 1977, assessments of the project were undertaken, resulting in the project paper presented here.

B. Detailed Description

This project is conceived as the second five-year phase of a multi-phased effort to assist the LCBC to develop resource uses that will restore threatened land and water resources in the area of the southern Lake Chad Basin.

Project Goal

The primary or sector goal of this project is to restore the natural resource base to permit an improvement in the living standards of the human population in the project area, consistent with an equitable distribution of benefits and beneficial land use.

By restoring the natural resource base, this project will allow the people to continue a way of life with which they are satisfied.

Objectively Verifiable Indicators

The achievement of the goal will be reflected in the following:

a) An increase in the herder per capita income due to the production of healthier, better fed cattle and increased agricultural sales.

b) An improvement in the status of both human and animal nutrition resulting from the greater food production and better management of the resources which go into the production of livestock herds.

c) A halt to the further erosion of the total resources available. This degradation of the range will cease when the uses to which the range is put are brought into balance with its realistic potential. This will mean the exclusion of former practices of overgrazing, shifting cultivation, and similar traditional practices which cause a rapid decline in the productivity of an area's resources.

Means of Verification

a) Herder association records of increasing earnings resulting from the sale of livestock, milk and other locally produced items. These records, which have only recently begun to be kept, should reflect area increases in agricultural and livestock activity at the herder association level as tangible signs of the herder associations effectiveness and general impact.

b) It will be possible to determine through medical and veterinary evaluations of the target human and animal populations that the basic needs of both groups are being met more effectively than in previous years when the lack of resource managment and wide fluctuations in the availability of some resources kept nutritional levels down.

c) During the implementation of this phase of the project, the current condition of the project area resources will be carefully noted, and an agreed upon plan for resource improvement prepared. The plan will contain a statement of objectives successful implementation will obtain. An evaluation of the project's impact on the area during the implementation of its later phases (Circa 1987) will necessitate a comparison with baseline data collected during this phase of the project.

Important Assumptions

a) A number of assumptions have been made in designing this project.

b) The first is that area rainfall will not fluctuate widely but will remain relatively normal.

c) Secondly, it is assumed here that LCBC member states will continue to support the LCBC in its attempts to improve the area's resource base and economic conditions generally.

d) Thirdly, it is assumed that the local organizations will be capable of undertaking the self imposed discipline required of them to achieve successful management of those natural resources under their control.

Project Purpose

The project's purpose is to promote throughout the project area proven practices for the more efficient use of resources for animal and agricultural production, which can be undertaken at the village level, and which will upgrade the resource base. These practices should help to simultaneously restore the resource base and promote higher living standards through increased livestock and agricultural productivity.

End of Project Status

The achievement of the project's purpose at its conclusion should be reflected in several ways. Practices for the more rational use of resources of the Assale-Serbewel areas will have evolved, based upon proven techniques which will have been introduced and tested during this project. In the pilot areas one will see that overgrazing will be

under greater control, and as indicated in these other areas, that resource restoration is in progress. This will be easily verified in the villages as one sees environmentally sound agricultural practices and village grazing management schemes being practiced and regenerated areas created around the villages.

Training efforts, as well as the public education sessions, will ultimately leave both a small core of technically competent indigenous personnel and a larger group of general citizens carrying forward the project's goals as a direct result of their exposure to its various activities.

Finally, the LCBC shall have been strengthened as a regional organization for development and cooperation and as an important forum for frequent debate and discussion of shared concerns.

Means of Verification

Attesting to the achievements of the project will be national-level livestock, forestry and agricultural services' reports, as well as the results of range surveys, made by the LCBC and national-level agricultural forestry and livestock services.

LCBC annual reports of activities in the project area's agricultural and livestock production will be an additional source of project verification.

Important Assumptions

Assumptions which guide the overall logic of the project's approach to the LCBC region's experience of declining resources and excessive resource use include the following:

a) that the identification of low cost village level practices which bear on resource use can be determined as rapidly as the project's implementation schedule indicates.

b) that the four members of the LCBC will continue to support the organization in its efforts to improve the area's resource base and the general economic conditions of the Lake Chad Basin's human population.

Project Outputs

In order to achieve the project purpose, the following outputs will be produced by this project:

First, a resource management plan will be developed for selected areas in Borno, Nigeria, Assale, Chad, and Serbewel, Cameroon and pilot/demonstruation activities undertaken during the last two years. Second, public education activities will be developed and implemented by the LCBC.

Objectively Verifiable Indicators

During the project's first year, technicians will be contracted and commodities will be ordered. By the end of the first year, the technicians will be on site.

During the second year participants will be identified and arrangements for their training completed. The project areas in Nigeria, Cameroon and Chad will be delineated and the following will be determined for each area; livestock carrying capacity, livestock profiles and surplus numbers, alternate grazing areas for surplus livestock watering points needed, range use regulations, local organizations and associations, livestock health program marketing norms, crop areas, cropland use patterns, possible crop demonstration activities, identified soil and water management norms, forestry land criteria determined and sited for forestry demonstration activities, plans completed for a forestry nursery, native grass seeds collected, sites for range regeneration demonstrations and plans for a plant materials nursery; and the public education activities will begin. Housing sites for technical advisors in each of the three project areas will be identified and construction begun. During the project's third year the forestry and plant materials nurseries will be established, and the preparation of the resource management plan for the project areas during the five years 1983-1987 will be finalized. Public education and range, forestry and crop demonstration activities begun during the project's third year will be continued through the fifth year. Implementation of the resource management plan for the selected areas will begin in the fourth year and continue through the fifth year and subsequent phases of the project.

Means of Verification

Several methods exist to verify the project's direction and activity. These will ultimately include LCBC project reports, along with those of national organizations and foreign donors.

Annual evaluations will provide a second means of establishing the effectiveness of project efforts, followed by a third and critical measure, on-site inspections of project activity.

Important Assumptions

The success of the project is founded on the assumption that the qualified personnel of a technical nature will be assigned to the project on time and be allowed to stay in assigned posts by the national governments involved.

Inputs

Inputs to the project's activity will be derived from numerous sources, including the member governments, the LCBC (through its technical branches, livestock and animal husbandry), the FAC, the UNDP/FAO, and, of course, AID. AID's contribution will be made primarily in the form of the provision of technical assistance, the supply of various commodities purchased both within and outside the LCBC region, and assistance with training activities initiated and conducted during the project's life by host country national, LCBC and expatriate personnel. Formal academic training in range management and agronomy will be provided for six project assistants in either the United States or third country setting with special emphasis on practical application and arid zones. These trainees will be secondary school or certificate-level persons assigned to work under project personnel.

Technical assistance will be provided by AID in the form of a range management specialist, a range/livestock husbandry specialist, an agronomist, a land use specialist, and an extension/information specialist. The range management specialist will serve as Sector Chief of the LCBC Serbewel activities. In addition to the above long term advisors, short term technical assistance will be provided in areas of expertise to include, but not limited to: veterinary science, soil/water conservation, hydrology, agricultural engineering, forestry, extension/information and economics.

Technicians' Scope of Work

a) Range Management Specialist - The Range Management Specialist will have primary responsibility for defining criteria for use of range and developing grazing plans for the range areas in the project implementation sites. Working with the land use and forestry specialist on a short term basis and the agronomist, the land area in the implementation sites will be classified as to most appropriate use. The Range Management Specialist will identify appropriate natural blocks for purposes of defining grazing programs and specific interventions designed to improve the productivity of forage in these blocks. Working in cooperation with the sociologist, he will be responsible for identifying suitable local management organizations through which the established range use plan will be applied.

S^2 R^2 level of French proficiency is required.

b) Range/Livestock Advisor - The Range/Livestock Advisor will be responsible for defining appropriate husbandry practices. Especially important will be husbandry practices which will increase fertility and reproduction rates, which will result in gradual breed improvement and which will lead to more rapid maturity of animals. Close cooperation with the marketing technicians (FAC) will be necessary to relate the marketing

actions to improvements in husbandry. Close cooperation with the veterinarian will be required to relate effective husbandry to disease control and prevention practices. Since the level of nutrition is usually the critical factor in animal production in the area, close contact with the range management activity will be essential to relate husbandry practices to forage availabilities and quality.

c) Agronomist - The Agronomist will have primary responsibility for the Agriculture (crop production, including forage crop production) element of the project. He will define/develop/demonstrate methods to reduce loss of water and increase the efficiency of utilization of soil moisture.

d) Rural Sociologist - The Rural Sociologist shall be experienced in the interaction patterns and general sociological setting of rural African communities. This person shall also demonstrate an FS-3 French language capability, as well as experience with the development of rural organizations. This person shall assist in the selection of groups of villages for herder association formation, and will advise on suitable interventions and expectable responses to these. The person shall analyze the social affinities of herder groups affected by the project's activity. The sociologist shall work closely with sector managers of the three sectors, as well as with other donors, LCBC personnel and national extension agents. Finally, the person will carry out research on the relationship of the human population of project-related villages to animals and land use, and advise on optimum social approaches to village-level activities.

e) Land Use Specialist - This technician will be required principally during the development of the detailed work plan. His principal work will be to assist the range management and agronomy technicians in making capability classifications of land in the implementation areas for allocation of land to different users: range, coops or forestry. He will also participate with the soil/water conservationist in determining measures for reducing erosion and water loss.

Although speaking knowledge of French will be desirable it is not essential. Familiarity with French soil and land classification systems and reading proficiency adequate to use French maps are highly desirable.

f) Extension/Information - During the work plan development stages this specialist will work closely with the sociologist in identifying and contacting the leadership in the local associations and other organizations whose support and acceptance of the program is essential for effective implementation of the project on the ground. He will also work closely with the other specialist to become fully versed on the technical interventions which will be applied. It will be the responsibility of this specialist, working through LCDC personnel, to maintain contact with the local populations at the proposed intervention sites and to interpret for the

Technical Assistance (000 US)

Long Term	FY 78	FY 79	FY 80	FY 81	FY 82	TOTAL
Range Management	20	80	80	80	80	340
Range/Livestock Husbandry	20	80	80	80	80	340
Agronomist	20	80	80	80	80	340
Sociologist	20	80	80	-	-	180
Land Use Specialist	20	80	80	-	-	180
Extension/Information Spec.	20	80	80	80	80	340
Range Management				80	80	160
Agronomist				80	80	160
TOTAL	120	480	480	480	480	2,040
Short Term						
Veterinarian		12	12			24
Soils/Water Conservationist		12	12	6	6	36
Hydrologist		12	12			24
Agricultural Engineer		12	12	6	6	36
Forester		12	12	6	6	36
Agricultural Economist		12	12			24
Sociologist				6	6	12
Land Use Specialist				6	6	12
		72	72	30	30	204
Total Technical Assistance	120	552	552	510	510	2,244

INPUTS
(000 US)

Participant Training	FY 78	FY 79	FY 80	FY 81	FY 82	TOTAL
6 participants to start training in the eighteenth month of the project (15,000/py x 6)	-	90	90	-	-	180
Commodities						
Vehicles ($12,000 each)	84		48			132
4 wheel drive truck (2 @ $20,000)	40					40
Spare parts	25					25
Office, audio-visual and agricultural equipment and miscellaneous supplies	50	50	50	-	-	150
	199	50	98	-	-	347
Other Costs						
POL	15	15	15	15	15	75
Forestry	-	50	50	50	50	200
Crop Demonstration	-	50	50	50	50	200
Range Demonstration	-	50	50	50	50	200
Nursery-Plant materials	-	100	-	-	-	100
Nursery-Forestry	-	100	-	-	-	100
Housing (2/area @ 80,000)		480				480
	15	845	165	165	165	1,355

BUDGET SUMMARY

(000 US)

USAID	FY 78	FY 79	FY 80	FY 81	FY 82	TOTAL
Technical Assistance	120	552	552	510	510	2,244
Participant Training	-	90	90	-	-	180
Commodities	199	50	98	-	-	347
Other Costs	15	845	165	165	165	1,355
Total	334	1,537	905	675	675	4,126
Inflation & Contingencies (10%)	-	153	189	223	313	878
GRAND TOTAL	334	1,690	1,094	898	988	5,004
Host Country (LCBC)	456	410	421	438	450	2,175
Other Donors	884	594	594	594	592	3,258
TOTAL PROJECT BUDGET	1,674	2,694	2.109	1,930	2,030	10,437

local populations the possible impact of the proposed interventions not only in terms of expected benefits but also in terms of the responsibility which must be accepted and effectively discharged by the local population. This is essentially an educational activity which will prepare the population for the actual application of the technical measures. An important part of the responsibilities of this technician will be to maintain a continuing appraisal of the reactions of the local populations to proposed actions and to pass judgements on probability of effective cooperation and adherence to regulation which will be necessary during project implementation.

A S^3 and R^3 in French is essential.

Commodities

The commodities purchased in support of this project represent a mixture of items produced in the United States and the host countries of the project. They include the following goods to be purchased from the United States: vehicles, household furnishings, audio-visual equipment, office equipment, barbed wire, metal posts and anchors, fence stays and barbed wire tool kits, as well as various miscellaneous items.

Local items purchased during the project will support agricultural, range management and reforestation efforts. These include trees, grass seed and farm implements such as machetes, hoes, rakes, shovels and the like. Details of these items may be found in Annex B below, the Procurement List.

Routine verification of project expenses shall take the form of regular project reports prepared by AID and LCBC personnel.

Important Assumptions

Critical to the feasibility and overall effectiveness of the project will be the assumptions that qualified French-speaking personnel can be located to provide technical assistance. Additionally, the assumption is made that the LCBC and member governments will provide requisite budgeted items on a timely basis. It is further assumed that donor contributions will arrive as scheduled.

C. Other Donors

This project is organized as a multi-donor effort. The Fonds d'Aide et de Cooperation (FAC), the United Nations Development Program (UNDP), and the Food and Agricultural Organization (FAO), and the LCBC and member states are the other participants. The previous phase of the project also included these donors, and proved to be an effective, workable

and successful combination. AID's collaborators in this phase have already begun to implement their planned activity, and have fielded technical assistance personnel. The activities of each donor is specified below.

FAC - The FAC effort focus is on livestock health. Two individuals are already at work on Phase II, having continued their efforts from the previous phase. A veterinarian based in N'Djamena will have responsibility for the Serbewel. Presently he is the Acting Sector Chief in Assale. Besides acting as animal health advisor for Serbewel, he will be the general advisor to the LCBC for the strengthening and development of the herder associations.

The FAC will then be providing a new Sector Chief for Assale, who will also be a veterinarian providing animal health service advice.

Two additional FAC technicians will be experts in agronomy and marketing, respectively. The latter individual is already at work with the LCBC feedlot operation at Dro-Gana, but will transfer his activities to N'Djamena to act as LCBC advisor on marketing policy and implementation matters.

The FAC agronomist will be N'Djamena-based, and will coordinate LCBC agriculture production and research screening and development efforts. This person will advise in the area of crop production stabilization.

FAO will also provide animal health medicines to the project as well as materials and equipment for the agriculture interventions and tests.

UNDP/FAO - The UNDP/FAO is providing the principal technical advisor to the LCBC Livestock Division. He is also the UNDP project manager for this project.

The UNDP will also be providing the Sector Manager for Borno. This person will be a veterinarian and will have similar duties as the Sector Managers of the Serbewel and Assale. He will coordinate the activities of Borno and provide the liaison between the Borno sector and the overall project. As the principal contact with herders, it will be his responsibility to establish the necessary climate in which proposed interventions by other technicians (i.e. range management specialists) can be introduced.

In addition to the technical advisors, the UNDP will be providing housing, equipment and supplies to support its activities, short-term consulting services, assistance to the Dro-Gana feedlot operation, and support for the continuing development of the herder associations.

L

LCBC/MEMBER STATES - The LCBC contribution can be broken down into three categories: personnel, investments and operating expenses. Most of these will be for the Serbewel and Assale sectors of the project area, as the Nigerians have indicated that they will provide all necessary counterpart and working personnel for activities in Borno State.

a) Regarding the provision of personnel, the LCBC will be providing the Project Director, who is also the Director of the LCBC Livestock Division. Since this project represents a major concern of the division, a considerable amount of his time will be spent on the project.

The LCBC will also provide sector counterparts for each sector. These counterparts will work along-side the donor-provided sector managers. Four counterparts are also to be provided to work in range management and three with agriculture. Ten veterinary nurses will work in the animal health area, and a manager for feedlot operations will be appointed.

Finally, support personnel such as clerks, typists, secretaries, mechanics and storehouse personnel are to be provided by the LCBC.

b) The investment category will include the construction of five houses for LCBC advisors, fuel storage tanks, and other minor construction such as vehicle shelters. Other investment will be the initial working capital to purchase livestock for the feedlot operation. Also included are the funds necessary for the LCBC final evaluation and report on Phase II, and the plans for the continuation of the project upon termination of donor support.

c) The remaining category of LCBC inputs is for necessary operating expenses and special activities. This category includes structural maintenance, vehicle operating expenses, N'Djamena project office overhead, insurance, international and local travel, utilization and maintenance of project equipment and supplies, and special activities such as the continuation of livestock shows, which were so successful in the Serbewel in 1976, and have such an impressive demonstration impact on individual herders as well as the associations generally.

III. PROJECT ANALYSES

A. Project Technical Analysis Including Environmental Assessment of the Climate

The project area lies between the general rainfall isohyets of 400 mm in the north and 600 mm in the south, with wide fluctuations in recorded rainfall by year. During the dry climatic phase (the drought of 1970-74) the average mean rainfall was down by more than 50 percent in some areas. For example, N'Djamena had 312.5 mm in 1973 against the normal average of 650 mm. The coverage of rainfall is also irregular due to heavily localized storms causing adjoining areas to have a vast difference in rainfall in any one day. The rainy season is well defined however, from May to September in the south, and June to September in the north. Rainfall irregularities are a permanent constraint to agriculture and range activities, and generally negative for the eco-system of the area.

The annual mean temperature is high, with the usual high variation associated with a continental climate. The months of April and May are the hottest months whereas October, November, December and January have minimal low temperatures. The annual average for N'Djamena is 28° C with a minimum in January of 23° C and a maximum in April of 36° C.

During the dry season the area is influenced by the Sahara winds blowing from the north. The Narmattan winds, which prevail roughly from November to January, have a particularly damaging effect. These winds induce vegetal fading, soil erosion, sand storms, and discomfort to both humans and animal life. During the rainy season there are "monsoon"-type winds blowing from the east and southwest, bringing varying degrees of humidity and rain.

As a result of low rainfall, strong winds and high temperatures, relative humidity is extremely low during the dry season. (Minimum for N'Djamena in March averages 41% at 0700 hours, 15% at noon and 20% at 1900 hours). During the wet season, relative humidity is much higher. (Maximum for N'Djamena in August averages 91% at 0700 hours, 69% at noon and 80% at 1900 hours).

The evaporation of free standing water has been measured according to both the French "Piche" method and the American "Penman" method. The two methods gave slightly different results: Piche (average for 3 years) 3123 mm; Penman (1 measure annually) 2362 mm.

The potential evaporation and transpiration (E.T.P.) calculated by ORSTOM (according to the formula of Thornwaite) is 2,070 mm per year. In N'Djamena, monthly details and the calculation of deficiency for plants (E.T.P. minum rainfall) are given in Table III below. In the north, we can estimate that the E.T.P. is higher as the rainfall is lower. The deficit is also higher and estimated at 1,800 mm yearly. Only the month of August is without deficit; the reserve of water so constituted in the soils probably compensates in part for the shortage in September. Thus, there is a deficit for ten months of the year in the general project area.

Soils

There are three main families of soils which correspond to three different types of evolution: (a) soils formed in sandy, rather homogeneous matter originating in alluvial formations but affected by wind; (b) soils developed in a more heterogeneous alluvial material, where heavy textures predominate, e.g., clay, sandy clay, and silty clay; and (c) soils formed in lacustrine clay.

1) In sandy formation, the normal development is from brown steppe-like soil (Aridisols); provisionally hydromorphic (pseudogley) and subsidiary alkalization can be observed, related to seasonal water logging of the ground and from shifting agriculture. In their unadulterated form these soils are poor in quality, with very little structure but with high permeability and little compaction.

Hydromorphism and alkalization induce a condition of compaction and lower the permeability. The upper layers of the soil become poor and easily removed by wind and water. When the top soil is removed, the compact and impermeable layer comes to the surface and natural regeneration of vegetation is extremely difficult.

2) In recent alluvial formations, there is not yet a complete important evolution (Entisol) and the only factor of evoluation is hydromorphism. Some of these soils are completely flooded during the wet season and others are only waterlogged below the surface. There soils are found around the main rivers, are relatively rich, and are often cultivated for dry season agriculture. Cultivation, however, induces the lowering of soil quality and general alkalization. This, in turn, will cause a commencing of the compacting action described above.

3) The lacustrine clays have generated vertisols (planters call them "black cotton soils"). Previously formed when the lake was at its highest level, these formations covered important homogeneous areas. The action of the lake water's receding has caused them to be cut and partially covered by the more recent alluvial formations. These soils are generally flooded for a short period of time in the year by either river water or rain water. They are very rich soils, but with low permeability and heavy texture, which makes them difficult to work for the indigenous agriculture.

Vegetation

Natural vegetation in the project area is of a Sahelian/Sudanian type, i.e., steppe shrubbery with thorn bushes. In the northeast of Assale one can observe a small area belonging to Sahelian vegetation (pseudo-steppe) with a few shrubs. Floral composition and the importance of vegetative cover depends on local climatic conditions, topographic location, main soil characteristics and, of course, human activities (farming and herding).

On sandy soils, vegetation is a shrubbery steppe, more or less dense, characterized by some annual grasses such as Aristada funiculiata or A. mutabilis, Chloris pilosa, Schoenefeldia gracilis and trees such as Acacia albida and Hyphaene thebaica. The importance and combination of vegetal components again reflects the combination of local climatic, topographic, soil and human factors. Degradation and erosion will lead to a poor shrubless steppe, with only growths of Panicum liatum and Schoenefeldia

gracilis.

The normal vegetation on vertisol is a shrubby steppe with Acacia senegal and Panicum leatum. On recent alluvial soil (Entisol) vegetation is a shrubby steppe, but is closely related to textural and topographical heterogeneity, and plants may differ from place to place. The chief components are: Panicum laetum, Brachiara, Balamites Aegyptiaca, and Boscia Sp., or bushes. Finally, on the edge of the lake, the vegetation is connected to the rise and fall of the water table, and characterized as a shrubless steppe with Phragmites Sp., and Calotropis procera.

The project area offers opportunities for the improvement of the vegetation available. Researchers at the Farcha Laboratory near N'Djamena have proposed several guidelines that could be applied to establish revegetation plots.

According to these Farcha Laboratory guidelines, ten hectare parcels of land within the grass steppe association dominated by Panicum laetum would revegetate with Cenchrus ciliaris Styloesanthes humilis, and Acacia albida. These species were recommended because of the soil conditions and the degree of range deterioration. A small parcel is recommended for revegetation because the sites would have to be protected from grazing for a period up to five years. The approximate cost per parcel would be approximately $4,000, of which fencing materials constitute 65% of the expense. Such costs could be reduced if traditional fencing and vigorous controls over these areas by the herder associations were used. Some sites could be planted only with Cenchrus ciliaris to produce seed for planting other plots.

Another alternative is to establish perennial grass pastures in the shrubby steppe associations having sandy loam or loamy sand soils which are dominated by Acacia senegal. It is recommended Cenchrus ciliaris be planted on such sites using a cultipacker to break the surface soil crust and prepare the seedbed.

Water Resources.

Besides the lake, only the Chari River is perennial. At its highest level (Oct-Nov) it usually floods the surrounding plains and feeds numerous main and secondary river channels related to ancient water courses (Serbewel in the Serbewel area; Bahr Linza and Bahr Erguiz in the Assale). Some of these defluents flow for a few months while others do not have flows at all any longer. However, ponds can be observed up to December or even February.

The water table is a continuous formation lying in from 100 to 180 meters of ancient eolian soils. The bottom of this aquifer is impermeable clay. Beneath this clay at about 300 meters another sand level contains a second aquifer which is artesian but fossilized. The upper aquifer is essentially recharged with surface water from rains and flood water from the Chari and, in the area bordering the lake, from Lade Chad itself.

If the recent drought did not affect the water table level in general, the drop of the level in the Assale area specifically (about two meters) was

important. This was the compiled result of the impermeability of flooded soils, poor rainfall, increased evaporation and underground flow toward the lowest part of the aquifer.

Animal Population - Serbewel and Assale

The latest recorded figures of livestock in the Serbewel and Assale areas are shown below in Table III. The recorded cattle population may be considered to represent something near the actual number present, with the exception of the nomadic herds, whose owners have not registered as part of the herders" associations. The numbers of sheep and goats is more open to suspicion. There is no proven mechanism for enumerating these animals in the project areas, and the numbers may actually be far in excess of the figures quoted. In the Serbewel area, there is a higher influx of nomadics with larger flocks of sheep and goats than has been seen in past years.

TABLE III. ANIMAL NUMBERS

	Serbewel		Assale		Total	
	A	B	A	B	A	B
Cattle	125,000	95,000	80,000	80,000	205,000	175,000
Sheep & Goats	70,000	(20,000)	20,000	(10,000)	90,000	(30,000
Camels, horses, donkeys	(6,000)		(4,000)		(10,000)	

A...Sedentary B...Nomadic ()....Estimated

It has been claimed that the increase in the animal population in the project areas can be attributed mainly to the better animal health programs, which are in turn giving better rates of calf survival. Other reporters have stated that the more precise methods of recording, opened up by the formation of herders' associations and the sanitation program records, account for part of the increase. The third and most likely factor is the drought period, which culled many old and unproductive animals from the herds. This has considerably strengthened the breeding structure of the herds which would lead, under normal circumstances, to increases in off-take. Many of the young stocks have not yet reached a marketable age, and the usual culling of females will be lower for the same reason. Viewed from a commercial standpoint, the herds examined in the Serbewel/Assale area in April 1977 contained only about six percent of animals which could be sold that year. As both the effective calving rate and the all around durability of the herds have been improved by the intensified animal health programs, one can conclude

that there will again be a considerable rise in numbers during 1977.

General Grazing Conditions - Serbewel and Assale

The primary constraint on livestock production is that of nutrition and the sustained availability of feed within the proximity of existing sources of water. For the Serbewel and Assale, this determines how much grazing land is available and its condition. In examining the situation of the Serbewel and Assale grazing lands, the following measures are used:

1 TBU : Tropical Bovine Unit (i.e., an animal equivalent to 250 kilograms of live weight).

1 TBU : 1 head of cattle, or 1 donkey, or 1 horse, or 1 camel, or 6 sheep or goats.

1 FU : Forage Unit - the energy equivalent of 1 kilogram of barley (grain).

Food Requirements (per TBU)

Maintenance:	2.3 FU per day.
Walking (7 km):	0.4 FU per day wet season.
Walking (15 km):	0.8 FU per day dry season.
Weight Gain:	3.3 FU per day live weight.

Normal Food Consumption

6 - 7 kg dry matter per TBU per day, or 30 - 35 kg green matter per TBU per day.

In order to estimate the forage values of the range in the project areas, classifications have been put on the rangelands, as follows in TABLE IV below.

TABLE IV. FORAGE VALUES

CLASS	DESCRIPTION	FU PER KG DRY MATTER	RESULTS
I	Poor	Less than 0.3 FU Dry matter	Loss of weight, diseases, emaciation, death
II	Average	0.4 to 0.5 FU Dry matter	Maintenance and walk ing; no growth or weight gain.
III	Good	0.5 to 0.6 FU Dry matter	Allows gain of weight ranging from 200 grs. to 700 grs. per day
IV	Excellent	0.6 to 0.7 FU Dry matter	
VV	Superior	More than 0.7 FU Dry matter	

Table V outlines the carrying capacity of the various classes of grazing lands.

TABLE V - CARRYING CAPACITY

CLASS	HECTARES PER TBU	WET SEASON	DRY SEASON	TOTAL
I	Plus 10	Max. 150	Max. 350	500
II	5 to 10	150 to 300	350 to 600	500 to 4,000
III	3 to 5	300 to 500	700 to 1,150	1,000 to 1,650
IV	1 to 3	500 to 1,500	1,500 to 3,500	1,650 to 5,000
V	Less than 1	Plus 1,500	Plus 3,500	Plus 5,000

The Serbewel and Assale project areas have an approximate total of 360,000 hectares of pastures available year round. With an average carrying capacity of 5.8 hectares per TBU, these grazing lands can feed a maximum of approximately 60,000 TBU. If used for dry season grazing only, with an average grazing capacity of 4.0 per TBU, these rangelands could support up to 90,000 TBU. If used only wet season grazing, the TBU carrying capacity averages 1.8 hectares and 160,000 units could be supported. As the lake has been receding, dry season grazing in 1977 amounted to over 600,000 hectares (up from 380,000

hectares in 1971) with a carrying capacity of approximately 170,000 TBU.

During the rainy season, nomadic herds are not present in the area, as they are able to graze in wet season pastures further north. The sedentary herds graze only on available dry areas and represent approximately 185,000 TBU. The normal capacity during the wet season is approximately 160,000 TBU (if one could assume no pasture available with no grazing the rest of the year). Immediately one can observe a global picture of over-grazing.

Most of this over-grazing occurs during the dry season, and is clearly more serious in the Borno State of Nigeria and the Serbewel sector than in the Assale sector. The Serbewel sector is the most affected by an influx of non-resident herders during the dry season. This has greatly increased the number of livestock in the Serbewel area, for most of its herders are residents making only short distance transhumance between dry season and wet season ranges. In fact, as many as 35% of the cattle may remain on wet season ranges during the dry season. Therefore, over-grazing occurs both on dry and on wet season ranges as well.

Otherwise, overstocking is basically a dry season problem. It occurs to some extent during the wet season in the Serbewel sector, and is rather localized. It is, however, generalized before the end of the dry season. It becomes especially severe on wet season ranges used year round, and on dry season ranges where even the woody plants have been overused. The estimates provided in Table VI below of stocking rates and carrying capacity for the project zone give an idea of how much additional forage is needed to meet the present needs.

TABLE VI. WET/DRY SEASON OVERSTOCKING

	TBU	
Estimated stocking rate (1977)	495,000	495,000
Estimated carrying capacity of dry season ranges 1/	320,000 2/	370,000 3/
Overstocking	175,000	125,000
Estimated number of cattle remaining on wet season ranges during the dry season (represents overstocking)	70,000	70,000
Overstocking of dry season ranges	105,000	55,000

These data, in general, indicate that range improvement projects should be carried out in two broad ecological areas of the project zone, viz, or wet season ranges and dry season ranges.

1/ Depends upon level of Lake Chad
2/ 1971 estimates
3/ 1977 estimates

As the present data on range resources are not wholly accurate and herd data are estimates, only rough estimates can be given as to the amount of land area that should be improved.

To examine the phenomonon of overgrazing further, we can break this down into sections:

Serbewel:

During the rainy season, Serbewel pastures are limited to less than 30 percent of the total area, including fallow land. The land available represents 130,000 hectares, capable of carrying 75,000 TBU if the pastures are used only during the wet season. The present stocking rate is 105,000 TBU. Quite obviously there is serious overgrazning. This is reflected in the area by the falling standards of herbage, a lack of regeneration and the excessive damage to the growing cover.

Assale:

The Assale's rainy season pastures are more than 50 percent of the area, or 230,000 hectares. This grazing land supports about 70,000 TBU, corresponding to full utilization of the pasture during the rainy season. This, of course reflects only the general picture, as some areas are subjected to higher concentrations of animals than are others.

It is obvious that pastures which have been overgrazed and fully utilized cannot support the flocks of sheep and goats plus the animals remaining in the villages. Additional damage to the cover, soil and general ecology is unavoidable.

During the dry season, as noted earlier, the sedentary herds are joined by an influx of nomadic herds in search of dry season pastures. Approximately 30 percent of the cattle (breeding and young stock) plus sheep, goats and other village livestock representing 70,000 TBU, remain on the bare wet season grazing areas. The balance of the herds, plus the nomadic influx, representing approximately 240,000 TBU, are left to graze the fallow lands and the lake and river areas. The whole area representing approximately 1,000,000 hectares, has available grazing lands totaling 600,000 hectares. The carrying capacity of these lands has been estimated at 170,000 TBU. From these figures it is estimated that there is an excess of 140,000 TBU - the 70,000 TBU left on the wet season grazing lands, plus 70,000 TBU on the dry season grazing lands.

The latest data available on the area are from the IEMVT agrologist who has prepared the following table. His figures show that the pasture lands are reacting in a pattern which will, if not reversed, leave only sheep and goat range. This is particularly true for the Serbewel.

TABLE VII. ASSALE/SERBEWEL RANGE STATUS

CLASS	ASSALE	SERBEWEL	STATE OF RANGE
I	45%	55%	Pastures slightly degraded
II	30%	25%	Pastures in advanced degradation
III	17%	13%	Completely degraded
IV	8%	7%	Under improvement

Range Management

Given acceptance of the figures contained in the foregoing pages, the realities of a salvage operation must be faced. All indicators are present that the area may well become a sheet and goat or even camel producing area within ten years time. There must be no doubt in the minds of both observers and residents alike that a further period of drought would accelerate the progress of the degradation, possibly beyond repair.

The problem facing planners now takes on moral as well as commercial or technical aspects. The normal procedures for developing agricultural strategies point to imposing range management techniques on limited areas and then extending those techniques to the area in general. As all indicators point to continued growth in herd numbers, and the continuance of overgrazing on steadily worsening ranges, the area may be in a totally damaged condition before it is possible to monitor and generally apply those techniques.

The operation of pilot or test zones would, of course, include the use of the range manager's most important tool: the balance between animal units and forage units. This would serve as a practical demonstration only if the herders outside the pilot zone gould be induced to balance their herd numbers in the same fashion. By operating on a broader scope, it is believed that better use of donor funds can be made while still facing up to the important task of saving a key livestock area.

The key tasks for introducing range management to the area include the following: a) reduce livestock pressure; b) begin range protection and regeneration (to include firebreaks, windbreaks and grass regeneration/seed plots); c) land salvage programs for village areas; d) control use of watering points; e) encourage preservation of forage for dry season use. With these activities introduced and accepted, normal policies of range management, such as controlled grazing and the use of rest/rotation could be applied.

The following activities must be considered "illustrative" in the sense that while they appear to the project team to be both possible and effective, specific planning, design and evaluation of both the appropriate range and specific activities must be carried out during the project, and rigorously evaluated. It is envisioned that the efforts discussed below will initially be undertaken as pilot, demonstration and trail activities, and during the life of this project evolve into a "master plan" of effective activities which can be carried out in the project zone.

Descriptions of Potential Pilot or Demonstration Activities

Reduce Livestock Pressure

The reduction of livestock numbers is, among other things, a problem of marketing. If off-take is increased, there must be a means for commercializing this off-take. The major demand for commercialized animals from the area is in Nigeria. At present there is no coordination agency available to link the supply with the demand. As the LCBC is now an established factor in the lives of all the herders in the project area, it would be the logical organization to provide the coordination preliminary to establishing a marketing system.

The Government of Nigeria already has a well-organized livestock and meat authority, and is in the market not only for red meat, but for live breeding stock as well, to expand their own production ranching programs. As Nigeria is one of the active partners in the LCBC, negotiations for the off-take of large numbers of cattle, sheep and goats would be a logical activity. Nigeria is presently selling imported meat in the market centers at a heavily subsidized price. If such consideration for the off-take of the project area were practicable, total livestock numbers could be reduced quickly.

Apart from the slaughter of animals for local consumption, there are two abattoirs convenient to the project areas for slaughter and export of meat. The Farcha slaughter house at N'Djamena has for many years been involved in the export of meat, and is presently working at 50 percent capacity. At Salah, near Maroua in northern Cameroon, the slaughter house is particularly geared to the slaughter of sheep and goats and is working at only 25 percent capacity. Both slaughter houses are situated adjacent to airports for airlifting meat to surrounding countries. The Farcha abattoir is controlled by the Government of Chad and the Salah abattoir by S.N.I., the investment company of the Government of Cameroon.

Chad has recently formed SOTERA (Societe Tchadienne d'Exploitationdes Resources Animals), a parastatal entity which will take a monopoly position in the exportation of livestock. It is reported that SOTERA will endeavor to increase export levels and an implicit goal seems to be to increase the incomes of small livestock producers.

Range Protection and Regeneration

The degradation of the range land is attributable to (1) overgrazing, (2) the cutting of tree cover for domestic use and land clearance for cultivation and (3) range fires. These practices cause different forms of damage, depending on the intensity of the activity concerned and the nature of the soil. There can be aiolian erosion of the finest elements of the soil, leaving behind only the coarser elements. Soil sterilization on a large scale is common from soil consolidation in denuded areas and there will almost always be a lowering of the quality and quantity of forage and browse.

Severe range degradation is clearly evident in the Serbewel and the Kukawa area in Borno. In the Assale region the situation is less grave but still serious. Urgent action must be taken in all three areas. The first task is to salvage what remains of the range and to attempt to bring about a steady reversal of the process by regeneration. For this, an integrated action is proposed which combines firebreaks and windbreaks/seed regeneration areas.

Village Management and Restoration Program

The general range management program will be one for area-wide activities. It will be a plan to begin attacking the general probelm of range degradation in the project area. To bring this operation to the village level, a test and demonstration of interest and practicality will be made by attempting the reclamation of barren lands around villages. This is a plan which will rely on the cooperation of active herder associations.

The requirements will be to choose villages which will reclaim denuded land. These areas might be fenced with native thorn trees and scrub bushes and rested for up to two years. Where possible, strips of existing herbage will be included to assist natural regeneration by wind carried seedlings. If the land is left to rest only, approximately 10 percent regeneration may be expected. As seeds become available from the seed regeneration beds, dramatic evidence of regeneration should be expected with the supplemental seeding.

The constant passage of concentrated livestock on its daily trek to and from villages is causing an ever-widening area of denuded land. The pattern varies somewhat from village to village and any model designed to address the problem is primarily indicative only of the type of action which is needed to arrest this destruction. Nevertheless, it is important that steps be taken to encourage discipline on village-based herds. This is particularly true of those whose major components are sheep and goats. This essential step of showing village herders possible improvements in their own immediate pasture lands can reap benefits for overall range management program.

The same villages participating in the regeneration activities, will, therefore, be the subject of demonstrations in range management. Each village is to be subdivided into five plots. These plots will be demarked by one hectare stands of trees planted at some distanace from the village. Quick growing varieties will be chosen so that the marks will become clearly visible as soon as possible. Two of the tree plantations will be wire fenced and the other

three protected by thorn scrub. This will be to demonstrate that the villagers can use the resources around them to get the same results as imported technology.

The demarcated plots are to be used in rotation for grazing and the passage of animals into and out of the village. Through this approach, four parts of the village will be protected at any one time. By using this method and starting regeneration of the natural vegetations in their own areas, it will seem a more natural progression for herders at a later stage to accept range management practices over a much wider area.

Watering Points

Many existing watering points are being overused in the project area and causing damage of a severe nature to the surrounding areas. None of these watering points can be closed down without causing a great deal of unpleasantness with herders and villagers. This would undermine the cooperation and trust which has been so painstakingly built up during Phase I of the project and is so necessary if Phase II is to be successful.

It could be possible to deflect some of the pressure from these points by the provision of strategically placed ponds in areas where forage remains later in the dry season. Ultimate strict control of watering points cannot be effected, however, until herd numbers have been brought to more manageable proportions. Only a resident specialist will be in a position to judge the use of water in relation to the progression of the season.

Though no new watering points are contemplated for this phase of the project, it might be necessary to introduce the concept of controlling water usage and to restore denuded and degraded lands around existing watering points. This could be accomplished by having a program of watering point vegetation restoration in the Serbewel and Assale sectors. There are fifty wells in the two sectors which have areas which are in an advanced stage of degradation. In some cases this means a completely denuded surrounding land.

Stabilized Crop Production

The prospects for significantly increasing either crop production or cropland productivity in the near term are far from bright. Those lands well suited for cropping are already being intensively cultivated by traditional methods for subsistance agriculture.

While there have been no specific studies of the efficiency of crop farming in the project area, research elsewhere has demonstrated that traditional farmers tend to make quite efficient use of their resources. These studies and experience with high yielding varieties of wheat and rice also confirms that traditional farmers are by no means resistant to change. However, a relatively large increase in prospective return is necessary to induce adoption of any new agricultural technology. Thus, to assume that crop production in the project area can be significantly increased by simply

introducing "modern" technology would be to ignore reality. There are not available "miracle" varieties of the subsistence crops subsistence crops grown in the area (sorghum, cowpeas, and millet) that promise 50-75 percent increases in yield on the project area soils. Both ground and surface irrigation bear some promise but not without considerable capital investment and chemical fertilizers will not pay without irrigation. Plowing of pasture lands for cropping may yield some short-run gains, but may also promote advancing resource degradation unless carefully controlled.

The natural environment precludes the project zone from having anything other than a somewhat limited agricultural potential compared to its pastoral potential. Low annual rainfall does not permit profitable agricultural crops with high yields. The sandy and sand/silt soils hold very little water and permit the growing of only subsistence crops such as millet, while the heavy clay and clay/sand soils, though often soaked, are difficult to work. A two-crop agriculture is generally found with sorghum grown in the set season and corn in the dry season.

The soils found along the water causes, and especially around the shores of Lake Chad are generally of the clay and clay/sand type. Those of the clay/sand type offer a superior agricultural potential due to moisture in the soil. Agropastural development could be recommended in these areas if sufficient investment were made to utilize modern agricultural techniques to increase productivity, and there was ethnic/cultural acceptance of these new techniques.

The project zone can generally be considered to include two distinct agropastoral zones. There is a zone of multiple cropping with a low level of livestock grazing. This zone is located around the lake shores, in wet depressions and along the banks of the Chari. The main cereal crops are corn and sorghum with considerable cultivation of beans, peppers, okra, sugar cane, tomatoes and leguminous plants such as manioc. The existence of a favorable microclimate and the presence of water reserves in the phreatic layer exploitable by plant roots permits an annual rotation of crops on the same soils. Near population centers, truck gardening is an important activity.

The second zone is a single crop cereal zone with pastoral dominance. In view of the rainfall and ethnic factors, the traditional single crop (primarily millet) followed by a fallow period when the land is used for pasturage, is the only possible agricultural activity. It is in this latter zone where project activities are to be concentrated, since it is this zone where cultivation and pastoral activities have their greatest competition.

The current practice of agriculture is a system of intinerant cropping (perpetual moving of fields in terms of time and space). A consequence of this agricultural shifting is an increased competition between available land areas for farming purposes and rangeland grazing purposes. Another consequence is that it provokes land degradation by destroying trees andother cover when fields are cleared for cropping and then abandoned after two or three years of cultivation.

Within the context of the resources management and restoration program, action will be taken to start a process of halting this agricultural "nomadism". Villages to participate in this program will have active local associations which will facilitate the introduction of interventions and the carrying out of an educative process as to the necessity for stabilized agricultural practices. The cultivation itself will remain within the traditional framework with traditional crops such as millet, corn and sorghum. Villages brought under the activity will be organized to select two large blocs of land for purposes of cultivation. These blocs will be sub-divided into 2-3 hectare sections for family cultivation.

Borno

The necessity for the activities of the LCBC to be extended into Borno State, Nigeria, becomes more apparent if one views the southern Lake Chad area in its totality. Any improvements in the Serbewel and Assale areas will have a better chance for ultimate benefit to the resident livestock raisers only if inroads are made into solving the problems of Nigeria.

The chain reaction starts in Niger where the poor quality of range pasture forces mass transhumance early in the dry season. In turn, the ranges and, in some cases, water, are used up in northern Borno leaving herders with no other choice but to move towards Cameroon in search of pasturelands.

The animal population of Borno State is equal to 1.5 million TBU, of which approximately half is located in the northern areas. The problem of a shortage of forage in this area is exacerbated by the influx of nomadic Hagana Arab and Fulani herds from Niger. The extreme overgrazing in northern Borno has resulted in the Nigerian authorities classifyimg it as a disaster area. Desertification is visible in the extreme northeast of Borno around the Kukawa area. This is an area with abundant water but almost no grazing land. As a consequence, the entire cover is being removed and one can envisage a desert area with no vegetation in a few years.

Further south at Maffa there is standing grass visible even late in the dry season. The reason is that livestock follow water, and there is little water available here. The water which is available is used early in the season when grazing activity is at its highest. The grass nearest to the water is consumed and grass farthest away from the water is left until there is no water available. A similar situation exists to the south of Maiduguri where there is a belt of undergrazed areas with little water availability.

The overgrazing of the northern Cameroon ranges has been the subject of numerous studies. The only dry season grazing left of any consequence is that of the Yaeres which is becoming an attraction for cattle in transhumance from many directions. The Yaeres is a large flooded plain caused by the overspill of the Chari river. As the waters subside, large number of cattle move into the area including an ever increasing number of

nomadic herds. The nomadic herds graze from January through May when they again leave the area. The local livestock continue to graze through the wet season on higher and dryer ground until the flood waters have receded.

The Yaeres area will not continue to be a pressure-release valve for transhumance animals for much longer, as the Government of Cameroon is seeking to bring it under control. USAID is assisting with a program which will, among other things, help develop year-round water in some areas, but more importantly, will restrict the area available to visiting herds. This will again, in turn, put additional pressures on the Lake Chad area.

To ease the pressure on northern Borno, and indirectly northern Cameroon, Nigeria has recognized the need to open up the central and southern Borno grazing areas. However, the Nigerians are reluctant to develop water resources without guidance in the light of the experience of the past ten to fifteen years. Much of the damaged area of the Borno range relates to the uncontrolled development of some 250 artesian wells in the early 1960s. To avoid similar mistakes in areas to be opened up, Nigerian officials wish to take advantage of the range management experience of the United States. They are aware that they lack the experienced manpower to address a complex situation.

Animal health programs in Nigeria are soundly based and there is no need to address this question as the project expands into Nigeria. The emphasis and sole purpose in the area will be range management. There are up-to-date technical maps of the area, and the Nigerian Government has indicated a willingness to provide back-up personnel and back-up facilities to the project. The need is to have experienced range management personnel available to assist in the development of a rational range management plan.

The Government of Nigeria has already demarked a number of grazing areas in Borno and made a strong division of the State administratively. There are eighteen local government divisions which have demarked and enforced laws on a total of more than 1,650 square miles of grazing reserves. More land is being added to these reserves each year. To carry out a program of resource management and control, Nigerian officials have indicated that financial resources are available . What is needed is a plan for range management and arid lands development to address these issues more thoroughly and directly.

Environmental Assessment

The project interventions will be designed to have a positive, beneficial impact on the environment (see the Initial Environmental Evaluation attached as Annex I). The range management and village grazing management marks will introduce controls on grazing which will begin to address the problem of overgrazing. The extension of the project into Borno State will allow a

division of many of the nomadic herds from the Serbewel sector, and thus help bring the Serbewel range into balance with the animal units on the land.

A start at revegetation will again begin a process whereby range degradation can be halted and perhaps reversed. Tree plantings and regeneration of grasses around villages and wells will help in holding the soils and promote a natural process of regeneration, while stabilizing agriculture will halt the cutting of trees and general loss of ground cover due to shifting agriculture.

All interventions will be introduced through the traditional social infrastructure. There will be, therefore, no social or cultural upheavals as a consequence of the project. In summary the project can be found to be environmentally sound and beneficial.

Summary Conclusions

This project is technically sound. In terms of local resource management, it will be desirable to undertake interventions which, initially at least, are pilot in nature. The illustrative interventions will fit the levels of technology in the project area. Many systems have already been carried out on a small scale during Phase I of the project. Proposals will take into consideration what the project area population is most likely to accept. They will present highly visible and tangible results by the end of the project life cycle.

Social factors have been taken into consideration in designing the project and its interventions and technical success from this standpoint is considered to be favorable.

Finally, no adverse impact on the environment is anticipated, while successful implementation will result in improvement in the basic resource base.

B. Financial Analysis and Plan

The overall project costs are estimated to total $10,437,000 equivalent, including allowances for inflation and contingencies. Of this total it is proposed that AID contribute $5,004,000; FAC $1,955,500, UNDP $1,302,800; and LCBC $2,175,000. FAC has offered formally CFA 355 million ($1,45 million equivalent) directly to the project. In addition, FAC is providing two technical assistance personnel (costing approximately $505,500 equivalent) who will not be charged in two year traunches. The UNDP figure also includes one technician not directly charged to the project.

With their approval of the initial project plan in June 1976, the Commissioners committed LCBC to financing budget items totaling approximately $1.9 million equivalent. In the overall budget presented in this project paper, the LCBC contribution will have to increase to nearly $2.2 million equivalent. Final decision on this increase as well as in other modifications of the previously

approved plan must be made by the assembled member government commissioners. Availability of funds for the project do not appear to be a constraint in this regard. Consequently, the LCBC contribution to the project at the revised level of approximately $2.2 million should reasonably be expected to be approved.

Within the multi-donor financing and operational framework which evolved and worked so well during the previous project there are distinct areas of concentration by the respective contributors. As in the previous project, FAC financing will be heavily concentrated in the area of range conservation and resource management. UNDP/FAO financing has and will continue to fill vital gaps between the other two external donors. The LCBC contribution is to cover what in a typical bilateral project would be local currency costs.

The table, Summary Cost Estimate and Financial Plan, gives a more detailed breakdown of project costs. Under the headings "Project Implementation" and "Operational Costs", the AID contribution reflects costs associated with the implementation of the resource development plan during the last two years of the project.

The AID contribution has had inflation and contingencies calculated at 10% of total costs. The inflation and contingency items for the LCBC contributions are overall project cost apportionments. For the UNDP, overall proposed dollar contribution to the project. The FAC had no allowance for inflation and the contingency item is the dollar equivalent actually included in the FAC budget.

The Impact on LCBC Recurrent Budget

As indicated previously, meeting its share of the project costs will not unduly strain LCBC budget resources during the project life. What the situation will be beyond this project depends heavily upon what LCBC decides the future mission of the project organization should be, and the success in institutionalizing the project organization during this project. It is patently obvious that LCBC could not undertake the proposed level of staffing and operational pattern without large contributions from external donors. Conversely, however, LCBC could reasonably be expected to maintain the core organization of member state nationals and the infrastructure in place at the end of the project. With this institutional base, LCBC would be in a position to attract external donor contributions to continue and increase developmental activities such as applying the resource management plan to progressive development of the entire project area.

C. Social Soundness Analysis

Demographic Data

The Assale/Serbewel is an area of approximately 8,800 square kilometers with a combined population of approximately 120,000. While the distribution of land area between the two sectors is almost equal, this is not true of the

SUMMARY COST ESTIMATE AND FINANCIAL PLAN

(US $ 000)

SOURCE	AID FX	AID LC	LCBC FX	LCBC LC	FAC FX	FAC LC	UNDP/FAO FX	UNDP/FAO LC	TOTAL
USG									
PERSONNEL	2,040			1,233.1	951.0		624.0		4,848
EQUIPMENT	347				255.0		129.0		731
CONSTRUCTION	180	300		200.0		20.5		135.0	835
PROJECT SUPPLIES	200	200		29.4	294.0		48.6	72.4	844
PROJECT IMPLEMENTATION		400				263.6		133.5	797
CONSULTING SERVICES	204				81.5				285
OPERATING EXPENSES		75		246.6					322
PARTICIPANT TRAINING	180								180
SPECIAL EXPENSES			49.0	25.0					74
CONTINGENCY				124.0	76.5	13.5	28.5	12.1	255
INFLATION	606	272		267.5			83.9	35.8	1,266
TOTAL	3,757	1,247	49.0	2,126.7	1,658.0	297.5	914.0	388.8	10,437

population. The Assale has a population of about 40,000 as compared to Serbewel's 83,000 thus giving the Assale a population density of 10/km^2 to Serbewel's 18.8/km^2. These figures do not include the nomadic Fulani who have been coming into the zone in ever increasing numbers since 1970. Estimates put their numbers at 4,000 in the Assale and 5,000 in the Serbewel but it is felt that these numbers understate reality.

Ethnic Groups

There are several ethnic groups resident in the project area. They are the Shuwa Arab (65%), the Kotoko (25%), the Hausa, Fulani, and Kanuri (somewhat less than 10% combined), with sprinklings of other groups. It is of relevance to the project that the distribution of population by ethnic group in the two areas is not identical. The Assale is 80% Arab, 10% Kotoko, and 9% Hausa and Kanuri. The Serbewel is 60% Arab, 30% Kotoko and 10% Hausa, Fulani and Kanuri. Thus, whereas in the Assale Arabs constitute an overwhelming majority, in the Serbewel this is less the case. Though as pointed out above, owing to different growth rates, the Arabs will outnumber the Kotokos increasingly as the years go by.

The Shuwa Arabs are semi-sedentary cattle and livestock raisers. They farm as well as herd and they are the people who have been participating in the Assale/Serbewel project up until the present. The Kotokos make their living by fishing and farming and they own some cattle which they entrust to Arabs to Fulanis to herd. The Kotokos also keep sheep and goats in their villages. The Fulanis resident in the area are semi-sedentary herderslike the Arabs, but they are a tiny minority and are only found as residents in the Serbewel. The Kanuris and the Hausas make their living mostly by fishing and farming, though some of them earn their livelihood with small commercial enterprises.

The Kotokos have lived in the Assale/Serbewel for the longest time. They are considered to be the direct descendents of the Sao people who were the original inhabitants of this area. The Arabs started migrating into the areas, according to most accounts, at the beginning of the sixteenth century. The most important wave of Arab in-migration, however, was not until the middle of the eighteenth century. The Arabs settled into the area among Kotoko and Kanuri villages that were already there. The intermingling of these groups had mixed effects. The Kotokos and Kanuris adopted the Muslim religion of the Arabs while the latter adopted the more sedentary life style of their neighbors. The Kotokos considered themselves the owners of the land and always levied taxes on the Arabs and others for the use of pasture, farmland, and water, and collected fees for river crossings. The colonial government, apparently fearful of growing pan-Arabism, felt it in its interest to keep the Kotokos in a dominant position, which it did by naming Kotokos as officials in the local government. In the Serbewel today, all five canton chiefs (central government representatives of the township equivalent level) are Kotoko Sultans and they still collect their traditional fees for land and water use and water crossing. In the Assale, on the other

hand, only one out of five canton chiefs is a Kotoko (the Sultan of Mani).

The history just described has led to poor relations between the two groups. The traditional Arab suspicion towards strangers was borne out by the Kotokos' harsh treatment of them, and the Kotokos always considered the Arabs to be foreigners with whom associations should not be fostered. Over the years, Arab suspicion of Kotokos has increased rather than decreased. The Arabs think of the Kotokos as sorcerers who will kill them and possibly eat their corpses. As a consequence the Arabs have as little to do with the Kotokos as possible.

In spite of the situation just described, all of the project staff in the Serbewel are Kotokos, since there are no Arabs with the necessary training. One would suppose that this would present a major problem for the project. According to the Serbewel Sector Manager, however, once the herders got to know the Kotoko staff, and were able to see that what they were doing was beneficial for their animals, the Arab herders began to accept the situation. In the Assale, all project personnel have been brought in from the southern part of Chad. Again the feeling is that using strangers on the staff initially hindered project acceptance, but that it is no longer a problem.

A more serious problem may have to do with the hegemony of the Kotoko sultans. Up until now, they have cooperated, more or less, with the project. Whether they will continue to cooperate and lend support to the strengthening of herders' associations is a real question. The formation of these associations could well provide the herders with the necessary political and economic base to be on a more equal footing with the sultans. This could well be perceived as a very real challenge to the sultans' authority and to their positions.

The group which has arrived most recently in the area is the nomadic Fulani who bring their herds of livestock in from Nigeria during the dry season. They do no farming whatsoever, which means they are completely dependent on their livestock for their livelihood. They are Muslims like the Arabs and the Kotokos but they speak their own language and consequently there is a minimum of communication between the nomads and those resident in the zone. The Kotokos have taken advantage of the Fulani presence by hiring them to herd Kotoko cattle and by charging them fees to use Kotoko rangeland and water (in Serbewel). The Arabs resent the intrusion claiming that the Fulanis bring diseas, start fires, and chop their trees down in order to feed their goats.

The Assale Sector Manager is addressing the Fulani problem by including them in the program. 1,236 Fulanis have received project cards and all of their cattle have been vaccinated. The first Fulani three-day training conference was held in the last week of April, 1977.

Including the Fulani will make things more complicated for the project, however. For example, teaching materials have to be translated into Fulani

as well as Arabic; also the Fulanis have had even less contact with "development" than have the Shuwa Arab and thus it will take longer to educate them. Nevertheless, the feeling is that as long as the Fulani are going to continue to reside in the zone during a good part of the year it can only hurt the project if they are left out. They are a significant part of the herding population and therefore they must be educated regarding good range practices and herd control.

The Shuwa Arab

Shuwa is a shortened version of Shawingat, which was the name given to those Arabs who first gave up a purely nomadic existence to become semi-sedencary beef and sheep raisers and part-time farmers. The Shuwa Arab is referred tp as a herder-farmer because he does in fact engage in both herding and farming. Although thought of as principally a cattle herding population, approximately forty percent of Shuwa households have no cattle. Additionally almost every Arab family has two or three grain fields that are farmed.

The Arabs farm using subsistence techniques, including short-hand hoes, little soil preparation, no regular irrigation and no fertilization. They mostly raise grain, though near Lake Chad they also grow some vegetables. In a good year, enough is grown to feed the family with some left over to sell at the local market. Family income is also supplemented by proceeds from the sale of milk products from cows or goats.

Owing to poor marketing conditions, primitive production methods, and a difficult natural environment, the average Arab is fairly poor. The typical household owns a few goats and perhaps a sheep. There will be possibly a donkey or a horse although neither one for use, and certainly not both. A radio, watch, or bicycle are not likely but some household possess at least one of these items.

The Arabs living in the Assale tend to be poorer than those living in the Serbewel. In 1975 it was estimated that only 56 percent of the Assale Arabs owned cattle, whereas the figure was 70 percent for Serbewel Arabs. Further, among those Assale Arabs who owned cattle, 70 percent owned ten head or less, while in the Serbewel this figure was 32 percent. Twice as many cattle-owning Arabs in the Serbewel (40%) as in the Assale (20%) owned between ten and twenty head. The difference between the two sectors diminished as the number of head increased. When the firgure reaches thirty or more head of cattle, the two sectors were nearly equal with six percent of Assale Arab cattle owners and eight percent of Serbewel Arab cattle owners falling into the category.

Project personnel report that the Serbewel Arabs are considerably easier to work with than are the Assale Arabs. They are more open to new ideas and seem more willing and able to follow instructions. The speculation is that this is probably attributable to the fact that the Serbewel Arabs are the product of a wealthier and more developed environment. In addition to their

greater personal wealth, the Government of Cameroon has also more adequately spread its services into the Serbewel than has the Government of Chad into Assale. Along with this, the perhaps unpleasant experiences of taking orders from the Kotoko sultans has had the positive result of giving them practice in complying with certain rules and regulations originating outside of the community. An additional explanation for the case with which the Serbewel Arabs cooperate with project personnel is their relatively worse overall environmental conditions in their area than in the Assale area.

The Arab household (called a zeribet) is a collection of circular grass huts surrounded by an enclosure of thorns. Some of the huts are for habitation by people while others are used as shelters for cattle and other livestock. Most households include a shelter with a grass roof and open at the sides for the male members of the zeribet to spend much of their free time talking, saying prayers, eating and greeting friends. The number of huts in a household, and their size, depends on the number of people in the zeribet and their wealth.

The households are composed of familial kin groups. A typical zeribet may house a man, his wife and their small children plus one or more of the man's older sons, their wives and children. Thus a household may consist of more than one nuclear family living together.

The activities of the household center on livestock care and farming. The men of the household are responsible for arranging (if not implementing) herding, birthing, health care, sale and purchase of cattle. They do farming as a secondary activity. The women are in charge of miling the livestock and selling surplus milk products in addition to preparing meals and maintaining the household in general. They may also have their own grain field or vegetable garden, or they may help the men tend their fields. Children learn livestock herding at an early age, being entrusted with the care of sheep and goats. Children often help with farming as well. If there is a school in the vicinity, one child -- usually the youngest boy -- may attend. All children receive some religious instruction from village Koranic scholars.

Arabs interviewed during the course of visits to the project zone were not enthusiastic about sending their children to school. They said that they needed the children to help with the herding and farming, and that the children needed this as an education for later life more than they needed a formal public school education. They were also concerned for their children's welfare. They asked who would take care of the children at school? Part of the problem, especially in the Assale, is that the schools are very far from most villages. A child desiring to attend must either leave for school before dawn in order to arrive on time, or arrange room and board in the school village. The latter solution is one that parents fear most. They believe that a child who leaves the herding-farming environment for too long will not want to return to it.

The herding of cattle is organized at the village level. Several family herds are combined to an average size of 125 head and herding responsibilities are shared by the families. Calves are herded separately to keep them from drinking up the cows' milk. Older boys are usually in charge of tending to the calves.

Transhumance is another major activity which involves most of the household. Old people may stay behind in the home village trending small animals, but the rest of the household usually moves with the cattle to a dry season location. In the Assale, average distances traveled are between 12 and 20 kilometers. In general, those closer to the Chari River move to the shores of that river. In the Serbewel transhumance take place towards the TafTaf River and the Yaeres region as well as Lake Chad the Chari River. Distances covered by transhumants in the Serbewel tend to be somewhat greater than those in the Assale -- sometimes as far as sixty kilometers. Transhumance is considered hard work and men who were asked said they would not do it if year around water and pastures were available near their home village.

Importantly for this project, the average Shuwa Arab does not readily part with his cattle. Although he regards cattle selling as a nomral fact of life, he prefers to sell only when his economic situation demands it, or most importantly, if it will in some way improve his herd. In a bad crop year it may be necessary to sell a cow to have money for food and other household needs. Marriage is an expensive transaction which may require the selling of one or two cows. Most herders try to follow four rules of thumb with regard to cattle sales: 1) do not sell fecund females; 2) sell older males; 3) use some of the sale proceeds to purchase females; 4) in general, sell only when necessary. This last rule is especially important to poorer herders. Clearly, these attitudes towards the selling of cattle influence off-take rates and the marketing of livestock generally.

Local Government

Local administration pertinent to Assale and Serbewel is essentially identical in both Chad and Cameroon. The largest relavent administrative unit is the Prefecture in Chad and the Department in Cameroon. The Prefecture and the Department are governed by a Prefect. The Prefecture of Department is composed of subprefectures each of which is presided over by a subprefect. Subprefectures are divided into a number of cantons which are presided over by Canton Chiefs (Fhef de Canton). Finally, each canton is composed of a number of villages (ca 50 - 1000) in which a village head (bulama) provides the liaison with the local government administration.

The Serbewel zone of the project corresponds to the subprefecture Serbewel while the Assale zone is a composite of parts of the subprefectures of Massakory and N'Djamena Rural. Serbewel is neatly broken into five cantons: Makari, Afade, Bodo, Goulfei, Wulki. The Assale includes the entire cantons of Assale and Mani and parts of the cantons of Massaguet, Afrouk and N'Djamena-Suburbain.

To a villager, the prefect and subprefect are powerful and distant. It is instead the Canton Chief (also known as the Sultan) whom villagers know and experience as government in the region. He transmits directives of higher officials to people and supervises the gathering of annual taxes. A villager can have a private audience with the Canton Chief if he arranges it through

his village head. Thus, the Canton Chief is the main liaison between villagers and higher government authorities.

Because of this, sultans in Chad and Cameroon are chosen so as to possess some legitimacy in the eyes of their villagers. Usually the chosen men are descendants of persons who held positions of authority in traditional, precolonial political structures which occupied the territory of the modern canton. Unfortunately, in Serbewel all sultans are descendants of Kotoko traditional rulers which gives them great prestige in the eyes of Kotoko villagers, but, as we know, less in the eyes of the Arabs. In Assale -- all sultans are Arabs with exception of the one in Mani.

It is important to note that the Canton Chief in no way officially represents any one ethnic group. He is a governing official whose responsibilities cover geographic units containing different ethnic groups. He governs villages which are led by village heads.

The village head is a man with very little authority. He explains and tries to carry out the Canton Chief's orders within his village. Village heads are usually descendants of the village founder but most are neither the wealthiest nor most respected man in the village. The local administrative unit of most importance to the Arab is the canton. His tribe and lineage are completely ignored in the contemporary local government of the project area.

Government Services

In general, government services in areas such as health, education and communications have been far more extensive in the Serbewel than in the Assale. All five of the capitals in the five cantons of the Serbewel have a primary school system and a medical dispensary. In addition, Makary, Goulfei and Fotokol also have representatives from the national police force and administrative government offices. Makary has an agricultural production station and a major telecommunications unit as well.

The Assale has been quite neglected from the point of view of government services. There are primary school systems in the Canton capitals of Massaguet, Bout el Fil, Mani and Karal but medical dispensaries are found only in Massaguet and Mani. The closest postal telecommunications unit is found in Massakory. Most major towns and villages in the Assale do not have schools. The roads within the Assale and those leading out to the rest of the country are less numerous and generally of inferior quality compared to those in the Serbewel.

With regard to government livestock services, neither the Assale nor the Serbewel has ever received anything approaching adequate attention. Historically, there were five Livestock Service personnel placed around the Serbewel who were supposed to take care of annual vaccinations, some irregular vaccinations, control of commercial herds, inspections, and related extension services.

To counteract this paucity of attention, the national coordinating committee

for the project in Cameroon has recommended that livestock taxes raised in the Serbewel be used to finance the purchase of animal medicines for the Serbewel. This measure has not yet been approved by the central government, but it is seen as a plausible stop gap while the project works to establish a user-payment scheme for financing animal medications.

Existing Cattle Marketing Structure

There are a number of large-scale and small-scale cattle merchants commercializing cattle in the Assale/Serbewel project area. The large-scale merchants usually reside in major towns such as N'Djamena, Kousseri, Gambaru of Maiduguri and they are full-time operators in cattle purchasing and selling. The small-scale merchants are seldom full time operators. They are herders who live like their neighbors but own more cattle than many (perhaps as many as 100 head). They use their position of relative wealth to make additional money. Usually they sell a few of their cattle at the beginning of the dry season to raise cash which they give to a buyer (often a relative). This buyer will go around buying cattle as cheaply as possible at small markets to resell for a profit at a larger market. The buyer returns the merchant his profit and is paid a commission. The merchant may use a portion of his proceeds to have the buyer begin the buyer-selling cycle again. This can go on until the end of the dry season. During the wet season,the small-scale merchant is generally not in the market.

Analysis

For purposes of discussion, the factors bearing on the socio-cultural feasibility of this project will be divided under two headings. The first heading contains traditional constraints and aspects of social organization of the project's target population (the herder/farmer) which could inhibit the successful outcome of the project. The second heading contains the external institutional factors, i.e., those things relating to the agencies involved in the implementation of the project which will influence the project's success.

Traditional Constraints

1. Cattle raising represents a way of life for the herder/farmer. Owning cattle not only brings economic security but social status and even political power to those who own many cattle. Possession of cattle implies that a man is endowed with those qualities that men and women alike regard as most admirable. They say that a man must have piety, bravery, industry, physical hardiness, ascetism and pastoral skill to be able to build a herd or to keep one. Thus, a man with a herd can attract a wife of his choice and can afford to pay for the marriage. A man with a herd can also afford to be generous, to make loans to his poorer relatives which increases his status as well as his power. Thus, there are strong pressures on men to acquire and maintain a herd.

2. All surplus cash is put into cattle because a herd is a form of capital which can be highly productive. It can be put to practical uses without intermediate transactions. For example: a) cows provide milk and milk products for the family and what is left can be sold at the market providing the family with ample cash for household expenses; b) cattle can be used to pay for major obligations like marriage or blood price*; c) cattle can be lent with less risk of loss than if cash were lent; d) a large herd guards against natural disaster, for if the crop fails one still has milk; if some cattle fall ill, one still has others.

3. The herder has great respect for the wisdom of his elders and the traditional way of life. The village elders customarily make the decisions regarding where to herd, where and how to seek water, the timing and routes of transhumance, and so forth. Each man however considers himself a cattle raising expert as well and he will challenge herding decisions if they seem contrary to his good judgment.

4. All of the cows' milk belongs to the women. The men have no say over its use. Women generally do the milking and take the various milk products. some of the milk is consumed by the family and the rest is sold at the market. This provides the women with cash for her household expenses as well as for personal luxuries such as perfume and jewelry.

5. The household (zeribet) traditionally performs most activities of animal husbandry and cattle commercialization. Men take care of daily herding, birthing, health needs, sale and purchase of cattle. Women do the miling and take responsibility for smaller livestock. Children may help their fathers or their mothers with their respective chores. Carrying out pastoral activities with non-relatives is practically unheard of.

6. There are no formal land tenure arrangements controlling access to pastureland and water. Villages have habitually used certain areas year after year but they do not consider themselves the possessors of these resources and anyone is free to come in and use the pasture and water that they use. This is slightly different in the Serbewel where, as we have seen, the non-herder population, the Kotoko people, consider themselves the owners of all the land and water located in what were formerly their principalities. Thus, the herders pay the Kotokos a tribute for the privilege of access to a pastureland and water. The important point is that anyone can come into the area and pay the Kotokos for the use of the land.

Tenure arrangements for farmland are somewhat different. In this case, villages in both Assale and Serbewel have stretches of land which they have always used for farming, whether it was originally bought from Kotokos or whether it was simply staked out by the village when it was first founded. Strangers can come to a village and get permission from the village head to farm on unused land, but land already under cultivation is the property of the village.

*Blood Price: a traditional method of settling disputes caused by murder. A family is paid for the loss of a member by the family responsible for the death and the fued is supposed to end right there.

7. The herder/farmer's social world is divided into three groups: kin, friends, and strangers. Strangers should be treated with respect and generosity but they should not be trusted. It is believed that one never knows what to expect from a stranger.

Institutional Constraints

1. Weakness inherent in a regional organization: the LCBC is a regional organization and as such lacks a clearly defined consttuency. It must compete for personnel with member government programs. It has been seen that when personnel are scarce, a member government will remove individuals originally assigned to an LCBC project and place them in a national position. The Assale-Serbewel project on the Cameroon side has lost five veterinary nurses in this way during the past year.

2. Weakness inherent in any organization: in this instance the weakness is understaffing, caused by domestic, i.e., national, personnel demands and a shortage of trained individuals.

The Peoples of Borno Project Area

Time and the uncertainty of the utility of a major effort precluded a detailed study of the social fabric of the Borno project area. Nevertheless, some investigation was carried out for the project and is included herein.

There are three major groups of people living in Borno State, Nigeria. The majority of the population is Kanuri. They outnumber the second largest group, the Shuwa Arabs by more than three to one. The third group is the M'Bororo. They are a nomadic tribe related to the Fulani and move in and out of the area. Their numbers have not been established, but they are significant. The Kanuris have inhabited the area the longest and their political organization has been supported by the nationa, Federal Government of Nigeria.

Unlike the Kotoko-Arab relationships in the Serbewel, the Kanuri-Arab relationship in Borno is not characterized by hostility. This could be explained by two important facts. First of all, the Kanuris have been Moslem much longer than the Kotokos. Having been so, the Kanuris and Arabs have had more closely related backgrounds. Secondly, about the time that the Arabs moved into the area, a new group of Kanembou moved into the land of the Kanuris. They eventually developed as Kanuris themselves while also becoming the dominant political group of the area. Thus, two different groups which arrived in the area at the same time have a history of cooperation.

There is intermarriage between the two groups and they have joking relationships and other socially significant relationships. Nevertheless, the Kanuris remain the socially and politically predominant group in the area. Perhaps owing to its lesser numbers, the Arab population remains more like passive residents in the zone.

As far as customs and life style are concerned, what has been said about the herder/farmer in teh Assale and Serbewel is basically applicable to Borno. The Shuwa Arabs are the same tribes as are located further east in northern Cameroons and Chad. The Kanuris are also farmer/herders, though their society has a farmer tradition older than that of the Arabs.

D. Economic Analysis

1. Introduction. Comprising as it does some 8,800 square kilometers, located in three different countries, the project area is by no means an homogenous economic unit. Relevant interproject differences, however, tend to be in degree and intercountry differences affecting economic behavior do not significantly affect the outcome of project-generated innovations. Thus, for immediate purposes, it is possible to generalize for the project area as a whole rather than to elaborate upon detailed differences.

Similar herd livestock production and subsistence farming by hand cultivation methods and a shifting pattern of land use characterize the entire project area. Livestock production, mainly cattle but including large numbers of goats and sheep, dominates the economic life. Cattle herds typically are family owned in units of 7-10 head and tended in village herds of approximately 125 head. In addition to milk for home consumption, they provide a family most of its cash income from the sale of one or two animals per year along with some milk. Crops are produced mainly for family use on one of two hectare units around villages. While most herders do some croppingk and vice-versa, no reliable data are available for matching the two to get a size distribution of aggregate family enterprises. In any event, such combination enterprises are small, yielding an average of some $90 per capita. Around one third of this is in cash with the balance in home consumption.

While some livestock owners have relatively large herds, typically twenty to twenty-five head units often tended by hired herders, they do not comprise more than seven percent of all owners in the project area. Some might presume, therefore, that project benefits would tend to aggregate to these large herders. Easy access of all herders to the types of interventions the project seeks to further, however, together with the relatively small number of large units, reduces the question of equity of the distribution of project benefits to only a minor concern.

No data are available for estimating such economic parameters as elasticity of supply or demand for crop products, the propensity of farmer families to consume their own produce, and the like. Such indicators would become highly important to deciding project priorities if ways were found to significantly the production of particular crops. Unitl then, however, attempts to change the traditional barter-market system likely would prove unrewarding. Cattle marketing is a different matter as indicated elsewhere in this project paper.

On a different front, neither the existing tax system nor land tenure laws of the concerned member nations appears to impose significant constraints upon achieving project objectives. Where they are not burdensome, however, and neirther affect significantly current incomes nor pose much as incentive to holding cattle. There is no reason to believe that, in the near term at least, amending the tax structure or its administration is a viable tool for either reducing overgrazing or meaningfully improving equity of income distribution.

The same is true with respect to the land tenure system. Throughout the project area, land rights are vested in the national government. Nonetheless, locally allotted -- or taken -- usufruct in both range and crop lands are deeply ingrained. Thus there is little reason to expect that these traditional rights will be altered by national government action in the foreseeable future.

In one important area, that of member government actions, as they now stand, can severely limit achievement of project objectives. This concerns the movement of cattle sales across the Chad and Cameroon borders. Technically speaking, exports of cattle from ehad are prohibited, while those from Cameroon to Nigeria limited by both licensing the number of dealer can export each month and levying an export duty. In practice, these respective regulations are honored mainly in the breach so far as private dealers are concerned. For obvious reasons, however, livestock association cooperatives functioning under LCBC aegis could not follow that expedient. Consequently, unless some way is found to "legalize" LCBC-associated exports to the much more profitable Nigerian market, prospects for cooperative marketing of cattle as an incentive to better herd management and means of enhancing current income of livesotck producers will be very difficult. LCBC-initiated negotiations toward establishing a free-zone for cattle movement would, if successful, remove the regulations constraint upon interstate marketing of cattle. Failing that preferred solution, which would be applicable to all exporters and transshippers, some alternative arrangement must be found which frees LCBC from existing cattle transit export regulations. Given the consequences of LCBC being required to adhere to these regulations, it can only be assumed that relief in some form will be provided.

2. Overall Project Assessment. To carry a cost-benefit analysis of either particular project interventions or the project as a whole beyond orders of magnitude would imply a precision unattainable at this juncture. Available basic data will not support sophisticated analyses regardless of the methodology employed. Additionally, there is some uncertainty about the traditional herder-farmers' acceptance of any innovation as this can bear on many factors besides apparent economic profitability or viability.

These and other estimating difficulties aside, presenting here an array of econoic net benefit estimates, which can be quantified, inevitable would divert attention from the farm more important social costs and returns involved. These can only be expressed in subjective terms. If one accepts the proposition that what happens to the range resources, hence incomes, in this area depends upon enlightened collective action by the herder-farmers, and public organizations, then the combination of potential economic and social benefits generated by an area resource management plan that enjoys wide support should represent a satisfying return on the project's investments. The traditional measures

of project economic feasibility are the benefit/cost ratio and the internal rate of return (IRR). These traditional measures, however, do not readily lend themselves to an analysis of the proposed project. While the costs of the project and of each of its components are known (see budget tables), it is virtually impossible to assign a valid monetary value to the benefits which will flow from each of the project outputs.

In view of these difficultuies, it is probably best to consider the project as a package of inputs which will lead to the realization of the project purpose, i.e., efficient resource use which will conserve the range resource base. From the economic point of view, the benefits to be expected will come from the production which this "saved" land will provide.

IV. IMPLEMENTATION PLANNING

A. Administrative Arrangement

The LCBC was created in 1964 by joint action of the four member governments -- Cameroon, Chad, Niger and Nigeria. Headquartered in N'Djamena, Chad, the LCBC has as its mission the progressive economic development of the Lake Chad Basin through the efficient utilization of resources, and providing a forum for facilitating collaborative and joint action by member governments toward resolving common development problems.

LCBC program and operational policies are set at semi-annual meetings of the four commissioners representing their respective governments. Policy execution rests with the Commission's full time Executive Secretary. Funding of LCBC administrative costs and the LCBC contribution to this and other program activities is provided by member governments in accordance with a formula established in 1972 with the creation of the Lake Chad Basin Development Fund. According to this formula, each member state agrees to make regular annual contribution of 0.1 percent of their respective national budgets. Using this formula, Nigeria has consistently provided approximately 62 percent of the Fund's budget, Cameroon provides 27 percent, and the remaining 11 percent is contributed by Chad and Niger. In addition, the member states are required to second pertinent ministry personnel to work under LCBC direction in specific LCBC activity areas.

Structurally, the LCBC comprises five technical divisions with Basin-wide responsibilities. These five divisions include livestock, agriculture, fisheries and forestry, water resources and geology, and telecommunications and civil engineering. The Office of the Executive Secretary has responsibility for the overall administration of policy directives, while day-to-day operation rests within the Office of the Administrator. There are seventeen senior professionals in the N'Djamena headquarters including African and non-African personnel. Recruitment of qualified member country African personnel has been limited by higher pay scales in Nigeria, the location of organization headquarters in N'Djamena, lack of qulaified people from Chad and Niger, and Cameroon restrictions on lending national staff to the LCBC.

Primary USAID responsibility for the project's implementation will rest with the CDO/N'Djamena. The USAID direct hire project manager will meet regularly with the Chief of the contract team, the LCBC and with principal members of the FAC and UNDP technical assistance teams to discuss the project's implementation. General administrative support for the contract team will be provided by the CDO/N'Djamena. The LCBC will provide office space and secretarial support.

Within the LCBC, primary responsibility for the implementation of this project will rest with the LCBC Administrator, who will be the point of contact for the Chief of the USAID-funded advisory team. The technical personnel will be assigned to the appropriate LCBC technical division. However, during the first three years of the project the USAID-funded technical personnel and the LCBC technical personnel with whom they work will function as a task force charged with preparation of the resource management work plan. After the project's 36th month, the composition of the technical advisory team will change to reflect the increased emphasis on implementation and the A.I.D. technical personnel will be more directly operationally integrated into the LCBC technical divisions.

Actual field implementation will be carried out by personnel from the respective national service agencies who have been seconded to the LCBC. In addition to providing technical backstopping and materials, the LCBC also pays an annual bonus to the seconded national service agency personnel. This administrative arrangement was tested and found to be effective under the previous project.

B. Implementation Plan

A time-phased implementation plan is given in the following chart or spread sheet.

1. Implementation Plan for First Thirty-six Months.

a. A 60-month period is programmed, of which the first 12 months is considered as "pre-implementation period". Thus the actual project planning period will extend over a 24-month period, and implementation of the approved operational plan will also extend over a 24-month period. Actual program implementation should be projected over a ten-fifteen year period.

b. Steps in Phase I (detailed project planning- see spread sheet)

i. Pre-field Implementation actions (months 1-12) (Items 2-6 of spread sheet).

ii. Field reconnaissance to lay foundation for identifications, determinations and definitions (items 7-24 of spread sheet) (months 12-18). This will be accomplished by a full-time team of four-five technicians supported by short-term specialists.

iii. First approximation of the what, wheres, and whens of work plan actions (items 9-28 of spread sheet) (months 18-24). Public information programs should be carried out throughout this period.

PROJECT IMPLEMENTATION PLAN

		FY78	FY79	FY80	FY81	FY82	FY83
1.	ProAg, PIO/T, PIO/C prepared.	XXX					
2.	RFP for technical services prepared.	X					
3.	ProAg signed.		X				
4.	Technical services contract negociated.		X				
5.	Vehicles, supplies, equipment and materials procured.		X				
6.	Technical advisors arrive in field.			X			
7.	Participants selected.			X			
8.	Project blocks identified.			X			
	Identify, determine, define:						
9.	Range areas.			X			
10.	Livestock carrying capacity.			X			
11.	Livestock profile and surplus numbers.			X			
12.	Alternate grazing areas for surplus livestock.			X			
13.	Watering points needed.			X			
14.	Range use regulations.			X			
15.	Local organizations and associations.			X			
16.	Livestock health programs.			X			
17.	Marketing norms.			X			
18.	Crop areas.			X			
19.	Crop land use norms.			X			
20.	Crop research and demonstration sites.			X			
21.	Soil and water management norms.			X			
22.	Forestry lands selection criteria.			X			
23.	Forestry research and demonstration sites.			X			
24.	Forestry nursery established.			X			
25.	Seeds and native grass collected.			X			
26.	Plant materials nursery established.			X			
27.	Public information program begins.			X			
28.	Preliminary response to #27 evaluated.			X			
29.	Project implementation plans completed.				X		
30.	Project implementation plan evaluated.				X		
31.	Project implementation plan finalized/agreed upon.					X	
32.	Implementation begun at selected sites.					X	
33.	First year implementation evaluated.						X
34.	Design, approve, authorize next five year project.						XXXXXXXXXX

iv. Synthesis and refinement of iii. (months 24-30). An important element will be that of observing responses of the local population and judging probabilities of acceptance of proposed interventions. It is assumed that consultation with the local populations will be maintained on a continuing basis beginning with the reconnaissance stage.

v. Evaluation of project work plan (month 30).

vi. Refinement and completion of a definitive operational work plan (months 30-36). This period should also serve to initiate procurement and to staff up for implementation of the work plan.

2. Principal elements to be considered in developing detailed plans.

a. Delimitation of field project implementation areas. Areas should consist of contiguous blocks and should be of sufficient size and diversity so as to:

i. interfere with traditional land use patterns (i.e. they must not be limited to small demonstration areas where project operators do their thing while the local population continue to do theirs);

ii. to have significant impact on production in the region as a whole in ten-fifteen years;

iii. to include areas for crop production and forestry as well as range so as to provide a solid basis for integrated resources use/management. One or at most two implementation areas in each of the Serbewel and Assale regions and one in the Bornu region should provide sufficient scope.

b. Classification of land in implementation areas with respect to use for range, crop production, forestry and with respect to soil and water conservation measures to be applied.

c. Definition of criteria for allocating land use to range, crops and forest (will include economic, social, spatial disposition, etc. criteria in addition to natural conditions of soil, topography, etc. in b.

d. Identification of water development needs consistent with proposed land use, disposition of the population and rational use of range forage.

e. With respect to the livestock sector:

i. Determine profile of livestock properly belonging in the area (excludes nomadic herds).

ii. Determine stocking rates by blocks, sub-blocks, or other appropriate natural subdivision of the range in the implementation area for initial stocking, with projections over time as improvements of range conditions are brought about (several patterns could be considered reanging from low initial rates with rapid rate of improvement through higher initial rate and less rapid improvement).

iii. Determine excess livestock based upon i and ii.

iv. Determine disposition of excess livestock (a) through marketing and actual reduction of numbers, (b) through arrangements for use of alternative range areas, yaeres, grazing in tsetse fly infested areas after prophylaxis treatment, developing underutilized range areas by provision of watering points), possible storage of fodder from yaeres flood plains, etc. Some form of destocking subsidy might be considered or conversely overstocking penalties (use of traditional reward/penalty system where applicable for achieving technical objective).

v. Define specific range management/improvement practices to be implemented with time phasing with respect to given blocks and sub-blocks.

vi. Define disease control program, including special attention to actions for increasing reporduction rate and prophylaxis against tryptosomiasis as well as the more general immunization programs.

vii. Define animal management programs for (a) increasing calf survival, (b) for improvement within native breeds, etc.

viii. Establish marketing norms and criteria, especially with respect to age/sex and reproductive potential.

ix. Identify local groupings or organizations through which self-imposed regulation and discipline in use of range, animal management, etc. can be made operational. Determine probable level of acceptance and self-enforcement of different practices.

x. Begin collection of seeds of native grasses and forage species.

xi. Establish plant materials nurseries for local and exotic forage species.

f. With respect to the crops sector:

i. Determine first approximation of suitable crops, rotations, potential feed crops, etc.

ii. Determine first approximation of desirable soil and crop management/cultural practices -- tillage, fertilization, soil/water conservation practices, etc.

iii. Determine potential for small irrigation from ground/ surface water (bas fond development).

iv. Define an applied research/demonstration program to test (i) and (ii) and alternatives based upon research from various centers.

g. With respect to forestry:

i. Determine first approximation of suitable species for differing purposes and conditions, e.g. fuel, soil/water conservation, wind breaks, feed/forage, differing soil conditions.

ii. Establish norms or criteria for choice of sites for and types of forest plantings using as criteria, social, economic and spatial factors as well as natural elements of soil and water.

iii. Identify certain specific sites to begin forestry plantings within the implementation area.

iv. Establish forestry nurseries.

v. Establish small test areas for planting species other than those identified in (i).

3. Notes to Spread Sheet.

a. It is assumed that during planning phase the technicians will live in N'Djamena or other suitable site where housing can be found.

b. As soon as general agreement has been reached on the blocks for project implementation and a reasonable probability for satisfactory project implementation has been established (about month 24) sites should be selected for construction of housing, etc., and construction should proceed so as to have completed facilities by the beginning of work plan implementation action (37th month).

c. It is assumed that one or at most two blocks for project operations will be defined in each of the Serbewel and Assale regions and one in the Bornu region.

d. Fielding of the planning team during the period March-June would be most desirable.

4. Some Basic Principles and Assumptions Underlying the Work Plan Proposal.

a. Feed (range) is the limiting factor in the area. The range cannot produce enough feed under present conditions to feed the livestock population.

b. Any intervention or combination of interventions which does not reduce livestock numbers to a level which will permit improving the condition of the range are destined to failure at best and aggravation of existing conditions at worst.

c. Livestock numbers can be reduced by (1) actual reduction by marketing, (2) transfer of some of the population to some currently underutilized areas or more distant planned transhumance.

d. Development of additional watering points can be useful only if needed to assure rational use of range or underutilized areas.

e. The initial impact on areas placed under a management program will be lowered to total livestock production. Production can be expected to increase only after the condition of the range has been improved and better use of range has been achieved by better animal management practices.

f. Animal management practices which will result in higher reproduction rates by increasing fertility, increasing calf survival, and elimination of non-productive cows, is the first essential step for more efficient use of range feed. As long as the reproduction rate remains between 30% and 40%, most of the range forage goes for maintenance rather than for production.

g. Disease control should focus on increasing the reproduction rate.

h. A program for increasing reproduction rates must be coordinated with a marketing program designed to eliminate non-productive cows and for earlier marketing of males.

i. The demonstration of favorable impact of range management/use practices on small areas is not useful. It has been done repeatedly in the past and has had no effect. Nor will fencing of range areas for pilot ranch operations be useful. This has also been done with no carry over effects.

j. The application of sound range/livestock management practices over a sufficient area to be meaningful can be accomplished only through acceptance and self-discipline by the concerned population.

k. Nomadic herds (as distinguished from transhumance herds) must be brought under control. Alternatives must be found to village chief incomes derived from fees charged to nomadic herds for grazing.

l. Range-crop rotation should be eliminated. Cropping of range lands destroys useful forage species. Diverting crop lands to range for short periods has little impact on soil fertility.

m. Reforestation must be useful to the local population, must not tie up good crop and grazing lands, and management should be by the population served.

C. Evaluation Plan

The CDO/N'Djamena project manager will submit annual evaluation reports which will demonstrate progress being made toward meeting the goal, purpose, outputs and inputs of the project. This evaluation, after consultation with the LCBC and donor-provided personnel, will assist in making sound budgeting and management decisions as well as detailing needed changes to assure timely progress in achieving project objectives.

In addition to annual evaluations, there are three special evaluations programmed for the 26th, 31st and 48th month of the project's implementation. The first will evaluate the effectiveness of the public information activities. The second will evaluate the implementation plan. The third will evaluate the eresults of one year of implementation activities.

D. Conditions, Covenants and Negotiating Status